Encyclopedia of Giftedness, Creativity, and Talent

Editorial Board

Encyclopedia of Giftedness, Creativity, and Talent

Editor Barbara Kerr
University of Kansas

VOLUME

1

SAGE

Los Angeles | London | New Delhi
Singapore | Washington DC

A SAGE Reference Publication

For information:

SAGE Publications, Inc.
2455 Teller Road
Thousand Oaks, California 91320
E-mail: order@sagepub.com

SAGE Publications Ltd.
1 Oliver's Yard
55 City Road
London, EC1Y 1SP
United Kingdom

SAGE Publications India Pvt. Ltd.
B 1/I 1 Mohan Cooperative Industrial Area
Mathura Road, New Delhi 110 044
India

SAGE Publications Asia-Pacific Pte. Ltd.
33 Pekin Street #02-01
Far East Square
Singapore 048763

Printed in the United States of America.

Library of Congress Cataloging-in-Publication Data
Barbara Kerr, editor.
p. cm.
Includes bibliographical references and index.
ISBN 978-1-4129-4971-2 (cloth)
1. Gifted children—Education—United States—Encyclopedias. 2. Creative ability in children—United States—Encyclopedias. I. Kerr, Barbara A.
LC3993.2.E63 2009
371.950973'03—dc22 2008055506

This book is printed on acid-free paper.

09 10 11 12 13 10 9 8 7 6 5 4 3 2 1

Publisher:	Rolf A. Janke
Acquisitions Editor:	Jim Brace-Thompson
Editorial Assistant:	Michele Thompson
Developmental Editors:	Carole Maurer, Sara Tauber
Reference Systems Manager:	Leticia M. Gutierrez
Reference Systems Coordinator:	Laura Notton
Production Editor:	Kate Schroeder
Copy Editors:	Kristin Bergstad, Robin Gold
Typesetter:	C&M Digitals (P) Ltd.
Proofreader:	Penelope Sippel
Indexer:	Julie Grayson
Cover Designer:	Janet Foulger
Marketing Manager:	Amberlyn McKay

Contents

Volume 1

Volume 2

List of Entries

Reader's Guide

Assessment and Identification

ACT College Admission Examination
Aptitude Assessment
Artistic Assessment
Biographical Assessment of Creativity
Cognitive Abilities Test
Creativity Assessment
Early Identification
Gifted Rating Scales
High-Stakes Testing
Identification
Intelligence Testing
Iowa Acceleration Scale
Kaufman ABC Tests
Levels of Gifted
Multicultural Assessment
Musical Talent Assessment
Naglieri Nonverbal Ability Test
Nonverbal Tests
Optimal Development
Raven's Progressive Matrices
SAT
Stanford-Binet
Teacher Nominations
Teacher Rating Scales
Test Development
Test Preparation
Torrance Tests of Creative Thinking
Wechsler Intelligence Scale for Children–Fourth Edition
Wechsler Preschool and Primary Scale of Intelligence–Third Edition

Creativity Studies

"Aha!" Experience
Cognitive Development
Creative Personality
Creative Problem Solving
Creative Process
Creative Productivity
Creativity and Mental Illnesses
Creativity in Science
Creativity in the Workplace
Divergent Thinking
Family Creativity
Flow
Gestalt Psychology and Creativity
Imagination
Innovation
Problem Solving
Relationship of Creativity to Intelligence
Sex Differences in Creativity

Cultural Issues

Africa, Gifted Education
Anti-Intellectualism
Asia, Gifted Education
Attitudes Toward Religion and Spirituality
Australia, Gifted Education
Canada, Gifted Education
China, Gifted Education
Cultural Conceptions of Giftedness
Cultural Values
Diversity in Gifted Education
Elitism
Eugenics
Europe, Gifted Education
Global Issues
Grandparenting
History of Creativity
History of Gifted Education in the United States
Japan, Gifted Education
Latin America/South America, Gifted Education
Legal Issues for Gifted
Multicultural Creativity
Multicultural Curriculum
Parental Attitudes

Education

Eminent People

Exceptionalities

Intelligence

Neuroscience and Genetics

Populations

Programs and Interventions

Psychological Issues

Talent Domains

Theories and Models

About the Editor

Barbara Kerr, PhD, holds an endowed chair as Distinguished Professor of Counseling Psychology at the University of Kansas and is an American Psychological Association Fellow. Her MA from the Ohio State University and her PhD from the University of Missouri are both in counseling psychology. Her research has focused on the development of talent, creativity, and optimal states, while training psychologists and counselors to be talent scouts who provide positive, strengths-based services. She has served as the founder of the Guidance Laboratory for Gifted and Talented at the University of Nebraska; Associate Director of the Belin-Blank National Center for Gifted and Talented at the University of Iowa; and codirector of the National Science Foundation projects for talented at-risk girls at Arizona State University. She is author of *Smart Girls: A New Psychology of Girls, Women, and Giftedness; A Handbook for Counseling Gifted and Talented;* coauthor of *Smart Boys: Talent, Masculinity, and the Search for Meaning*, *Counseling Girls and Women,* and more than one hundred articles, chapters, and papers in the area of giftedness, talent, and creativity. She currently directs the Counseling Laboratory for the Exploration of Optimal States (CLEOS) at the University of Kansas, a research-through-service program that identifies and guides creative adolescents, and is coinvestigator for the National Science Foundation Milestones and Danger Zones for Math/Science Talented Women project. Barbara Kerr has two adult children in creative professions and lives on a Civil War–era farm where she engages in sustainable farming and natural horsemanship.

Contributors

Cheryll M. Adams
Ball State University

Jill L. Adelson
University of Connecticut

Fatma A. K. Al-Lawati
Sultanate of Oman

Don Ambrose
Rider University

Karen D. Arnold
Boston College

T. L. Arrington
University of Kansas

Susan G. Assouline
Belin-Blank Center, University of Iowa

Jenna Bachinski
University of Connecticut

Clar M. Baldus
Belin-Blank Center, University of Iowa

Nancy J. Bangel
Indiana University—Purdue University Fort Wayne

Susan M. Barnett
Cornell University

Reuven Bar-On
University of Texas

Tyler M. Barratt
Arizona State University

Maya Bassford
American Psychological Association

Susan Marcia Baum
College of New Rochelle

Jennifer G. Beasley
University of Virginia

Anne S. Beauchamp
University of Kansas

Ronald A. Beghetto
University of Oregon

Wendy A. Behrens
Minnesota Department of Education

Sally R. Beisser
Drake University

Camilla Persson Benbow
Vanderbilt University

Kristin B. Berman
College of New Rochelle

Ernesto M. Bernal
Educational Consultant, San Antonio

George Betts
University of Northern Colorado

Teresa Argo Boatman
Minnesota Council for the Gifted and Talented

Sean Boileau
University of California, San Diego

Diane Boothe
Boise State University

Megan Brent
University of Kansas

Dina Brulles
Paradise Valley Unified School District

Virginia H. Burney
Ball State University

Carolyn M. Callahan
University of Virginia

Eric M. Carbaugh
University of Virginia

Carol A. Carman
University of Houston—Clear Lake

Erin M. Carr Jordan
Arizona State University

Karen L. Carroll
Maryland Institute College of Art

Abbey Block Cash
ECLECTICS: Approaches in Teaching and Learning

Jerrell C. Cassady
Ball State University

Stephen John Ceci
Cornell University

Tomas Chamorro-Premuzic
Goldsmiths, University of London

David W. Chan
Chinese University of Hong Kong

Christine Charyton
Ohio State University at Newark

Pui Chi Chiu
University of Kansas

Nancy L. Christiansen
Brigham Young University

Charles D. Claiborn
Arizona State University

Sanford Cohn
Arizona State University

Nicholas Colangelo
University of Iowa

Shelbi K. Cole
University of Connecticut

Laurence J. Coleman
University of Toledo

Selby M. Conrad
University of Kansas

Arthur L. Costa
California State University, Sacramento

Bonnie Cramond
University of Georgia

Laurie J. Croft
University of Iowa

Jennifer Riedl Cross
Ball State University

Tracy L. Cross
Ball State University

David Yun Dai
State University of New York–Albany

Gregory Decker
University of Kansas

Janice B. DeLisle
Lovejoy Independent School District

Jeffrey L. Derevensky
McGill University

Samuel Loren Deutch
University of Kansas

Arlene Rae De Vries
Independent Scholar

David N. Dixon
Ball State University

Felicia A. Dixon
Ball State University

Sarah Dixon
Arizona State University

Patricia Doney
University of Georgia

Marcia Dvorak
Kansas Enrichment Network

Ashley Edmiston
American Psychological Association

Maurice J. Elias
Rutgers University

Lyn English
Queensland University of Technology

Fred Estes
Nueva School

Jonathan Feinstein
Yale School of Management

David Henry Feldman
Tufts University

Joseph R. Ferrari
DePaul University

Dawn P. Flanagan
St. John's University

Elizabeth A. Fogarty
East Carolina University

Megan Foley Nicpon
University of Iowa

Christy T. Folsom
Lehman College, City University of New York

Donna Y. Ford
Vanderbilt University

Joanne F. Foster
OISE/University of Toronto

Andrea Dawn Frazier
Ball State University

Joan Freeman
Middlesex University

Victoria Elena Frehe
University of Kansas

Reva Friedman-Nimz
University of Kansas

Terence Paul Friedrichs
Friedrichs Education

Cathrine Froese Klassen
World Council for Gifted and Talented Children

Joanne Russillo Funk
Norfolk, Virginia, Public Schools

Camea J. Gagliardi-Blea
New Mexico Highlands University

Françoys Gagné
Université du Québec à Montréal

James J. Gallagher
University of North Carolina

Rosina M. Gallagher
SENG

M. Katherine Gavin
University of Connecticut

Marcia Gentry
Purdue University

Patricia Gillespie
Ball State University

Mary Eleanor Givens
University of Kansas

Shawn M. Glynn
University of Georgia

Fernand Gobet
Brunel University

Ted Goertzel
Rutgers University

Temple Grandin
Colorado State University

Michael Graves
University of Kansas

Jerald Grobman
Psychotherapist

Miraca U. M. Gross
University of New South Wales

Richard J. Haier
University of California, Irvine

D. M. Hansen
University of Kansas

Jan B. Hansen
University of St. Thomas

Ryan Hansen
University of Kansas

Amy Katherine Harkins
Deer Oaks Behavioral Health

Joanne Haroutounian
George Mason University

Thomas P. Hébert
University of Georgia

Nancy Heilbronner
University of Connecticut

Jason A. Helfer
Knox College

Ravenna Helson
University of California, Berkeley

Suzanna E. Henshon
Florida Gulf Coast University

Gail N. Herman
Garrett College and Lesley University

Nancy B. Hertzog
University of Illinois at Urbana-Champaign

Jessica Ann Hockett
University of Virginia

Katherine Hoekman
University of New South Wales

Thomas R. Hoerr
New City School in St. Louis, MO

Patricia Lance Hollingsworth
University of Tulsa

Zi Ning Hor
University of Kansas

Angela M. Housand
University of Connecticut

John C. Houtz
Fordham University

Viven S. Huan
National Institute of Education

Tse-Yang Huang
National Hsinchu University of Education

Scott L. Hunsaker
Utah State University

Scott G. Isaksen
The Creative Problem Solving Group

Jane Jarvis
University of Virginia

Susan K. Johnsen
Baylor University

Jennifer L. Jolly
Louisiana State University

Karen A. Jorgensen
University of Kansas

Rex E. Jung
Mind Research Network

Joyce E. Juntune
Texas A&M University

Layne Kalbfleisch
George Mason University

Sandra N. Kaplan
University of Southern California

Frances A. Karnes
University of Southern Mississippi

James C. Kaufman
California State University, San Bernardino

Sandra I. Kay
Independent Scholar

Caitlin Kazelis
University of Kansas

Kelly Kearney
University of Connecticut–Storrs

Susan Keller-Mathers
Buffalo State College

Barbara Kerr
University of Kansas

Anatoliy V. Kharkhurin
American University of Sharjah

Kyung Hee Kim
College of William & Mary

Mihyeon Kim
College of William & Mary

Sangwon Kim
Fordham University

Neal Kingston
University of Kansas

Richard T. Kinnier
Arizona State University

Thomas Kirsch
South Mountain Community College

Yasemin Kýymaz
University of Kirsehir

Judith C. Lacey
Kansas Association for Gifted, Talented, Creative

Kim Lansdowne
Scottsdale Unified School District

Amber Larson
University of Kansas

Emily G. Lattie
DePaul University

Sandra S. Lea-Wood
CHIP Centre Geelong

Hyo Jung Lee
University of Kansas

Lynne C. Levesque
Independent Consultant and Scholar

Peter Liljedahl
Simon Fraser University

Ban Hong Lim
University of Kansas

Kai Kok "Zeb" Lim
University of Kansas

Tock Keng Lim
PsychMetrics International

David F. Lohman
University of Iowa

Adeline Low
University of Kansas

Todd I. Lubart
Université Paris Descartes

David Lubinski
Vanderbilt University

Bronwyn MacFarlane
College of William & Mary

Matthew C. Makel
Duke University Talent Identification Program

Eric L. Mann
Purdue University

Rebecca L. Mann
Purdue University

Jacobus G. Maree
University of Pretoria

Jack Marmorstein
Rosetta Stone

David Martin
University of Kansas

Dona Matthews
Hunter College

Richard E. Mayer
University of California, Santa Barbara

Kara T. McAlister
Arizona State University

Rachel R. McAnallen
University of Connecticut

Richard P. McGlynn
Texas Tech University

Cari McIntyre
American Psychological Association

Robyn McKay
University of Kansas

Edna Marie McMillan
World Council for Gifted and Talented Children

Erin Morris Miller
James Madison University

Heidi Molbak
Heidi Molbak Educational Consulting

Diane Montgomery
Oklahoma State University

Sidney M. Moon
Purdue University

Thomas C. Motl
University of Kansas

Karen D. Multon
University of Kansas

K. Denise Muth
University of Georgia

Brenda Smith Myles
Ziggurat Group

Jack Naglieri
George Mason University

Brooke Nash
University of Kansas

Maureen Neihart
National Institute of Education

Linda C. Neumann
Glen Ellyn Media

Kathleen D. Noble
University of Washington

D. Joe Olmi
University of Southern Mississippi

Paula Olszewski-Kubilius
Northwestern University

Jill Olthouse
University of Toledo

Barry Oreck
Long Island University

Rhea L. Owens
University of Kansas

Alessandra Padula
Università degli Studi di L'Aquila

Pamela L. Paek
University of Texas at Austin

Kristina Ayers Paul
University of Connecticut

Roland S. Persson
Jönköping University

Scott J. Peters
Purdue University

Jean Sunde Peterson
Purdue University

Anthony J. Petrosino
University of Texas at Austin

Steven I. Pfeiffer
Florida State University

Connie L. Phelps
Emporia State University

Michael M. Piechowski
Institute for Educational Advancement

Rebecca L. Pierce
Ball State University

Jane Piirto
Ashland University

Jonathan A. Plucker
Indiana University

John Poggio
University of Kansas

Marion Porath
University of British Columbia

Bethany A. Pritchard
California State University, San Bernardino

Barbara Probst
Fordham University

Susan Rakow
Cleveland State University

Kristin Rasmussen
University of Kansas

Kevin Rathunde
University of Utah

Priyanka Raut
University of Kansas

Karen E. Ray
Eastern Shore Psychological Services

Dan Rea
Georgia Southern University

Rosemary C. Reilly
Concordia University

Sally M. Reis
University of Connecticut

Joseph S. Renzulli
University of Connecticut

Marjurie Ribeiro
Ball State University

Marybeth Rigali-Oiler
Arizona State University

Tracy L. Riley
Massey University

Sylvia Rimm
Case School of Medicine

Anne N. Rinn
University of Houston—Downtown

Ann Robinson
University of Arkansas at Little Rock

Sharon E. Robinson Kurpius
Arizona State University

Karen B. Rogers
University of St. Thomas

Robert Root-Bernstein
Michigan State University

Valija C. Rose
College of William & Mary

Deborah L. Ruf
Educational Options

Mark A. Runco
University of Athens, Norwegian School of Economics and Business Administration

Claudia A. Sacramento
Aston University

Michael F. Sayler
University of North Texas

Robin Schader
University of Connecticut

Stephanie Schmalensee
Indiana University

Conan A. Schreyer
East Hartford High School

Stephen T. Schroth
Knox College

Karl Schweizer
Goethe University

Liang See TAN
National Institute of Education

Scott Seider
Harvard University

Tricia Seifert
University of Iowa

Julia Shaftel
University of Kansas

Beverly D. Shaklee
George Mason University

Elizabeth Shaunessy
University of South Florida

Wenda Sheard
Supporting the Emotional Needs of the Gifted

Samuel J. Shepard
University of Iowa

Beverly Taylor Sher
College of William & Mary

Bruce M. Shore
McGill University

Eric Shult
University of Kansas

Linda Kreger Silverman
Gifted Development Center

Dean Keith Simonton
University of California, Davis

Dorothy Sisk
Lamar University

Olha Skyba
University of Kansas

Joan F. Smutny
National-Louis University

Elizabeth Smyth
University of Toronto

Glenn E. Snelbecker
Temple University

Olga Solomon
University of Southern California

Marlene Sotelo-Dynega
St. John's University

Kristie Speirs Neumeister
Ball State University

Frances R. Spielhagen
Mount Saint Mary College

Bharath Sriraman
University of Montana

Tamra Stambaugh
College of William & Mary

Kristen R. Stephens
Duke University

Robert J. Sternberg
Tufts University

Heidrun Stoeger
University of Regensburg

Michele L. Strutz
Purdue University

Rena F. Subotnik
American Psychological Association

Erin Sullivan
University of Connecticut

JoAnn P. Susko
Rider University

Michael K. Swan
Washington State University

Mary Ann Swiatek
KidsPeace, Lafayette College

Alice Wickersham Terry
Kennesaw State University

Carol L. Tieso
College of William & Mary

Carol Ann Tomlinson
University of Virginia

Joyce Lenore VanTassel-Baska
College of William & Mary

Wilma Vialle
University of Wollongong

Angela M. Rodrigues Virgolim
Universidade de Brasilia

Beth A. Visser
Brock University

Mark von Schlemmer
University of Kansas

Belle Wallace
National Association for Able Children in Education

Howard D. Walters
Ashland University

Yuki Ozawa Waugh
Lone Star College-Montgomery

Nadia E. Webb
James Madison University

Barbara Wells
University of Kansas

Gilman W. Whiting
Vanderbilt University

Clifton Wickstrom
Educational Pathways, International

Wendy M. Williams
Cornell University

Hope E. Wilson
University of Connecticut

Susan Winebrenner
Education Consulting Services

Tracy Winter
Center for Reconstructive Psychiatry

Henry Woodworth
Center for Reconstructive Psychiatry

Ya-Ting Tina Yang
University of Kansas

Chris Yoon
Azusa Pacific University

Angela L. Zapata
Arizona State University

Franck Zenasni
Université Paris Descartes

Albert Ziegler
University of Ulm

A. Michael Zimmerman
University of North Carolina at Pembroke

Introduction

For many years, the study of giftedness, creativity, and talent was of concern to a small community of scholars in psychology and education. Now, however, the nature of intelligence, the sources of innovation, and the ways of nurturing special abilities have become topics of great interest to a wide variety of disciplines, to policymakers, and to the general public. This encyclopedia was created to bring to a wide audience the theoretical and research knowledge across many disciplines about giftedness, creativity, and talent development. Written in a highly readable, clear style, the encyclopedia offers, for the first time, a comprehensive overview of the field, not just for scholars, but for educators, counselors, administrators, government leaders, families, and gifted, creative, and talented students themselves.

Several trends, evident in this encyclopedia, have brought giftedness into the spotlight. Within academe, postmodernism brought about a questioning of the most basic concepts of intelligence, creativity, and talent. If these concepts are socially constructed, as postmodernists claim, then it is critical to understand the history of their development and the changes in their meaning across time and culture. In this encyclopedia, the history of the development of each idea represented by each headword is carefully related, so that the reader can understand how the meanings of giftedness, creativity, and talent have been negotiated, and how current meanings have emerged.

Another trend has been the growth of positive psychology. For most of the 20th century, psychology focused mainly on human pathologies, and education mirrored this trend with a focus on remediation of learning deficits and disabilities. A renewal of interest in human possibility, in strengths and virtues, and in optimal development has incorporated the study of giftedness and creativity. Educators have begun to recognize that in focusing only on identification and remediation of those students who are slower to learn, it is often those who learn rapidly and think creatively who are left behind. Positive psychology is evident throughout this encyclopedia, not only in its emphasis on the wide diversity of gifts and optimal states, but also in the tendency of the authors to focus on strengths of gifted and creative individuals, even the strengths to be found in those who struggle with learning exceptionalities and mental disabilities.

The revolution in the science of the mind is a trend that will continue to have extraordinary consequences for the study of intelligence and creativity. As technology has made possible the study of the neurophysiology and the neurochemistry of the brain, psychologists and educators are no longer dependent only on observation of behavior to understand learning, reasoning, and problem solving. In some cases, these advances have led to the replacement of time-honored beliefs with entirely new ideas. For example, the idea that the number of neurons is fixed at birth was replaced with the evidence that neurons and neuronal connections are continuously being made in the brain. Advances in measurement and statistical analysis led to more complex ways of understanding human abilities. Out of this progress in observation, measurement, and analysis came controversy. Is there just one intelligence, or are there many? Is creativity a personality trait, an aspect of consciousness, or an interaction of culture and the individual? Should talent be considered latent potential or proven performance? All of these controversies have enlivened research and theory-making among scholars. These controversies are evident in many of the encyclopedia's entries, where authors have provided balanced, objective assessments of the various

arguments about the nature of intelligence, innovation, and optimal states.

Educators of gifted, creative, and talented children, however, must make sense out of these controversies as they make daily, practical decisions about how to identify and teach these students. Identification of gifted children, once based on the results of intelligence tests alone, is now a complex process in most schools. Identification must take into account specific as well as general ability; cultural, gender, and language differences; and dual exceptionalities. A proliferation of curriculum models as well as identification models sometimes makes it difficult for educators to link identification strategies to particular placements and curricula. Schools can choose among a wide variety of grouping procedures ranging from differentiation within the regular classroom to full-time placement in special classrooms or schools. Where educators once faced the problem of choosing between enrichment and acceleration, they now have a dizzying array of combinations and variations of these approaches, as well as new possibilities for individualization of instruction using online and distance learning technologies.

Fortunately, both professional organizations and scholarly journals have encouraged the selection and synthesis of best practices. The method of meta-analysis has begun to clarify which grouping and instructional strategies promote the best outcomes in achievement and social-emotional development for gifted children, and this information is beginning to trickle down to teachers and administrators. In this encyclopedia, the most recent, definitive, and integrative studies are explained in clear ways. Using this information and the resources provided, educators can make informed decisions about the identification strategies and the curriculum models that best meet the needs of their gifted, creative, and talented students.

Policymakers from schoolboard members to leaders of nations must also make practical decisions about how communities and societies will treat their brightest, most promising students. Only a few nations have broad and well-funded policies and programs that promote the identification and special education of gifted students. The United States, with its history of anti-intellectualism and antipathy to any perceived form of elitism, has been an indifferent, if not hostile, society with regard to its children who learn rapidly and create new ideas. With the publication of *A Nation Deceived: How America Holds Back Its Brightest Students* (2004), these topics became a national concern. Policymakers were exposed, often for the first time, to the facts about how gifted students are prevented from receiving the kinds of grouping and curriculum models, such as acceleration, that are best for them. Similar movements in other countries, often spearheaded by national and international gifted advocacy organizations, have developed. In this encyclopedia, the policies that have held back gifted children are reviewed in many entries. More important for policymakers and the advocates for gifted children, however, is the presence in these volumes of the kind of information they can use to make a persuasive case for appropriately challenging and differentiated education for gifted, talented, and creative students.

The Development of the Encyclopedia

Choice of Headwords

The headwords of this encyclopedia were chosen using multiple methods. First, the table of contents of the leading journals in the field in the last 5 years, including the *Gifted Child Quarterly,* the *Roeper Review*, the *Journal of Secondary Gifted Education,* and *Creativity: Research Journal,* were perused, as well as reviews in the *American Psychologist, Annual Reviews of Psychology,* and *Educational Researcher.* Conference proceedings for the National Association for Gifted Children, the Council for Exceptional Children—The Association for the Gifted, and the World Conference for Gifted were also reviewed for the past 5 years. Because of the great lag that often exists between the creation of knowledge and the dissemination of findings to the general public, one of our most intensive searches was of the abstracts of dissertations in gifted education and educational psychology for the past 10 years to get a glimpse into the discoveries of future leaders in gifted education and the psychology of creativity. The index pages of major compilations of information in the field, such as the *International Handbook of Gifted Education,* the *Handbook of Gifted Education,* and the *Handbook of Creativity,* were also examined to grasp the major interests of current leaders

in the field. The most frequently occurring words and those words that were appearing with increasing frequency were made into a master list to be viewed by the Board of Advisors.

The Board of Advisors was selected in the same way as the headwords, by examining the journal, conference, and dissertation sources and seeking those authors who not only appeared frequently as authors or dissertation advisors, but also those who were cited frequently by others. In this way, a sort of sociological portrait of the field was developed, so that advisors could be selected from among intellectual leaders. Advisors were chosen to be as diverse a group as possible, representing not only particular populations of gifted and creative people, but also representing the full spectrum of opinions within the field. The Board of Advisors includes the editors of major journals; leaders in the national professional organizations; distinguished scholars; directors of national centers for research and training in gifted education and creativity; outstanding teachers of gifted education; and authors of major textbooks and trade books in giftedness and creativity.

Author Selections

In the case of every headword, our first choice for an author was the person who created the words or the ideas represented by the headword, and our second choice was the author who had written frequently and well about that idea in peer-reviewed journals and scholarly books. We were able to make these determinations with the help of the Board of Advisors. At a headword meeting attended by a majority of the board, authors were nominated for each headword. Those who received the most nominations were then invited to author the headword entry. In most cases, we were fortunate enough to be able to sign either the originator of the term or the most recognized scholar associated with that term. In the few cases in which the first-choice author could not write the entry, we asked for a recommendation of a colleague considered by the author to be the most authoritative about that idea. In cases in which we could not sign the originator, a nominated colleague, or the next Board of Advisors' choice, we chose authors from our staff of writers. All of our staff writers were faculty members or advanced doctoral students in educational psychology, gifted education, counseling psychology, or school psychology. We selected them based on their interest in and knowledge of the term, their skills in reviewing research and theory, and their ability to write rapidly and gracefully.

Review Process

We were determined that each author should have the benefit of peer review, much as one would for a major scholarly journal. We therefore sent the headwords out in groups to members of the Board of Advisors, and asked that each headword be reviewed according to the guidelines that had been presented to each author. We expected that each entry have a clear definition; an interesting history; a lively discussion of the issues and controversies related to the term; a balanced and critical assessment of the issues; a careful description of applications of that idea to practice; and finally, a list of important and useful resources.

Editing

After each entry was reviewed by one or two members of the Board of Advisors, the managing editor read the article to assess major problems that might require a complete resubmission by the author, and passed all that had been judged acceptable on to the editor. The editor read every entry three times: once for the general sense of the article; once for seeking places for possible additions and revisions; and once when all of these additions and revisions had been made. In most cases, the editor herself wrote the necessary additional material or revised the submitted material in keeping with the reviewers' comments or in order to create parallel formats and intellectual consistency among all entries. In some cases where extensive revision was necessary, the editor returned the entry to the author for rewriting. In many cases, no revision or only the most minor revisions were required.

After 3 years of preparation, we believe that the *Encyclopedia of Giftedness, Creativity, and Talent* presents the state of the art in this field. The encyclopedia contains thousands of ready-to-use facts from the fields of education, psychology, sociology, and the arts. The 411 entries and more than 550,000 words review research findings on giftedness, talent,

and creativity and their applications in education, training, science and the arts, government policy, and everyday life. From A to Z, the entries cover the major facets of this field, from artistic ability, to achievement motivation, to creative personality, to emotional intelligence, gender differences, genius, intelligence testing, learning styles, minority underrepresentation, multiple intelligences, musical ability, prodigies, scientists, self-actualization, thinking skills, and more.

Barbara Kerr

Absorption

Auke Tellegen and Gilbert Atkinson defined absorption as a disposition for total attention that fully engages one's representational (i.e., perceptual, enactive, imaginative, and ideational) resources. In addition, Tellegen and Atkinson believed that this sort of unique focus resulted in a new sense of the reality of an object of attention, an imperviousness to distraction, and an altered state of reality. In order to assess the different qualities of the absorption, Tellegen and Atkinson developed the Tellegen Absorption Scale (TAS) in 1974. Later, the TAS was revised by Tellegen twice, once in 1982 and again in 1992.

Absorption, both directly and indirectly, has been linked to creativity, giftedness, and talent. When looking at creativity, hypnotizability, and absorption, Jessica Manmiller, V. K. Kumar, and Ronald Pekala found creative capacity to be closely related to absorption. As far as giftedness and talent are concerned, no direct aspect of absorption has been connected to giftedness and talent. However, Ellen Winner noted that intrinsic motivation is a hallmark of giftedness and talent. With this in mind, Suzanne Roche and Kevin McConkey also found intrinsic motivation to be a key concept of absorption. Thus, individuals reach high levels of absorption only if they willingly attend to a specific activity. This self-driven desire is a trait that is common within the gifted, talented, and creative literature.

Tellegen Absorption Scale

Validity

For the construction of the original 71-item self-report questionnaire, Tellegen used previous items that had been found to have a relationship with absorption and hypnotic susceptibility. Tellegen reworded the questions from "you" to the declarative "I." Another 18 of the questions used by Tellegen were taken from the Trust Rating Scale he had developed, also for their correlations with hypnotic susceptibility. The remaining 23 questions were created by Tellegen.

The following were the categories of items:

Category	*Name*
1	Is responsive to engaging stimuli
2	Is responsive to "inductive" stimuli
3	Often thinks in images
4	Can summon vivid and suggestive images
5	Has "crossmodal" experiences (e.g., synesthesia)
6	Can become absorbed in own thoughts and imaginings
7	Can vividly reexperience the past
8	Has episodes of expanded (e.g., ESP-like) awareness
9	Experiences altered states of consciousness

In later years Tellegen revised his definition of absorption. Previously absorption was thought to be a total dedication to a stimulus or activity. Tellegen noted that absorption did not prevent other attentional processes from occurring at the same time. Furthermore, participants with high absorption scores are more apt to participate in experiential activities (i.e., activities moderated by intrinsic motivation that are viewed as a means unto themselves).

Reliability

A psychometric evaluation of the TAS determined that it is basically unidimensional; that is, rather than measuring many different aspects of absorption, it seems to assess only the presence of absorption. As recently as 1991, the TAS was found to have high internal consistency. Absorption has been found to be related to fantasy proneness. The measures of absorption and imagination and for absorption and imagery vividness were also found to be related.

Absorption and Other Constructs

Openness to Experience and Fantasy Proneness

Other researchers have sought to look at the connection between absorption and openness to experience and fantasy proneness. A factor analysis of the TAS and two measures of openness (the first measure assessed imagination, dreams, fantasy, etc., and the second measure concerned intellectual curiosity and social/political liberalism) found that absorption was related to the imaginative involvement facet of openness. Openness to experience may have a strong connection with absorption but more research is needed to explore the complexity of these psychological processes. For one thing, openness to experience is composed of several different facets, some of which may not be related directly to absorption. In relation to fantasy proneness, certain hypnotic participants (i.e., high TAS scores for absorption) possess a unique group of personality traits and experiences that enable them to indulge their fantasy at a much higher rate. Like the subjects in original hypnosis studies, these fantasy-prone participants had a history of intense imaginative involvement in reading, play activities, and mystical experiences.

Linda Dunn, Anne Corn, and Martha Morelock investigated the connection between fantasy proneness and domain-specific abilities. In particular, the authors focused on creative writers. Utilizing the Inventory of Childhood Memories and Imaginings Children's Form (ICMIC), which is positively correlated with the TAS (r = .67–.81, p < .001), the authors focused their attention on fantasy proneness within the student population of Vanderbilt University. High ICMIC scores were most prevalent in the creative writing group. Furthermore, students in the writing group were also found to be more intellectually advanced, according to IQ tests.

Consciousness

The connection between absorption and consciousness was investigated by Pekala and colleagues. They found that absorption correlated with alterations of attention, awareness, and imagery. The authors found absorption to be correlated with the subjective experience of time, meaning, perception, and body image. In addition to these findings, they noted that high-absorption participants indicated a greater change in experience when stimulus conditions (eye closure, hypnotic procedures, etc.) were focused more on internal events.

Physiological Feedback

Over time, though, researchers started to investigate the role of absorption within the physiological paradigm. Penelope Qualls and Peter Sheehan found that absorption influences the levels of biofeedback learning. With specific physiological and cognitive levels of relaxation inhibited, high-absorption participants were still able to relax by using imaginal systems in response to their instructor's external directions. John Shea instructed high- and low-absorption participants to raise or lower their heart rate under direct instruction, biofeedback, imagery, and hypnosis conditions. He found that high-absorption participants were more apt to lower their baseline heart rates and habituate more quickly. He noted that the greatest high rate change for high-absorption participants occurred in the imagery condition.

Eric Shult

See also Creative Personality; Creative Process; Creative Productivity; Creativity Assessment; Giftedness, Definition; Optimal Development; Spiritual Intelligence

Further Readings

Dunn, L., Corn, A., & Morelock, M. (2004). The relationship between scores on the ICMIC and selected talent domains: An investigation with gifted adolescents. *Gifted Child Quarterly, 48,* 133–142.

Glisky, M. L., Tataryn, D. J., Tobias, B. A., Kihlstrom, J. F., & McConkey, K. M. (1991). Absorption, openness to experience, and hypnotizability. *Journal of Personality & Social Psychology, 60,* 263–272.

Lynn, S. J., & Rhue, J. W. (1986). The fantasy-prone person: Hypnosis, imagination, and creativity. *Journal of Personality and Social Psychology,* 51, 404–408.

Manmiller, J. L., Kumar, V. K., & Pekala, R. J. (2005). Hypnotizability, creative capacity, creativity styles, absorption, and phenomenological experience during hypnosis. *Creative Research Journal, 17,* 9–24.

Pekala, R., Wenger, C. F., & Levine, R. L. (1985). Individual differences in phenomenological experience: States of consciousness as a function of absorption. *Journal of Personality and Social Psychology, 48,* 125–132.

Roche, S. M., & McConkey, K. M. (1990). Absorption: Nature, assessment, and correlates. *Journal of Personality and Social Psychology, 59,* 91–101.

Tellegen, A. (1976). *Differential personality questionnaire.* Minneapolis: University of Minnesota Press.

Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences ("absorption"), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology, 83,* 268–277.

Wilson, S. C., & Barber, T. X. (1981). Vivid fantasy and hallucinatory abilities in the life histories of excellent hypnotic subjects ("somnambules"): Preliminary report with female subjects. In E. Klinger (Ed.), *Imagery: Vol. 2. Concepts, results, and applications* (pp. 133–149). New York: Plenum Press.

Winner, E. (1996). *Gifted children: Myths and realities.* New York: Basic Books.

Winner, E. (1997). Giftedness vs. creativity in the visual arts. *Poetics, 24,* 349–377.

Academic Advising

Academic advising is individualized guidance in academic planning. At every stage of the educational process, gifted students need advisors who can help them select appropriate educational opportunities. Sound academic advice can come from many sources, including family members, community members, teachers, mentors, and professional advisors. This article discusses academic advising for gifted children from preschool through college.

Often, the first people to become aware that a young child is gifted are the child's parents. Parents of young gifted children are often desperate for guidance on how to meet their children's academic needs. Before the advent of the Web, such advice could be hard for parents of gifted toddlers and preschoolers to find. Now, excellent Web sites such as www.hoagiesgifted.org allow parents to contact other parents of gifted children, as well as experts in the field of gifted education, and to find educational materials and programs that will benefit their children. As parents are often their children's foremost educational advocates, an early acquaintance with the academic advice and resources available online may be invaluable for them.

When the child enters school, new potential sources of academic advice become available, including teachers and administrators. Although these individuals may know what the child has accomplished in the classroom setting, they may not be aware of the child's true capabilities: A preschool curriculum that introduces the numbers from 1 to 10, for example, will not allow a child who can count to 1,000 and add and subtract multidigit numbers in his or her head to demonstrate his or her abilities.

In order to ensure that a child has access to appropriately stimulating work, a team approach to academic planning, involving parents, teachers, school administrators, and professionals expert in the use of aptitude and achievement testing for gifted students is essential. Test results, along with information about the child's interests, activities, and achievements provided by the parents, can help team members understand what the child already knows, what the child is ready to learn, and how quickly he or she is likely to learn it. The team can then use its knowledge of resources available at the school as well as those available from other sources, such as distance learning programs, to design an academic plan for the child. Good communication between team members, as well as close attention to the child's response to the newly provided

academic opportunities, will allow the plan to be modified appropriately as the child grows.

Because many school districts do not identify children as gifted or offer aptitude or achievement testing for children before the second or third grade, parents of gifted preschoolers and early elementary students may be forced to seek outside testing and academic advice. Many gifted education Web sites list organizations, such as the Center for Talented Youth at Johns Hopkins (CTY), that offer such testing along with academic advising for gifted students.

Though academic planning is a process that should include input from both adults and from the child, the balance between the adults' involvement and the child's involvement must shift as the child grows older. At the preschool and early elementary levels, children's direct input will probably be limited, although their wishes should be considered in the development of an academic plan. By middle school, however, school personnel expect a student to be directly involved in making academic choices, as is clear from the inclusion of electives in the typical U.S. middle school curriculum. The transition from adult-directed academic choices to student-directed academic choices should thus begin no later than elementary school.

While a team approach to academic advising is still appropriate at the middle school and high school levels, students should be consulted frequently as the plan is developed and should have the final say on their academic plan. Learning to make good academic choices is an essential life skill, and students should thus be allowed to make as many of their own academic choices, with appropriate guidance from adults, as possible.

As students mature, they will find informal academic advisors in many places. Adult mentors chosen by a student, such as a favorite teacher, a MathCounts coach, or a neighbor whose profession interests the student, can be excellent sources of academic advice. Information from older gifted students who have gone through the college application process, or who have participated in special academic programs that the student is considering, can be very useful. Advice from these informal sources should be integrated into a student's academic planning decisions.

Precollege students can also seek academic advice from college staff members. University professors are willing to provide academic advice to precollege students interested in their field of expertise, and most universities also have advisors for students interested in law, business, and the health professions. Conversations with such advisors can help a student make good academic and extracurricular choices in the precollege years. Finally, although often expensive, educational consultants can offer excellent advice, given that most certified independent educational consultants have visited more than 100 campuses.

By the time students start college, they should be seeking academic advice on their own. At most U.S. universities, academic advisors will include parents in advising sessions only if the college student requests that they be present. Overprotective parents (often called *helicopter parents* because they hover over their young adult children) are seen as obstacles to the student's development into an independent adult. This does not mean that parents are not good sources of academic advice for college students; it does, however, mean that they should expect to take an informal, rather than a formal, role in the advising process once the student enters college.

Beverly Taylor Sher

See also Career Counseling; Individual Education Plan; Mentoring Gifted and Talented Individuals

Further Readings

Gross, M. U. M. (2004). *Exceptionally gifted children* (2nd ed.). New York: RoutledgeFalmer.

Rogers, K. (2002). *Re-forming gifted education: Matching the program to the child.* Scottsdale, AZ: Great Potential Press.

Academic Self-Concept

How do we view and develop an image of ourselves? Philosophers and social scientists have been exploring this question for centuries and have expounded on the development and importance of self-concept. Self-concept is people's perception of themselves that is formed through life experiences, and is both multifaceted and hierarchical.

Self-concept is multifaceted because people view themselves in related yet independent dimensions. People also develop self-concept hierarchically by first obtaining inferences about self in subareas of a domain (e.g., math or verbal ability) and then by judging the self in general (i.e., overall academic ability). Individuals utilize internal and external comparisons to evaluate themselves.

Self-concept is derived from a variety of sources; thus it is not a unidimensional construct. For example, one's global self-concept can be split into academic and nonacademic categories. Academic self-concept (one's view of one's academic ability) can be divided into subcategories, such as mathematical or verbal ability, while the general domain of nonacademic ability may include social, emotional, and physical components. As self-concept is related positively to outcomes (i.e., self-esteem, academic success, and creativity), there are a wealth of studies examining the role of self-concept as both a mediating and an outcome variable of desirable results in educational and psychological situations, such as academic success. Factors such as age and gender also impact the development of gifted, creative, and talented individuals' general and academic self-concept.

Age

Global self-concept develops with age. The self-versus-other distinction emerges after birth and begins to consolidate between ages 3 and 8. Between the ages of 8 and 12, children are aware of self-permanence, that their personality is a combination of unique factors, and that they are different from other people. Beginning in adolescence and through early adulthood (ages 12 to 24), men and women are able to engage in abstract thinking for heightened understanding of themselves and others. Adolescents and young adults have the ability to label personal qualities and to distinguish intra- and interpersonal similarities and differences clearly. Although a clearer understanding of self increases with age, research shows mixed results regarding the evolution of gifted adolescents' global self-concept over time. Some studies report no age differences in talented middle- and high school students' general self-concept scores; however, other studies report significant differences among gifted individuals' self-concept scores based on grade level. For example, total self-concept scores among gifted girls were reported to decrease significantly from Grades 3 to 5 to 8.

Gender Differences

The relationship of gender to self-concept is inconsistent. Though gifted men generally report higher global self-concept scores than do gifted women, studies conducted on children in Grades 5 to 12 have found no differences in academic self-concept scores based on gender. However, other research reports gender differences among gifted males' and females' academic self-concept scores. One study found that even when there were no differences in academic performance among gifted eighth graders, the males viewed themselves as more capable than did the females. Gender differences can be found among specific aspects of academic and nonacademic aspects of self-concept. For example, gifted females generally report higher verbal self-concept scores and lower math self-concept scores than do gifted males. Although talented males usually report higher physical self-concept scores than do talented females, gifted females have higher scores on perceived honesty and peer relations than do gifted males. One possible explanation for gifted males' and females' differing self-concepts is their personality types as indicated by the Myers-Briggs Type Indicator (MBTI). Gifted males reported a tendency toward introversion (I), and gifted females' psychological type was extraverted (E).

Academic Success

Fostering the development of academic self-concept among gifted, talented, and creative individuals is necessary for scholastic success. Academic self-concept is positively related to many positive outcomes, such as achievement, autonomy, and career aspirations. For example, gifted college honors students are more likely to attend graduate school, have higher levels of academic achievement, and have greater academic self-concept than non-honors students. Academic self-concept is also a strong predictor of truancy such that students with low academic self-concept are more likely to withdraw from school.

Though both gifted and nongifted individuals' academic self-concept is potentially impacted by

age and gender, there are additional factors that are unique to the development of gifted, talented, and creative students' academic self-concept. One factor that is theorized to specifically impact gifted and creative people is overexcitability or the ability to process larger than typical amounts of information from the environment. Overexcitabilities can be experienced in the dimensions of psychomotor (i.e., act competitively), sensual (i.e., enhanced sensory experience), intellectual (i.e., strive for knowledge through discovering or analyzing), imaginational (i.e., daydreaming, dramatizing, imagery), and emotional (i.e., intensified relationships and compassion for others). Gifted students have higher overexcitability scores than do nongifted students according to several studies; however, overexcitability is not always valued socially and may be interpreted as hyperactivity, nervousness, or as a behavior problem (such as attention deficit disorder or attention deficit hyperactivity disorder). Consequently, gifted, talented, and creative individuals often feel embarrassed or guilty and they are in conflict with their environment, which can have a negative effect on academic self-concept. Another factor that may thwart academic self-concept occurs when gifted, talented, and creative students leave a mixed ability group and enter a gifted program. Upon being surrounded by peers of equal ability, gifted individuals' academic self-concept may be challenged by their not being able to make self-favorable comparisons. While a reduction in academic self-concept may ensue temporarily, there are positive long-term effects from being grouped with gifted peers.

Role of Professionals

Helping professionals can promote the development of gifted, talented, and creative individuals' global and academic self-concept by being aware of the factors that shape self-concept, as well as by providing these students with adult and peer mentorship opportunities, academic enrichment (e.g., extracurricular activities, college tours, internships, advanced assignments), and family education on the experiences and needs of gifted, talented, and creative individuals.

Sarah K. Dixon and
Sharon E. Robinson Kurpius

See also Aspiration Development and Self-Fulfillment; Boys, Gifted; Creative Personality; Girls, Gifted; Overexcitabilities

Further Readings

Cross, T. L., Speirs Neumeister, K. L., & Cassady, J. C. (2007). Psychological types of academically gifted adolescents. *Gifted Child Quarterly, 51,* 285–294.

Gross, C. M., & Rinn, A. N. (2007). Gifted adolescents' overexcitabilities and self-concepts: An analysis of gender and grade level. *Roeper Review, 29,* 240–248.

Hattie, J. (1992). *Self-concept.* Hillsdale, NJ: Lawrence Erlbaum.

Marsh, H. W., Trautwein, U., Ludtke, O., Koller, O., & Baumert, J. (2005). Academic self-concept, interest, grades, and standardized test scores: Reciprocal effects models of casual ordering. *Child Development, 76,* 397–416.

Worrell, E. C., Roth, D. A., & Gabelko, N. H. (1998). Age and gender differences in the self-concepts of academically talented students. *Journal of Secondary Gifted Education, 9,* 157–162.

Academic Talent

Educators in the field of gifted education have as a primary goal serving academically talented students. Early research in the field by Lewis Terman, Leta Hollingworth, Virgil Ward, and Howard Gardner first drew attention to the specific characteristics and needs of academically talented students. Research in the field today continues to focus on academically talented students.

Academic talent can best be described using Joseph Renzulli's *three ring conception of giftedness* (see Figure 1). The terms *schoolhouse giftedness* and *creative-productive giftedness* are used to differentiate two types within the gifted population. According to Renzulli, schoolhouse giftedness manifests itself in students' test-taking abilities, products, and general academic performance in school. Academic talent is most valued in the traditional school setting; students who perform well in all coursework, exhibit teacher-pleasing behaviors, and conform to the norms of the school are easily recognized as academically talented. The challenge for educators is to recognize academic

talent in the students who are withdrawn, rebellious, or otherwise demonstrate problem behaviors in the classroom.

Renzulli contrasts schoolhouse giftedness with creative-productive giftedness, arguing that creative productivity is more difficult to measure because of the varying ways students can show this type of talent. The more traditional schoolhouse giftedness is in some ways easier to identify and measure because educators have historically been trained to encourage academic talent. Renzulli points out that the characteristics and abilities required for exceptional performance on traditional aptitude tests are exactly the abilities required of students to excel in traditional school settings. Students who possess academic talent can therefore out-perform their fellow students who do not possess traditional academic abilities, but rather creative-productive abilities.

Characteristics of Academically Talented Students

Heterogeneity characterizes the population of academically talented students; no one talented child will be the same as another, making it difficult for educators to identify talent in some cases. Some possible characteristics that educators should be aware of include the following: asynchronous development; multiple interests; emotional sensitivity; perfectionism.

Students who are able to achieve exceptional scores on standardized tests, including IQ tests such as the Stanford-Binet, are likely to be academically talented. Their ability to perform well on tasks that require higher-level thinking implies high academic ability and potential. A student who is able to perform at a high level on tests, projects, assignments, and general participation in the classroom can be considered academically talented. It is

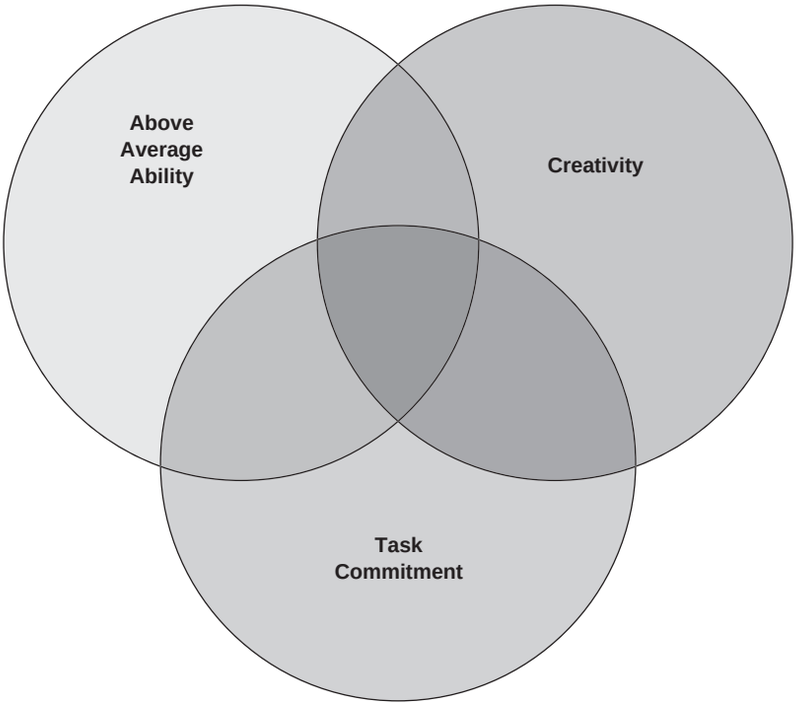


Figure 1 Three Ring Conception of Giftedness

Source: J. S. Renzulli.

important for educators to be aware of the myriad ways in which a child can be identified as academically talented. Identification does not rest solely on a child's IQ score, academic performance, or behavior in a classroom; it can be one, all, or any combination of these factors.

Joyce VanTassel-Baska provides a comprehensive view of the academically talented student, describing specific learning needs, the importance of instilling self-discipline within the talented student, and the often nontraditional paths of thinking utilized. In addition, her research shows that chronological age is not an important factor to consider when determining appropriate learning experiences for academically talented students; they often possess the precocity and maturity to learn more complex material at a faster rate than their age peers.

Academically talented students may demonstrate a need for increased attention and support in order to avoid the emergence of underachieving behaviors, especially in the adolescent years. Unchallenged, academically talented students may assume lazy, indifferent, rebellious, or withdrawn attitudes toward school, at times masking their potential and ability.

Needs of Academically Talented Students

Academically talented students need appropriately challenging and engaging learning opportunities to succeed at their maximum potential in the classroom. Too often, academically talented students are not offered sufficiently rich and advanced learning opportunities because they are assumed to be self-sustaining learners. Talented students have unique learning needs that educators should service as fully as possible. Depth and complexity are overarching goals of curriculum for all gifted learners and should be focal points when educators are developing or identifying curriculum for high-potential students.

Domain specificity is another important element to keep in mind when identifying and serving academically talented students. Academic abilities tend to be correlated, with most academically talented students performing well across academic classes. There are, however, among very highly talented students, those who are superior in one or two subjects, but not necessarily in all subjects. It is important for educators to understand that a student's talents may be so specific and extreme in one subject that he or she might struggle in others. Nicholas Colangelo and Barbara Kerr's studies of high achievers and of students who scored perfectly on the ACT tests confirmed this differentiation at the highest levels of ability.

Academically talented students need challenging and engaging learning opportunities just as creative-productive students do; educators of talented students have a responsibility to provide appropriate levels of challenge and enrichment to ensure each individual student's success. Lev Vygotsky's *zone of proximal development* illustrates the need for talented students to be provided with levels of challenge just beyond their current mastery in order for the students to reach a cognitively higher level of thinking and achievement. According to Vygotsky, this builds self-efficacious students who are more able to identify their strengths and build upon them.

Appropriate Support for Academically Talented Students

Benjamin Bloom first suggested that fostering talent development in academics and the arts and sports follows essentially the same process. He identifies several environmental variables that can affect the manifestation of talent in children: supportive parents or caregivers; superior teaching in the talent area; enriched experiences such as field trips, competitions, or access to mentors; and encouragement for motivation to excel in the talent area. Bloom's environmental components of talent development are incorporated in Joseph Renzulli's hound's-tooth background in his *three-ring conception of giftedness* (Figure 1); the three rings are embedded in the background to portray the importance of personality and environmental factors such as optimism, romance with a discipline, courage, sensitivity to human concerns, physical/mental energy, and vision/sense of destiny. The significant impact that personality and environmental factors have on the emergence of gifts and talents in students cannot be overemphasized; research has shown that a combination of "nature" and "nurture" affects student achievement and later success in life.

A Nation Deceived, a research summary and position statement by Nicholas Colangelo, Susan

Assouline, and Miraca Gross and sponsored by the Templeton Foundation, decried the extent to which academically talented students have been denied opportunities for acceleration. Research clearly shows that academically talented students can benefit from all forms of acceleration if the interventions are carefully chosen. Acceleration in one, several, or all areas of coursework; early admission or grade skipping; and special summer courses compacting high school or college courses into a shorter time period are all possible approaches to challenging academically talented students.

Offering academically talented students enriched and advanced learning experiences will engage them on an appropriate level, encouraging increased motivation, self-efficacy, and overall satisfaction in school. Depending on the classroom situation, teachers should provide appropriately differentiated activities for each academically talented student because of the enormous variation that exists within this group of students. In addition to advanced and enriched learning at school, academically talented students will benefit from supportive and engaged care-giving at home, mentoring, career guidance, and involvement in extracurricular activities that support their area of academic talent.

Jenna Bachinski

See also Academic Self-Concept; Achievement Motivation; Best Practices; Creative Productivity; Enrichment Theories; Intelligence; Precocity; Talent Development

Further Readings

Baum, S. M., Reis, S. M., & Maxfield, L. R. (Eds.). (1998). *Nurturing the gifts and talents of primary grade students*. Mansfield Center, CT: Creative Learning Press.

Colangelo, N., Assouline, S., & Gross, M. (2004). *A nation deceived*. Retrieved November 20, 2008, from http://www.accelerationinstitute.org/Nation_Deceived/

Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan, 60,* 180–184, 261.

Terman, L. M. (1926). *Genetic studies of genius: Mental and physical traits of a thousand gifted children* (Vol. I, 2nd ed.). Stanford, CA: Stanford University Press.

VanTassel-Baska, J. (1998, June). The development of academic talent. *Phi Delta Kappan, 79*(10), 760.

ACCELERATION/*A NATION DECEIVED*

In 2002, the John Templeton Foundation provided a grant to the Belin-Blank Center to generate a national report on academic acceleration. The 2004 report, *A Nation Deceived: How Schools Hold Back America's Brightest Students,* was coauthored by Nicholas Colangelo, Susan Assouline, and Miraca U. M. Gross, and reviewed and synthesized the previous 50 years of research on acceleration. A summit of leading researchers and scholars in the field of gifted education was held in 2003 at the University of Iowa. From this summit came the guidelines for the report.

The report *A Nation Deceived: How Schools Hold Back America's Brightest Students* consists of two volumes. Volume I is a synthesis of the research on acceleration, covering approximately 50 years. Volume II is an edited volume of articles by leading researchers, and provides the research background for the synthesis of Volume I.

The report concludes that America's schools routinely avoid academic acceleration, the easiest, most effective, and most efficient way to help highly capable students reach their full potential. While the "popular" perception is that a child who skips a grade will be socially stunted, 50 years of research show that accelerating bright students in fact more often makes them happier.

The term *acceleration* refers to advancing a student through the traditional curriculum at rates faster than typical. There are 18 forms of acceleration, which include grade skipping, early entrance to school, single-subject acceleration, and Advanced Placement (AP) courses. Acceleration is appropriate educational planning because it means matching the level and complexity of the curriculum with the readiness and motivation of the student.

Research shows that students who are accelerated tend to be more ambitious and to earn graduate degrees at rates higher than other students. Interviewed years later, an overwhelming majority of accelerated students have said that acceleration was an excellent experience for them. Accelerated students feel academically challenged and socially accepted, and they are less likely to fall prey to the boredom that plagues many highly

capable students who are forced to follow the curriculum for their age peers.

The report provides information about entering school early, skipping grades in elementary school, the AP program, and entering college ahead of their peers. Included are comments by accelerated students, deans of colleges of education, a superintendent, and a schoolboard member. Every sentence in Volume I is supported by the research in Volume II of the report.

With all this research evidence, why haven't schools, parents, and teachers been more willing to accept the idea of acceleration? *A Nation Deceived* presents reasons why schools hold back America's brightest students:

- limited familiarity with the research on acceleration;
- philosophy that children must be kept with their age peers;
- belief that academic acceleration hurries children out of childhood;
- fear that acceleration hurts children socially;
- political concerns about equity; and
- worry that other students will be offended if one child is accelerated.

The cost of the national report, both online and print, was covered by the John Templeton Foundation. The editors of *A Nation Deceived* hope to change the conversation about educating bright children in America. A Web site (www.nationdeceived.org) has been established to encourage dialogue on academic acceleration across the nation and throughout the world.

A major outcome of *A Nation Deceived* was the establishment of the Institute for Research and Policy on Acceleration (IRPA). IRPA is also funded by the John Templeton Foundation and is housed at the Belin-Blank Center at the University of Iowa. All services of IRPA are offered at no cost. The purpose of IRPA is to

- conduct research on the cognitive and affective characteristics that moderate students' success with different forms of acceleration;
- synthesize current research on acceleration in ways that are useful to practitioners, policymakers, and researchers; and
- serve as an international clearinghouse for research and policy on acceleration.

Nicholas Colangelo and Susan G. Assouline

See also Belin-Blank Center; Curriculum Models; Research, Quantitative; Talent Searches

Further Readings

Institute for Research and Policy on Acceleration: http://www.accelerationinstitute.org
A Nation Deceived: http://www.nationdeceived.org

Acceleration Options

After years of controversy, it is now generally agreed by scholars of gifted education that acceleration is the best educational arrangement for gifted students. Several events turned the tide among scholars to bring about this consensus. First of all, when most schools in the 1970s adamantly opposed providing acceleration to gifted children—based on nonempirical beliefs that acceleration was deleterious to children's emotional and social development, and on the spurious linking of acceleration with "tracking"—Julian Stanley and his colleagues at Johns Hopkins University determined that the only way to provide this much-needed programming was for universities to do so through talent searches and out-of-school courses. Talent search programs permitted seventh graders who scored at or above the mean for high school seniors on out-of-level achievement tests to take accelerated, college-level courses. These programs, now internationally available, have a database built over 35 years for tens of thousands of students. Long-term follow-up studies of adults who received accelerated instruction through talent search programs not only showed that they continued their rapid learning and high achievement, but also became productive and successful adults. A second event was the development of sophisticated statistical techniques for analyzing the results of many studies of acceleration. These meta-analyses, most prominently those of James Kulik and Chen-Lin

Kulik and of Karen Rogers, have shown definitively that acceleration works—not only to increase academic achievement, but also to promote social and emotional adjustment. A third event was the publication of *A Nation Deceived: How America Holds Back Its Brightest Students,* by Nicolas Colangelo, Susan Assouline, and Miraca Gross. This publication, sponsored by the Templeton Foundation and made available to the public for free downloading, achieved worldwide attention for the needs of gifted children to be accelerated. It provided a summary of the straight facts about acceleration, the options available for acceleration, and a resource listing all the research to date in support of this educational strategy. Finally, the recent recognition by policymakers that nations' economic health depends on a large pool of intellectual talent, particularly in science, technology, engineering, and math (STEM), has made more funding available to study ways of increasing the talent pool in the sciences and enhancing persistence toward higher degrees. Most of these STEM studies point to early, rigorous education.

Paradoxically, no educational arrangement for which there is so much research support has received so much opposition from general educators. Creating optimal acceleration programs for gifted children continues to be an uphill battle in most schools, particularly in countries with either strong histories of anti-intellectualism or fears of elitism. Because of this, teachers who wish to provide accelerated instruction, and parents who want to pursue this course for their children, often turn to a variety of acceleration options that can provide, at least in part, fast-paced learning for high-ability children. *A Nation Deceived* provides comprehensive information about 18 acceleration options that can be grouped into two categories: whole grade acceleration and subject acceleration. These options are listed as follows:

- Early admission to kindergarten
- Early admission to first grade
- Grade skipping
- Continuous progress
- Self-paced instruction
- Subject-matter acceleration/partial acceleration
- Combined classes
- Curriculum compacting
- Telescoping curriculum
- Mentoring
- Extracurricular programs
- Correspondence courses
- Early graduation
- Concurrent/dual enrollment
- Advanced Placement
- Credit by examination
- Acceleration in college
- Early entrance into middle school

Of all the acceleration options, early admission to kindergarten and to first grade is the simplest and most practical approach. For children who are ready—and far more gifted children are ready for kindergarten a year earlier than most parents or educators believe—early admission provides the opportunity for continuing challenge throughout school. Unfortunately, the practice of kindergarten redshirting, in which children, mostly boys, are held back an extra year, is more common than early admission. Barbara Kerr and Sanford Cohn decry these practices and cite research that underlines how destructive kindergarten redshirting is for gifted boys. Colangelo, Assouline, and Gross provide a careful decision-making strategy for determining children's readiness for this kind of acceleration. Grade skipping, early entrance to middle school, and early graduation are also grade-based approaches that are beneficial to gifted children. Intelligence testing, out-of-level testing, and the use of the Iowa Acceleration Scale, an instrument for decision making about acceleration, are all useful ways of determining readiness for these options. Follow-up studies of adults who received these kinds of early admissions and grade skipping not only show that they did not regret their acceleration; most show that they wish they had had more acceleration.

Educators of gifted students have been resourceful in the use of accelerative strategies within the classroom. Combined classes permit groups advancing at different paces, so that gifted students can be doing work with students at the next year level. Continuous courses work well in gifted programs so that students can pursue accelerated instruction in subjects in which they excel.

Wherever parents have found schools that refuse to provide acceleration, many have turned to out-of-school programs with great success. The talent search programs, already mentioned, have provided opportunities for hundreds of thousands of students to take accelerated courses, often completing college courses in as little as 3 weeks of full-time summer instruction. A wide variety of extracurricular options, listed in the yearly *Educational Opportunity Guide* published by Duke University's Talent Identification Program, on the National Association for Gifted Children's Web site and Hoagie's Web site, are available to students at all levels. Online courses are proliferating as colleges and universities tap the population of gifted students as avid consumers of college-level material. Both schools and organizations for gifted offer mentoring programs in which gifted students are matched with mentors who guide them in selecting and implementing acceleration plans.

When public schools do not provide early admission, grade skipping, or accelerated programs for gifted students, the families that can provide appropriate education for their gifted children are mainly those who are affluent and well-informed. In the last decade, Talent Search programs and in-school programs have made great strides in reaching out to underserved populations of gifted students. In addition, scholarship programs such as the Davidson Fellows programs have begun to make funding available for students who need financial assistance to pursue accelerated instruction.

As information about acceleration gradually overcomes the prevailing myths, and clear explanations of options trickle down from scholars to policymakers and educational administrators, it is possible that acceleration will become recognized as the treatment of choice for gifted students.

Barbara Kerr

See also Acceleration/*A Nation Deceived;* Advanced Placement; Curriculum Models; Early Admission, College; Identification; Online Gifted Education; Talent Searches

Further Readings

Assouline, S. G., Colangelo, N., Lupkowski Shoplik, A. E., Lipscomb, J., & Forstadt, L. (2003). *Iowa Acceleration Scale*. Scottsdale, AZ: Great Potential Press.

Colangelo, N., Assouline, S., & Gross, M. (2003). *A nation deceived: How America holds back its brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development. Retrieved December 30, 2008, from http://www.accelerationinstitute.org/Nation_Deceived/ND_v1.pdf

Kulik, J. A., & Kulik, C.-L. (1984). Effects of accelerated instruction on students. *Review of Educational Research, 54*(3), 409–425.

Rogers, K. B. (2001). Re-forming gifted education*: How parents and teachers can match the program to the child*. Scottsdale, AZ: Great Potential Press.

Talent Identification Program. (2008). *Educational opportunity guide*. Durham, NC: Duke University. Retrieved December 30, 2008, from http://www.tip.duke.edu/about/index.html

Achievement Motivation

Motivation can be defined as the driving force behind all of the actions of an individual, and achievement motivation can be defined as the need for success or attainment of excellence. This entry discusses motivation theories, behavior that predicts achievement, the role intrinsic motivation plays in creativity, and motivation in relation to gifted students and gifted underachievers.

Motivation Theories

Murray's Concept of Needs

Henry Murray, working as director of the Harvard Psychological Clinic, was active in developing a theory of motivation throughout the period from 1930 to 1960; his major assumption was that behavior is driven by an internal state of disequilibrium, or a lack of something, that drives the individual to action. Murray classified needs as primary or biological (food, water, air, sex, and avoidance of pain) and as secondary, deriving from

the biological needs (achievement, dominance, affiliation, and nurturance). The main contribution of Murray was the concept that personality is driven by the secondary needs, and the extent these needs are felt by individuals shapes their personality and behavior.

McClelland's Achievement Research

David McClelland extended Murray's concept of needs into the use of the Thematic Apperception Test (TAT) to identify three needs: the need for affiliation (nAf), the need for power (nP), and the need for achievement (nAch). McClelland said that together these three needs serve to motivate the successful attainment of goals. Achievement-motivated individuals set goals that they can attain with effort and ability, and they seem to be more concerned with personal achievement than with the rewards of success. McClelland said achievement-motivated individuals spend time thinking about doing things better, and they need concrete feedback about their task and work, to which they respond favorably, and use this information to shape their task.

In his research on the families of achievement-motivated individuals, McClelland found that these individuals were more likely to be found in families in which parents expected independence of their children between the ages of 6 and 8, and encouraged them to make choices, to do things without help, such as knowing the way around the neighborhood, and taking care of themselves around the house. A Stanford study in 1986 found that the parental style most conducive to academic achievement included setting clear standards while recognizing the child's rights, expecting mature behavior, and fostering healthy discussion and dissent.

McClelland developed motivational models, promoted improvement in employee assessment methods, advocated competency-based assessment and tests, and suggested such tests are better than traditional IQ and personality-based tests for employee assessment. He described people with a high need for achievement as more receptive to new ideas and more accepting of participative management programs.

Achievement Behavior

Motivational researchers including John Adair, Katherine Benziger, Paul Hersey, Ken Blanchard, and Douglas McGregor share the view that achievement behavior is an interaction between situational variables and the motivation to achieve. Two motives are directly involved in the prediction of behavior: implicit and explicit. Implicit motives are spontaneous impulses to act, aroused through incentives inherent in the task. Explicit motives are expressed through deliberate choices and stimulated by extrinsic reasons. Task behavior is accelerated in the face of challenges through implicit motivation in which performing the task in the most effective way becomes the major goal. A person with strong implicit motivation experiences pleasure from achieving a goal in the most efficient way; whereas explicit motivation is built around self-image and ego-involvement in demonstrating superior abilities.

Intrinsic Motivation and Creativity

Teresa Amabile in 1989 found in her research that individuals were motivated by intrinsic and extrinsic forces. She concluded that intrinsic motivation seemed to enhance creativity, and extrinsic motivation appeared to be detrimental. Amabile found that intrinsic motivation can be taught, and students can learn to cope with the negative effects of extrinsic constraints on their creativity. She identified six constraints that undermine creativity: (1) expected evaluation, (2) surveillance, (3) reward, (4) competition, (5) restricted choice, and (6) extrinsic orientation.

E. Paul Torrance, in his 30-year follow-up study of high school students that began in 1959, found that the students who were administered the Torrance Tests of Creative Thinking had correlation coefficients between their creativity measures in high school and their creative accomplishments as adults ranging from .46 to .58., significant at the .01 level. In conducting case studies of those participants, Torrance found they were intrinsically motivated with a passion for their work and their accomplishments. They were future focused,

thrived on challenges, and found motivation in discovering the reason behind things.

Motivation of Gifted Students

Gifted students exhibit puzzling behavior in terms of motivation: If the task is in their interest level, they persevere, and if not, they fail to complete assignments and tasks. Joseph Renzulli, Robert Hartman, and Carolyn Callahan in 1971 developed the Scale for Rating Behavioral Characteristics of Superior Students, which included characteristics that described the superior student's motivation in areas of interest. One item read: Needs little external motivation to follow through in work that initially excites him or her; and another item read: Becomes absorbed and truly involved in certain topics. This scale has been modified and refined by Renzulli and his colleague in 2002, and one item reads: Ability to focus for long periods of time in areas of interest.

Elizabeth Drews reported the results of a National Defense Education Act (NDEA) study in which she categorized gifted students into three groups: the creative–intellective, the studious, and the social leader. Her research involved gifted high school students with IQs greater than 120, and she found the three groups had different motivations and aspirations. The studious represented 60 percent of her study; approximately 20 percent of the group was in each of the other two categories. The studious students needed help in pursuing their interests against peer values and in becoming more self-directed in their learning. Drews described the studious as having an intrinsic drive to perform in an outstanding manner in the areas defined by parents and teachers as "school learning." The studious had a strong extrinsic desire to get high marks and to measure up to the expectations of those in authority.

Laurence Coleman and Tracy Cross in 2001 suggested that by constructing an environment that contains opportunities for choice, time for making decisions, and self-expression and psychological support, teachers can promote the growth of intrinsic motivation. Torrance emphasized the importance of developing pride in the achievement of gifted students, and suggested that schools provide favorable recognition for the development of the intellectual and creative talents of students. Specific suggestions included reducing the isolation of the gifted, particularly of students with divergent characteristics, by providing various kinds of groupings within class or in special classes. He pointed out that many of the successful achievers in his 30-year follow-up study had sponsors who encouraged and supported them in expressing and testing their ideas. Torrance stressed that gifted students need help in coping with their anxieties and fears, and many gifted students will not be able to explore the frontiers of the curriculum or their chosen field if they are fearful of breaking away from the safe and most frequently traveled paths.

Torrance used a strategy of open-ended writing to elicit the creative thinking of gifted students to help them better understand their fears about being different. One theme he used was a lion that could not roar. In their stories, the students wrote about the lion being shackled by some of the same kinds of fears that shackle gifted students. Yet, most of their stories included an occasion that helped the animal transcend its fears. Torrance called these occasions "necessities," and suggested educators and parents need to create necessities for the learning and thinking of creative students. One way to do this would be to exploit the opportunities of the moment in the classroom and home and to help gifted students develop feelings of a mission or a purpose, and to see that what they are working on is worthwhile and important.

Gifted Underachievers

Lewis Terman in a classical long-term study of 1,500 gifted children and adults described the gifted as the largest group of underachievers in education, and subsequent research has shown that gifted students still lack appropriate educational provisions. James Gallagher in 1985 said at least 10 to 15 percent of the gifted could be classified as underachievers. The U.S. Department of Education in 1995 reported that gifted students frequently are 2 to 4 years ahead of their chronological age-mates in school subjects, and these students know from 40 to 60 percent of the information being covered in their classes. In 2008, Sidney Moon said that in classrooms with little academic challenge, it may be harder for elementary gifted students to develop a strong work ethic, when their school work is always easy. Instead, these students may develop a work ethic

to "just get by." Moon suggested elementary gifted students (ages 5–10) need to develop self-regulation skills, a strong work ethic, resilience when encountering obstacles or failure, and resistance to the "just get by" attitude. She recommended middle school gifted students (ages 11–13) increase their time-management skills, resist anti-achievement peer pressures, and negotiate achievement conflicts; and high school gifted students (ages 14–18) need to maintain motivation in challenging classes, make autonomous decisions, and choose challenging coursework.

Benefits of Achievement Motivation

Achievement motivation provides a strong foundation for the "good life." Individuals who are motivated to achieve are dynamic and feel in control of their life, because they pursue goals they have identified for themselves. McClelland said achievement-motivated people are the ones who make things happen and get results, and that this extends not only to getting results through their organizations, but they achieve their goals in a variety of interests and activities in their community. The journey toward productive and creative lives is maximized by the energy that achievement motivation provides individuals, and their accomplishments in identifying and solving problems make contributions not only to their personal lives in being able to find purpose, a cause to pursue, and a goal to achieve, but to impact the lives of others positively.

Dorothy Sisk

See also Intrinsic Versus Extrinsic Motivation; Motivating Gifted Students; Underachievement

Further Readings

Adair, J. (2007). *Leadership and motivation: The fifty-fifty rules and the eight key principles of motivating others*. London: Kogan Page.

Amabile, T. (1990). Within you, without you: Towards a social psychology of creativity and beyond. In M. Runco & R. Albert (Eds.), *Theories of creativity*. Newbury Park, CA: Sage.

Hersey, P., & Blanchard, K. (1977). *The management of organizational behavior: Utilizing human resources*. Englewood Cliffs, NJ: Prentice Hall.

McClelland, D. (1975). *Power: The inner experience*. New York: Irvington.

McClelland, D. (1987). *Human motivation*. Glenview, IL: Scott, Foresman.

McGregor, D. (1960). *The human side of enterprise:* New York: McGraw-Hill.

Moon, S. (2008). Personal and social development. In F. Karnes & K. Stephens (Eds.), *Achieving excellence: Educating the gifted and talented*. Columbus, OH: Pearson, Merrill, Prentice Hall.

Renzulli, J., Smith, L., White, A., Callahan, C., Hartman, R., Westberg, K., et al. (2002). *Scales for rating the behavioral characteristics of superior students*. Mansfield Center, CT: Creative Learning Press.

Shneidman, E. (1981). *Selections from the personality of Henry A. Murray*. New York: HarperCollins.

Terman, L. (1925). *Genetic studies of genius: Vol. I. Mental and physical traits of a thousand gifted children*. Stanford, CA: Stanford University Press.

Torrance, E. P. (1972). *Why fly? A philosophy of creativity*. Norwood, NJ: Ablex.

ACT College Admission Examination

The ACT is one of two major tests designed to help colleges make admittance decisions. The other is the SAT. Although scores from either test are acceptable to college admission offices, there are regional patterns, with the ACT more commonly taken by students in the middle of the country and the SAT by those students on the East and West Coasts. In 2006, the ACT was administered to approximately 1.2 million students.

This entry begins by discussing the purpose and uses of the ACT and its history. It then describes the test, its score scales, and its technical quality. Lastly, the use of the ACT in identifying gifted and talented students is explained.

Purpose and Uses

Although the ACT is best known for its use as a college admissions examination, it was developed to serve multiple purposes, including counseling and college course placement. The ACT is a curriculum-focused examination, testing student

achievement in English, Mathematics, Reading, and Science (with an optional writing component). Grade 7–12 teachers and curriculum specialists in these core areas were surveyed regarding what they teach; the results were used to develop the content specifications of the ACT. To the extent that the content specifications of the ACT match a specific local curriculum, ACT scores can be used to evaluate high school academic programs.

Another component of the ACT is an interest inventory that measures and compares examinee preferences with jobs and academic majors.

History

The ACT was first administered in 1959. Originally, ACT stood for American College Test, but since 1996 it has no longer been an acronym and is just the name of the test, pronounced as the names of the letters: A—C—T.

Test Description

The ACT consists of five sections: English, Mathematics, Reading, Science, and Writing, which is optional. All items, except for the writing essay, are multiple-choice format. The English section consists of 75 items that an examinee has 45 minutes to complete. Items cover punctuation, grammar, usage, sentence structure, and writing strategy, organization, and style.

The Mathematics section consists of 60 items administered in 60 minutes. Topics include pre-algebra (e.g., number operations, ratios and proportions, and elementary probability and statistics), algebra (e.g., using variables to express relationships, solving algebraic equations, using the quadratic formula), coordinate and plane geometry, and trigonometry.

The Reading section consists of 40 questions to be answered in 35 minutes. Passage context includes social studies, natural sciences, prose fiction, and humanities, selected to be typical of those used in first-year college courses. Items focus on determining main ideas, locating and interpreting details, sequencing events, making comparisons, analyzing causal relationships, vocabulary in context, and analysis of the author's style and voice.

The Science test has 40 items administered in 35 minutes. It measures the examinee's scientific reasoning skills in the context of biology, chemistry, physics, geology, astronomy, and meteorology. The test consists of seven sets of graphs, tables, research summaries, or descriptions of conflicting scientific hypotheses, each with a set of about five items. The items require the examinee to understand and analyze the information provided.

The optional Writing measure provides one prompt and allows examinees 30 minutes to write an essay.

Score Scales

The ACT provides a variety of scores. A composite score that ranges from 1 to 36 summarizes a student's overall performance. It is the average of the four subject area scores, rounded up to the next highest integer value. The composite score is equated so that the meaning of the score is the same regardless of the particular set of questions or year that a student took the test. Associated with that composite score are two percentile ranks (the percentage of students scoring the same or lower)—one comparing the score to all students who took the ACT, and the other comparing the score to all students in that state who took the ACT.

Scores are also provided for each of the four subject areas, which are also on a 1-to-36 scale. The English test also provides subscores in Usage/Mechanics and Rhetorical Skills. Mathematics provides subscores in Pre-Algebra/Elementary Algebra, Algebra/Coordinate Geometry, and Plane Geometry/Trigonometry. The Reading test provides subscores in Social Studies/Sciences and Arts/Literature. Subscores are on a 1–18 scale and cannot be used to directly calculate subject test scores, nor do subscores from one edition of the test have closely comparable meaning to subscores from another edition. Subject areas and subtest areas also have reported percentile ranks based on all students who take the ACT.

Students who take the optional Writing component also receive a score on a 2–12 scale and an associated national percentile rank, as well as a combined English/Writing score and percentile rank.

Technical Quality

Detailed technical information for the ACT is provided in a comprehensive technical manual available

online. The two most important characteristics of test scores are validity (does the test measure what it is purported to measure) and reliability (essentially, are test scores for individuals likely to be consistent across test editions and across time). Evidence regarding validity is complex and cannot be adequately summarized in the available space, but can be found in the technical manual.

Reliability is typically measured on a scale that ranges from 0 to 1, with a 0 indicating scores are randomly inconsistent and a 1 indicating scores are perfectly consistent. The ACT composite score has a reliability of .96, which is excellent. Subject area scores have reliabilities ranging from .80 to .91. Subscore reliabilities range from .72 to .86.

Uses With Gifted, Creative, and Talented Students

Individually administered intelligence tests, such as the Wechsler Intelligence Test for Children, Stanford-Binet, or Das-Naglieri Cognitive Assessment Series, may be highly appropriate for identifying gifted children, but they must be administered by highly trained examiners and thus are much more expensive than group administered tests. On the other hand, most group administered tests were not designed to differentiate among the most able examinees—designing a test to do so would weaken its discrimination power for the much larger group of test takers in the middle of the distribution.

An alternative that can work to identify highly gifted students is to administer a test intended for older students. To maximize the efficiency of talent identification, several gifted and talented programs have chosen to use a two-tiered process. First, students who *might* be among the most gifted are overidentified. For example, the Center for Talented Youth (CTY) program at Johns Hopkins University allows students in Grades 7 or 8 to apply if they have scored at or above the 95th percentile on an age- or grade-level-appropriate nationally normed standardized test (they also provide alternative ways to demonstrate equivalent merit). For these students, the second stage requires taking the SAT or ACT, tests typically taken by students 4 or more years older when they are in 11th or 12th grade. The CTY program considers only mathematics and reading scores from the ACT, because these are most closely related to reasoning ability rather than educational achievement. In 2007, seventh-grade students had to achieve a score of 22 in Reading or 21 in Mathematics and eighth-grade students had to attain a score of 24 in Reading or Mathematics to qualify. Based on a norming study conducted for the ACT in 1995, the scores required of seventh grade students are higher than those achieved by about 78 percent of all high school seniors. The scores required of eighth-grade students are higher than about 86 percent of all high school seniors.

Other academic talent search programs, such as the University of Iowa's Belin-Blank Exceptional Student Talent Search, Northwestern University Center for Talent Development, University of Denver Rocky Mountain Talent Search, and Duke University's Talent Identification Program, all use a similar two-tiered approach.

Neal Kingston

See also Achievement Motivation; Talent Searches

Further Readings

ACT News Reports: http://www.act.org/news/mediakit/index.html
ACT Technical Manual: http://www.act.org/aap/pdf/ACT_Technical_Manual.pdf
ACT Test Prep: Description of the ACT Assessment: http://www.act.org

Action Research

Action research is one among four varieties of educational research—quantitative research, qualitative research, evaluation research, and action research. Action research stands alone as a research approach because it is directly importable into the classroom. Action research fits well in the lives of professionals, parents, and children and is a useful tool for improving the practice of teaching gifted and talented children.

Action research originated with Kurt Lewin in the 1940s as a means for studying social action. Since that time it has been relatively invisible in the United States. Action research has a greater following

in the United Kingdom and Australia. The Holmes group, which advocated for teacher education reform in the 1990s, campaigned for it to become part of teacher educational programs and propelled it into the consciousness of researchers.

Action research has more than one form. The most well-known names and their developers are as follows: Chris Argyris's action science, John Heron and Peter Reason's cooperative inquiry, and Paulo Freire's participatory action research.

Action research is similar to other forms of social science research: All look at a question of interest or problem or an issue in the world in order to understand it. The methods are systematic, public, and limited. Systematic means a deliberate step-by-step approach is taken. Public means that the procedures and the analytic decisions in the process are transparent and available to others for review. Limited means that the study is tied to a research question.

The basic differences between action research and other forms of research are that action research makes no pretense to generalization, often is intended to produce a desired outcome or change, and has a cyclical recursive nature. Action research answers local questions generated by persons in that situation. Generalizing to another time or place is neither intended nor possible. The issue of selection of participants or subjects is constrained by their presence in the situation. One studies only those persons or events in the situation of interest. Representativeness of the larger population is irrelevant. Randomization does not make sense with this kind of research. In the education of gifted, talented, and creative, the questions grow out of the practices of teachers, administrators, or counselors. The research problem is defined by that person for the particular local situation in which the problem resides. The person doing the action research might say, "In my classroom or school, this problem is going on, so how can I improve this situation? What parts will I work on?" The implementation of systematic methods is determined by what is possible in that environment. Statistics are used infrequently because the forms of measurement—such as observation, narratives, and frequency counts—are generally not amenable to statistics. The meaning of reliability and validity in action research depends upon the purposes of the specific action research project, the outcomes, and the audience for whom it is intended.

The research process in action research welcomes changes. The assumption is that the problem or question will change and be reconceptualized as the researcher increasingly understands the context as the data are gathered. Standards of reliability, validity, and successful outcome are based on whether the procedures work according to evaluation criteria set by the action researcher. Lastly, as the practitioner–researcher moves through the process, feedback and reflection lead to changes in definition of the problem and the desired outcomes. This makes action research a more variable process than other methodologies.

The steps in the action research process illustrate this point:

1. The teacher or practitioner–researcher wants to change, usually to improve, her or his practice.
2. Action research occurs in a local context (a classroom, a school, a playground, a learning center).
3. A question or issue is formulated. Frequently the possible outcome is generally described; rarely is the outcome final because the situation is not static.
4. Information (data) is gathered on the question(s) using a variety of sources, such as observing, interviewing, conversations, people, documents, tests, and examples of student work. Standardized tests are used infrequently.
5. The original question often undergoes a change as a result of the literature search, data gathering, and reflection. For example, the researcher realizes that the starting premise, such as the presence of attention deficit disorder, is really a curriculum mismatch.
6. The practitioner–researcher establishes the standard for evaluating the success of the intervention.
7. The investigator implements a plan to improve the situation or solve the problem.
8. The data are studied to determine what is happening. Often the practitioner–researcher realizes that the process is moving in a desired direction. More frequently, upon reflection, the investigator reformulates and recycles the process as the problem question and the outcomes become clearer.

9. The final step, if that can be said, is that the practitioner–researcher accepts the results and moves on to solve another issue or problem.

Relatively little published research can be found under action research and gifted and creative. The *Journal for the Education of the Gifted* had a department that published action research. Action research has been done mainly by insiders such as teachers and counselors, whereas mainstream research is done by university professors working outside of gifted education. Furthermore, the cyclical nature of action research departs from conventional research because it permits refinement of the study as the researcher becomes more sophisticated about the parameters of the problem.

Laurence J. Coleman

See also Best Practices; Effective Programs; Problem Solving; Professional Development; Research, Qualitative

Further Readings

Brighton, C., & Moon, T. (2007). Action research step-by-step: A tool for educators to change their world. *Gifted Child Today, 22,* 23–27.

Coleman, L. J., Guo, A., & Dabbs, C. (2007). The state of qualitative research in gifted education as published in American journals: An analysis and critique. *Gifted Child Quarterly, 51,* 51–63.

Dods, R. F. (1997). An action research study of the effectiveness of problem-based learning in promoting the acquisition and retention of knowledge. *Journal for the Education of the Gifted, 20,* 423–437.

Eliot, J. (1991). *Action research for educational change.* Buckingham, UK: Open University Press.

Kitano, M., & Pedersen, K. (2002). Multicultural content integration in gifted education: Lessons for the field. *Journal for the Education of the Gifted, 25,* 269–289.

Administrative Attitudes

Administrative attitudes are the beliefs held by school administrators that greatly influence every decision that is made within a school. Administrative attitudes provide the vehicle for finding the framework for formulating a clear vision of successful schools. In addition, they also help to create a paradigm for how administrators view effective teaching; student success; and the significance of providing a supportive, productive, and nurturing learning environment for all members of the school community. Administrative attitudes determine whether or not creativity and talents are cultivated and giftedness appreciated; thus, they have great relevance with respect to addressing the needs of gifted and talented and creative students and teachers. When one thinks of administrative attitudes, one usually thinks of how the attitude of the school administrator impacts a school's environment and culture. When the attitude enables the school leader to harness the power of school culture, the leader is able to lead the way to school reform.

The content of this entry addresses some essential questions that should be explored with respect to administrative attitudes and their impact on what happens in schools. These essential questions include the following:

1. What are appropriate administrative attitudes?
2. How can administrative attitudes maximize student learning and achievement?
3. Do administrative attitudes in high-achieving schools differ from the administrative attitudes in lower-achieving schools?
4. Do administrative attitudes foster creativity and talent and cultivate giftedness among students and teachers?
5. How do administrative attitudes empower teachers to take risks and establish high standards for their students and themselves?
6. Do administrative attitudes dictate how parents and members of the community are involved in the education of students within a particular school?

Appropriate Administrative Attitudes

Appropriate administrative attitudes support risk taking and advocate change that can move a school community to take action and make decisions in the best interest of its primary stakeholders, the

students. Differences in administrative attitudes often make the difference between a high-achieving school and a school that fails to meet the needs of its students and staff.

Student Learning and Achievement

Administrative attitudes significantly impact decision making. To maximize student learning and achievement, decisions must be made with respect to the selection of highly qualified and proficient professional staff. In addition, administrative attitudes shape the quality of supervision and support for the professional staff. Professional development is valued and expected. Schools that maximize student learning and achievement are generally led by administrators whose attitudes embrace the concept of teachers being empowered to make decisions about lesson planning, what strategies and modifications to implement to effectively teach students from special needs to gifted and talented, and how to assess what their students are learning. School leaders with appropriate administrative attitudes recognize that "teachers make the difference" in the classroom.

Higher-Achieving Versus Lower-Achieving Schools

A significant amount of the effective schools research clearly supports the fact that the attitudes of school administrators impact student achievement and the overall success of a school. Effective school administrators have a clear focus with specific goals that guide decision making and the basic operation of the school. This focus is effectively communicated to all staff, and measures are taken to have everyone embrace shared beliefs and become active members of a collaborative and cooperative school community.

In effective schools, school administrators recognize and celebrate accomplishments and acknowledge failures. Their primary focus is to inspire and lead the professional staff toward new and innovative school practices by ensuring that the faculty and staff are aware of the most current educational research and that discussion of best practices are a part of the school culture. Effective school administrators are willing to challenge and upset the status quo. They lead the way for curriculum development and facilitate the implementation of creative educational programs for gifted and talented students, at-risk students, and other students in need of specialized programs.

Creativity and Giftedness

Administrative attitudes must be based on the premise that "all students can learn." In addition, administrative attitudes must reflect the fundamental belief that all students should be encouraged to reach their maximum learning potential. This can be achieved only by teachers utilizing creative and engaging activities that empower their students to seek the highest level of achievement and performance possible. Administrative attitudes and teacher attitudes join forces to create a school climate that appreciates and applauds creativity and giftedness among not only students, but the professional staff as well.

Risk Taking and High Standards

Maintaining high standards for students and teachers needs to be a driving force in administrative attitudes. A survey of the research clearly supports the fact that administrators who empower their teachers to make decisions regarding choice of instructional strategies to be implemented in their classrooms are more likely to experience a higher level of success in having their students meet the intended curriculum standards. When teachers are empowered they feel safe trying alternative strategies and new ideas as a means to enable their students to reach their learning potential. Both gifted students and struggling students are provided an opportunity to master learning using a strategy that is comfortable for them. When teachers feel empowered, students also feel empowered. Administrative attitudes that support risk taking and high standards create a school atmosphere that is electrified with excitement and a desire for learning.

Parents and Community Members

If administrators possess the attitude that parents and members of the community can play an important role in the education of students, then opportunities to actively involve parents and members of

the community will be created and supported by school administrators. Mentoring and internship programs will be available for gifted and talented students who want to expand their knowledge and gain experience working with a professional or expert in a field of interest. Administrators who value parent opinion and input will provide a welcoming atmosphere in their schools where parents feel comfortable sharing their knowledge about their children and want to be partners with the school in their child's education.

JoAnn P. Susko

See also Creative Leadership; Emotional Intelligence; Leadership; Political Leaders; Risk Taking; School Attitudes

Further Readings

Fullan, M. (2006, November). Leading professional learning. *School Administrator, 63*(10), 10–14.

Green, R. (2005). *Practicing the art of leadership: A problem-based approach to implementing the ISLLC standards* (2nd ed.). Saddle River, NJ: Pearson, Merrill, Prentice Hall.

Marzano, R., Waters, T., & McNulty, B. (2005). *School leadership that works: From research to results*. Alexandria, VA: Association for Supervision and Curriculum Development.

Munro, J. (2008). *Roundtable viewpoints: Educational leadership*. New York: McGraw-Hill.

Administrative Decision Making

Teachers and school administrators want to develop nurturing and productive school communities that embrace teaching and learning. The challenge for school administrators is in making decisions that will move their schools in this direction. Thus, decision making is a fundamental process that contributes to the overall culture and climate of a school.

School administrators want to make sure that the decisions they make with respect to hiring highly qualified teachers and implementing new curriculum strategies and school programs continue to provide learning opportunities that are challenging for creative and gifted and talented students. The challenge for classroom teachers lies in making decisions with respect to facilitating the learning process for all students; deciding what to teach and how to teach it; and what needs to be done to make sure that students possess the social, emotional, and academic skills they will need to achieve success both inside and outside of the school environment.

Today, more than ever, both teachers and administrators need to be decision makers. The increasing demands that are being placed on a school administrator to be a jack-of-all-trades with respect to being a visionary; a competent manager; maintaining the facility; managing a budget; providing guidance to teachers, students, and parents; and being an instructional leader require both teachers and school administrators to be school leaders and to work collaboratively for the benefit of the primary stakeholders, the students and parents of the school community.

In a collaborative school environment, decisions are made collectively, involving all constituents affected by the decision. Yet even in a collaborative school environment some decisions need to be made immediately without an opportunity to obtain input, especially when the safety of students and/or staff is at risk without immediate action. Because making good decisions is contingent upon several factors, including time, the situation, and the expertise needed, there is no one best style, model, or process that is more effective than another. Therefore, the effectiveness of the decision making of school leaders is determined by how effective they are in determining when to make decisions collaboratively, and when to make decisions independently.

Decision Making as a Process

Decision making most frequently can be defined as a systemic process to resolve a problem or a particular issue. Regardless of the model that a school leader selects when making a decision, the basic model for decision making should include the following steps: (a) identifying the problem, (b) analyzing the problem, (c) identifying alternative solutions, (d) assessing the alternatives, (e) selecting an alternative, (f) implementing the selected alternative, and (g) evaluating the process.

When making a decision, a school leader should try to minimize negative consequences and maximize positive outcomes. It is important for a school leader to make informed choices and to act with integrity in an ethical manner. It is equally important for the school leader to know that regardless of the quality of the decision reached and the manner in which the decision was implemented, it will not only affect faculty, staff, and students, but it will also help to shape the perceptions these stakeholders will have with respect to the effectiveness of the leader.

Brainstorming

One of the most common techniques considered when the input from a group is desired for collaborative decision making is brainstorming. This can be accomplished using a small core group of individuals or a much larger group of individuals representing various aspects of the total school population. Brainstorming is a risk-free process where everyone in a group spontaneously contributes possible solutions or conditions to be considered when making a decision to resolve a problem. All responses are accepted without judgment, and members of the group are then encouraged to combine or improve upon the ideas suggested in step two of the process. The responses are then categorized according to commonalities, and the information is synthesized to create possible solutions to the problem presented. School leaders, who often facilitate the process of brainstorming, need to take extreme care not to allow their attitudes and beliefs to influence the results of the brainstorming process. School leaders need to establish ethical frameworks and standards for decision making and hold themselves accountable to these frameworks and standards. Any influence that school leaders have should be used constructively and productively to assist others involved in the decision-making process.

Communication

An aspect that is extremely important to the decision-making process is how school leaders communicate the details of a decision to all who will be affected by the decision. Often, a number of problems arise when decisions are made because the details of the decision are not effectively communicated. What needs to be communicated to all stakeholders is the description of the process utilized to come to the conclusion and the type of facts and supportive data that played a role in making the decision. All communication from school leaders should be made without bias and should reflect professional and ethical conduct.

Decision Making as a Fair Process

All affected constituents need to feel that a fair process was utilized in reaching decisions. Basically, there are three principles related to fair process that school leaders need to consider. They are (1) engagement, (2) explanation, and (3) expectation clarity. In essence, engagement is seeking the input of those affected and allowing them to discuss the merits of the decisions with one another. Explanation refers to providing very clear answers as to why the final decisions were made, and expectation clarity is the accurate and detailed explanation of new rules or conditions that will be put in effect as a result of the decisions. Ultimately, individuals want their ideas and opinions to be heard and they want to understand the reasoning behind the decisions.

JoAnn P. Susko

See also Creative Leadership; Emotional Intelligence; Leadership; Political Leaders; Risk Taking; School Attitudes

Further Readings

Danielson, C. (2007). The many faces of leadership. *Educational Leadership, 65*(1), 14–19.

Green, R. (2005). *Practicing the art of leadership: A problem-based approach to implementing the ISLLC standards* (2nd ed.). Saddle River, NJ: Pearson, Merrill, Prentice Hall.

Marzano, R., Waters, T., & McNulty, B. (2005). *School leadership that works: From research to results*. Alexandria, VA: Association for Supervision and Curriculum Development.

Munro, J. (2008). *Roundtable viewpoints: Educational leadership*. New York: McGraw-Hill.

Shapiro, J., & Stefkovich, J. (2001). *Ethical leadership and decision making in education: Applying theoretical perspectives to complex dilemmas*. Mahwah, NJ: Lawrence Erlbaum.

Adolescent, Creative

Creativity is more than an individual phenomenon and must be seen in relation to the people and types of information that comprise an individual's context. The creative adolescent emerges from a sociocultural context. In high school, for example, an adolescent's creativity is related to the judgments of significant others (e.g., teachers) and the nature of the particular subject under study (e.g., arts vs. sciences). Individual differences are also important. Several theories of creativity suggest that adolescents are more likely to be creative if they are able to combine openness to immediate experience with disciplined thought. This affective–cognitive combination is associated with eminent, creative adults as well as talented and creative adolescents.

The Creative Adolescent in Context

A systems theory perspective views creativity as a process shaped by multiple forces, including but not limited to the contributions of the creative person. Such an approach is not at odds with creativity research that focuses on characteristics of the person. What is known about individual differences that affect creativity can be incorporated into systems models that integrate persons with their sociocultural contexts.

Mihaly Csikszentmihalyi adopted a systems view and asked the question, *Where* is creativity? He suggested that creativity resided in a process shaped by three forces. First, a *person* introduces a novel contribution. Second, a *field* selects from the variations produced by individuals those deemed worthy of recognition and preservation. Third, a symbolic *domain* is the cultural repository that contains the selections of the field and allows the transmission of information to subsequent generations. These three subsystems—person–field–domain—are related through circular causality. In other words, each subsystem affects the others, and in turn is affected by the others. Thus, creativity is not located "inside" the individual or any of the other subsystems. The system of interrelationships is greater than the individual parts of person, field, and domain.

Each subsystem is important for understanding creativity. A symbolic domain (e.g., mathematics) is part of the shared knowledge of a culture. It provides the set of rules, concepts, and procedures for working with a specific body of knowledge. The potentially creative person must become immersed in a domain and learn about it before he or she can change or add to it. When an individual introduces a novel variation, members of a field act as gatekeepers of the domain. The field's job is to decide if a new idea is worthy to be selected and preserved. For example, when a scientific article is submitted to a journal for possible publication, it competes with other submissions to that journal. Peer reviewers serve as gatekeepers and decide if the article is worthy of publication. Even if the article is published, it competes for the attention of the field (i.e., other scientists) with articles published by other journals. If the author's ideas are going to be recognized as creative, they must gain notice through this social process.

The person–domain–field interrelation is relevant for understanding real-world creativity. It is also relevant for understanding creativity in adolescence. In middle school and high school, for example, every skill that affords an adolescent an opportunity for creativity (e.g., math, science, music, art, athletics) is part of an organized field. There is an institutional network of people and activities in schools that supports and recognizes creativity. In science, the field includes teachers who recognize the creative contributions of adolescents by evaluating tests, assignments, projects, and so on. Judges in science fairs may also provide opportunities for teenagers to demonstrate their skill and gain public recognition for their creativity. Civic organizations, businesses that provide prizes, national organizations, and even student or community newspapers are part of the field that selects some student contributions as creative and worthy of distinction.

Understanding an adolescent's creativity also requires considering the type of information in each domain and how it is presented and organized. Although there are similarities across domains with respect to the ways teenagers learn and develop, learning to be a sculptor or painter requires a different set of skills from learning to be a neuroscientist. Each domain requires the assimilation of a specialized body of knowledge that

makes it possible to engage the domain. Young musicians must learn to read music, whereas young scientists must learn the procedures involved in experimental design. The goals and values of domains may also differ. Music typically involves expressive performance and aesthetic judgments. Teachers may appeal to students' emotions as part of their musical training. The sciences tend to be geared toward instrumental and rational judgments. Teachers may motivate students by emphasizing the utility of the sciences for technological progress.

Characteristics of the Creative Adolescent

Understanding creative adolescents not only involves looking at the fields and domains they are embedded in, it involves understanding individual differences. Decades of creativity research have revealed that some personal characteristics make innovation more likely. The flexible adaptation associated with the creative personality revolves around a blend of particular characteristics. Part of that blend, and one of the more researched aspects of creativity, is the person's ability to engage the information in a domain playfully and affectively. This ability results in a wider range of perceptions and associations and allows a person to see something in a new way. Divergent thinking alone, however, is not sufficient for creativity; the insight has to be carefully developed and communicated. That is why many models of the creative personality emphasize the need to blend divergent and convergent thinking, or affective processes with rational, cognitive processes that can shape and order insights. For example, Heinz Werner suggested that a creative person had *mobility* between a physiognomic mode (i.e., sensitivity to properties that provide information about affective or emotional significance) and a geometric–technical mode that relies on rational processes associated with scientific thinking. Others have suggested that the integration of these dual modes in creative thinking reflects the integration of information processing in the two brain hemispheres.

Mihaly Csikszentmihalyi and Kevin Rathunde have referred to this blend of affective and cognitive processing in the creative person as *psychological complexity.* Complexity is a systems theory concept that suggests a system is flexible and capable of self-organization through the processes of differentiation and integration. In terms of the creative person, differentiation is the process of generating novel insight; integration is the ability to elaborate an insight and communicate its place in relation to existing knowledge. A person with psychological complexity is more likely to be creative because he or she can blend affective and cognitive processes in ways that generate and elaborate novel insight and combine divergent and convergent thinking. Interviews with eminent and creative individuals provide examples of psychological complexity and the association of creativity with a dynamic interrelation of affective and rational modes. Jonas Salk, the developer of the first successful polio vaccine, for example, described peak moments of creativity as the bidirectional movement between intuition and rationality.

Psychological complexity in adolescence manifests itself somewhat differently than in adulthood. Adolescents are less experienced than adults: What is creative or novel for a teenager may seem commonplace for an adult. Moreover, the kinds of information an adolescent and an adult can assimilate and accommodate would differ. Jean Piaget noted that adolescents have entered a stage of formal operations after having passed through sensorimotor, preoperational, and concrete operational stages; as a result, they are no longer tied to the here-and-now information within their grasp and can deal logically with abstract information. The synthesis of affective and cognitive modes implied in the notion of psychological complexity is, therefore, possible in adolescence, although it is likely to be more frequently achieved in adulthood. Adults are capable of postformal operations and a more effective blending of logic with affectively rich life experience.

Despite developmental differences between adults and adolescents, a study of talented teenagers demonstrated that psychological complexity was related to talent development. One indication of psychological complexity was the co-occurrence of positive affective involvement with a simultaneous concentration and focus on important goals; teenagers with this combination of modes more successfully developed their talents. Talented adolescents also differed from average adolescents in both openness to experience and work orientation.

This personality configuration was true of both males and females, suggesting an androgynous profile of the talented and creative adolescent. Openness to experience presumably helped these adolescents to grasp novel connections, whereas a work orientation allowed new connections to be carefully developed and integrated.

Summary

The creative adolescent, like the creative adult, emerges from a sociocultural context and the interrelations of persons, fields, and domains. Members of a field are gatekeepers; they select from variations produced by individuals those they consider to be creative. The symbolic domain is the repository of cultural information that provides the rules, concepts, and procedures for engaging a particular body of knowledge. Creativity must be seen in relation to the people and types of information that comprise an individual's context. In high school, for example, adolescents' creativity is related to the judgments of their teachers and the nature of the subject matter they study. Nevertheless, individuals are the source of new insights and innovations. Several perspectives on creativity suggests that individuals are more likely to innovate when (a) they are open to immediate, affectively rich experience and (b) they are able to elaborate and develop insights with disciplined thought. This affective-cognitive combination of modes can be referred to as psychological complexity. Developmental differences affect psychological complexity; however, research suggests it is associated with eminent, creative adults as well as talented and creative adolescents.

Kevin Rathunde

See also Brain Hemisphericity; Creative Process; Divergent Thinking; Talent Development

Further Readings

Barron, F. (1955). The disposition toward originality. *Journal of Personality and Social Psychology, 51,* 478–485.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: HarperCollins.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1997). *Talented teenagers: The roots of success and failure.* New York: Cambridge University Press.

Labouvie-Vief, G. (1980). Beyond formal operations: Uses and limits of pure logic in life span development. *Human Development, 23,* 141–161.

Martindale, C. (1999). Biological bases of creativity. In R. Sternberg (Ed.), *Handbook of creativity.* New York: Cambridge University Press.

Rathunde, K., & Csikszentmihalyi, M. (2006). The developing person: An experiential perspective. In R. M. Lerner (Ed.), *Handbook of child psychology: Vol. 1. Theoretical models of human development* (6th ed.). New York: Wiley.

Russ, S. W. (1993). *Affect and creativity.* Hillsdale, NJ: Lawrence Erlbaum.

Werner, H. (1958). *Comparative psychology of mental development.* New York: International Universities Press.

Adolescent, Gifted

The literature on gifted adolescents is concentrated on their characteristics, their social coping strategies, gender differences, and the relationships among factors that predict their achievement. Much of what we know about them is embedded in the literature on gender differences and achievement conflicts in the general population.

Characteristics

As a group, gifted adolescents differ from their non-gifted peers in self-efficacy, attitudes, aspirations, and achievement. The self-perceptions of young adolescents tend to be accurate. Gifted adolescents as a group appear to have stronger academic self-concepts and higher self-efficacy than their non-gifted peers. Like younger gifted children, gifted teens tend to be advanced in their development, often presenting as more similar to youth 2 to 4 years older than to their age-mates. However, gifted teens with learning disabilities or other learning problems are a common exception. They tend to be developmentally younger than their age-mates. Most, though not all, gifted teenagers are perfectionistic, meaning that they hold high expectations for themselves in some endeavor

and strive to meet them. For most of them, this perfectionism seems to be facilitative, motivating them to work hard and pursue high goals. For one-fourth or less, this perfectionism is maladaptive, prompting them to avoid necessary activities and causing disruptive levels of anxiety or depression.

There is no evidence that gifted adolescents are more prone to depression or suicide than other adolescents, but emerging evidence seems to support the possibility of differences in the structure of their suicidal ideation and in the way their suicidality is expressed. Limited information about the psychological profiles of identified gifted adolescents suggests that they differ from non-gifted teens in significant ways. They may be more likely to endorse an intuitive-perception profile on personality measures, and creatively gifted teens appear to spend more time alone and tend to marginalize themselves more than their non-gifted peers.

The self-concepts of gifted adolescents have been the focus of many studies. Their academic self-concepts tend to be positive, unless they also have a learning disability or problem of some kind, in which case their self-concepts are often negative. Findings concerning their social self-concepts are mixed, with some concluding that their social self-concepts are significantly higher than average-ability classmates, while others concluding that they have lower social self-concepts. Generally, their social self-concepts are lower than their academic self-concepts. One reason for the mixed findings is the contexts in which gifted adolescents are studied. Those in peer-ability grouped classrooms and programs may demonstrate lower academic self-concepts than those in mixed-ability classes where comparisons regarding ability are generally more favorable.

The characteristics of gifted adolescents vary by ethnic and racial groups. Many differences are noted among these groups in their experiences, characteristics, achievement, and program impact, but it is not yet clear how many of those differences are more specific to class and context rather than to ethnicity or race. Gifted American Indian, Latino, and African American teenagers are much less likely than other gifted adolescents to take accelerated or advanced coursework in school, whereas Asian Americans are more likely to do so.

Gender Differences

Gender differences have been noted in gifted adolescents in self-efficacy, attitudes, aspirations, and achievement. Gifted adolescent girls report working harder than gifted adolescent boys, and achievement test scores vary by gender. Girls outscore boys on reading tests but boys score higher on math and science tests. Average scores on college admission tests are lower for girls than boys across core subject areas. At least four times as many boys as girls score 700 or more on the SAT before the age of 13 from among those who participated in talent search programs for mathematically able youth such as searches led by Camilla Benbow and her colleagues. Data from the Organization of Economic Cooperation and Development (OECD) indicate that boys outscore girls in mathematics in 21 countries, but outscore them in science in only 11 countries. Only 7 countries report no gender differences in math assessment scores, and 16 report no gender differences in science scores. Girls outscore boys in reading in all participating countries. Benbow and her colleagues' well-known longitudinal studies of mathematically gifted adolescents observe that gender gaps persist at the highest levels of mathematics. Current consensus is that a combination of biological, social, and environmental factors contributes to these persistent gender differences. There is some evidence that media reports of these differences may have an impact on the self-efficacy of gifted girls.

A number of authorities have investigated the future goals and career aspirations of gifted adolescents and observed that girls tend to express greater gender role flexibility in their career aspirations than boys. In spite of the fact that gifted female adolescents report higher aspirations and enroll immediately in college at higher rates than do males, more men earn doctoral degrees in math and science. This has been a major focus of Barbara Kerr and Sharon Kurpius's interventions developed for their National Science Foundation sponsored projects for math/science talented girls. Gender differences are less frequently found among Asian American gifted teens, and few gender differences are observed among gifted teens in Asian countries.

Social Coping

Gifted adolescents tend to employ coping strategies that are quite different from their non-gifted peers. Much of the work on social coping has been done by Tracy Cross, Laurence Coleman, Mary Ann Swiatek, and their colleagues. Some gifted adolescents involve themselves highly in extracurricular activities in school, underachieve, or exhibit negative behaviors in order to be perceived differently by others. Others engage in behaviors aimed at denying or hiding their high ability and distance themselves from the stereotype of the gifted group. Some gifted adolescents cope by helping others or by cultivating relationships with adults, while others seek out-of-school talent development opportunities, avoid special programs for the gifted in school, hide their high ability, or deliberately underachieve in order to cope. Engaging in conforming and avoidance behaviors to devalue conventional popularity and focusing on the importance of peer acceptance are also used. Deliberate attempts to highly involve themselves in activities that are unrelated to their being gifted are also made.

There are gender and age differences in the coping styles of gifted adolescents. In comparison with gifted females, gifted adolescent males are more likely to employ humor to devalue their popularity and are less likely to deny their giftedness. They also place less value on peer acceptance and interpersonal activity when compared to their female counterparts. Boys are more likely to refer to adults for support as a form of coping while girls tend to rely more on peer support. In contrast, gifted adolescent girls tend to conform and hide their giftedness in social situations. They are also more inclined to engage in helping behaviors as a social coping strategy. Girls seek social support from close friends when confronted with concerns more often than boys do, but they are less likely to engage in physical recreational activities and relaxing diversions than boys. Regarding age, older gifted adolescents deny and hide their giftedness more than younger gifted adolescents do. They are also more likely to engage in helping behaviors. Older adolescents are less likely to conform or to minimize the importance of their popularity than younger adolescents.

Overall, compared to their non-gifted peers, gifted adolescents tend to deal directly with their problems and are less inclined to hope for the best when faced with difficult situations. Although both gifted and non-gifted adolescents as a group tend to perceive themselves as industrious and able to deal with problems that arise, gifted adolescents appear more likely to work hard at dealing with their problems before seeking relaxing diversions and physical recreation. They are less likely to employ strategies that help them to reduce tension. They do not declare they lack the strategies to cope but rather prioritize their coping strategies by dealing with their problems directly. When compared with their chronological peers, gifted adolescents seem to depend less on the use of intimate relationships to help them cope.

There is little information about the social coping of gifted adolescents in countries other than the United States. Like their Western counterparts, adolescents in Hong Kong are also perfectionistic and feel a lack of challenge in their school work. They also experience stress arising from parental expectations and from feeling that they are different from their peers. Very often these students experience intense emotions about what is happening around them and feel powerless to effect any change.

The Need to Belong Versus the Need to Achieve

A common, though not universal, finding regarding gifted adolescents is that many struggle to manage the need to belong with their need to achieve, especially females, African Americans, Latinos, and those from low-income or disadvantaged backgrounds. Over time, these tensions appear to corrode their aspirations and self-concepts. In an effort to minimize or avoid these conflicts, gifted adolescents may deny their talent, lower their aspirations, or underachieve. Gifted adolescents perceive the mixed messages society gives to those who are talented and react to their perceptions of the hidden costs of upward mobility or high achievement.

For instance, gifted students from working-class or impoverished backgrounds may deny their talent, not only because they perceive conflicting messages, but also because they are uncomfortable negotiating the crossing of class boundaries. Gifted students from lower socioeconomic backgrounds

may be encouraged to work hard in school but discouraged from pursuing a college education or from taking accelerated classes. Parents may tolerate the pursuit of high achievement only as long as it does not interfere with earning a paycheck or with responsibilities at home.

Tacit assumptions regarding class, identity, and achievement negatively affect a large proportion of gifted adolescents. The evidence suggests that many such individuals internalize the conflicts. Several writers have suggested that making these assumptions explicit, normalizing the tensions as a societal phenomenon, and openly discussing the hidden costs of success help students manage such tensions and stay the course of upward achievement.

In sum, gifted adolescents are a very heterogeneous group. Significant differences exist in their attitudes, self-perceptions, coping styles, achievement, aspirations, and personality by gender, class, race, ethnicity, and nationality. It is becoming increasingly clear that culture and context play pivotal roles in the development, adjustment, and achievement of gifted teens.

Maureen Neihart and Vivien S. Huan

See also Adolescent, Creative; African American, Gifted; Cultural Values; Sex Differences in Mathematical and Spatial Ability; Social Development; Social-Emotional Issues

Further Readings

Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability at age 13: Their status 20 years later. *Psychological Science, 11,* 474–480.

Chan, D. W. (2004). Social coping and psychological distress among Chinese gifted students in Hong Kong. *Gifted Child Quarterly, 48,* 30–41.

Cross, T. L., Cassady, J. C., & Miller, K. A. (2006). Suicidal ideation and personality characteristics among gifted adolescents. *Gifted Child Quarterly, 50,* 295–306.

Cross, T. L., Coleman, L. J., & Terhaar-Yonkers, M. (1991). The social cognition of gifted adolescents in schools: Managing the stigma of giftedness. *Journal for the Education of the Gifted, 15,* 44–55.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure.* Cambridge, UK: Cambridge University Press.

Ferguson, W. E. (1981). Gifted adolescents, stress and life changes. *Adolescence, 6,* 246–267.

Frydenberg, E. (1993). The coping strategies used by capable adolescents. *Australian Journal of Guidance and Counseling, 3,* 1–9.

Frydenberg, E., & Lewis, R. (1993). Boys play sport and girls turn to others: Age, gender and ethnicity as determinants of coping. *Journal of Adolescence, 16,* 252–266.

Kerr, B. A., & Kurpius, S. R. (2003). *Counseling girls and women: Talent, risk, and resiliency.* Mesa, AZ: Nueva Science Press.

Manaster, G. J., Chan, J. C., Watt, C., & Wiehe, J. (1994). Gifted adolescents' attitudes towards their giftedness: A partial replication. *Gifted Child Quarterly, 38,* 176–187.

Swiatek, M. A. (2001). Social coping among gifted high school students and its relationship to self concept. *Journal of Youth and Adolescence, 30,* 19–39.

Adult, Gifted

Adults can be recognized as gifted by two different means: Either they are identified as gifted during their educational years, and/or they attain recognition in adulthood for superior performance in a particular talent area. The first means of identification, in youth or in the educational years, is generally based on high performance on standardized tests and IQ tests. Gifted youth are identified for their potential future contributions and labeled as gifted to receive special educational services that will help them develop their talent. Many gifted adults experience greater degrees of job and life satisfaction than their same-age counterparts, good mental and physical health, adequate income, and often achieve at high levels constituting recognition of their previously identified potential.

The second means by which adults are classified as gifted is superior performance in a specific domain. This second means of classification, although not exclusive of identification in youth, is the manifestation of talent in a specific domain. This form of identification is generally based on peer acknowledgment of contributions made to a specific field. Individuals receiving recognition for contributions in adulthood are creatively productive, achieve expertise in their domain, and sometimes even achieve eminence. There are personality

characteristics and environmental influences that contribute to superior adult performance.

Identification in Youth

Much of what is known about adults who were identified in the educational years is based on longitudinal research. For example, the longitudinal study of 1,528 childhood geniuses undertaken by Lewis Terman and his colleagues extended over the course of approximately 40 years, and participants have been contacted for numerous follow-up studies by other researchers. The study included anthropometric measurements, cultural and socioeconomic background assessments, health histories, personality trait evaluations, analyses of interests, and thorough documentation of family backgrounds, the expectation being that these cognitively advanced individuals would achieve at levels beyond those of the general population; the appraisal of this achievement being educational attainment, contributions to knowledge and culture, and the recognition gained by them. In 1959, 38 years after the study began, Lewis Terman and Melita Oden published the first follow-up study of these individuals who were identified in their youth. The group of geniuses, overall, was very successful in adulthood and happier and healthier than the average person. The majority of the participants graduated from college (70%), which is notable given that at the time, only 8 percent of people of the same age from the general population were graduating from college. Not only were a disproportionate number of participants graduating, but many graduated with honors, and 14 percent of the men in the group and 4 percent of the women attained Ph.D. or comparable level degrees compared to less than 3 percent of same-aged individuals in the general population at that time.

The participants often chose professional and semiprofessional occupations such as doctors, lawyers, teachers, and professors. The rewards and publications garnered by this group are numerous, and they consistently achieved well beyond what would be expected of a random sample of the population. Not surprisingly, when asked to identify the top 10 factors that contributed to their life accomplishment, adequate education was most frequently cited by both men (83%) and women (79%). Despite this clear acknowledgment of one environmental influence on success and the clearly defined capacity for achievement based on cognitive ability, 37 percent of males and 44 percent of females in this group felt that they had not lived up to their potential.

These findings are in keeping with two other famous groups of individuals with high IQs, identified in their educational years, and located for follow-up research in their adult years. The two groups, students studied by Leta Hollingworth in New York City schools and students who graduated from the Hunter College Elementary School, also in New York, were much smaller (64 and 156, respectively). Similar findings, however, were reported. Participants were more likely to do the following:

- Attain advanced degrees
- Express satisfaction with their careers, with men typically listing work first as a source of satisfaction
- Describe their health as good and even very good
- Experience normal psychological adjustment
- Define success in terms of adequate income, helping others, and having a happy home life

Although 1,000 participants in a research study and comparable findings in other, smaller studies is substantial, generalizations about the entire population of gifted adults cannot be made from such a small number of empirical research studies on gifted adults. Illustrating this fact is one major difference between the Terman students as adults and the Hunter group. The Hunter group believed that they had lived up to their intellectual abilities, clearly contrasting with Terman's large percentage of men and women who believed that they had not lived up to their potential.

Another problem with making generalizations using these studies is the use of high IQ as the primary identification and inclusion measure. Using IQ to define and identify individuals in their educational years tends to exclude individuals who make contributions in aesthetic domains and the arts. One study actually excluded participation of two youth because of their low IQ. Both went on to become Nobel Peace Prize winners.

Eminence and Superior Achievement

A colleague of Terman's, C. M. Cox, studied the relationship between eminent performance and cognitive ability (i.e., genius) retrospectively. Analyzing the biographies of more than 300 eminent adults, the researcher hoped to find that these individuals had been gifted in their childhood. The results, however, suggested that some of these individuals may *not* have possessed the highest levels of cognitive ability in their childhood. Using a subsample of 100 geniuses, she demonstrated that certain personality traits (e.g., motivation, persistence) could compensate for lacking IQs at superior levels.

Other personality traits consistently identified by researchers Sally M. Reis, Dean Keith Simonton, Joyce VanTassel-Baska, Herbert J. Walberg, and Ellen Winner include the following:

- Resilience and perseverance
- Superior capacity for communication
- A sense of destiny about work
- Force of character, strong will, determination
- Ability to focus for long periods of time
- Rage to master, perceived importance of talent manifestation, strong need to excel, single-mindedness
- Motivated
- Well-rounded, having broad interests
- Creative, imaginative, innovative
- Vital, healthy, energetic
- Risk taking
- Above-average intelligence

Beyond personality and cognitive ability, there exists substantial influence from the environment in developing talent and skills that result in superior adult achievement, and some facets of expert performance are developed through experience and practice.

Biographies of eminent individuals reveal shared environmental influences. One shared influence is access to a cadre of friends, colleagues, or family members who support creative individuals and their work, particularly during times of profound breakthrough or pivotal moments in their careers. Another is access to the domain of interest during the developmental years. These are two of the most common environmental influences shared by eminent adults. Others include the following:

- Having to overcome obstacles
- Ten years of experience/practice
- Parental support (emotional, logistical, financial), parental involvement
- Top-level instruction, teacher involvement
- Time and opportunity, materials available, access to the domain of interest
- Vitality, health

Of course, no one achieves eminence without first achieving expertise in a field and being creatively productive, but the opposite is not necessarily true. A gifted adult can be prolific and brilliant, but if the contribution is not valuable to the Zeitgeist, he or she will not be eminent during that time. This truth, however, does not change the fact that the person is gifted.

Creative Productivity and Expertise

Those who possess the ability to be creative and productive have many traits in common. For example they are imaginative, curious, attracted to complexity, and they have a sense of humor while being motivated and willing to take risks. Creative people have the ability to feel comfortable understanding extreme positions and more importantly are able to function within the continuum of that spectrum (i.e., embody dichotomies within their characteristics). For example, creative individuals can be very energetic, but they can also be calm and at rest, or they are highly intelligent but possess a naive outlook, or they can be playful yet possess extreme discipline.

In addition, when analyzing the biographies of creative geniuses, researchers find that they are immensely productive. Their work is prolific to the point of being habitual. One researcher, Ellen Winner, describes it as the "rage to master." It may be that superior adult achievement to the degree of eminence is rare because only a very few people have the capacity to produce enough work to exert influence on a given domain. This level of work is not produced in an environment driven by external rewards, but rather driven by a characteristic that is intrinsically motivated: the characteristic of

producing work for personal pleasure rather than an external entity's satisfaction.

There are also some consistencies across studies of expert performance that are useful for describing aspects of high levels of performance for adults. The work by K. Anders Ericsson and other researchers suggests that 10 years of experience within a field is necessary for expert levels of performance to emerge, that experts receive top-level instruction, that there is strong parental support of the developing expertise, and that there is a relationship between age distributions and peak performance distributions. For example, chess players peak in their thirties, athletes tend to peak in their twenties, and contributions to the fine arts are usually made by people in their thirties and forties.

A major recurring theme throughout all the studies is that of a support network for creative productivity, expert performance, *and* eminence. Whether it is parental support, teacher support, or an organization that provides scaffolding—historical records, biographies, and retrospectives frequently reveal that the high-achieving adult did not do it alone.

Angela M. Housand

See also Creative Productivity; Eminence; Expertise

Further Readings

Arnold, K. D. (1995). *Lives of promise: What becomes of high school valedictorians*. San Francisco: Jossey-Bass.

Cox, C. M. (1926). *The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.

Ericsson, K. A. (Ed.). (1996). *The road to excellence: The acquisition of expert performance in the arts and sciences, sports, and games*. Mahwah, NJ: Lawrence Erlbaum.

Finkel, D., & Pederson, N. L. (2001). Sources of environmental influences on cognitive abilities in adulthood. In E. L. Grigorenko & R. J. Sternberg (Eds.), *Family environment and intellectual functioning: A life-span perspective* (pp. 173–194). Mahwah, NJ: Lawrence Erlbaum.

Gardner, H. (1993). *Creating minds*. New York: Basic Books.

Reis, S. M. (1995). Older women's reflections on eminence: Obstacles and opportunities. *Roeper Review, 18*(1), 66–73.

Reis, S. M. (1998). *Work left undone: Choices and compromises of talented females*. Mansfield Center, CT: Creative Learning Press.

Simonton, D. K. (1991). Emergence and realization of genius: The lives and works of 120 classical composers. *Journal of Personality and Social Psychology, 61,* 829–840.

Terman, L. M., & Oden, M. H. (1959). *The gifted group at mid-life*. Stanford, CA: Stanford University Press.

VanTassel-Baska, J. L. (1989). Characteristics of the developmental path of eminent and gifted adults. In J. L. VanTassel-Baska & P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners: The home, the self, the school* (pp. 146–162). New York: Teachers College Press.

Walberg, H. J., Tsai, S. L., Weinstein, T., Gabriel, C. L., Rasher, S. P., Rosecrans, T., et al. (1981). Childhood traits and environmental conditions of highly eminent adults. *Gifted Child Quarterly, 25,* 103–107.

Winner, E. (1996). The rage to master: The decisive role of talent in the visual arts. In K. A. Ericsson (Ed.), *The road to excellence: The acquisition of expert performance in the arts and sciences, sports, and games* (pp. 271–301). Mahwah, NJ: Lawrence Erlbaum.

Advanced Placement

The Advanced Placement (AP) program is a cooperative endeavor between secondary schools and colleges that allows high school students to complete college-level courses during high school. Historically, one of the more common responses to serving exceptionally bright students was to place them in the next grade, accelerating their learning, often leading to earlier completion of college-level work. The AP program falls into this broader spectrum of acceleration strategies. Acceleration of content or services encompasses two perspectives. The completion perspective focuses on maximizing return on one's educational investment by minimizing the time required to complete an educational objective. The enrichment perspective focuses not on time but rather

on the increase in challenge that is inherent in attempting more advanced work. The AP program includes both the completion and the challenge perspectives, depending on the goals of the student taking the course.

History

The AP program arose in the 1950s out of the belief that secondary schools and colleges should work together to allow motivated students to complete work at their level and advance as quickly as possible. In 1951, the Ford Foundation's Fund for the Advancement of Education sponsored studies of the transition from secondary to postsecondary education that indicated students should be allowed to advance as quickly as possible to avoid repetition of course work in high school and college. At the same time, educators from several college preparatory high schools and colleges began work on how best to use the last years of high school and first years of college. From this work a pilot program of high school courses and assessments was developed, offering 11 subjects that could be taken by high school juniors and seniors and accepted as replacements for introductory college courses.

By the mid-1950s, the pilot program involved 27 schools and had demonstrated successful results on the first examinations. At this point, the College Board took over administration of the program, which was named the College Board's Advanced Placement Program. During the 1960s the first teacher training workshops were offered by the College Board, and during the 1990s the College Board introduced Pre-AP programs to help students gain the necessary learning skills to be successful in AP courses. Course offerings have expanded over time, growing to 37 courses in 22 subject areas as of 2007.

Program Structure and Design

The AP program courses span the range from fine arts to science and include such courses as Art History, Physics, English Literature and Composition, Environmental Science, Japanese Language and Culture, and Music Theory. All except the Studio Art test consist of two sections, a multiple choice and a structured answer section that varies in design according to the subject (written, oral, or computation, as appropriate). The tests are administered in May and are paper based, but increasingly more Internet-based tests are being offered. There is a fee for each exam; as of 2008 the cost was $84 per test. Fee reductions are available for students with financial needs. Services are available for students with documented disabilities. The assessment results are reported on a 5-point scale with 5 indicating the student is extremely well qualified to be placed in the next level of the course sequence, down to 1, indicating that no recommendation is given regarding the student's placement.

It is not required that one complete an AP course to take the corresponding AP test. Arrangements can be made to take the test at a participating school that offers that course. Students may prepare for AP tests through homeschooling or distance learning. This allows some access to AP testing for students who attend schools with fewer AP offerings as well as for elementary and middle school students. Several colleges and programs, such as Rice University, The Center for Talent Development (CTD) at Northwestern University, and The Education Program for Gifted Youth (EPGY) at Stanford University, offer AP courses through distance learning.

The AP test is designed to be a standardized measurement of the core ideas of the course. The acceptance of AP courses as equivalent to college courses assumes that there is a specific body of knowledge that experts agree is essential for a college freshman to know. The College Board takes several steps to ensure AP courses are comparable to those being offered in colleges and universities. A Development Committee made up of both high school and college faculty prepares the Course Description, Teacher's Guide, and examination for each subject. Schools that wish to label a course as AP submit an audit form to the College Board, which reviews the materials (i.e., course outline, sample lesson plans, evidence of teacher experience, and content knowledge) and then gives permission for the school to use the AP designation.

Colleges and universities are surveyed every few years to determine the breadth and depth of classes that correspond to the AP course offerings to make certain the AP exams reflect current college course expectations. In addition, portions of the AP tests

are administered to college students who have completed an analogous introductory course to compare their performance to that of high school students who have completed the AP courses. This information is also used as a guide in setting AP exam grades.

Demographics

The AP program is a prevalent part of education in the United States. Nearly 60 percent of U.S. high schools participate in AP programs, and one in three high school graduates takes an AP course in high school. Over 90 percent of U.S. colleges and universities have an AP policy granting incoming students credit, placement, or both for qualifying AP exam grades. Individual colleges and universities create their own guidelines determining which AP test scores for which courses will be accepted for college credit. However, one does not have to plan to go to college to enroll in an AP course. Over time the demographic profile of the typical AP examinee has changed from largely male students attending elite high schools to a demographic with greater balance of gender and background. Nevertheless, schools with more funding and those that are able to attract the most qualified teachers are often able to offer a greater number of AP courses, leading to inequity among schools in more and less affluent neighborhoods.

Evolution

A program that began as a cooperative endeavor among elite high schools and colleges to consolidate the amount of work and time required to complete university-level work has changed to include a diversity of students with many different long-term goals. Over time the number of AP courses has proliferated, reflecting a similar increase in the number and kinds of courses offered in universities. Similarly, the kinds of students who take AP courses have gradually evolved to include more women and non-White individuals, better representing the student population in the United States, and giving more students the chance to move ahead with more advanced work.

Erin Morris Miller

See also Adolescent, Gifted; Early Admission, College; High-Stakes Testing; Secondary Schools; Test Preparation

Further Readings

Hertberg-Davis, H., Callahan, C. M., & Kyburg, R. M. (2006). *Advanced Placement and International Baccalaureate programs: A fit for gifted learners?* (Research Monograph RM06222). Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Reindl, T. (2006). *Postcards from the margin: A national dialogue on accelerated learning.* Retrieved August 8, 2007, from http://www.jff.org

VanTassel-Baska, J. L. (2001). The role of Advanced Placement in talent development. *Journal of Secondary Gifted Education, 12,* 126–132.

Africa, Gifted Education

In most, if not all, of the developing countries of Africa, primary education for all children has yet to be achieved. Moreover, the Western concept of individualistic accomplishment and progress is inappropriate when considering the concept of "giftedness" in the developing countries of Africa. The African concept of "a person" is closely bound up with the concept of "community" where individuals express "gifts" through group activity. The powerful African concept of *ubuntu,* meaning "humanity," binds the group together in common effort. This is profoundly evident in the community focus on collective celebration, dance, music, and song, which is acknowledged worldwide. Hence, even in South Africa, which is developing very productively, there is generally great reluctance to discuss giftedness, which is often perceived as elitist and divisive. Only in the more Westernized cities would one find what is called "the new middle class" of Black Africans who aspire to be like Americans or Europeans. The dilemma lies in accommodating the need to lift the standard of living of all people in a developing country while not sacrificing the cultural richness and energy that enabled people to survive a very debilitating political regime.

Nevertheless, initiatives to cater to potentially able pupils are developing, particularly in urban and periurban communities. For example,

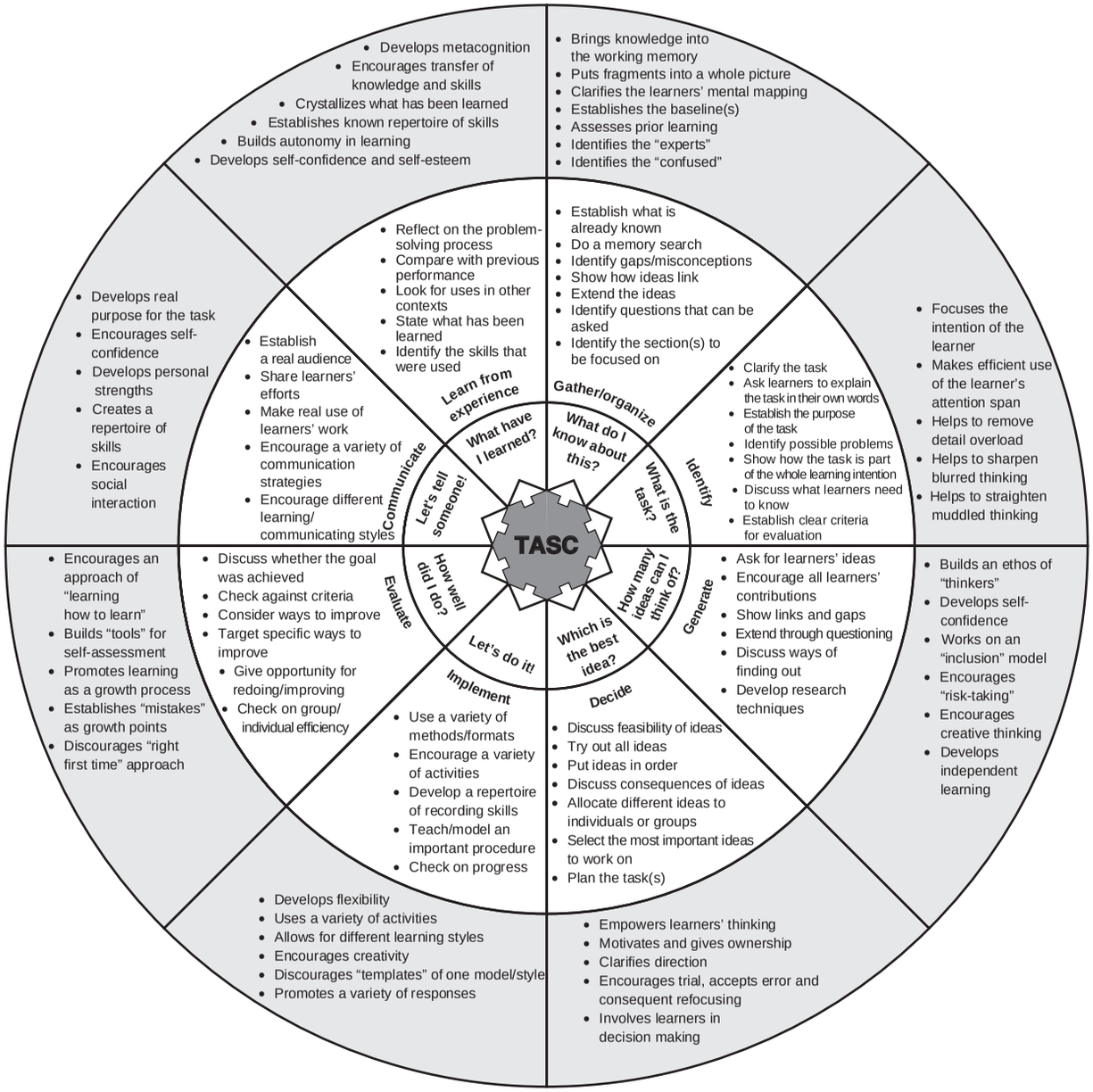


Figure 1 Overview of the Thinking Actively in a Social Context (TASC) Problem-Solving Framework

Source: © Belle Wallace, 2000.

M. A. J. Olivier and Lesley A. Wood are working with teachers in the disadvantaged community of Nelson Mandela Bay to improve teachers' sense of self-efficacy and power as change agents. Kevin Rochford, at the University of Cape Town, is developing science research skills with groups of young students in order to equip them with the skills and confidence to investigate science problems in relation to South Africa. Another example is the work of Jacobus G. Maree and Jacob M. Molepo, which centers on developing life skills in communities where pupils are seriously impoverished and threatened with AIDS/HIV. Maree is also working in the Limpopo Province to develop students' skills of problem solving in mathematics so that potentially able young mathematicians can then pursue their studies at the University of Pretoria.

The examples of upliftment initiatives referred to in the previous paragraph all take into account Jean McNiff and Jack Whitehead's notion of *living theory,* which involves the community of pupils and teachers in a cyclic process of action research that is initially formulated with the target group; and through processes of reflection, evaluation, and consequent rethinking, the action research is revised and developed further.

Issues in Identifying Pupils With High Potential

Through the mid-1980s and the 1990s, Belle Wallace and Harvey Adams worked with groups of disadvantaged learners in the KwaZulu Natal Province. The major aim was to identify learners with high potential who could benefit from enrichment and extension activities that would enable them to matriculate to enter universities. It was evident that conventional intelligence tests could not identify very able learners who had been deprived of educational experiences of even the most basic quality. Moreover, the concept of "cultural deficit" was unacceptable, and the concept of "cultural strengths" was preferred. Consequently, the paradigm of living theory was adopted as the mode of research and development.

What initially emerged was the learners' articulation of their need for the self-assurance that they *could* achieve: Their expressed need was for the development of positive self-concept and internal locus of control. In addition, these learners were surviving in a debilitating environment because they were resilient, determined, and excellent practical problem solvers. It was through analyzing these strengths and simultaneously reviewing current research into "intelligence" that a collective base for action emerged as follows:

- Sternberg's intelligence as problem solving
- Feuerstein's processes of dynamic assessment
- Vygotsky's concept of "zone of proximal development"
- Bandura's belief in the reciprocal modeling of behavior

Gradually, through reflective practice, the Thinking Actively in a Social Context (TASC) framework evolved as a flexible model for the systematic teaching of problem-solving skills that applies in real-life situations and also in formal learning. The learners had ownership and could transfer the processes of their thinking from real-life situations into the classroom. A range of Advanced Thinking Skills evolved that supported the TASC problem-solving framework. In addition, a network of Basic Thinking Skills evolved as necessary for primary school development.

There is not enough space in this entry to discuss TASC in detail. It is possible only to present a concept diagram to encapsulate a summary of the TASC Framework (see Figure 1).

Belle Wallace

See also Cultural Conceptions of Giftedness

Further Readings

Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence*. New York: Cambridge University Press.

Vygotsky, L. S. (1978). *Mind in society*: *The development of higher psychological processes* (M. Cole et al., Eds. & Trans.). Cambridge, MA: Harvard University Press.

Wallace, B., & Adams, H. B. (1993). *TASC: Thinking actively in a social context.* Oxford, UK: AB Academic.

Wallace, B., & Adams, H. B. (Eds.). (1993). *Worldwide perspectives on the gifted disadvantaged.* Oxford, UK: AB Academic.

Whitehead, J., & McNiff, J. (2006). *Action research: Living theory.* London: Sage.

African American, Gifted

Two significant events occurred in 1954 that had a profound impact on the education of gifted students who were African American. Indisputably, the first was *Brown v. Board of Education, Topeka,* which required that African Americans receive an equal education in desegregated settings. Second was the creation of the National Association for Gifted Children, the prominent advocacy organization for students identified as gifted. Both developments, one focused on diversity and equity, and the other focused on giftedness and equity, represented unprecedented opportunities to meet the needs of gifted African American students.

Attention to the issue of African Americans in gifted education is riddled with controversy. Gifted education has received much criticism from both advocates and opponents. The primary criticism is that African Americans are consistently underrepresented in gifted education and Advanced Placement (AP) classes. At no time in the history of gifted education has their school representation matched their representation in gifted education. Gifted education has historically been segregated by race. For instance, as of 2002, Black students represented approximately 17.2 percent of students in school districts nationally, but 8.4 percent of those enrolled in gifted programs—a discrepancy of more than 50 percent. Compared to Black females (all other groups), Black males are even more underrepresented in gifted education.

Several factors contribute to underrepresentation. Nationally, the first step to being screened for gifted education services in most schools is teacher referral. As indicated in a recent extensive review of the literature by Donna Ford, Tarek Grantham, and Gilman Whiting, every study on teacher referral to gifted education found that teachers frequently and consistently underrefer Black students for gifted education services and AP classes. Lack of training in cultural diversity, low expectations and stereotypes, and lack of training in gifted education play a role in teachers' not recognizing giftedness among African Americans. Thus, teachers are the initial gatekeepers to these students accessing gifted education. Second, students are administered intelligence and/or achievement tests. African Americans often do not score at the predetermined cutoff scores; this is particularly true on traditional intelligence tests, where African American students tend to score one standard deviation below White students. Thus, traditional tests are the second barrier. Claude Steele has studied a unique form of test anxiety among Black students, finding in several studies that "stereotype threat" hinders their test performance. Black students who experience this threat have learned to believe that they are not good test takers and that they are less intelligent than other groups. Thus, when faced with a test, they experience anxiety, uncertainty, and repulsion. Further, the debates about test bias continue, along with the efficacy and fairness of their use with Black students. Despite these two concerns (and others) about using tests with African American (and other culturally and linguistically diverse) students, this practice continues; and so does underrepresentation.

How can we increase the percentage of African American students identified as gifted, and how can we ensure that they stay in gifted programs after being recruited? Efforts must focus on both recruitment and retention, such as the following:

- Instruments, policies, and procedures that have a disparate impact on African American students must be changed or eliminated. Instruments (tests, checklists, nomination forms) must be selected carefully; criteria (cutoff scores, etc.) must be examined carefully; and policies and procedures (e.g., teacher referral) must be evaluated to see whether they are educationally useful or harmful.
- A philosophy of inclusion rather than exclusion is necessary; inclusion is recognized as the need to eliminate tools and practices that exclude African Americans from gifted education services.
- Definitions and theories need to be developed with cultural groups in mind. Are they sensitive and responsive to the characteristics of and values of African Americans? Educators and decision makers must understand that the notion of giftedness is socially constructed, such that what is viewed as and valued as gifted in one culture may not be considered gifted in another. One cultural group may value verbal skills, another may prize social skills, and another may value creativity.

- Evaluation must be ongoing and systemic. School personnel must consistently examine patterns and trends (male vs. female representation, underreferral, ineffective tests and instruments) and eliminate barriers.
- Education, including professional development, is necessary for educators and families as well as other decision makers and stakeholders. All parties must be given formal preparation in understanding definitions and theories of giftedness, recognizing characteristics of gifted and talented students, and understanding tests, including their purpose and limitations.
- Educators must receive formal preparation in understanding culture, including how culture affects learning and test performance. They will need to know more about culturally diverse students in terms of characteristics; learning styles; communication styles; and values, traditions, customs, and norms. All school personnel require assistance in creating culturally responsive classrooms, developing multicultural curricula, and modifying their instructional styles and strategies to accommodate diverse learning and cultural styles. With such formal preparation, educators may be less likely to view cultural differences as deficits.

African American students possess gifts and talents like all other groups. No group has a monopoly on being gifted. Nonetheless, the field of gifted education remains racially segregated; too few Black students have been identified as gifted. For change to occur, a philosophy of inclusion is essential. Instruments, definitions, theories, criteria, policies, and procedures must be selected with care and modified so they are culturally sensitive, fair, and equitable. School personnel and families must be educated about gifted education and about cultural diversity. And educators must be diligent, assertive, and proactive about evaluating and changing gifted education and advanced placement with the focus of recruiting and retaining African American students.

Donna Y. Ford and Gilman W. Whiting

See also Cultural Conceptions of Giftedness; National Association for Gifted Children; Stereotype Threat; Teacher Nominations; Underrepresentation

Further Readings

Ford, D. Y. (2006). Closing the achievement gap: How gifted education can help. *Gifted Child Today, 29*(4), 14–18.

Ford, D. Y., & Harris, J. J., III. (1999). *Multicultural gifted education.* New York: Teachers College Press.

Ford, D. Y., & Milner, H. R. (2005). *Teaching culturally diverse gifted students*. Waco, TX: Prufrock Press.

Ford, D. Y., & Grantham, T. C. (2003). Providing access for gifted culturally diverse students: From deficit thinking to dynamic thinking. *Theory Into Practice, 42*(3), 217–225.

Ford, D. Y., Grantham, T. C., & Whiting, G. W. (2008). Culturally and linguistically diverse students in gifted education: Recruitment and retention issues. *Exceptional Children, 74*(3), 289–306.

Ford, D. Y., & Whiting, G. W. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (Part 1). *Gifted Education Press Quarterly, 20*(2), 2–6.

Moore, J. L., III, Ford, D. Y., Owens, D., Hall, T., Byrd, M., Henfield, M., et al. (2006). Recruitment of African Americans in gifted education: Lessons learned from higher education. *Mid-Western Educational Research Journal, 19*(2), 3–12.

Steele, C. M. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist, 52,* 613–629.

Tomlinson, C. A., Ford, D. Y., Reis, S. M., Briggs, C. J., & Strickland, C. A. (Eds.). (2004). *In search of the dream: Designing schools and classrooms that work for high potential students from diverse cultural backgrounds*. Washington, DC: National Association for Gifted Children.

Whiting, G. W., & Ford, D. Y. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (Part 2). *Gifted Education Press Quarterly, 20*(3), 6–10.

"Aha!" Experience

An "Aha!" experience is a moment of sublime clarity that brings an intuitive awareness of the answer to a problem with which one has been struggling. In other words, it is an effective experience that yields an insight into a hitherto unsolvable problem. "Aha!" experiences are widely

reported in the literature on general creativity and mathematical creativity, as well as problem solving. They are also well documented in the historical literature of momentous discoveries in science and mathematics. A well-known example is that of Archimedes running through the streets of Syracuse exclaiming "Eureka!" at having discovered the principle of water displacement that related weight, volume, and density to determine the purity of the gold in King Heron's crown. Other well-known stories include that of the chemist Friedrich Kekulé dreaming of a snake biting its own tail, which led him to conceptualize the structure of benzene as being ring like, or Albert Einstein imagining riding a beam of light in thought experiments that led to the formulation of special relativity.

The literature attributes the "Aha!" construct to the famous book, *The Art of Thought*. Some erroneously attribute it to the prominent 19th- and 20th-century mathematicians Jacques Hadamard (1865–1963) and Henri Poincaré (1854–1912) because of the popularization of their writings in the scientific community. This construct was developed within Gestalt psychology in Germany in the very early part of the 20th century by Max Wertheimer, Wolfgang Koehler, and Kurt Koffka. Some historians push it back to the late 19th century to the writings of Ernst Mach (a physicist turned philosopher interested in the physiology of sensory perception) based on the evidence of written communication between Hadamard and the Gestaltists, which could lead one to infer that Hadamard was influenced by the developments and the terminology within Gestalt psychology. Attempts to understand this elusive construct also appear in a questionnaire that attempted to study mathematical creativity published in the French periodical *L'Enseigement Mathematique* in 1902. This questionnaire and a lecture on creativity given by Poincaré to the Societé de Psychologie inspired Hadamard to investigate the psychology of mathematical creativity through an informal inquiry among prominent mathematicians and scientists in America, including George Birkhoff, George Polya, and Albert Einstein, about the mental images used in doing mathematics. In this inquiry, most of the prominent scientists described the "Aha!" experience as a constituent of their creative process, which in turn led to the theorization that the creative processes followed the four-stage process of the Gestalt experience, namely of preparation–incubation–illumination–verification. The first stage in creativity consists of working hard to get an insight into the problem at hand, called the preliminary period of "conscious" work or the *preparatory* stage. In the second, or *incubatory,* stage the problem is put aside for a period of time and the mind is occupied with other problems. In the third stage the solution suddenly appears while one is perhaps engaged in other, unrelated activities, such as Archimedes sitting in a bathtub, or Kekulé dreaming about snakes, referred to as illumination analogous to the "Aha!" experience. However, the creative process does not end here. There is a fourth and final stage in the scientific community, which consists of expressing and publishing the results in language or writing and subjecting it to scrutiny.

In opposition to the notion that the "Aha!" experience is a brief flash of intuition, contemporary educational psychology has characterized the "Aha!" experience as a much lengthier state of the confluence of intuition, persistence, and imagination when the mind is in a state of relaxation. The psychologist Mihaly Csikszentmihalyi outlined a theory of "flow" that captures some of the essence of what might be called the "Aha!" state in the creative experience. The state of flow is one in which the forces of intrinsic motivation converge with that of the challenge of the task at hand with the result of a person being completely immersed in the problem or activity.

The pedagogical notion of guided discovery best defines a practical application of the "Aha!" experience to the classroom, where the teacher guides students via appropriate examples and discourse toward the personal discovery of a scientific result or concept. From the point of view of programming and pedagogy for gifted and creative students, it is important to emphasize that there is enough documented evidence that "Aha!" experiences come only after tremendous acts of persistence, meaning that an intrinsic interest in solving a particular problem and a prolonged engagement with the challenge are necessary ingredients. Exemplary examples of this are Johannes Kepler's discovery of the laws of planetary motion as a result of 20 years of painstaking numerical calculations. Andrew Wiles's proof of Fermat's Last

Theorem was a 7-year undertaking. Currently the most outstanding unproved conjecture in mathematics with numerous implications is the Riemann hypothesis, which states that the roots of the zeta function (complex numbers z, at which the zeta function equals zero) lie on the line parallel to the imaginary axis and half a unit to the right of it. The analyst Norm Levinson undertook a determined calculation on his deathbed that increased the credibility of the Riemann hypothesis.

Bharath Sriraman

See also General Creativity; Gestalt Psychology and Creativity; Mathematical Creativity; Problem Solving

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Hadamard, J. W. (1945). *Essay on the psychology of invention in the mathematical field*. Princeton, NJ: Princeton University Press.

Sriraman, B. (2004). The characteristics of mathematical creativity. *Mathematics Educator, 14*(1), 19–34.

Sternberg, R. J. (2000). *Handbook of creativity* (pp. 93–115). Cambridge, UK: Cambridge University Press.

Wallas, G. (1926). *The art of thought*. New York: Harcourt Brace.

Wiles, A. (1997). The proof. *Nova*. Aired on PBS on October 28, 1997. Retrieved November 7, 2007, from http://www.pbs.org/wgbh/nova/transcripts/2414proof.html

American Psychological Association Center for Gifted Education Policy

The Center for Gifted Education Policy (CGEP) is housed in the Education Directorate of the American Psychological Association (APA). The Center was first created and funded by the American Psychological Foundation to bring the topic of giftedness to the attention of psychological scientists and practitioners. The CGEP mission is to generate public awareness, advocacy, clinical applications, and cutting-edge research ideas that will enhance the achievement and performance of children and adolescents with special gifts and talents in all domains, including the academic disciplines, the performing arts, sports, and the professions. Although CGEP has conducted many projects, two are central to its mission: (1) the CGEP Listserv and (2) the Pinnacle Model and Catalyst, its associated talent development program. Since 2004, CGEP has been supported by APA and grants from the Jack Kent Cooke Foundation and the Camille and Henry Dreyfus Foundation.

The CGEP Listserv

The CGEP Listserv provides a venue for researchers, graduate students, and practitioners to discuss issues, exchange information, and generate potential collaborations. Subscribers post messages to the Listserv requesting research references and study instruments, as well as inquiries about various policy questions. In addition, the Listserv serves as a mechanism to spread news of interest, including announcements about state, national, and international conferences; programs for young people; and career and research opportunities. As of November 2007, 416 subscribers participated from the United States, Canada, Singapore, France, Great Britain, Jordan, Israel, Finland, Sweden, Switzerland, Bermuda, Germany, Holland, Greece, Spain, Saudi Arabia, and Peru. One can go to www.apa.org/ed/cgepListserv.html to join the Listserv.

The Pinnacle Model

The *Pinnacle model* was conceived by Martin Seligman to bring to life a component of positive psychology. Positive psychology explores an affirmative evaluation of one's activity in the real world. Instead of focusing on healing destructive behaviors or poor mental health, positive psychology addresses optimal human performance. In that vein, Seligman wanted to use a mentoring model in a number of important fields to support talent development of the most gifted adolescents in the United States. In collaboration with Rena Subotnik, CGEP director, he developed the Pinnacle Project, a yearlong program that teamed an eminent master in a field of arts, sciences, or the professions; a rising star; and a highly gifted

high school student who had shown a demonstrated interest and talent in that field. The purpose of the Pinnacle Project was to bring together developed and developing talent in order to

- Publicize the talent development needs of gifted adolescents
- Provide an opportunity for highly gifted adolescents to learn from and be guided by mentors in their fields of interest
- Plan investigations that would serve as a basis of mentoring relationships
- Discuss in a safe forum the joys, psychological stresses, and expectations associated with talent development at the very highest levels
- Establish a venue for fertilization of ideas about talent development across disciplines

Over the years, the Pinnacle model has evolved into several new mentoring programs. The most recent and highly evolved is called Catalyst.

The Catalyst Project

The Catalyst Project is designed as an out-of-school program for adolescents with deep interests in and commitment to the arts or sciences. Over a 3-year span, which began during the summer of 2007, Catalyst will immerse 100+ participants in the talent development of young artists and scientists, combining intensive exploration in a specific discipline with intergenerational professional advice and consultation, as well as interdisciplinary creative stimulation.

As with Pinnacle, the purpose of Catalyst is to provide team-based support for transforming adolescent talent into the next generation of important innovators. The Catalyst Project focuses exclusively on chemistry and the arts. Also, instead of one high school student, each master works with three or four so as to increase the impact of the program and provide peer support for participating students. Components of the Catalyst Project include the participants, the Summit, a mentoring project, and a reunion.

Participants

There are three types of participants: Masters, Associates, and Scholars. Masters consist of eminent scholars in four domains of chemistry and three in the arts. Associates are rising stars in four subfields of the chemical sciences. Scholars are high school–age individuals who have exhibited outstanding achievement in one of those fields as a result of their commitment of time and talent.

The Summit

During a summer week known as the Summit, Masters, Associates, and Scholars are involved in domain-specific and interdisciplinary discussion and project planning. Each day includes team meetings (where the Master, Associate, and Scholars generate the beginnings of a yearlong project), Masters' lectures or demonstrations, roundtable discussions, and cultural and recreational activities. The objective of team sessions is to establish a yearlong mentoring relationship based on a project and career guidance. Other planned activities are designed to (1) elicit creative connections among disciplines, and (2) focus on developing support and friendships among talented adolescents and adults.

The Mentoring Project

Masters and their Associates maintain a relationship with "their" Scholars through visits, telephone, and e-mail or postal correspondence in order to complete projects discussed and/or developed during the Summit.

The Reunion

Scholars, Masters, and Associates gather the following year at the Summit to allow the Scholars to present their projects and interact with members of the new cohort. The return of previous cohorts creates a growing community of individuals who continue to help one another by providing connections, information, recommendations, and creative collaborations that allow for continued development of talent and career success.

Rena F. Subotnik and Ashley Edmiston

See also Adolescent, Creative; Adolescent, Gifted; Eminence; Mentoring Gifted and Talented Individuals; Talent Development

Further Readings

American Psychological Association, Center for Gifted Education Policy: http://www.apa.org/ed/cgep.html

Bloom, B. S. (1985). *Developing talent in young people.* New York: Ballantine Books.

CGEP Listserv: http://www.apa.org/ed/cgepListserv.html

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55,* 5–14.

Subotnik, R. F. (2000). Talent developed: Conversations with masters in the arts and sciences: Martin Seligman: Author and past-president, American Psychological Association. *Journal for the Education of the Gifted, 24,* 97–108.

Anti-Intellectualism

The history of gifted education in the United States reveals that gifted education has been, and remains, a contentious issue in education. There are many possible explanations for this history, such as competition for limited resources with other areas of education; difficulty in determining (identifying) who is gifted; and/or fears of elitism, racism, and classism. Each reason has some merit and certainly contributes to the debate regarding the place of gifted education in the U.S. educational system. However, another reason explains more profoundly the controversial history of gifted education: anti-intellectualism.

Richard Hofstadter wrote a highly acclaimed book titled *Anti-Intellectualism in American Life* that won the 1964 Pulitzer Prize in nonfiction. Hofstadter defined anti-intellectualism as "a resentment and suspicion of the life of the mind and those who are considered to represent it; and a disposition constantly to minimize the value of that life" (p. 7).

Nicholas Colangelo has interpreted Hofstadter's definition as disrespect for the *high-level* activities of the mind and those who represent such activities. At the adult level, we as a society refer to them as "intellectuals," and although we may have ambivalence about such individuals, they are not the focus of anti-intellectualism. This is due, in part, to the fact that they are adults and also because they are not members of any one institution to which we can point.

Anti-Intellectualism and Gifted Students

A more deleterious effect of anti-intellectualism is on the students termed "gifted." These students are of course younger and more vulnerable to the attitudes of society. Just as important, however, is the fact that they are in schools, and schools are places where American society can play out its ambivalence about inequality, individual differences, and the meanings of egalitarianism.

Anti-intellectualism manifests itself in schools as a disrespect or ambivalence toward the following:

- Students who score very high on standardized tests (frequently dismissed with comments about the student simply being a good test taker)
- Students who obtain high grades (referred to as "teacher-pleasers" or "overachievers")
- Students who want to excel in the academics and the arts (referred to derogatorily as "nerds," "geeks," "brains")
- Students who are selected for, and participate in, gifted programs (referred to as "elitists")

One of the most contentious issues for gifted education is recognizing giftedness in the K–12 setting. Should gifted students even be identified? Should there be programs for such a select group of students? Should there be extra resources provided to identified students? Yet it seems that the minute a student graduates from high school there is a community acceptance and pride in giftedness. For example, it is the pride of all high schools to have its graduates going to Stanford, Princeton, Yale, Harvard (i.e., gifted programs). The battles over giftedness take place prior to high school graduation day.

It is not quite accurate to say American society is ambivalent or uncomfortable with exceptional talent. There is often little discomfort recognizing and programming for athletic talent and, to some extent, musical and artistic talent. The contention is in recognizing intellectual/academic talent. This, too, can be attributable to a deeply ingrained attitude of anti-intellectualism.

Manifestation in Schools

When guests walk into a school, what are they likely to see that may indicate the school's value system? If the first thing they see is a beautiful trophy case filled with athletic championships and pictures of all-state players, this says "athletics are valued." Will there be prominently placed displays of academic awards and large color pictures of students who have won academic, artistic, and musical honors? Which student does the school honor most? How does the math team compare to the status of the basketball team? These are not difficult questions for a school to answer, and the answer should provide considerable insight into the "place" that academics and the arts hold relative to athletics.

What Can Be Done?

There is tremendous power in labeling something for what it is. Those who critique gifted education have taken upon themselves the monikers of being "child-centered," "inclusive," "anti-elitist," "egalitarian," "democratic," "defenders of the public school." These are rather positive attributes. On the other hand, such persons will seldom (if ever) label themselves as anti-intellectual, dismissive of individual differences, or disrespectful of the uniqueness of each child. Yet, some of these latter labels may be accurate. At heart, antigiftedness is anti-intellectual and anti individual differences. If we as a society begin to call things for what they are, we may make progress toward the greater recognition and promotion of the value of intellectual and artistic excellence.

Nicholas Colangelo

See also Administrative Attitudes; Attitudes Toward Gifted; Teacher Attitudes

Further Readings

Gardner, J. W. (1984). *Excellence: Can we be equal and excellent too?* (2nd ed.). New York: Norton.

Hofstadter, R. (1963). *Anti-intellectualism in American life*. New York: Vintage.

Aptitude Assessment

Aptitude and *intelligence* are often considered to be interchangeable terms and to be potentially enriched in school settings. Their definitions are different, however: *intelligence* is generally defined as a mental capability for learning from experience. *Aptitude,* on the other hand, can be defined as someone's capacity for learning or ability to do something well in the future. It is sometimes confused with an individual's ability simply to perform a task, but the difference is that while ability to perform can be measured in the present, aptitude is about predicting someone's future success based on ability. Given the nature of education, most school programs focus on academic aptitude. Aptitude assessments are often used to place students in gifted and talented education programs. In traditional U.S. academic settings, nonacademic aptitudes, such as sports, music, and leadership, are not typically assessed by specific aptitude assessments; nonetheless, the education system offers opportunities for students to improve their aptitudes in such nonacademic arenas as well.

Academic Aptitudes

Most gifted and talented programs require assessments for measuring academic aptitude. One of the major strengths of intelligence tests is their ability to predict academic success; therefore, in gifted education programs, they are used as aptitude tests. The two main assessments in use are the Stanford-Binet Intelligence Scale and the Wechsler Intelligence Scale for Children (WISC). The Stanford-Binet is currently in its fifth edition and assesses five areas: fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing, and working memory. The WISC is currently in its fourth edition, and measures four main areas: verbal comprehension, perceptual reasoning, processing speed, and working memory. Both assessments report scores for each area while also having a formula for an overall intelligence quotient (IQ) score.

Most gifted programs have a minimum score on the assessments for admittance into a program. For those who believe that only one kind of aptitude

exists, an overall academic aptitude, the total score on the assessments suffices (e.g., an IQ score of 145 and above). For those who believe that many kinds of aptitudes exist, the other areas within each assessment are also used to point out students' strengths, such as quantitative reasoning, which is related to an aptitude for mathematics. For those who want other measures to define academic aptitude, other evidence is often gathered, such as parental recommendation, teacher recommendation, students' grades, and, sometimes, student portfolios. Collectively, these pieces of evidence can portray students' aptitudes for academic success in ways a single assessment cannot. And, depending on how the gifted and talented programs are structured, students' aptitudes for different subjects may place them in different gifted and talented education programs that can nurture those aptitudes in which they demonstrate the most strength.

College admissions also depend to some degree upon aptitude testing. The two major tests, the ACT and the SAT, however, differ in that the ACT is a measure of achievement—that is, what students have already learned in school, and the SAT claims to be an aptitude test, a measure of basic verbal and mathematical reasoning abilities. This distinction is somewhat controversial, given that both tests probably require both achievement of a knowledge base as well as aptitudes to reason well.

Nonacademic Aptitudes

Howard Gardner's *theory of multiple intelligences* would suggest that there are multiple aptitudes that students can possess and exhibit. Nonacademic aptitudes are often evidenced by early, unusual abilities, such as the musical child with perfect pitch, or the artistic child who draws more accurately and with more complex detail than peers. Although many gifted and talented programs focus on academic aptitude, schools also have other types of programs to allow students with nonacademic aptitudes to flourish and excel in school. Students with high bodily-kinesthetic aptitudes often play sports in school and are part of teams that regularly allow them to capitalize on this aptitude. High-performing athletes are also often awarded sports-related scholarships to colleges and universities. Dancers and students with high musical aptitude learn to flourish in performing arts programs, some of which are incorporated into their school, and some of which they attend outside school for extra enrichment. In addition, student council and extracurricular clubs are places for students with high interpersonal aptitude to have an enriching opportunity to excel in building relationships with, and leading others.

Interpersonal aptitude, linked to emotional intelligence, may influence whether students will have some form of success in actualizing other aptitudes. Students who are high achieving in academic coursework have the frame of mind to work hard and monitor their efforts to succeed in their academic achievement endeavors. Students who participate in competitive sports also realize by self-monitoring what they must do to be ready to compete against other individual or teams, and thus regulate and monitor their efforts in training. The same is true for students in music and dance, who need to practice their pieces regularly to improve. Likewise, those involved in student council or club leadership assess how well they are gauging student interest in their own endeavors.

Regardless of how aptitude is perceived or defined, the goal of gifted and talented education programs is to enrich students' aptitudes, in both academic and nonacademic arenas, with the goal of engaging students in school by capitalizing on their strengths.

Pamela L. Paek

See also Academic Talent; Aptitude Assessment; Giftedness, Definition; Identification; Intelligence Theories

Further Readings

Colangelo, N., & Davis, G. A. (2002). *Handbook of gifted education* (3rd ed.). Needham Heights, MA: Allyn & Bacon.

Davis, G. A., & Rimm, S. B. (2003). *Education of the gifted and talented* (5th ed.). Boston: Allyn & Bacon.

Gardner, H. (1993). *Multiple intelligences*. New York: Basic Books.

Sternberg, R. J., & Reis, S. M. (2004). *Definitions and conceptions of giftedness*. Thousand Oaks, CA: Corwin Press.

Aptitudes

Aptitudes are characteristics that contribute to the quality and rate of acquisition of knowledge and skills in a specific domain. Aptitudes are highly related to the domain because different kinds of domains are organized in distinct ways and impose different kinds of demands on individual aptitudes. Suppose that two persons have the same opportunities to develop a teaching skill. They take the same course, complete the same assignments, and practice the same teaching skill in the same classroom for the same length of time with the same supervisor. One person acquires the teaching skill easily, the other has difficulty, takes more time, and never masters the skill to the same level that the other person does. Some researchers suggest that these two people differ in *aptitude* for acquiring the skills necessary to teach. Assessments of aptitude need to occur with domain-specific tasks. Although biologically based sources of variability exist between people, individuals need sufficient and targeted learning opportunities and support from parents, teachers, and the community to develop their aptitudes fully. Educators need to understand the kinds of conditions, interventions, technologies, support systems, and other resources that are crucial in the conversion of aptitudes into expertise.

Definition of Aptitude

Lyn Corno and his colleagues formally define *aptitude* as the degree of readiness to learn and to perform well in a particular situation or domain. Individuals bring many characteristics that they have learned through their life experiences to the situation, such as knowledge, skills, attitudes, beliefs, values, motivation, and persistence. A small set of these characteristics or aptitudes helps them take advantage of formal and informal learning opportunities. Examples of characteristics that commonly function as academic aptitudes include the ability to make connections using previous information, to transfer knowledge to new situations, to use feedback in correcting errors, to organize information into generalizations, and to manage time. David Lohman notes that aptitudes are not necessarily positive and cites examples of individuals who have the propensity to have or to cause accidents, lie, be unsociable, or create problems. Phillip Ackerman has studied clusters of aptitudes or traits that combine to produce certain outcomes that are observed in academic contexts. He has described these aptitude complexes as combinations of traits such as abilities, attitudes, personality variables, and prior knowledge that are particularly useful for efficient learning.

Given the definition, aptitude is tightly linked to context. To understand the aptitudes that might assist an individual in acquiring new information, the context must be carefully examined. Consequently, defining the situation is part of defining the aptitude and ultimately leads to the individual's achievement in a specific setting. For example, discussions, lectures, problem-based tasks, and cooperative groups all require different types of aptitudes for an individual to be successful. Sometimes the same situation that elicits modes of responding that function as aptitudes in one individual can also elicit modes of responding that thwart goal attainment in others. For example, Lee Cronbach and Richard Snow reported that discovery-oriented or constructivist approaches to learning generally succeed better than more didactic approaches with more able learners. These students can use their superior reasoning abilities in ill-structured learning situations. Other students, however, might need more structure and be more anxious in situations where the learning tasks are open ended. In summary, changing the context changes in small or large measure the personal characteristics or aptitudes that influence success in the context.

Aptitude and Achievement

William Angoff has described these differences between aptitude and achievement. First, aptitudes are acquired through informal learning versus formal learning and are based on older learning and more general content. The general content, however, is more generalizable than the skills and knowledge acquired in a specific achievement domain. For this reason growth in aptitudes is much slower than growth in achievement, which might be quite rapid. Aptitudes are also able to predict future learning whereas achievement essentially describes what has been learned.

Aptitudes are resistant to stimulation and have a major genetic substratum, whereas achievement is susceptible to stimulation and has a major practice component. Finally, although achievement is limited to individuals who have been systematically exposed to knowledge and skills, aptitude is applicable to the general population.

Lohman notes that achievement can function as an aptitude. For example, reading skills are important aptitudes for school learning. Aptitude, therefore, though different from achievement, does encompass it.

Aptitude and Gifted Individuals

A number of researchers in gifted education mention aptitudes as part of their models and definitions of giftedness. For example, Lewis Terman believed that individuals possess unique combinations of general abilities and special aptitudes that need to be cultivated. Abraham Tannenbaum described special aptitudes as arranged in relatively few clusters, thus limiting the number of children capable of excelling in any of these group factors. For example, a child who has outstanding potential as an artist is likely to excel in whatever aptitudes are required in that area, whereas a different group of factors would be needed for a student who excels in science. Similar to Ackerman, he describes the need for an aggregate of complex aptitudes in children to link early promise with eventual fulfillment. Among the five factors in Tannenbaum's model (i.e., general ability, special ability, nonintellective factors, environmental factors, chance), he identifies special ability as the special capacity and affinity for particular kinds of work. He mentions that these aptitudes are recognizable in children in particular domains such as music, whereas aptitudes for social and political structures may develop much later.

Françoys Gagné uses *aptitudes* and *gifts* synonymously and suggests that human abilities are more general in early childhood and may be characterized as gifts or aptitudes. In the early years of childhood, aptitudes are quite undifferentiated and people may be aware only that the child has certain strengths such as verbal precocity, appreciation of natural beauty, or psychomotor agility. From these general gifts or aptitudes, specific talents grow as a result of environmental and intrapersonal catalysts that may be either positive or negative in their impact. Environmental influences include the milieu, persons, provisions, and events. Intrapersonal influences include physical/mental characteristics and self-management. With good experiences, more and more specific talent strengths emerge, and gifted youth who understand their own talents are able to take advantage of the best opportunities around them.

Though other theorists in gifted education use *talents, strengths, gifts, aptitudes, abilities,* and *potential* almost synonymously, all agree that they need to be developed. Students who understand their aptitudes and who have excellent support are more likely to realize high-level creative achievements in a particular domain.

Assessing Aptitude

Whatever the aptitudes may be, it is necessary to assess them as soon as they become measurable so as to determine the extent of the child's special aptitudes and whether to design appropriate curriculum modifications to cultivate them.

Aptitude is commonly inferred (a) from an individual's rate of learning as compared to others or (b) from performance on tasks that require similar aptitudes. In the first case, when a student learns something from only a few examples or with little practice, people describe retrospectively that he or she has an aptitude in that area. In this example, aptitude describes the variation in learning rates exhibited by individuals who seemed similar in other characteristics. In the second case, an individual's facility on tasks that require similar knowledge, skills, or cognitive processes are measured or observed. If individuals perform well on these assessments, then one can estimate the probability that they will do well in a particular domain. For example, Rena Subotnik and Linda Jarvin reported that dance instructors screen potential students by evaluating their body proportions, ability to turn their feet outward, and ability to emulate physical movements. Although none of these characteristics required the performance of a dance routine, all are considered important aptitudes for acquiring dance skills.

Career aptitude tests are also used to predict success in a specific or general professional path or

course of study. Individual aptitudes may be tested as part of a larger battery of subtests and are often used in guiding career choice. For career guidance and planning, assessments may measure different aptitudes such as general learning ability, numerical ability, verbal ability, spatial perception, and clerical perception. Results from objective aptitude tests are then compared to age-group norms or other criteria.

However, as opposed to general learning ability, most researchers encourage the use of aptitude assessments that are closely aligned with the domain or field. Particular aptitudes are more important in the development of high levels of competence than general abilities.

Aptitude–Treatment Interaction

Aptitude–treatment interaction (ATI) is the concept that some instructional strategies (treatments) are more or less effective for particular individuals depending upon their specific abilities. As a theoretical framework, ATI suggests that optimal learning results when the instruction is exactly matched to the aptitudes of the learner.

Snow reported that highly structured treatments seemed to help students with low ability but hindered those with high abilities and that nonanxious or independent students tended to prefer low structure. Though Snow believed that aptitude treatment interactions are very common in education, he reported that many ATI combinations are complex and difficult to demonstrate clearly and are not sufficiently understood to be the basis for instructional practice. For example, most ATI research does not provide sufficient attention to the social aspects within the learning situation. Aptitude variables vary within individuals as a function not only of the task but also of situational variables.

Because of this complexity, results of successful studies have been difficult to replicate and generalize because of the many classroom variables; positive results were discounted or counted depending upon different criteria, making it difficult to determine if ATI exists. Over the past 30 years, the aptitude–treatment interaction rubric has failed to deliver a comprehensive framework for instruction design. Ackerman has suggested that interventions need to focus on an entire complex of traits.

Recently, Robert Sternberg and his colleagues have reported more promising results by matching instruction and assessment to student aptitudes. Using Sternberg's *triarchic theory of intelligence,* they defined analytical, creative, and practical aspects of abilities in verbal, quantitative, figural, and performance domains and measured the strengths of high school gifted students who were participating in a 4-week summer psychology program at Yale. The course had two components in common (a college-level psychology text and lectures) and one component that was either matched to students' aptitudes or not (memory, analytical, creative, and practical). Student performance was assessed on homework assignments, a midterm, an independent project, and the final exam. Using a comparison group analysis, the researchers reported that matched students did better than nonmatched ones and that an interaction occurred between ability and the type of instruction. Those who performed the best on each task were those whose task assignment matched their abilities. These results suggest that the magnitude of effective learning may be influenced by mapping instruction to individuals' aptitudes.

Susan K. Johnsen

See also Academic Talent; Aptitude Assessment; Expertise

Further Readings

Ackerman, P. L., Kyllonen, P. C., & Roberts, R. D. (Eds.). (1999). *Learning and individual differences: Process, trait, and content determinants*. Washington, DC: American Psychological Association.

Angoff, W. H. (1988). The nature-nurture debate, aptitudes, and group differences. *American Psychologist, 41,* 713–720.

Corno, L., Cronbach, L., Kupermintz, H., Lohman, D., Mandinach, E., Porteus, A., & Talbert, J. E. (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow.* Mahwah, NJ: Lawrence Erlbaum.

Snow, R. E. (1998). Abilities and aptitudes and achievements in learning situations. In J. J. McArdle & R. W. Woodcock (Eds.), *Human cognitive abilities in theory and practice* (pp. 93–112). Mahwah, NJ: Lawrence Erlbaum.

Sternberg, R. J., & Davidson, J. E. (Eds.). (2005). *Conceptions of giftedness* (2nd ed.). New York: Cambridge University Press.

Sternberg, R. J., Ferrari, M., Clinkenbeard, P., & Grigorenko, E. L. (1996). Identification, instruction, and assessment of gifted children: A construct validation of a triarchic model. *Gifted Child Quarterly, 40,* 129–137.

Architecture

A pioneer in the field of research on creativity generally and architects specifically, Donald W. MacKinnon, conducted groundbreaking research on the characteristics of creative individuals. His work sought to define what is generally true of creative persons based on their personality traits and environmental influences in youth, define fields of creativity, and compare the most creative of those within the field of architecture to those who possessed less creative ability. The findings of MacKinnon's research have had far-reaching effects for talent development and gifted education.

Research on Architects

To determine who was creative, MacKinnon and his colleagues first had to define a concept of creativity. In their view, true creativeness had to meet three conditions: novelty of thought or action, adaptive to reality (i.e., able to solve a problem), and resulting in a product that remained true to the initial creative insight. This conception of creativity required that creativeness be studied as a manifest quality, thereby confining the selection of individuals to be studied to those who had exhibited creativity through clearly identifiable creative products. Architecture was one of six fields sampled and was unique in that it required the individuals within the field to be both creative scientist and artist. In addition, a variety of talents are required to be successful in architecture. Successful architects must first market themselves, attain clients by convincing clients that they are the best person for the job, form a contract for services, develop a concept for the design process, artfully design a building, produce design sketches the client will understand, render mathematically and technically accurate drawings, ensure that the building is structurally sound with well-planned mechanical and electrical systems, work with a contractor to ensure that the design is built to specification, and finally be a savvy businessperson throughout. Multiple roles and creative products are required of an individual who engages the field of architecture and excels to the top of the field.

For MacKinnon's research, the top architects in the field were recruited from across the country as well as lesser-known architects and individuals new to the field of architecture. The top architects, as compared to their less-productive and lesser-known counterparts, more often described themselves as inventive, independent, enthusiastic, and industrious, whereas the others tended to see themselves as responsible, sincere, and understanding. The top architects tended to be more sensitive and were more often observed by research staff as having originality in thought, asthetic sensitivity, a sense of destiny, sensitivity to others' ideas, cognitive flexibility, inquisitiveness, a sense of personal identity, and intellectual competence.

The top architects in the field reported similar environmental influences in their youth as well. The top architects self-reported that experiences at home and in school as well as the quality of their interpersonal relationships fostered their creativity and set them apart from their less creative peers. Parents of the top architects engendered autonomy by granting their children freedom to explore, make decisions, and choose activities of interest in the early childhood years. These architects believed that this enabled them to develop a sense of independence and control. In contrast, these individuals lacked a sense of closeness with one or both parents, potentially feeling no strong emotional ties. There were, however, clear standards of performance and personal conduct within the family structure, and although they described themselves as independent and without strong emotional ties, mentors and role models were prevalent in their lives. Across almost all of the most creative architects, there was also a very early development of artistic expression, particularly in drawing and painting.

These creative architects generally earned a B average in college, and expressed that if they were interested in a course they earned top marks, but if the course was uninteresting, they were willing to do no work at all. These creative individuals tended to question authority and would not accept concepts as fact unless they were able to demonstrate the validity for themselves.

Influence on the Field of Gifted and Talent Development

Most current conceptions of giftedness have creativity as one component of the complex construct of being "gifted," and many of these conceptions require some manifest product to assess whether an individual is creative and by extension gifted. Moreover, current identification methods for gifted programs in educational settings generally use multiple assessments, including measures of creativity or creative behaviors. This is in contrast to earlier identification practices that relied primarily on IQ scores. In these educational settings, where talent is potential with no or limited evidence to support its existence, teachers utilize creativity training and activities resulting in creative products for talent development.

MacKinnon's insightful identification and explication of architecture as a field in which multiple talents are required and come to bear on the outcome, has enabled educational professionals to see the value in developing activities, projects, and educational plans based in architecture and associated principles of the field. Through the medium of architecture, students can explore math, history, visual arts, and science, as well as employ the skills of practicing professionals such as marketing, planning, design, bookkeeping, drafting, research, and sales. Architecture also supports the pedagogical practices of knowledge constructivism, experiential learning, and collaborative group work, where members of the group bring their special talents to bear on the outcome of a project.

Architecture, ultimately, provides the opportunity for transfer of knowledge and training by helping individuals to see the relationships between multiple domains. It requires self-discipline to complete a project, reinforcing the self-regulation of behavior to achieve a goal. It engages multiple senses and sensory modalities for knowledge acquisition and expression. It requires that individuals maintain an awareness of conceptual understandings while addressing minute details; and it deals in the symbolic, relying on metaphors and analogies for the creation of an architectural masterpiece. It plays an important role not only in the expression of creative genius, but also in the development and expression of talent.

Angela M. Housand

See also Creative Productivity; Creativity, Definition; Multipotentiality; Relationship of Creativity to Intelligence; Role Models; Talent Development

Further Readings

MacKinnon, D. W. (1978). *In search of human effectiveness*. Buffalo, NY: Creative Education Foundation.

Mary, C. (1999). Math in architecture: Using technology to connect math to the real world. *Gifted Child Today Magazine, 22*(4), 24–31.

Pentacost, C. H. (1999). Building foundations in architecture. *Gifted Child Today Magazine, 22*(2), 36–39.

Art Education

As a field of study, art education is dedicated to the development of artistic ways of knowing and thinking among all learners through meaningful engagement with art making and critical response. Although the field serves a broad spectrum of learners, including those with learning challenges and the gifted, the majority of its attention is focused on mainstream K–12 learners, primarily within the context of school settings. In the course of the field's evolution since the late 19th century, it has served shifting societal needs, and today's art education reflects agendas such as human development through engagement with art objects and art-making processes; learning in the domain of art; and investigation of issues that range from making interdisciplinary connections to social issues and the study of visual culture. Members of the profession include art teachers in community, early childhood, and K–12 settings; museum educators; and college art educators.

Certain theories emerging from art education are relevant to notions of giftedness, creativity, and talent. Specifically: Gestalt psychology and Rudolph Arnheim's ideas regarding art, visual perception, and visual thinking; Viktor Lowenfeld's perspective on the stages of creative and artistic development of children; Manuel Barkan's notion of art as a discipline with history, theories, skills, and knowledge; Nelson Goodman's theory of art as a symbol system affected both David Perkins's work

and Howard Gardner's theory of multiple intelligences; and Elliot Eisner's theory of children's creativity influenced Mihaly Csikszentmihalyi's notions of art as visual problem solving requiring high-level perceptual and cognitive processes to communicate emotional content. All have provided scaffolding for further research on artistic modes of thought and expression.

Art Education and the Gifted

At the level of practice, most art teachers would admit to special care for those who have artistic potential, recognizing a professional commitment to nurture, guide, and advocate for these students. At the level of theory and research, investment in the gifted and talented has moved in cycles from interest to disinterest, responding to the political climate in education and questions taking center stage in the field of art education. In general, artistic development in gifted education is not well understood, and giftedness in art education is not given the focus many believe it deserves.

Art Education and Creativity

In the 1950s, creativity was of paramount interest in art education, due in part to the influence of Lowenfeld's text for art educators, *Creative and Mental Growth,* and its focus on creative expression as a primary goal. At the same time, the United States' interest in establishing creativity as a national strength contributed to the ascendancy of modernism and the creation of a cast of leading artists. Psychologists studying creativity turned to artists as models of creative personalities. In interesting ways, investigations of creativity informed art education, and art education research informed psychologists.

Research by the leading psychologists of creativity informed art education practice. Graham Wallas's *four-stage theory* described the creative process in studies of personality as well as performance. Susanne Stein's concern with the creative process required for viewing art forms, and Richard Greene's interest in aesthetic knowledge highlighted the role of creative thought requisite to appreciating art forms.

Nearly a third of all articles in *Studies in Art Education* from its inception to the 1960s have been studies on creativity. E. L. Mattil studied effects of two methods of instruction in art for ninth graders, depth and breadth. His findings that depth contributed more to work considered artistically creative supports the need for differentiated instruction of artistically talented students. June McFee found artistic engagement opened academically able students to creative modes of thinking, supporting the importance secondary principals attributed to the role of art education for all gifted students.

Art Education and Talent

The talent development model evolving in gifted education suggests that every talent domain requires extended periods of concentrated, deliberate practice to develop expertise. Art educators agree that artistic ways of knowing and thinking involve development of artistic behaviors, attitudes, discipline, and expertise over time. The need to provide opportunities for talent development in the visual arts has been well documented.

In the 1970s, given federal endorsement, there was sufficient interest in the gifted and talented in the visual arts to encourage the development of special programs in elementary and secondary education. A variety of programs were developed, some modeled after existing high schools for the arts; others were federally funded as magnet programs, designed to integrate diverse student populations. Both contributed to a developing network of schools for the performing and visual arts. As political and financial support for gifted programs has decreased, magnet or specialized schools for the arts appear to offer viable avenues for the development of artistic ability, complete with selective entrance procedures and intensive preparation. Many comprehensive high schools serve artistically talented students through International Baccalaureate or Advanced Placement programs. Summer institutes include state-run governor's schools and residential programs at universities and colleges of art. The fact that these programs are available to some but not all students creates unequal opportunities for advancement of artistic ability. Many students still do not have access to quality art instruction; interaction with similarly able peers; or opportunities to meet artists, visit museums, or learn how to do work that would

qualify for competitive awards such as Scholastic Arts Scholarships, Arts Recognition and Talent Search awards, and nomination as Presidential Scholars in the Visual Arts. Specialized high schools of the arts send high proportions of their students on to the leading art institutes, such as the School of the Art Institute of Chicago, San Francisco Art Institute, Parsons School of Design, and Rhode Island School of Design.

Interestingly, connoisseurship, the capacity to discern and appreciate subtle qualities in the arts, has traditionally been associated with well-educated minds. As such, art appreciation and study of art history are often considered by secondary school principals as appropriate aspects of gifted programs for academically talented students.

Sandra I. Kay and Karen L. Carroll

See also Artistic Ability; Artistic Assessment

Further Readings

Carroll, K. L. (2007*). Better visual arts education.* Baltimore: Maryland State Education Department of Education (available through the National Art Education Association [NAEA]; e-mail: info@ArtEducators.org).

White, J. H. (2004). Learning in the visual arts: Characteristics of gifted and talented individuals. In E. W. Eisner & M. Day (Eds.), *Handbook of research and policy in art education* (pp. 379–405). Mahwah, NJ: Lawrence Erlbaum.

Artistic Ability

The term *artistic ability* is often defined as, and is used here to describe, advanced ability in the visual arts as it relates to conceptions of giftedness, creativity, and talent.

Children gifted in art have fluency of imagination and expression, highly developed visual and organizational sensibility, intuitive quality of imagination, directness of expression, and a high degree of self-identification with subject matter, visual and conceptual fluency of ideas, complexity and elaboration; visual memory and detail; sensitivity to art media and technical control; random improvisation; and verisimilitude or the technical mastery of true-to-life results. Certain behaviors also seem to be associated with artistic potential: early interest in childhood; emergence through drawing; rapidity of development; extended concentration; self-directedness; possible inconsistency with creative behavior; use of art as escape; and ability to transfer skill to new situations. Additional behaviors include perceptual acuity, personal aesthetic preferences, and problem-defining and problem-solving skills.

Because artistic potential often appears in early childhood, one would expect longitudinal studies to be prevalent, yet descriptive case studies prevail in the research. Biographical studies of artists, especially the study of the childhood work done by artists such as the work of David Pariser on Pablo Picasso, Paul Klee, and Henri Toulouse-Lautrec and Karen Carroll on Edvard Munch have provided retrospective insights on the development of this level of expertise. Benjamin Bloom's study of accomplished sculptors focused attention on early memories of engagement with construction and spatial abilities rather than two-dimensional efforts. Prodigious childhood behavior may not develop into adult artistic productivity. Current understanding suggests that artistic ability is a constellation of qualitative traits evident in behaviors and products that emerge and develop in relationship to pleasurable and meaningful engagement with art making.

Artistic Ability and Gifted

Until the 1972 federal definition of giftedness included the visual and performing arts as an area in which giftedness could be manifest, relatively little was done to identify and serve this population formally. Use of multiple criteria is recommended for identification and may include both general ability measures as well as domain-specific criteria. However, research on the relationship between general intellectual ability or achievement tests and artistic ability has had mixed results. Although many students identified as intellectually or academically gifted also have demonstrated artistic abilities, not all do. Artistic ability can be found without demonstrated intellectual ability, and general intelligence may not be

immediately apparent when it is masked by academic learning challenges.

Three-dimensional ability is also not necessarily accompanied by two-dimensional ability and vice versa. Studies of spatial ability or figural (nonverbal) reasoning measures have not demonstrated a correlation with artistic ability. These assessments do not appear to measure *visual thinking*, or thinking in images, although studies investigating dyslexia and the use of an Impossible Figures Test to identify artistic ability have been conducted. In Howard Gardner's *theory of multiple intelligences, visual–spatial intelligence* is described as an ability to think in images, and researchers in many fields have noted it as valuable to creative producers in all disciplines.

Many researchers have studied ways of identifying the artistically gifted and talented. Ironically, self-identification remains one of the strongest identifiers of artistic ability. Because identification of giftedness in the visual arts remains more of an art than a science, intuition, knowledge of the domain and the personal judgment of reviewers often enter into selection processes for special programming.

Creativity

There has been a history of cross-pollination of ideas between studies in creativity and studies of artistic ability—from art director Alex Osborn's brainstorming techniques' influence on creativity research to the seminal work of J. P. Guilford and E. Paul Torrance informing art education practice. Both creativity and artistic production require intense motivation, direct engagement of the senses, problem finding, and creative problem-solving skills. Despite some perceptions that artistic ability is a synonym for creativity, the relationship between artistic ability and creativity, as measured on creativity tests, remains unclear. Divergent thinking tests do not seem to be good indicators of artistic ability. Others claim that both divergent and convergent thinking are requisite to artistic production.

Studies of the creative thought of adult artists have provided insights on the affective and cognitive characteristics of artistic ability. Artistically gifted scored higher than the intellectually gifted in imaginational and emotional overexcitabilities. Empirical studies of the creative process of artists provide an interesting line of research. The problem-finding behaviors of creative and less creative art students and studies on differences in figural problem-solving and problem-finding behaviors among professional artists, semi-professional artists, and nonartists have been conducted. Cognitive psychology's study of expertise provides promising avenues of research.

Visual Art Talent

It is not yet possible to predict a Michelangelo, but the talent-development perspective has enriched our understanding. Bloom's study suggested that there are three stages in the development of talent (love of subject, development of discipline and technique, and individual position in the field) requiring differently specialized teachers, and that exceptional levels of talent require a supportive environment, motivational encouragement, special experiences, and excellent teaching to support the extensive training required. Mihaly Csikszentmihalyi's research added recognition, extrinsic and intrinsic rewards, and resources to the list of requisite conditions for creative contributions.

Sandra I. Kay and Karen L. Carroll

See also Art Education; Artistic Assessment

Further Readings

Bloom, B., & Sosniak, L. (1985). *Developing talent in young people*. New York: Ballantine Books.

Getzels, J. W., & Csikszentmihalyi, M. (1976). *The creative vision: A longitudinal study of problem finding in art*. New York: Wiley.

Hurwitz, A., & Day, M. (2007). *Children and their art* (8th ed.). Orlando, FL: Harcourt Brace Jovanovich.

Kay, S. I. (2000). On the nature of expertise in visual art. In R. C. Friedman & B. M. Shore (Eds.), *Talents unfolding: Cognition and development* (pp. 217–232). Washington, DC: American Psychological Association.

Pariser, D., & Zimmerman, E. (2004). Learning in the visual arts: Characteristics of gifted and talented individuals. In E. W. Eisner & M. Day (Eds.), *Handbook of research and policy in art education* (pp. 379–405). Mahwah, NJ: Lawrence Erlbaum.

Artistic Assessment

Since artistic work is the end product of an internal process combined with an external awareness, it is a challenge to evaluate and assess. In addition, there are a variety of different situations for which art assessment is useful; as this changes so does the focus of the assessment. Thus art educators may use certain criteria to assess their students, whereas mental health professioals may use a different approach. This entry focuses on assessment of the visual arts—drawing, painting, and sculpture—and provides information about assessment of these productions, giving the reader a sense of the variety of approaches and methods of art assessment.

Art Assessment in the Schools

Educators are continually challenged to provide measurable, objective assessment of their students' growth and development. Art educators are no exception and are faced with the daunting task of assessing art. The Center for Educator Development in Fine Arts provides detailed suggestions for assessment of art students of all ages. These include assessment of the process and the product, continual provision of feedback during the artistic process, assessment based only on content or skills that they have been taught, provision of specific feedback, and the student's evaluation of his or her product. Naturally, the means of assessing these students varies with their developmental level, but focusing on the whole process of art production rather than the end product provides richer assessment and education.

For younger students, the assessment of the art product is limited. Young children are rarely insightful about their productions, though these products may be profoundly beautiful to adult viewers. For the most part, young children are curious about the artistic process and readily engage with the materials. The focus in assessing these youngsters is often social and process oriented. Are students able to interact with their peers in appropriate ways? Are they willing to try new media? How do they approach the task and solve new problems?

As students become older and increasingly able to reflect on and process their artwork, this too becomes an area for assessment. Students may be asked to provide a self-assessment of their work, have class discussions, or receive written and verbal critiques of their work.

High school students may be assessed by experts in the field, be expected to take oral and written tests about the properties of art, and be expected to research historical and modern artists. These elements add dimension to assessment and richness to art education. Knowledge of previous artistic movements and a developing awareness of the formal elements of art can be assessed. Are students aware of the relationship between form and function? Have they begun to master the technical skills of certain media? Do students pay attention to their process, and to their failures in addition to their successes? Are they aware of the context in which their artwork was created? These questions begin to provide an assessment of the students' process as well as their product.

Students who choose to continue with art education in college will be subject to assessment that focuses on product. Although process continues to be important, the final product becomes the representation of this effort. Students are asked to provide insightful reasons for artistic choices that reflect an understanding of technical skills, historical trends, and their thought process about the development of the piece. This type of assessment provides a detailed understanding of the process as evidenced by the final product.

Art educators are faced with the challenge of including these several facets in their assessment. One tool that can be beneficial is the rubric. Rubrics consist of a series of descriptions about a specific criterion. Each of these descriptions identifies what skill, ability, or behavior must be present. This allows for an objective means of assessment. Naturally, artistic tastes vary, and without an objective set of criterion focused on both process and product of artwork, it is difficult to remove subjective impressions. It is important for art educators to be aware of their own biases in art to add further awareness to this process.

Art Assessment of Development

Most art assessment will be housed within education; however, it is important to note that art is frequently used to assess developmental level and mental health concerns. Art provides a unique

means of assessing individuals of varying ages and developmental levels. Again, both process and product are important parts of this assessment.

How the students engage with the materials provides insight into their internal processes. Do they line all of the markers up by color before beginning, or do they smear paint with their fingers over the paper (and sometimes the walls)? Do the students try new art activities or do they prefer to stick with what they know? The answers to these questions can provide valuable information about how an individual student is functioning and how he or she might respond to intervention.

In addition, the product an individual creates can also provide information about his or her level of functioning. Is the figure drawn developmentally appropriate? Are there unusual elements in the drawing that suggest differing thought processes? The answers to these questions, again, provide a foundation for continued exploration.

Importance

Whether art is assessed in the school or in a clinic, the means of assessment is vital to the outcome. If subjective assessment is the only tool used, students will not be provided with the feedback necessary to develop and hone their skills and may be misinterpreted. By providing objective and comprehensive art assessment, students have the advantage of grounded feedback and insight from those around them.

Selby M. Conrad

See also Artistic Ability; General Creativity; Identification

Further Readings

Blaikie, F. (1994). Values inherent in qualitative assessment of secondary studio art in North America: Advanced Placement, Arts PROPEL, and International Baccalaureate. *Studies in Art Education, 35,* 237–251.

Cannatella, H. (2001). Art assessment. *Assessment & Evaluation in Higher Education, 26,* 319–326.

Huffman, E. S. (1998). Authentic rubrics. *Art Education, 51,* 64–68.

Rubin, J. A. (1986). *The art of art therapy.* Levittown, PA: Taylor & Francis.

Taylor, P. (Ed.). (2006). *Assessment in arts education.* Portsmouth, NH: Heinemann.

Asia, Gifted Education

Conceptions of giftedness are grounded in culture. Understanding how giftedness is identified and nurtured in diverse contexts helps us broaden and deepen our own perspectives. It also improves our understanding of the role of culture and context in the identification and education of gifted and talented children. Asia is the world's largest and most populated region. More than half the people in the world live there. Geographically speaking, it consists of four regions: Central Asia, Eastern Asia, Southern Asia, and Southeast Asia. Historically, each region pursued different paths in its social formation and political development. As a result, Asia is a continent with amazing diversity. It includes some of the richest countries in the word (Japan) and the poorest (Bangladesh). Asians are therefore distinctively unique in their political, social, and cultural outlooks.

Asians were identifying gifted children and developing their abilities long before there was a United States or a United Kingdom. For example, as early as the Spring and Autumn Period in the 8th century BCE, the Chinese valued talent in interpersonal intelligence, arts (including music and calligraphy), athletics (including archery and horseback riding), and arithmetic. Later, in the 3rd century BCE, the Chinese sent child prodigies through the Boy's Imperial Examination. The imperial examination system begun in ancient China served to filter talents in the society. The modern version of such a system can be seen today in the stiff competition in national examinations in Asian countries.

Giftedness in Asia

To understand giftedness in Asia, it is essential to grasp fundamental differences between Eastern and Western philosophies concerning ability. In Western societies, genetics is largely viewed as the dominating force in latent ability. Although environmental factors are acknowledged and the nature/nurture debate remains ongoing, parents generally believe that their children are born with a predetermined predisposition to certain kinds and levels of ability. Their job is to identify and develop their children's innate aptitude.

Table 1 An Overview of Program Development Among Asian Countries

Country	*Program Development*	*Identification Process*	*Programs and Services*
Hong Kong	1990 Hong Kong Education Commission defined the term *gifted children* 2006 Research and Development Projects	Standardized tests including intelligence, creativity, learning aptitude, and academic achievement Performance in school including both academic and non-academic Awards through competitions Nominations: teacher, self, peer and parents Interviews Portfolio evaluation	Provision of gifted services via the three-tier model: Level 1—whole class approach Level 2—school-based pull-out approach Level 3—external support through 'support Measures for the Exceptionally Gifted Students' initiative started since 2001 2000–2003 Cluster School Gifted Project 2002–2006 Seed Project
India	1962 Jnana Prabodhini 1975 Inception of MENSA 1986 National Policy of Education-Navodaya Vidyalaya Scheme 378 N.V.	Two-tier selection: state and national level examinations Three components: 1. Mental ability tests (60%) 2. Arithmetic (20%) 3. Language (20%)	75% of the seats in the district are reserved for candidates from rural areas National Council of Educational Research and Training (NCERT) awards 750 scholarships each year No provision for nursery or preschool children
Indonesia	1989 Second Law on the National Education System (Chapter III, para 8/2)	Tests on intelligence, creativity, and standardized achievement tests (since 1982)	Project schools for the gifted in Jakarta (urban) and Cianjur (rural), 1982–1986 The field-tested Plus Curriculum (since 1994)

Country	*Program Development*	*Identification Process*	*Programs and Services*
	1998 Broad Outline of the State's Policy (GBHN)	Screening tests including learning behaviors (intelligence), creativity, and achievement motivation Tests identifying the underachieving gifted (since 1990) Teacher, peer, and self-nomination scales (1993)	"High Schools of Excellence" in 27 provinces at local, provincial and national levels Other provisions: Scholarships for overseas study in science and technology Science contests Programs for gifted and creative preschool children established by private organizations/ foundations (e.g., the Creativity Development Studio The University Research for Graduate Education Project (URGE), competitive grant and fellowship programs
Japan	1965 The Research Institute of Education for Brilliant Children (privately owned) 1972 Central Council for Education (an advisory body to the Japanese Ministry of Education) proposal	Unknown	Afterschool activities No differentiated curriculum for the gifted and stringent entrance examination criteria apply to all Early admission to college—Under the School Education Acts, exceptional few who display giftedness in math and physics enter college before the age of 18
People's Republic of China	1978 Establishment of Cooperative Research Group of Supernormal Children of China	Multi-criteria and multi-method: 1. Nomination by parents or teachers or reported in the media 2. Recommended by professionals	Special class for intellectually gifted adolescents in the University of Science and Technology of China (USTC) in 1978

(Continued)

Table 1 (Continued)

Country	*Program Development*	*Identification Process*	*Programs and Services*
		3. Tested with the standardized intelligence test 4. Observations	Early enrollment, acceleration programs for elementary and high school students, grade skipping, special class, special schools, special activity within/out-of-class settings, vocational or weekend programs, and individualized instructions
Philippines	1966 Opening of the Teacher Training Program for the Gifted in the Department of Special Education, University of Philippines 1987 Official commitment to Gifted and Talented Programs in the Constitution	It is a combination of assessments including standardized tests, classroom grades, teacher recommendations, and interviews with parents and students	1963 the Manila Science High School 1964 the Philippine Science High School Scholarships are offered to deserving but underprivileged students National High School for the Arts 1983 TAG; provides identification and assessment measures; guidance to parents and gifted students through support groups
Singapore	1984 Inception of Gifted Education Unit at both Primary and Secondary Levels 2004 Broaden Conception of Giftedness and Talents Through the Implementation of Integrated Program 2006 Extension of Program to Top 5% of the National Cohort	Screening stage—achievement tests in English language and mathematics Selection stage—general ability, language and numerical abilities	Gifted programs operating at the selected centers for the top 1% primary students and subject-specific talent development programs for the top 5% School-based programs for high-ability high school students; specialized schools such as NUS Math and Science High School, Singapore Arts School, and the Sports School

Country	*Program Development*	*Identification Process*	*Programs and Services*
South Korea	1983 Establishment of the Science High School 1996 Allow Grade Skipping and Early Entrance to Elementary School 1999 Introduction of Gifted Education Law 2001 Research Center on the Education of the Gifted and Talented at the Korean Educational Development Institute (RCEGT-KEDI) 2002 Law for Promotion of Education of the Gifted	Academic performance Award records Physical conditions	Special High Schools in the areas of science, foreign language, sports, and performing arts Cyber Gifted Education System was established in 1998 to provide enrichment programs on the Web Private institutions that provide enrichment programs for young gifted children (e.g., the Korea Academy of Gifted Education affiliated with the CBS Cultural Center); Korean Minjok Leadership Academy was established in 1996 for high school students
Taiwan	Before 1973 Dawning Stage 1973–1979 Initial Experimental Stage 1979–1984 Promoting Stage after 1984 The Special Education Law (revised in 1997)	Strict and systematic multi-assessment and screening process through group intelligence tests, students' daily performances, and teachers' observations Upper 10%—group and individual standardized tests	Early entrance Grade skipping Early graduation Advanced placement Exemption from entrance examination Enrichment programs
Thailand	1999 National Center for the Gifted and Talented	Unknown	The LONG-term Scholarship Project started in 1984 The National Science and Mathematics Olympiads project started in 1991

This is not the case in Asian societies. Asians view environmental forces as dominant, and they generally believe that all children are born with similar potential but with different rates of development. Therefore, the prevailing view is that with hard work, anything is possible. Though the strength of this belief varies across and within Asian countries, common parental and educational practices reflect this mind-set. As a result, Asian parents and teachers approach the identification and development of children's abilities quite differently from their Western counterparts. For instance, there has been little emphasis on early identification. Gifted Asian children are often identified later than their Western counterparts.

Further, until quite recently, equity was largely a concern of Western countries. Streaming has been the norm in much of Asia for generations. The difference among societies is the age at which streaming begins and the levels at which it is maintained. Ability grouping, special classes, and elite schools have a long history. In other ways, though, Asian programs are similar because most have adapted Western models according to their own sociocultural and political contexts. However, the way in which education is funded and the goals of education differ from Western contexts. Among Asian countries, there are sharp divides between developed and developing nations.

Developed Versus Developing Nations

The development of gifted and talented education among Asian countries is uneven because they are progressing at different rates of development. In the poorest countries, the priority is often to focus resources on improving the quality of manpower as a foundation for economic planning. One of the common factors in the formula of success among developed Asian countries (e.g., Singapore, Taiwan) is the significant investment in education and emphasis on changing quality of life. Developed countries tend to have comprehensive, established educational systems that include programs for gifted and talented children. Over time, they have accumulated enough resources to choose the foci of their human resource development and to scale the height of educational excellence. In contrast, poor, developing countries such as Vietnam, Cambodia, and Myanmar did not get out of wars immediately after the Second World War. That region continues to lag in educational development due to destruction from decades of war and to many unresolved political and social factors even at present. India, though it has been independent since 1947, is overwhelmed with equity issues in its allocation of national resources (e.g., availability of educational opportunities and scholarships) due to the gap between the rich and the poor. Table 1 summarizes the major characteristics of programming in nine Asian countries.

Because many Asian countries still lack the resources and infrastructure to advance their own research, they lack indigenous theoretical foundations of educational psychology of their own. They tend to depend on research from the United States, the United Kingdom, and Australia to inform their practices and policies. There is a great need in Asia for research that is grounded in the local contexts and cultures.

In recent years, many places in Asia (e.g., Taiwan, Singapore, Hong Kong) have begun to broaden their conceptions of giftedness to include more than test scores. There are tentative steps toward limited inclusion of gifted children in the regular classroom and a growing awareness of twice-exceptional children. As educational philosophies and practices become more differentiated, some governments and private agencies are experimenting with a wider variety of programming options, including special schools for children with domain-specific talents and interests, inclusion of children with disabilities in gifted programs, and providing counseling services for gifted children.

Sustainability of Gifted Programs

The differences between Asian and the Western conceptions of giftedness reflect the important roles of cultural beliefs, social contexts, and available resources. In view of the impact of globalization, it is inevitable that Western ideas will be integrated into specific cultural contexts at the initial stages of development. The sustainability of the programs, however, will depend on the firm belief in giftedness, government support, and effective contextualization of concepts, methods, and research.

Maureen Neihart and Tan Liang See

See also Asian American, Gifted; Diversity in Gifted Education; Early Identification; Elitism; Global Issues; Identification; Parental Attitudes; Prodigies; Specialized Secondary Schools

Further Readings

Chan, D. W. (2008). Giftedness of Chinese students in Hong Kong: Perspectives from different conceptions of giftedness. *Gifted Child Quarterly, 52,* 40–54.

Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotnik, R. F. (Eds.). (2000). *International handbook of giftedness and talent* (2nd ed.). Oxford, UK: Elsevier.

Hong Kong Education Bureau. (2007). *Curriculum guide on school-based gifted development programmes*. Retrieved January 31, 2008, from http://www.edb.gov.hk/index.aspx?langno=1&nodeID=3606

Maitra, K. (2006). An Indian perspective on gifted education: The synergy of India. In B. Wallace (Ed.), *Diversity in gifted education: International perspectives on global issues* (pp. 143–149). New York: Routledge.

Raina, M. K., & Srivastava, A. K. (2000). India's search for excellence: A clash of ancient, colonial, and contemporary influences. *Roeper Review, 22*(2), 102–108.

Shi, J. (2005). Recent developments in research and education of supernormal children in mainland China. *Gifted Education Quarterly, 97*(1), 17–22.

Wallace, B. (Ed.). (2006*). Diversity in gifted education: International perspectives on global issues*. New York: Routledge.

Wu, W., Cho, S., & Utami, M. (2000). Programs and practices for identifying and nurturing giftedness and talent in Asia (outside the mainland of China). In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 765–778). Oxford, UK: Elsevier.

Yewchuk, C. R. (1992). Gifted education in China. *Roeper Review, 14,* 185–189.

Asian American, Gifted

Asian American students are a fast-growing minority population in schools in the United States. The term *Asian* is generally used for groups of people with physical and cultural characteristics resembling East Asian people. However, there are 37 countries on the continent of Asia, and those countries are a very diverse group. In the United States, however, Asian Americans are often considered to be the same and not as individuals with varying potential. The term *Asian American* cannot be defined as one group that shares a culture or physical attributes.

Gifted Asian American Students

Because Asian American children are overrepresented in gifted programs throughout the United States, there is a belief that most Asian children do well in school. This belief has meant that a lot of these children's needs go unmet, and they are not offered services that are available to other minorities. The needs of Asian American gifted children are complex as compared to the needs of other American children because their culture, language, and style of communication may be very different. Even if a family is acculturated well enough to adjust to American society, gifted Asian American children may differ from majority gifted children in many ways. Some requirements of their culture and family may be at a tangent to the prevalent atmosphere they find themselves in, especially if they are treated as "different" or "special"; a value common to most Asian cultures is humility and modesty.

Many factors, such as language barrier, cultural expectation, and lack of parents' knowledge about the school system, can add to the problem of identifying gifted children and then tailoring a program to suit them. Parents may need coaching to help their children cope with the demands of gifted education programs. There is a need for parents and educators to consider these children as the individuals they are as well as within the context of their Asian American identity in order to maximize these children's educational experience.

Main Issues

Identification

One of the major issues in Asian communities is the need to develop a process for identifying the children who are gifted. Most schools in the United States are not equipped with facilities and

programs for identifying gifted children from various ethnic backgrounds and providing them with training suited to their needs. For example, while identifying potential gifted Asian students among recent immigrants, English proficiency level needs to be considered.

Culture

Though the system provides for the identification and nurturing of gifted children, in the case of Asian children, this may not be as effective as desired. This is because the children may not be engaged with the American way of life, but rather required to adhere to the original family and cultural values of the country of origin. It is difficult to abandon the cultural values of the generations of their heritage, for example, when students are encouraged to make decisions independently. Many Asian cultures value consultation with family, elders, and authorities before making personal decisions.

There are clear conflicts where the American way of life is juxtaposed with the Asian way of life, thus creating contradiction. Many gifted Asian children experience boredom with the education delivered, which may be too slow or too easy for them, yet they may be reluctant to complain or question their education. Furthermore, there may be an expectation to mirror the American lifestyles of peers, though parents desire their children to reflect the values and thought patterns of the inherited Asian culture.

This difference can hardly be understood by educators unless they interact and take pains to understand the Asian culture, background, and expectations of the community, which will largely differ from the American model. Educators can be misled while analyzing the potential of a child from an Asian background because of common stereotypes. They may either admiringly treat average Asian American children as gifted, eventually making them miserable in programs that are too challenging; or they may consider gifted Asian Americans as ordinary students who have been pressured to succeed, thereby making them bored with the schooling. Many bright Asian students can be seen as average kids because of language differences and other cultural difficulties.

Overrepresentation

Asian Americans are considered the most represented group among minorities in gifted programs. Asian Americans make up only 4 percent of the population of the United States, yet they make up more than 8 percent of all the gifted children in America; some states report as high as 18 percent. The high levels of achievement among Asian Americans reflect cultural values that support educational achievement, coupled with the belief that education ensures upward mobility in a society where some avenues to success are closed to minorities. In fact, Asian Americans have the most positive attitude about their chances for economic and academic success in America. There is also a strong interdependence among family members, and children are raised with the belief that their school performance reflects on the family's honor. When Asian children immigrate to America they retain many of their cultural values, one of which is to succeed academically. This motivation to succeed has led to Asian American children being termed the model minority and to being overrepresented in gifted programs.

Stereotyping

Asian American children are often labeled as the model minority and are expected to excel in school and not to present problems to school authorities. They are labeled "whiz kids" who have no behavioral or psychological distress. Such stereotyping is dangerous because it can cause lowered self-worth if Asian American students do not achieve expected model-minority success. Those who do not live up to the image are often considered "not Asian enough" and consequently can suffer self-esteem issues.

Many high-achieving Asian students experience anxiety about upholding the image of the model minority. Those students who are unable to perform to the stereotyped standards may become depressed and too embarrassed to ask for help. Although a lot of Asian American students do excel academically and have fewer delinquent behaviors, they have more depressive symptoms, withdrawal behavior, and social problems than majority children. They also have reported poorer self-images and dissatisfaction with social support.

They may feel that other people resent the fact that they are overrepresented in gifted programs and college admissions.

Stereotyping of Asian Americans has also led to a lack of student services and support for Asian American students who are undereducated and have low socioeconomic status. Because Asian American students are sometimes referred to as "geniuses," "overachievers," "nerdy," "great in math and science," "competitive," and "uninterested in fun," they are often thought not to need special help.

Finally, there are Asian American students who are third-, fourth-, and fifth-generation Americans. The fact of their visible racial differences may cause others to make the assumption that they are less acculturated than they actually are, leading to misunderstandings. These students may also have special needs neglected because it is assumed that they will succeed without help.

Support Systems

Teachers

Where teachers have students from Asian communities, there could be problems of interpretation of behavior. The teachers may be used to American children playing and socializing in a very free manner, while the Asian students may seem shy and timid. Their shyness or aloofness may be interpreted as abnormal or strange behavior. Thus, teachers and educators need to be trained to understand the cultural background, customs, and inhibitions of particular Asian communities. Educators need to be encouraged to interact with the parents of the child, because in many Asian communities, education is seen as an extension of family activity.

It is suggested that more parent–teacher conferences, special instruction, and seminars for parents about their children and their true potential be conducted in schools, with special attention to the gifted Asian children.

Schools

Schools can support the education and success of gifted Asian American students. Margie Kitano and Marcia DiJiosia, in their article "Are Asian and Pacific Americans Overrepresented in Programs for the Gifted?" suggested the following:

- Schools should accommodate different learning styles.
- Schools should support and require excellence in critical thinking and in oral presentations by Asian students.
- Schools should understand parent and family immigration histories and potential confusion regarding the roles of these factors in school, the process of schooling in the United States, and the culture into which these children are assimilating.
- Schools should support early career exploration for Asian students.
- Schools should provide accurate portrayals of Asian perspectives in the curriculum and strategies for coping effectively with stereotyping and culture conflict.

Chris Yoon

See also Cultural Conceptions of Giftedness; Cultural Values; Giftedness, Definition; Identification; Images of Gifted in Film; Parenting; Teachers of Gifted

Further Readings

Barkan, E. R. (1992). *Asian and Pacific Islander migration to the United States: A model of new global patterns*. Westport, CT: Greenwood Press.

Coker, D. M. (1988). The Asian students in the classroom. *Education and Society, 1*(3), 19–20.

Huang, G. (1993). *Beyond culture: Communicating with Asian American children and families*. New York: ERIC Clearinghouse on Urban Education. (ERIC Document Reproduction Service No. ED366673)

Kim, Y. Y. (1985). Intercultural personhood: An integration of Eastern and Western perspectives. In L. A. Samovar & R. E. Porter (Eds.), *Intercultural communication: A reader* (4th ed.). Belmont, CA: Wadsworth.

Kitano, M. K., & DiJiosia, M. (2002). Are Asian and Pacific Americans overrepresented in programs for the gifted? *Roeper Review, 24*(2), 76–81.

Plucker, J. A. (1994). Issues in the social and emotional adjustment and development of a gifted, Chinese American student. *Roeper Review, 17*(2), 91.

Plucker, J. A. (1996). Gifted Asian American students: Identification, curricular, and counseling concerns. *Journal for the Education of the Gifted, 19*(3), 315–343.

Asperger's Syndrome

Many highly creative students have been labeled with an assortment of labels ranging from autism, Asperger's syndrome, attention deficit hyperactivity disorder, and dyslexia, to learning disabled. The *Diagnostic and Statistical Manual, fourth edition,* used by psychiatrists and psychologists to identify disorders, requires that people have at least normal intellectual functioning, impairments of social perceptions and skills, and repetitive behaviors or obsessive interests and thoughts. The mildest of the autism spectrum disorders, Asperger's syndrome, often may simply be perceived as intellectuality and eccentricity. Most creative, intellectual, quirky students can be successful with appropriate guidance, education, and mentoring. One brilliant student with Asperger's will enter and stay in a good career because of good mentoring, but another, more neglected Asperger's student may end up depressed or in a dead-end job that he or she hates.

Many of the successful students had some formal instruction in career-related skills either in late childhood or during their teens. Their obsessive interests can be channeled into educational projects. For example, a child's interest in cars can be used as a motivator for all kinds of learning. Reading about cars or doing math problems involving cars channels an obsession into productive learning.

Discussions with many parents, teachers, and successful creative people indicate that during their formative years they were mentored. Many successful computer programmers who have Asperger's syndrome were taught programming by their parents—they were apprenticed into the field by their parents. In other cases, a professor took an interest in a student, or a friend of the family taught the individual. The best career paths emerge when there is formal instruction in career-related subjects. A mentor needs to "light the fuse" to get career-related learning started. Once this creative spark is ignited, a student will often pursue study on his or her own, but in many cases some formal instruction is needed to get the student started. Otherwise these quirky, creative students may go down the wrong path into trouble or into nonproductive activities such as nonstop video playing.

One example of a student who benefited from mentoring is Temple Grandin. When Grandin was 3 years old, she had all of the symptoms of autism, such as no speech, no eye contact, many tantrums, and hours of solitary play. Today she is a professor of animal science at Colorado State University and a designer of livestock handling equipment. Half of the cattle in the United States and Canada are handled in equipment she designed. She was mentored by a great science teacher who motivated her to study with the goal of becoming a scientist.

Specialized Minds

Many creative students have problems with the school system because they are really good at one subject and horrible in another. The educational system often puts too much emphasis on deficits and not enough emphasis on the areas of strengths. For example, a teenager who may need tutoring in English should be taking college math. If this student is allowed to take the advanced classes in his area of interest and talent, he will likely flourish. If he is forced to stay in a boring math class with his peers, he may become a behavior problem. Grandin, the author of *The Way I See It: A Personal Look at Autism and Asperger's,* believes that there are three basic types of specialized minds.

Types of Specialized Minds

The first type of specialized mind is the visual thinking mind. For example, Grandin thinks in photo-realistic pictures, which allows her to excel in work as a designer. This kind of visual thinking can be likened to a full-motion virtual-reality computer system. A visual mind works like a search engine for images. Many visual students fail algebra, but are able to do geometry or trigonometry.

The second type of specialized mind is the pattern thinker. Instead of thinking in photo-realistic pictures, those with this type of specialized mind think in patterns and see relationships between numbers. These individuals often excel at music and math. Both music and math require pattern thinking, and these individuals often pursue careers in music, math, computer programming, engineering, or statistics. Many pattern thinkers often need extra instruction in writing and composition.

The third type of specialized mind is a word thinker who has no visual or drawing skills. In school their favorite subject is often history. These

people often memorize incredible amounts of information about their favorite topics. These topics range from sports statistics to politics. Some of these individuals make excellent journalists. They have strong writing skills for factual information, but may be poor at fiction writing. Jobs that require meticulous record keeping, such as librarian or archivist, are ideal.

Role of Mentoring

Many educators have little contact with technical fields, and they do not know of the great opportunities that exist for students with Asperger's or Asperger's-like behaviors. What many people do not realize is that mentors who could "light the fuse" and get these students motivated are easy to find. A mentor might be a next-door neighbor who is a retired engineer, or a church organist who could teach a student music.

Inquisitive minds need to be nurtured and they need direction to get started on the right path. If Mr. Carlock, the science teacher, had not entered Grandin's life during her teenage years, she would probably not be a college professor today.

Temple Grandin

See also Mathematical Talent; Scientifically Gifted; Twice Exceptional; Visual-Spatial Learners

Further Readings

Grandin, T. (2008). *The way I see it: A personal look at autism and Asperger's.* Available at http://www.templegrandin.com/templegrandinart.html

Grandin, T., & Barron, S. (2005). *The unwritten rules of social relationships: Decoding social mysteries through the unique perspective of autism.* Available at http://www.templegrandin.com/templegrandinart.html

Hoagies' gifted education page. (2008). *Asperger's syndrome and high-functioning autism.* Retrieved November 19, 2008, from http://www.hoagiesgifted.org/aspergers.htm

Aspiration Development and Self-Fulfillment

High achievement partially derives from the development of strong aspirations, which in turn provide impetus for talent development. The combination of aspirations and talents can bring forth long-term self-fulfillment. Aspirations are powerful and persistent long-range life goals that manifest as robust desires for achievement of ideals to which the individual ascribes great value. Self-fulfillment is best defined as the attainment of a satisfying and worthwhile life well lived.

Ethical philosopher Alan Gewirth described how aspirations develop over time from nebulous, fleeting early wishes, to unsatisfied desires, and later to a sensed need for accomplishment with regard to dimensions of life such as knowledge acquisition, professional expertise, personal identity and autonomy, avocations, and roles in the family or community. Ultimately, aspirations can strengthen into powerful beacons for an individual's long-range development.

The motivational power of strong aspirations encourages the development of capacities or talents. The pursuit of important goals often requires considerable abilities; aspirations bring forth talent development by encouraging people of high ability to turn latent capacities into vigorous, refined talents. As individuals with latent high ability develop and follow their aspirations, they engage in sequences of long-term choices and strivings that generate achievements representing impressive talent development. When all goes well, this aspirational striving and talent development over the long term leads to self-fulfillment.

Life Trajectories

Examples of various paths individuals may follow through life in their pursuit of aspirations can reveal differences in the nature and extent of self-fulfillment they can achieve. Those following the path of *Privileged Relational Altruism* are born into wealth and privilege, and develop strong ego-transcending aspirations by acquiring relational–altruistic outlooks on the world. A relational–altruistic identity emerges from a sense of connectedness with all of humanity as opposed to self-centeredness or strong identification with a particular ethnic, religious, or national group. This is an impressive life path because it requires the ability to resist strong pressures toward self-centered identity formation in the modern, globalized world. Those following the

Privileged Relational Altruistic life path tend to express genuine generosity toward others less fortunate. For instance, many of the physicians in the international humanitarian aid organization Doctors Without Borders fit this impressive aspiration-development pattern because they sacrifice their own comfort and endanger their own safety for the benefit of desperate victims in war-torn regions. Such long-term, self-transcending altruism can lead to the highest forms of self-fulfillment.

Two other life trajectories from privileged starting points illustrate very different forms of aspiration development. For instance, the path of *Passive Shallow Opulence* represents long-term underachievement because those following this path complacently accept their comfortable, material-rich social positions and see little reason to strive for the attainment of difficult goals over the long term. Consequently, they develop weak aspirations, anemic talents, and only modest levels of self-fulfillment. Examples are those who inherit wealth or benefit from nepotism while doing little with these considerable advantages.

Along another life path, *Aggressive Shallow Opulence,* individuals capitalize on the advantages of their privileged life circumstances to develop powerful aspirations that generate strong talent growth and refinement over the long term. However, their aspirations are colored by egoistic–individualistic identity formation as opposed to a relational–altruistic outlook on life. As talented egotists they tend to become highly competitive, driven, ruthlessly exploitative, and insatiably materialistic. These propensities push them toward self-fulfillment over time, but in a diminished, shallow, hollow form. In spite of their impressive abilities and exceptional motivation, their inability to transcend ego stops them short of the highly rewarding relational–altruistic self-fulfillment. Examples of individuals following this life trajectory include owners of exploitative sweatshop industries, manipulative financiers who engage in insider trading, and unethical corporate lobbyists.

Examples of life trajectories that do not contain the advantages of privileged life circumstance reveal additional dimensions of aspiration development. Individuals following the path of *Deprived Relational Altruism* grow up in poverty yet somehow manage to develop lofty, self-transcending aspirations in spite of the arduous demands of day-to-day subsistence. Their personal experiences with deprivation can trigger the development of aspirations that impel them to help other unfortunate or oppressed people. Such development engenders their purposeful, lifelong altruistic orientations. For example, Frederick Douglass, a prominent champion of abolition during the latter days of slavery in the United States, was an important deprived relational altruist. He grew up in slavery, eventually escaped, and then devoted his life to abolishing that barbarous, exploitative system even though he could have led a much safer and more comfortable life had he become more egocentric and ignored the plight of others.

Yet another life trajectory, the path of *Deprived Passive Escapism,* illustrates the problem of stunted or crushed aspirations. Even if they have impressive latent abilities, severely deprived inner-city youth can fall prey to this debilitating life path because they are surrounded by the underachievement and desperation fomented by lack of opportunity. Consequently, they grow up oblivious of the high-powered intellects and creative talents that lie dormant within them. This life trajectory represents minimal aspiration development, severely stunted talent development, and very little self-fulfillment throughout life's journey. Still other life trajectories portray additional dynamics of aspiration and capacity development within various life contexts.

In essence, important aspects of identity formation strongly shape the development of aspirations and talents. Individuals who become self-centered, egocentric, rational actors, as in the hypothetical, self-obsessed *homo-economicus* of predominant economic theory, tend to pursue aspirations that encourage greed and power, seeking for materialistic gain and self-aggrandizement. Such a lifestyle usually ensures a lifetime of insatiable, frenetic striving for goals that engender limited hollow self-fulfillment over the long term. In contrast, individuals who follow aspirations that transcend the self become relational altruists who engage in lifestyles of empathic support of others. Ethical philosophers contend that relational–altruistic aspirations enable bright individuals to better the world while engaging in actions that promote their own highest levels of self-fulfillment. In contrast, those following less altruistic life paths may stunt their own self-fulfillment because any altruistic

acts they perform are confined to their own particular identity groups, with little consideration for outsiders.

Don Ambrose

See also Achievement Motivation; Life Satisfaction; Locus of Control; Optimal Development; Poverty and Low-Income Gifted; Self-Actualization; Socioeconomic Status; Underachievement

Further Readings

Ambrose, D. (2003). Barriers to aspiration development and self-fulfillment: Interdisciplinary insights for talent discovery. *Gifted Child Quarterly, 47,* 282–294.

Ambrose, D. (2005). Aspiration growth, talent development, and self-fulfillment in a context of democratic erosion. *Roeper Review, 28,* 11–19.

Bowles, S., Gintis, H., & Osborne-Groves, M. (Eds.). (2005). *Unequal chances: Family background and economic success*. Princeton, NJ: Princeton University Press.

Gewirth, A. (1998). *Self-fulfillment*. Princeton, NJ: Princeton University Press.

Roemer, J. E. (2000). Equality of opportunity. In K. Arrow, S. Bowles, & S. Durlauf (Eds.), *Meritocracy and economic inequality* (pp. 17–32). Princeton, NJ: Princeton University Press.

Astronomy

Since the dawn of humanity, the motion of the sun, moon, and stars has both intrigued humans and been instrumental in helping impose order on time through the creation of lunar, solar, and lunisolar calendars. Numerous ancient cultures in diverse geographic locations devised sophisticated calendars based on astronomical observations to regulate events within their societies such as crop planting, tides, religious rites, and ceremonies. The nomenclature used to name the days of the week and the months in numerous ancient calendars such as the Hindu, Hebrew, and Old Norse calendars indicates that the ancients were well aware of the motions of numerous planets in addition to the lunar and solar cycles, which in turn were intricately linked to their mythologies and cosmologies. It can safely be said that nearly every culture in the history of humanity has used astronomical observations to regulate life. Archeological artifacts of ancient societies, such as the Mayans, Incas, Celts, Egyptians, Persians, Greeks, Islamic, Indians, and Chinese, among others, which are part of our shared heritage and found to date in numerous locations around the world, bear a testament to the intricate connection of astronomy and the advancement of human life.

The study of astronomy can be viewed as a truly interdisciplinary area of inquiry at the intersection of the humanities, science, and mathematics, because it relies on systematic observation, documentation, and charting of the skies as a consequence of the economic, sociopolitical, theological, or cosmological needs of a particular society. The voyages of the ancient and modern mariners across the oceans were as much driven by the curiosity to explore what lay beyond the horizon, as by the human penchant for trade and conquest. Polynesian and Phoenician sailors were able to go back and forth across oceans nearly 2,500 years before the advent of current global positioning technology as a result of their sophisticated navigation abilities that relied on astronomical calculations while observing known constellations and the North Star to calculate positions on the open oceans in such voyages. The history of science bears copious evidence that astronomy as a field of inquiry attracted the most gifted of human minds from all societies, from the ancient Greeks to Hindu astronomers and Islamic geometers who created the branch of mathematics known as spherical geometry. The vernacular of astronomy is replete with words of Arabic, Sanskrit, and Greek origin as historic evidence of the contributions of the geometers from these societies. In the next section, the development of astronomy beginning with the work of Ptolemy (c. 87–150 CE) is outlined.

Development

The Ptolemaic model of astronomy was based on the assumption that the Earth was the center of the universe, which was accepted by the Catholic Church as being compatible with its teachings. A common misconception is that this geocentric view of the world could not explain the curious planetary phenomenon observed by Nicolaus Copernicus (1473–1543), namely the retrograde

motion (moving backwards and then forwards) of Mars, Jupiter, and Saturn, in addition to the nearly invariant times that Venus and Mercury appeared in the sky, which is shortly before sunrise and after sunset. Yet these queer motions are perfectly reasonable when one views the sun as the center of the "system" as opposed to the Earth. In such a model, the peculiarities of the inner planets (Mercury and Venus) as well as the outer planets (Mars, Jupiter, and Saturn) in relation to the Earth make perfect sense. The retrograde motion of the outer planets is due to the fact that they are overtaken by the Earth in its orbital motion. Similarly, Venus and Mercury appear static and only before sunrise and after sunset because their orbital motions do not allow them to get behind the Earth to manifest in the night sky. It is amazing what a little change in perspective does for one's perceptions.

Ptolemy's system explains this phenomenon and others (e.g., the precession of the equinoxes) precisely. What disturbed Copernicus initially about Ptolemy's system was that it failed to fulfill, in certain crucial ways, Ptolemy's own rules. The main sticking point here was what is known as the *equant,* which Ptolemy used to describe the motions of the inner planets. But even the main point, that the Earth rather than the sun is placed at the center, was not as much a problem of fact as it was a strain on the whole system; it made Ptolemy's system "monstrous." Why? Because, with that arrangement, no planet had any connection with any other planet except the Earth; Ptolemy's system, in effect, was not a system.

For Ptolemy, it was enough to "save the appearances," that is, to give a mathematical description of the peculiar motion of the planets. And, for that, his system was more than sufficient (to some extent, more so than Copernicus's). For Copernicus, the system of the heavens had to provide some unifying principle. This sense of unity and wholeness that drove Copernicus was essentially religious and aesthetic in character. In *De Revolutionibus,* Copernicus describes, in no uncertain terms, the three motions of the Earth: its rotation around the sun, its rotation around its axis, and the rotation of the axis itself (the motion causing the precession of the equinoxes). What is true is that, unlike Copernicus, Galileo sought to find indubitable physical evidence for these motions. However, the conflicts of Copernicus's findings with Church dictum prevented a wider dissemination of his simpler planetary model until his death.

Galileo Galilei (1564–1642) pushed things farther by using mathematics to explain interplanetary motion. In fact, many science historians claim that Galileo was the first person to use mathematics systematically as the language of science instead of Aristotelian logic. Aristotle's conceptions of motion had several flaws that were rectified by Galileo's determining that velocity and acceleration were distinct. More important, the question that vexed Copernicus of why the motion of the Earth was unfelt (if in fact it was moving) was answered by Galileo by suggesting that only acceleration is felt, whereas velocity is unfelt and invariant except when acted on by an external force (the notion of inertia). Thus, Galileo suggested that the Earth, in addition to orbiting around the sun, was also rotating on its own axis. His attempt to make his model public met with fierce resistance from the Church and led to his condemnation by the Inquisition.

During this same time period the German astronomer Johannes Kepler (1571–1630) confirmed and supported many of Galileo's well-formulated theories. Kepler was born in Weil der Stadt, Württemburg. While studying for the Lutheran ministry at the University of Tübingen, he became familiar with the Copernican model, which he defended explicitly in the *Mysterium Cosmographicum*. The political forces of that time period, with his unique personal circumstances, namely his strong adherence to the *Augsburg Confession,* but rejection of several key Lutheran tenets, the use of the calendar introduced by Pope Gregory XIII, his rejection of the *Formula of Concord,* and finally his snub of Catholicism led to his exile in Prague where he worked for the Danish astronomer Tycho Brahe. With the help of Brahe's data, Kepler made several seminal discoveries published in *Astronomia Nova*. The beauty of this work lies in the fact that Kepler arrived at the first two laws of planetary motion by working with incomplete/imperfect data (these data were obtained before the invention of the telescope). The first two laws were: (1) Planets move in ellipses with the Sun at one focus, and (2) The radius vector describes equal areas in equal times. Finally, the third law was published in *Harmonices Mundi* in 1619. The

third law states that the squares of the periodic times are to each other as the cubes of the mean distances. Incidentally, Newton's theory of gravitation grew out of Kepler's third law and not a falling apple, as suggested by myth.

Bridge Across Disciplines

The numerous examples of truly eminent thinkers given above represent a unique sample of individuals who made remarkable contributions to theology, science, and mathematics, and who also happened to be astronomers, theologians, and scientists. These individuals are best characterized as *polymaths*. The current tension between the disciplines that came out of the Renaissance, namely natural philosophy–art–alchemy (metallurgy/chemistry) theology during the post Renaissance continues today in the modern-day antipathy between the ever-increasing numbers of subdisciplines within the arts, science, mathematics, and philosophy. Many of the thinking processes of astronomers who unified numerous disciplines are commonly invoked by artists, scientists, mathematicians, and philosophers in their craft, albeit the end products are invariably different. These disciplines explore our world for new knowledge. Literature is an excellent medium for gifted students to study to understand the frequent shifts in perspective that occurred in the development of astronomy. Motion paradoxes can easily be investigated by exploring geometry and spherical geometry motivated by problems in astronomy and art. After all, art suggests new possibilities and pushes the limits of our imagination, whereas science verifies the actual limitations of these possibilities using mathematics. Both are driven by the need to understand reality, with philosophy and theology often serving as the underlying framework linking the three. Models and theory building in astronomy lie at the intersection of art–science–mathematics. The history of model building in science, particularly astronomy, conveys *epistemological* awareness of domain limitations. The study of astronomy creates natural bridges across disciplines in the humanities, science, mathematics, and art. Some of the research literature in gifted education indicates that the study of astronomy is ideal for bright students who prefer independent, self-directed, or autonomous learning involving extended projects that lead to advanced concepts and that are interdisciplinary in nature. By building bridges between disciplines today, the greatest benefactors are the potential innovators of tomorrow.

Bharath Sriraman

See also Eminence; Imagination; Multiple Intelligences; Polymaths; Visualization

Further Readings

Forbes, G. (1909). *History of astronomy.* London: Watts & Co.

Reis, S. M., Atamian, G. C., & Renzulli, J. S. (1985). The effectiveness of a self-instructional curricular unit in the development of advanced level concepts in astronomy. *Gifted Child Quarterly, 29*(4), 151–154.

Repcheck, J. (2007). *Copernicus' secret: How the scientific revolution began.* New York: Simon & Schuster.

Saliba, G. (1994). *History of Arabic astronomy: Planetary theories during the Golden Age of Islam.* New York: New York University Press.

Sriraman, B. (2009). A historic overview of the interplay of theology and philosophy in the arts, mathematics and sciences. *ZDM—The International Journal on Mathematics Education, 41*(1) [Focus issue on Interdisciplinarity in Mathematics Education] *1, 75–86.*

Sriraman, B., & Dahl, B. (2008). On bringing interdisciplinary ideas to gifted education. In L. V. Shavinina (Ed.), *The international handbook on giftedness.* London: Springer Science and Business.

Szpiro, G. G. (2003). *Kepler's conjecture.* Hoboken, NJ: Wiley.

Voelkel, J. R. (2001). *The composition of Kepler's Astronomia Nova.* Princeton, NJ: Princeton University Press.

Asynchrony

Giftedness is not mere precocity—getting "there" sooner. There is some evidence suggesting a qualitative difference in the inner experience and awareness of the gifted. A young child with the emotional development of his or her age peers but with advanced cognitive awareness of the perils in

the world can sometimes feel helpless and afraid. It is known that developmental discrepancies can create vulnerability: We recognize the vulnerability in the experience of having a 17-year-old body and a 9-year-old mind. Yet to be grasped, however, is the magnitude of the challenge of a child who has a 17-year-old mind trapped in the body of a 9-year-old. Societal support is offered to families of children with developmental delays, but those whose minds are many years ahead of their bodies typically do not arouse much sympathy.

Asynchrony literally means being out-of-sync. The gifted are out-of-sync both internally and externally. The clearest example of this unevenness is the rate at which mental development outstrips physical development. Studying young gifted children, Wendy Roedell observed that rather than demonstrating high abilities in all areas, they had peaks of extraordinary performance as well as valleys. Their intellectual development usually surpassed the development of their physical development and social skills. They were likely to excel only in those physical tasks that involved cognitive organization.

Background

Asynchrony is a relatively new way of looking at giftedness, but it has deep historical roots. Leta Stetter Hollingworth, the foremother of gifted education, viewed giftedness as a set of complex psychological issues arising out of the disparities between children's mental and chronological ages. She established that the farther removed the child is from average in intelligence, the more pressing the adjustment problems become. Many contemporary researchers have documented that adjustment difficulties increase with IQ.

Hollingworth suggested that to have the intelligence of an adult and the emotions of a child combined in a child's body is to encounter certain difficulties. She stated that the younger the child, the greater the difficulties, and that the years between 4 and 9 are probably the most likely to be beset with problems.

Giftedness as asynchrony highlights the internal experience of the gifted, their vulnerability, the difficulties that increase with IQ, and the important role of parents, teachers, and counselors in gifted children's optimal development. The practitioners and parents who gathered to construct this new vision were deeply concerned with the emphasis on products, performance, and achievement in modern conceptions of the gifted and talented. The construct of giftedness as asynchrony builds upon the child-centered insights of Leta Hollingworth, Lev Vygotsky, Kazimierz Dabrowski, Jean-Charles Terrassier, and Annemarie Roeper. The concept of asynchrony was developed in 1991 by the Columbus Group, which created the following position statement:

> Giftedness is *asynchronous development* in which advanced cognitive abilities and heightened intensity combine to create inner experiences and awareness that are qualitatively different from the norm. This asynchrony increases with higher intellectual capacity. The uniqueness of the gifted renders them particularly vulnerable and requires modifications in parenting, teaching, and counseling in order for them to develop optimally.

Mental Age Versus Chronological Age

Alfred Binet constructed *mental age* as a means of capturing the degree to which a child's mental abilities differ from those of other children his or her chronological age. The concept of mental age has been enormously helpful in our understanding of the discrepancies in children with developmental disabilities. Mental age predicts the amount of knowledge mastered, rate of learning, sophistication of play, age of true peers, maturity of the child's sense of humor, ethical judgment, and awareness of the world. In contrast, chronological age predicts height, physical coordination, handwriting speed, emotional needs, and social skills, according to Linda Kreger Silverman. Although unpopular for several decades, mental age is beginning to make a comeback in the testing industry. "Test ages" are reported for subtest scales on the *Wechsler Intelligence Scale for Children, Fourth Edition* (WISC–IV). The test publisher is currently working on extended WISC–IV norms that will extend the maximum IQ and index scores up to 210 points. Rasch-ratio IQ scores can be derived on the *Stanford-Binet Intelligence Scale, Fifth Edition* (SB5), based on the disparity between the child's test age (mental age) and chronological age, and an extended norm table generates scores up to

225, as explained by G. H. Roid. Extended norms on both scales allow a better picture of the degree of asynchrony in highly, exceptionally, and profoundly gifted children.

The intelligence quotient is simply the ratio of mental age to chronological age multiplied by 100. Binet viewed intelligence as a rich, complex, multifaceted Gestalt—a myriad of dynamically interrelated abilities, including emotion and personality. He believed that intelligence is highly influenced by the environment, and can be improved through appropriate instruction. From Binet's developmental perspective, intelligence is a continuously evolving process, not a static amount of raw material that stays the same throughout life. Consistent with Binet's philosophy, the IQ should be seen as a *minimal estimate of asynchrony*—the extent to which cognitive development (mental age) diverges from physical development (chronological age).

Asynchrony cannot be thought of as static; it is dynamic, constantly changing. At age 6, a moderately gifted child with an IQ of 135 has a 6-year-old body and an 8-year-old mind; at 9, the child has a 9-year-old body and a 12-year-old mind; at age 12, the child will be mentally 16. By comparison, an exceptionally gifted 6-year-old, with an IQ of 170, has a 10-year-old mind; at 9, the child has a 15-year-old mind; and at 12, a 20-year-old mind. The situation becomes even more complicated when it is understood that psychologically the child is an amalgam of many developmental ages and may appear to be different ages in different situations. Uneven development is mirrored in external adjustment difficulties because the gifted child often feels different from, or out of place with, others. External asynchrony is the lack of fit with other same-aged children and with the age-related expectations of the culture. The greater the degree to which cognitive development outstrips physical development, the more out-of-sync the child feels internally, in social relations, and in relation to the school curriculum. Age is not an appropriate ruler for either a gifted child's social or academic needs: Degree of asynchrony must also be taken into account.

Implications

Defining giftedness as asynchrony enables twice-exceptional children and underachievers to be recognized as gifted. The most asynchronous children are those who are both gifted and learning disabled. Silverman, a psychologist specializing in asynchrony, has noted a remarkable number of gifted children who have learning disabilities, such as central auditory processing disorder, sensory processing disorder, Asperger's syndrome, writing disabilities, visual perception weaknesses, spatial disorientation, dyslexia, and attention deficit hyperactivity disorder. Giftedness masks disabilities and disabilities depress IQ scores, so that the child may appear average. Asynchrony can be seen in the scatter of subtest scores on IQ tests. Twice-exceptional children tend to obtain high scores in subtests richly loaded in abstract reasoning and to demonstrate significant weaknesses in subtests measuring processing speed and working memory. Underachievers often have extraordinary visual–spatial strengths, combined with auditory–sequential weaknesses in reading, writing, spelling, and calculation that prevent them from being identified for gifted programs. Many underachievers are actually twice exceptional.

The gifted not only think differently from their peers, they also feel differently. Asynchrony implies greater complexity. Complexity affects all aspects of one's development throughout the life span. Kazimierz Dabrowski and Michael Piechowski observed five realms of heightened intensity and complexity: psychomotor, sensual, imaginational, intellectual, and emotional. Neural activity substantially beyond the norm in any of these five dimensions is called *overexcitability* and represents an abundance of physical, aesthetic, creative, intellectual, or emotional energy.

Vygotsky elucidated the inextricable relationship between cognition and emotion. Children respond emotionally to information they receive cognitively, and this inner awareness has an impact on the course of their development. John Gowan likened precocious cognitive awareness to premature rupturing of the protective placental shell during the prenatal period. Too-early exposure to environmental realities can be as precarious in postuterine as in prenatal development. Gifted children need child-centered parents, teachers, and counselors who are willing to listen to them and understand them, who appreciate their fragility, and who are not trying to mold them to fit better into society or to produce more.

The idea of asynchrony was partially derived from the experiences of parents who made statements such as the following:

> We were told that at age 9 he displayed "cognitive reasoning skills way beyond his years.... I wish he came with a blinking sign on his forehead to let me know just who I am dealing with: the 3-year-old, the 14-year-old, or the 25-year-old. It's the tension of being caught between all those ages I just mentioned....I live by it every day in order to give some organized definition to what's going on." (Estes, cited in Kearney, 1992, pp. 1, 8)

This perspective is very useful in attempting to gain support for the gifted. It bypasses the perennial concern about elitism. Most other definitions equate giftedness with high achievement; therefore, special programs often sound like more advantages for an already-advantaged group. Since asynchrony is not a competitive concept, it is less likely to invite envy. More asynchrony is not better. Giftedness becomes atypical development—a set of qualitative differences that need to be addressed at home and at school. It occurs in all cultures, all ethnic groups, and all socioeconomic levels. Whereas giftedness as the potential for recognized achievement is gender-biased, giftedness defined as asynchrony is gender-fair.

Asynchrony is gaining in popularity because it offers a pathway to understanding the inner experience of the gifted child. It reminds us that gifted children are vulnerable and at risk, and that we are obliged to respond to their differences with supportive parenting, teaching, and counseling.

Linda Kreger Silverman

See also Academic Self-Concept; Guidance; Personality and Intelligence

Further Readings

Dabrowski, K., & Piechowski, M. M. (1977). *Theory of levels of emotional development* (Vols. 1 & 2). Oceanside, NY: Dabor Science.

Dauber, S. L., & Benbow, C. P. (1990). Aspects of personality and peer relations of extremely talented adolescents. *Gifted Child Quarterly, 34,* 10–15.

Hollingworth, L. S. (1926). *Gifted children: Their nature and nurture.* New York: Macmillan.

Hollingworth, L. S. (1942). *Children above 180 IQ Stanford-Binet: Origin and development.* Yonkers-on-Hudson, NY: World Book.

Kearney, K. (1992). Life in the asynchronous family. *Understanding Our Gifted, 4*(6), 1, 8–12.

Kerr, B. A. (1991). Educating gifted girls. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 402–415). Boston: Allyn & Bacon.

Kerr, B. A. (1991). *A handbook for counseling the gifted and talented.* Alexandria, VA: American Association for Counseling and Development.

Manaster, G. J., & Powell, P. M. (1983). A framework for understanding gifted adolescents' psychological maladjustment. *Roeper Review, 6,* 70–73.

Roedell, W. C. (1989). Early development of gifted children. In J. VanTassel-Baska & P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners: The home, the self, and the school* (pp. 13–28). New York: Teachers College Press.

Roeper, A. (1982). How the gifted cope with their emotions. *Roeper Review, 5*(2), 21–24.

Silverman, L. K. (1995). The universal experience of being out-of-sync. In L. K. Silverman (Ed.), *Advanced development: A collection of works on giftedness in adults* (pp. 1–12). Denver: Institute for the Study of Advanced Development.

Silverman, L. K. (2002). *Upside-down brilliance: The visual-spatial learner.* Denver, CO: DeLeon.

Silverman, L. K. (2008). The theory of positive disintegration in the field of gifted education. In S. Mendaglio (Ed.), *Dabrowski's theory of positive disintegration: A personality theory for the 21st century.* Scottsdale, AZ: Great Potential Press.

Athletic Giftedness

Athletes who are exceptionally talented evoke discussion about factors that contribute to athletic success. Athletes such as Michael Jordan, Tiger Woods, and Mia Hamm go down in history books as extraordinary talents. Understanding what helps world-class athletes succeed is the first step in knowing how to identify gifted athletes and promote the development of athletic talent. Athletic giftedness results in success at the highest level of competition through a combination of natural physical attributes, a serious dedication to training,

psychological skills, a propensity to overcoming adversity, and a strong social support system.

Natural athletic ability is due in part to physical characteristics such as height, size, speed, coordination, dexterity, and flexibility. Adolescents experiencing growth spurts may find that their athletic performance improves in conjunction with their physical transformation. Genetic contributions to athletic giftedness can be witnessed in family success stories such as Peyton and Eli Manning in football and Venus and Serena Williams in tennis. However, physical traits that help an athlete succeed are not sufficient for an individual to reach success at the highest level. Anecdotal evidence and research findings demonstrate that social support is also an influential factor in the development of athletic giftedness. The support of family, coaches, and teammates is critical, particularly during times of adversity. Furthermore, these characteristics only begin to explain how individuals come to excel in a particular sport.

Athletic giftedness can be attributed in part to kinesthetic intelligence, one of many types of intelligence proposed by Howard Gardner. The kinesthetic sense involves awareness of bodily position and movement through time and space. Talented athletes seem to have a keen awareness of the objects and events around them. They can time their movements with precision, power, and gracefulness. They have a feel for the game, are able to understand and create complex patterns, can anticipate the next move during a performance, and demonstrate swift reaction time. Multiple areas of the brain are responsible for various aspects of kinesthetic intelligence. Strengthening the synaptic connections between these brain areas (through physical practice, repetition, and mental imagery) will enhance kinesthetic intelligence. Research indicates a role for both genetic and environmental factors for both kinesthetic intelligence and athletic giftedness. Genetic predisposition alone does not guarantee athletic success. There are many other factors that contribute to the likelihood that an individual will excel in athletics.

The environmental contribution to athletic giftedness is evident in part through the impact that practice has on muscular and cortical development. Physical and mental training builds and strengthens neural connections used to recognize patterns, make decisions, and inform muscle movements. World-class athletes devote incredible amounts of time and energy to training. Typically they spend 10 years or more training intensely before peaking at an international level. Though natural talent may lead to initial success, a strong commitment to regular practice is what propels individuals into the higher tiers of competition. Furthermore, athletic success is much more probable when an athlete derives enjoyment from participating in the sport. Many top athletes participated in multiple sports as youngsters and made their own decision to specialize in a particular sport as they reached mid to late adolescence, a pattern that may prevent burnout and increase sport commitment.

Gifted athletes often do not have to think extensively during their performance; the necessary actions are so ingrained through practice that they become automatic. Optimal performance occurs when an athlete experiences *flow,* an expression first labeled by Mihaly Csikszentmihalyi. Flow is also described as being "in the zone," "in the groove," or when "everything clicks." Flow is more likely to occur when an athlete is focused, confident, composed, feels strong, and is free of self-doubt. Talented athletes possess mental skills that contribute to the likelihood of achieving a flow state and thus experiencing athletic success. For example, they develop ways to manage cognitive anxiety so that worrisome thoughts do not get in the way of their performance. They learn how to focus on important sensory information while eliminating distractions. They may utilize relaxation strategies such as deep breathing to reduce somatic anxiety and increase calmness of body and mind. Gifted athletes may also employ imagery techniques to prepare mentally for competition, visualize success, and manage their mood and energy level.

Both confidence and willingness to learn from others, also known as *coachability,* are invaluable to athletic success. Gifted athletes who trust in their abilities and glean useful knowledge from others about their sport put themselves in a better position to use their athletic gifts appropriately. Those who set specific, measurable, and realistic goals for themselves are also setting the stage for success. Breaking down long-term goals into manageable short-term goals and creating a daily visual reminder of these goals serves as an effective motivational strategy. Successful athletes hold themselves accountable for doing the little things that will help

them accomplish their goals, and they believe in their ability to achieve success. Those who strive for perfection but can cope adaptively with failure will be most able to channel their athletic gifts toward positive ends. Talented athletes who experience success have generally coped with difficult events in the course of their career, and positive coping strategies such as optimism and social support have helped them rise to the top.

Megan Brent and Caitlin Kazelis

See also Competitions; Flow; Imagery; Reaction Time; Talent Development

Further Readings

Armstrong, T. (1993). Body smart: Using your kinesthetic intelligence. In T. Anderson (Ed.), *7 kinds of smart: Identifying and developing your many intelligences* (pp. 77–93). New York: Plume.

Durand-Bush, N., & Samela, J. H. (2002). The development and maintenance of expert athletic performance: Perceptions of world and Olympic champions. *Journal of Applied Sport Psychology, 14,* 154–171.

Morgan, T. K., & Giacobbi, P. R. (2006). Toward two grounded theories of the talent development and social support process of highly successful collegiate athletes. *Sport Psychologist, 20,* 295–313.

Starkes, J. L., Helsen, W., & Jack, R. (2001). Expert performance in sport and dance. In R. N. Singer, H. A. Hausenblas, & C. M. Janelle (Eds.), *Handbook of sport psychology* (2nd ed., pp. 174–201). New York: Wiley.

Attention Deficit Hyperactivity Disorder

Attention deficit hyperactivity disorder (ADHD) is the most common childhood behavioral disorder, occurring in 3 to 7 percent of school-aged children. ADHD is diagnosed more often in boys than in girls and is characterized by behaviors related to inattention, hyperactivity, and/or impulsivity. Children with ADHD are typically at risk for problematic educational and social outcomes, such as low achievement in school or difficulty with peer relationships. The etiology of ADHD varies between children and includes such contributors as heredity, biological or neurodevelopmental factors, and factors related to parenting and families. The American Psychiatric Association outlines symptoms and other information related to ADHD in the *Diagnostic and Statistical Manual of Mental Disorders* (fourth edition text revision; *DSM-IV-TR*). Gifted and/or creative children can be diagnosed with ADHD, an occurrence called *dual diagnosis,* or they can be misdiagnosed with ADHD due to an overlap in behavioral characteristics associated with both giftedness/creativity and ADHD.

Types

Four types of ADHD are included in the *DSM-IV-TR,* including the Predominantly Inattentive Type, the Predominantly Hyperactive-Impulsive Type, the Combined Type, and ADHD Not Otherwise Specified. The *Predominantly Inattentive Type* includes symptoms related largely to inattention, such as the inability to maintain attention, avoiding tasks that require mental effort, losing things and being forgetful, failing to pay close attention to details, and lacking in organizational skills. The *Predominantly Hyperactive-Impulsive Type* includes symptoms related to hyperactivity and/or impulsivity, including being unable to sit still, being restless, talking excessively, fidgeting, and interrupting others. To be diagnosed with either of these types of ADHD, six or more symptoms of either inattention or hyperactivity/impulsivity, as outlined in the *DSM-IV-TR,* must be present for at least 6 months in two or more settings (e.g., school, home). The onset of most of the symptoms must occur before the age of 7. Further, the symptoms must be maladaptive and must be inconsistent with the child's developmental level. The *Combined Type* includes symptoms of both inattention and hyperactivity/impulsivity, and *ADHD Not Otherwise Specified* includes behaviors that are symptomatic of either inattention or hyperactivity/impulsivity, but do not meet the diagnostic criteria outlined in the *DSM-IV-TR.*

Diagnosis

The most common method for identifying ADHD is the use of rating scales, which are norm-referenced

instruments that list a variety of behaviors (e.g., "Is impulsive") and ask the rater to gauge the degree to which a child exhibits the behavior. Common rating scales include Conners' Parent and Teacher Rating Scales–Revised, the Child Behavior Checklist, and the Behavior Assessment System for Children. The diagnosis of ADHD, however, should ideally be based on multiple sources and multiple types of information across different settings. For example, in addition to using rating scales, diagnosticians could employ clinical interviews, laboratory measures, and direct behavioral observations. Clinical interviews should explore such topics as the child's family history, current family situation (i.e., to check for family conflict or other issues that might be causing symptoms), medical history, academic performance, behavior problems, and peer relationships. Laboratory measures are designed to measure core symptoms of ADHD, such as attention span, impulsivity, and motor activity. Common laboratory measures include the Continuous Performance Test (CPT), the Matching Familiar Figures Test (MFFT), and the Test of Variables of Attention (TOVA). Direct behavioral observations provide diagnosticians with an opportunity to compare a child's behavior across an array of settings, including school, home, and during leisure time. Multiple behavioral checklists have been created to assist teachers, parents, and others in observing a child's behavior, including several mentioned above.

Treatment

Psychostimulants are the most typical method used to treat ADHD in children. Although these drugs stimulate the central nervous system in people without ADHD, they have a calming effect on people with ADHD. Common psychostimulants include methylphenidate (e.g., Ritalin, Concerta), dexmethylphenidate (e.g., Focalin), amphetamine-dextroamphetamine (e.g., Adderall), and dextroamphetamine (e.g., Dexedrine, Dextrostat). Another popular method used to treat ADHD is cognitive–behavioral therapy, which focuses on treating the way one's thoughts and feelings affect one's behavior. A combination of psychostimulants and cognitive–behavioral therapy is likely to be one of the most effective treatment options for children with ADHD.

Giftedness and ADHD

Some gifted and/or creative children may demonstrate behaviors that are symptomatic of ADHD. These overlapping behavioral characteristics include difficulty paying attention, a high activity level, impulsive behavior, trouble completing certain tasks, difficulty following rules and regulations, potential social difficulties, and potential academic underachievement. Because of the possible overlap in some characteristics associated with giftedness and ADHD, two issues arise: the dual diagnosis of giftedness and ADHD, and the misdiagnosis of giftedness and ADHD.

Dual Diagnosis

It is possible for a child to be both gifted and to have ADHD. However, the diagnosis of ADHD for a child who is gifted can be difficult, because a child's intellectual ability could mask the ADHD or the ADHD could mask a child's giftedness. Once identified as being gifted and having ADHD, though, a child is said to have a dual diagnosis, or is said to be *twice exceptional*.

Misdiagnosis

Because of the overlap in some characteristics associated with giftedness and ADHD, the potential for misdiagnosis is believed to exist. The misdiagnosed child is one who exhibits behaviors typically indicative of ADHD, but who does not have ADHD. The ADHD-like behaviors are explained by the child's giftedness. For example, inattention could be explained by an imaginational overexcitability, considered to be a characteristic of intellectually gifted by many theorists, or by boredom in the classroom due to a nonstimulating curriculum. Hyperactivity could be explained by a psychomotor overexcitability. Creative children, characterized by a personality characteristic termed *openness to experience,* may seem impulsive and inattentive as well. Because of the potential for misdiagnosis, it is imperative that diagnosticians be aware of the overlap in characteristics associated with intellectual giftedness, creativity, and ADHD.

Anne N. Rinn

See also General Creativity; Overexcitabilities; Twice Exceptional

Further Readings

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., Text rev.). Washington, DC: Author.

Baum, S. M., & Olenchak, F. R. (2002). The alphabet children: GT, ADD/ADHD, and more. *Exceptionality, 10,* 77–91.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, P., & Olenchak, F. R. (2005). *Misdiagnosis and dual diagnosis of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders*. Scottsdale, AZ: Great Potential Press.

Attitudes Toward Gifted

Attitudes toward gifted describes the perception of the world toward individuals identified as gifted. Research studies have identified that the attitudes of peers, parents, teachers, and the gifted themselves play an important role in the social and emotional development of gifted students. It was noted by Barbara Clarke that attitudes within society, and specifically within the educational community, are a prime force in furthering or denying educational opportunities for our gifted children. Research points to a few common factors that might affect attitudes toward gifted—self-perception of the gifted, contact with gifted persons, level of education, training and knowledge about giftedness, gender, and occupation as a teacher.

Gifted Students' Attitude Toward Giftedness

Gifted students have mixed attitudes toward their giftedness label. In terms of academic tasks or superior performance in talented areas, students have a positive attitude toward their giftedness. Yet in terms of perception by peers, teachers, siblings, and parents, gifted students tend to have a negative attitude toward their giftedness; that is, they believe that others perceive their giftedness negatively.

Being gifted has positive personal ramifications for the students. It confirms the students' belief in their own talent and abilities; provides greater confidence in their abilities to master difficult material; and may lead to extra resources to support their gifts. From an academic standpoint, gifted students gain more opportunities to win scholarships and obtain placement into advanced classes easier. They achieve good academic grades easily and win favor with teachers and parents.

From a social point of view, most gifted students perceive their giftedness as a negative thing. Concerns over being rejected by one's peers who are less academically talented and of instilling envy in others creates some unease about being gifted. As a gifted student progresses from childhood to adolescence, the need to belong to one's peer group grows stronger than ever, which is no different from non-gifted students in school, hence, the apprehensions about not fitting in with others is a valid concern for these gifted students. Some studies, however, show that gifted students may have an exaggerated notion of how negatively they are perceived. Nonetheless, social recognition from others, enhanced peer relationship for those gifted students with naturally high social skills, and awareness of potential contributions to the greater society are some positive social aspects that are appreciated by gifted students.

Peers' Attitude Toward Giftedness

In early childhood, non-gifted peers have favorable relationships with their gifted peers; however, it appears that the relationship deteriorates somewhat over the years as one approaches adolescence. This is especially pronounced for females. This could be attributed to the greater values and emphasis given to athletic performance and personal appearance compared to academic achievement by peers, leading to a social chasm between those who are academically achieving and those who are not. Males tend to focus more on athletic ability during childhood and adolescence; hence, the social relationship between gifted and non-gifted peers remains somewhat stable compared to their female counterparts. Another reason could be that young children are attracted to their gifted peers for their better social perspective-taking and social problem-solving skills that smooth social interaction; with advancing age, however, both groups may level off on their social skills and the

focus turns to other areas for good relationships to be maintained.

Gifted students who were in integrated classrooms—classrooms where both gifted and non-gifted students are taught together—have better relationships with non-gifted students than those who are in separate pull-out classrooms for the gifted only. This may be an artifact of the uncomfortable and visible experience of being taken out of the regular classroom for "gifted" activities. Gifted students who share some activities with their non-gifted peers are able to socialize together to a greater extent, and their non-gifted peers are able to dispel the notion that those who are gifted are strange or elitist. Shared extracurricular activities may help smooth any differences that exist in terms of academic achievement, allowing the non-gifted peers to shine in their own right, which would allow both gifted and non-gifted students to value each other's strengths and contributions to a positive school environment.

Non-gifted peers generally have more favorable attitudes toward their gifted peers when their gifted peers are not considered to be highly gifted. It would appear that highly gifted students have interests and values that are so far advanced and different from their non-gifted peers that little common bond or interest exists that could foster positive relationships. Then again, students in school would pick on other students who are perceived to be different from them, not limited to those being gifted.

Gifted students tend to have the most positive peer experiences when they are allowed to associate with similarly gifted students. Summer camps and programs for gifted students, online communities, and schools in which all students are gifted often lead to new friends for gifted students who have had few friends, and to lasting friendships and alliances that support gifted students' self-concept.

Siblings' and Parents' Attitude Toward Giftedness

It is not a stretch of the imagination to note that sibling rivalry will invariably occur when one sibling is better than the other in certain areas of their lives, be it average ability or superior abilities. However, the existence of superior academic intelligence or talent is definitely a cause of concern for siblings and parents, which justifiably alters the family dynamics in a different manner than if the child or adolescent were only moderately better than his or her siblings. Initially, siblings of gifted students will naturally have negative attitudes toward their gifted brothers or sisters; however, over time, it appears the negative effect toward the gifted siblings disappears. It should be noted that the negative effect toward siblings is not exclusive to those labeled intellectually gifted; the nonlabeled siblings will have similar attitudes toward their siblings whenever their siblings are recognized as talented in sports, music, arts, or leadership ability.

Parents, being concerned about their child's ability to fit in with school peer groups, even when a label is positive, such as being gifted, are naturally ambivalent about the labeling. Concerns over the changing family roles; the relationship between the gifted child, the neighborhood, and the community; and the relationship between the gifted child and the school are ongoing concerns that parents have to manage proactively for a positive resolution for their child's giftedness. Parents have to manage the changed family dynamics between gifted children and their siblings, gifted children and the parents, and the changed relationship between husband and wife as resources and time are channeled to the gifted children's development. Parents also have to navigate the response of neighbors and community to the gifted child, making sure the gifted child has mental-age peers who will accept the child; they also will have to manage the envious reactions of neighbors. In addition, parents' concerns over teachers' attitude toward their gifted child and the pursuit of differentiated gifted curriculum for their child in school are other concern areas that parents may have to deal with. Despite all that, over time, as with non-gifted siblings' attitudes toward their gifted siblings, parents' negative attitude toward giftedness usually fade, provided parents are successful in navigating the myriad presenting issues that accompanies the child's giftedness label noted above.

Teachers' Attitude Toward Giftedness

Teachers play a significant role in fostering the academic and intellectual development of their students. Students in gifted programs across the

country confront different kinds of reactions from their teachers. Some teachers harbor a positive feeling, whereas others may harbor extreme negative feelings toward gifted students and education. The two important factors that affect a teacher's attitudes toward gifted students may be the teacher's self-perception as gifted, or teacher training and experience in gifted education. Some teachers may hold stereotypical views about gifted students being arrogant, overconfident, and self-centered, and object to special educational provisions for gifted students. Teachers' knowledge of the academic needs of gifted students and strategies to help them adjust well in a classroom with non-gifted students will help foster a positive attitude toward these students, while the lack of such knowledge may foster negative feelings. Professional education programs in gifted education will assist in training and educating teachers about giftedness.

Implications

The various reactions to giftedness by peers, teachers, siblings, parents, and the students themselves undoubtedly have a reaction on the gifted student. Given that giftedness may directly or indirectly influence one's social relationship with others, gifted students will naturally try to counter the effects of being labeled gifted by taking countermeasures to ensure their social circle is not compromised. Gifted students may cope with their giftedness by minimizing the effects of giftedness, denying their own giftedness, rejecting concerns about social rejection by others, and increasing involvement in extracurricular activities.

Students may minimize their giftedness by purposely underachieving in school; using less sophisticated vocabularies with their peers; and revealing less concern, knowledge, and information about the world than their true capabilities. These students may also deny their own giftedness and talent, attributing them to errors in the standardized test in order to conform to peer pressure and the desire to fit in with their peers. Another way to cope with the rejection of peers would be to refute the need to be popular or fit in with one's peers. Intellectualizing and rationalizing about the needs of others to fit in with peer culture is a defense mechanism that could be put up by those facing rejections by a peer group. For those who are athletically inclined, the ability to shine in sports is a good way to bond with peers to avoid being ostracized. Superior athletic abilities are seen as less intimidating than superior intellectual abilities, which helps moderate effects of one's academic performance in class. This is also true for those gifted students who have good social and leadership abilities and who are able to connect with others in school clubs and organizations, enabling them to socialize with others without threatening their peers.

Priyanka Raut and Kai Kok "Zeb" Lim

See also Controversies in Gifted Education; Elitism; Parental Attitudes; School Attitudes; Teacher Attitudes

Further Readings

Bégin, J., & Gagné, F. (1994). Predictors of general attitude toward gifted education. *Journal for the Education of the Gifted, 18*(1), 74–86.

Colangelo, N., & Brower, P. (1987). Labeling gifted youngsters: Long-term impact on families. *Gifted Child Quarterly, 31,* 75–78.

Cornell, D. G., Pelton, G. M., Bassin, L. E., Landrum, M., Ramsay, S. G., Cooley, M. R., et al. (1990). Self-concept and peer status among gifted program youth. *Journal of Educational Psychology, 82,* 456–463.

Field, T., Harding, J., Yando, R., Gonzalez, K., Lasko, D., Bendell, D., et al. (1998). Feelings and attitudes of gifted students. *Adolescence, 33,* 331–342.

Geake, J. G., & Gross, M. U. M. (2008). Teachers' negative affect toward academically gifted students: An evolutionary psychological study. *Gifted Child Quarterly, 52,* 217–231.

Guskin, S. L., Okolo, C., Zimmerman, E., & Peng, C.-Y. J. (1986). Being labeled gifted or talented: Meanings and effects perceived by students in special programs. *Gifted Child Quarterly, 30,* 61–65.

Keirouz, K. S. (1990). Concerns of parents of gifted children: A research review. *Gifted Child Quarterly, 34,* 56–63.

Kerr, B., Colangelo, N., & Gaeth, J. (1988). Gifted adolescents' attitudes toward their giftedness. *Gifted Child Quarterly, 32,* 245–247.

McCoach, D. B., & Siegle, D. (2007). What predicts teachers' attitudes toward the gifted? *Gifted Child Quarterly, 51,* 246–255.

Schneider, B. H., Clegg, M. R., Byrne, B. M., Ledingham, J. E., & Crombie, G. (1989). Social relations of gifted children as a function of age and school program. *Journal of Educational Psychology, 81,* 48–56.

Swiatek, M. A. (1995). An empirical investigation of the social coping strategies used by gifted adolescents. *Gifted Child Quarterly, 39,* 154–160.

Attitudes Toward Religion and Spirituality

Perhaps more than any other topic in education or the general humanities, religion and spirituality suffer from a lack of agreement with regard to definition. At one extreme is the view that the two constructs are synonymous; to be religious is to be spiritual and vice versa. At the other end is the viewpoint that religion is a more formalized set of processes, often rooted in historical literature, that are practiced in accordance with a higher power. The construct of religion, then, is different from spirituality in that spirituality need not involve any aspect of religion. A person who would normally be seen as an atheist or one who follows nontraditional (or more often non-Western) beliefs can still be very spiritual. An existential view of life and action as well as the ability to transcend literal experience, common factors in spirituality definitions, do not rely on formalized religious practice, although they can certainly play a role for a religious person. This standpoint is becoming more and more accepted as many nations are experiencing a mixture of faiths within their borders as well as a variety of attitudes toward such faiths.

This topic is important to the field of education and specifically to gifted and talented education for two main reasons. First, to understand, acknowledge, or incorporate the topics of religion and spirituality into education is to take a crucial step toward considering the whole child in the classroom. Second, something Michael Piechowski has discussed is that gifted and talented students tend to be sensitive about such issues as religion and spirituality, to the point that some may even have special gifts or insight in these areas. This entry provides an overview of gifted and talented student attitudes toward religion and spirituality before discussing applications and pitfalls of spiritual discussions and activities in the classroom.

Background

In the United States, religion was incorporated into education long before the existence of a formal education system. One of the first textbooks used in colonial America was the Bible. However, since that time religion and spirituality have seen themselves progressively cleansed from the public school system, to remain only in the private sector. The phrase *separation of church and state* has been a part of our official national dialogue since the *Everson v. Board of Education* Supreme Court case of 1947. The sheer number of court cases on the topic of religion in schools is enough evidence to say that the attitude toward the role of religion and spirituality in the American education system is mixed at best.

Since the 1970s, people such as Dorothy Sisk, Michael Piechowski, Linda Silvermann, and Barbara Kerr have been interested in the spiritual sensitivity and awareness that some gifted students possess. Piechowski's latest book is perhaps the best window yet into this greatly unexplored region of the gifted and talented student. Put simply, many gifted students are interested in such "larger" issues and questions as those that pertain to religion and spirituality.

Characteristics

Howard Gardner disagreed with the existence of a spiritual intelligence as intelligence is traditionally defined. He did support the idea of an eighth "existential intelligence," however, which can be seen when gifted students ask fundamental questions about existence and are not pacified by answers to the simple, easy-answer questions posed in many classrooms. This perspective does not have universal agreement as scholars such as Barbara Kerr, John McAlister, Kathleen Noble, and Robert Emmons have evaluated and found evidence for the construct of spiritual intelligence. In practice, many gifted students will go so far as to seek out spiritual or religious motivations in seemingly unrelated topics. Some are naturally drawn to the religious or spiritual motivation for actions both in fiction and in their daily lives. In

one example, an eighth-grade girl asked to compare a character in a short story to Satan from the Bible as opposed to a character from her young adult novel. This sensitivity to spiritual/religious issues aligns with some of the most basic characteristics of gifted children: thinking that is abstract, a strong empathy and understanding of others, heightened sensitivity to injustice, and a strong metacognitive ability. When taken as a whole, the gifted child seems primed for interest in spiritual and religious issues.

Classroom Applications

Gifted students' interest in higher-order issues such as spirituality and religion can be incorporated into daily lessons as long as the instructor uses such topics as instructional tools as opposed to venues for moral instruction or opportunities to voice support for one particular faith. Much of world literature and world conflict is rife with religious and spiritual implications. Such topics are not only ideal for the language arts and social studies classrooms, but they are also a way to bridge all content areas. High school students could read about Native American spirituality in novels in a language arts class while also studying the history of the Battle of the Little Big Horn in a social studies course. The same concept can link English and science. If a science teacher mentions the religious and ethical conflict over stem-cell research, a language arts instructor can latch on to such a topic for persuasive essays. In this fashion the instructor does not present any opinion on any single faith or view, but instead provides spiritual/religious topics for deep thought and analysis.

A major benefit of addressing religion and spirituality in the classroom is that students have a safe environment in which to examine their own thoughts and beliefs in an external fashion. In something as simple as including an assignment option that addresses these issues, teachers can encourage gifted and talented students with such interests to explore them further.

Scott J. Peters

See also Emotional Intelligence; Existentially Gifted; Overexcitabilities; Spiritual Intelligence; Spirituality; Supporting Emotional Needs of Gifted

Further Readings

Emmons, R. A. (2000). Is spirituality an intelligence? Motivation, cognition, and the psychology of ultimate concern. *International Journal for the Psychology of Religion, 10*(1), 3–26.

Kerr, B. A., & McAlister, J. (2001). *Letters to the medicine man*. Cresskill, NJ: Hampton Press.

Mendaglio, S. (1995). Sensitivity among gifted persons: A multi-faceted perspective. *Roeper Review, 17*(3), 169–172.

Piechowski, M. M. (2003). Emotional and spiritual giftedness. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 403–416). Boston: Pearson Education.

Piechowski, M. M. (2006). "*Mellow out," they say. If I only could: Intensities and sensitivities of the young and bright*. Madison, WI: Yunsa Books.

Australia, Gifted Education

Australia is an island continent comprising a federation of eight states and territories with a population in the region of 21 million; it has roughly the same land mass as the United States. The government school system is funded by both state and federal governments but centrally administered by the individual states; as a consequence, identification of, and catering for, gifted and talented children varies considerably throughout the country. Personal communications with gifted education managers within all state and territory departments of education have provided current information regarding the provisions for gifted and talented children throughout Australia.

At present there is no formal federal government legislation or policy addressing the education of these students, although there have been two small yet noteworthy funding initiatives at the national level. The first, a Senate inquiry in 1988 whose recommendations funded a few programs across states and territories in the early 1990s, and the second, in 2001, concluded that although there were some significant developments since the previous Senate review in 1988, a substantial amount remained to be achieved. This committee noted also a lack of acknowledgment by educators that giftedness occurs regardless of socioeconomic status. A further key finding, that teacher training

was an essential element in the identification of, and catering for, gifted and talented students prompted a rise in the profile of the educational needs of the gifted, and subsequent funding was directed to the development and dissemination of a professional learning package for teachers.

The provision of funds enabled the package to be presented to trainee and serving teachers. In addition, parent workshops were held in targeted rural and remote areas, and extension of this work continued throughout 2008. Both teacher and parent programs were conducted by the successful tender, GERRIC (Gifted Education Research Resource and Information Center) at the University of New South Wales.

Identification of Gifted and Talented Children

Identification of gifted and talented children is documented in policy guidelines in government education departments throughout Australia. Although approximately 30 percent of Australian children are educated in nongovernment (private) schools, these institutions tend to follow government guidelines. Through the influence of GERRIC (University of New South Wales) there is a strong adherence to Françoys Gagné's theory as a definition of giftedness, although there is evidence of the earlier influence of Sidney Marland, Joseph Renzulli, and more recently, the Columbus Group. Identification comprises both objective and subjective measures, including formal psychometric testing, achievement testing, portfolios, parent/teacher checklists, and self-nomination.

State and Territory Provisions

All states and territories promote a whole-school approach to gifted education in which schools and teachers are encouraged to provide a challenging and enriched differentiated curriculum. Other specialized provisions vary from state to state; the most common being enrichment and extension programs (pull-out and in-class). Traditionally, Australian teachers have been wary of interventions such as ability grouping and acceleration, which were seen to move students away from their chronological age peers. There have been significant attitudinal shifts toward acceptance of acceleration, however—whether by grade advancement, single subject acceleration, early school entrance, or ability grouping—when teachers have received professional development on appropriate curriculum for gifted and talented students.

In New South Wales, Australia's most populous state, the education of gifted and talented children is organized in a variety of ways: the provision of selective high schools, opportunity classes for gifted children within regular elementary schools, and specialist high schools. Several specialist high schools cater to students who are gifted in the creative and performing arts, languages, technology, and sport. In the Australian Capital Territory, government policy pertaining to the education of gifted and talented students mirrors that of New South Wales.

Within Victoria, a number of schools offer a select entry accelerated learning program (SEALP) cohort within a regular high school. This allows gifted students to complete the 6 years of secondary education in 5 years by compacting the first 3 years of high school. In addition, there are two selective high schools for high-ability students and a selective arts high school. Victoria, like New South Wales, is planning further specialist schools for physically and intellectually talented students.

In Victoria, two long-standing organizations catering for the needs of gifted students are the CHIP (Children of High Intellectual Potential) Center and Monash University. The CHIP Center supports parents, children, and schools through identification, assessment, counseling, educational programs, parent information sessions, and professional development in schools and universities, whereas Monash University conducts research in educational and developmental psychology as well as providing graduate and postgraduate programs in gifted education. The Krongold Center at Monash also conducts psycho-educational assessments and counseling. The efforts of these two organizations have resulted in some major changes of attitude and behaviors toward gifted and talented education in Victoria.

A range of centrally endorsed Gifted and Talented Education (GATE) programs cater to the needs of gifted students in Western Australia. Supplementary provisions comprise the GATE Academic Talent Program and specialist Arts programs. In addition, online options, such as GATE

Approved Specialist Programs and Primary Extension and Challenge (PEAC) programs, enable the most talented students to interact with their gifted and talented peers in specific curriculum fields at higher levels than can normally be provided in the regular classroom. Selective schooling, similar to that offered in New South Wales and Victoria, is offered at Perth Modern School and John Curtin College of the Arts.

"Academies" accelerate learning opportunities for Queensland's brightest students and provide a pathway for their future careers. The Academies are available to students in years 10, 11, and 12. Enrollment in the Academies is based on academic merit and is conducted through a selective entry process, with a maximum enrollment of 450 students at each Academy.

In Australia's smallest state, Tasmania, provisions for gifted and talented students are confined to a whole-school approach. There are no special select-entry schools as such: The Department of Education's Center for Extended Learning Opportunities (CELO) manages the department's early-entry and acceleration programs; develops and delivers online extension programs; coordinates and supports delivery of vacation extension programs; and provides logistical, policy, and professional learning support to schools.

Similar to Tasmania, the Northern Territory does not have a large population of school-age children. Currently there is one early-childhood gifted class, three primary gifted classes, and secondary classes for "students of high performance" in years 8 and 9. As is the case in other states, Northern Territory schools are encouraged to develop suitable whole-school approaches to gifted education, with educational advisors supporting schools and classes.

In South Australia, several clusters of high schools operate as a consortium working together to provide additional staffing for specific gifted education programs through the IGNITE program. The three Ignite schools have been provided with resources to cater specifically for the individual needs of highly gifted students: Students can accelerate vertically through middle school, completing years 8, 9, and 10 in 2 years, or can opt for a companion program that emphasizes subject acceleration and lateral extension, rather than grade skipping.

National Projects

According to Judith Hewson, president of the Australian Association for the Education of Gifted and Talented Children, the establishment of a National Center is intended. It is anticipated that this independent foundation will undertake concerted collaboration with universities and gifted education organizations across the nation to implement national projects in both research into giftedness and the education of gifted students.

Sandra S. Lea-Wood

See also Academic Talent; Children, Middle School; Gifted Education Centers; National Academy of Arts, Sciences, and Engineering; National Research Center on the Gifted and Talented; State Associations; World Views

Further Readings

Chessman, A. (2006). *Sharing the journey: The New South Wales Implementation for Gifted Education.* Paper presented to the biennial conference of the Australian Association for the Education of Gifted and Talented Children, Freemantle, Australia.

Collins, J. (Chair). (2001). *Education of gifted children: Report of inquiry into gifted education by the Senate Employment, Workplace Relations, Small Business and Education References Committee.* Canberra: Australian Government Printer.

Gross, M. U. M. (2003). International perspective. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education.* Boston: Allyn & Bacon.

Vaile, W., & Geake, J. (Eds.). (2002). *The gifted enigma: A collection of articles originally published in the* Australasian Journal of Gifted Education. Cheltenham, Victoria, Australia: Hawker Brownlow Education.

Autism

According to the American Psychiatric Association's *Diagnostic Statistical Manual of Mental Disorders–Text Revision (DSM-IV-TR),* autism, or autistic disorder, belongs to a group of pervasive developmental disorders that include Asperger's syndrome, Rett's syndrome, childhood

disintegrative disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS), also referred to as atypical autism. Three disorders from this group are combined under the "autism spectrum" umbrella: autistic disorder, Asperger's syndrome, and PDD-NOS. Asperger's syndrome is differentiated from autistic disorder in that language development is normal. A diagnosis of PDD-NOS is given when a child's symptoms meet some but not all criteria for the diagnosis of autistic disorder or Asperger's syndrome.

Autistic disorder is a neurological condition that emerges in the first 3 years of life. It disrupts sociocommunicative development and thus impairs children's ability to use spoken language in culturally normative ways. Autistic disorder is diagnostically defined in the *DSM-IV-TR* by a combination of impairments in social interaction and communication; atypical patterns of behavior, interests, and activities; and delays or atypical functioning before age 3 in social interaction, language, and symbolic or imaginative play. Specific symptoms include impairments in the use of eye gaze, facial expression, and gesture; failure to develop age-appropriate peer relationships; delay in spoken language development, with no attempts to compensate through alternative modes of communication, such as gesture; repetitive or idiosyncratic use of spoken language; narrow repertoire of interests and activities, and adherence to routines and rituals; and stereotyped and repetitive motor movements, such as hand or finger flapping. The severity of autistic symptoms varies across children and may change with age, often in the direction of improvement, especially if intervention and educational programs are tailored to a child's unique talents, interests, and sociocommunicative needs.

There is growing national and international concern over the rising rates of autism spectrum diagnoses and an ongoing debate about whether the rising rates truly reflect increasing prevalence or changing diagnostic criteria, improved differentiation from other diagnoses, and diagnostic migration from other clinical groupings, especially mental retardation.

Role of Education in Intervention

Currently considered incurable, autism is managed with therapeutic interventions that are mostly educationally focused. The National Research Council's 2001 report "Educating Children With Autism" states that the education of children, parents, and teachers is the primary form of treatment for autism. In the report, education is defined as the fostering of skills and knowledge that include not only academic learning but also development of social and adaptive skills, improvement in language and communication, and reduction of behavioral problems. Thus, approaches to the education of students with autism appear to be primarily remedial. A few "islands of excellence" programs are targeting not the reduction of autistic symptoms, but rather the development of talents and creativity in children and youth with autism.

No single treatment has been successful in eradicating all the symptoms of autism, nor has one single approach been successful for all children. The most commonly used interventions for autism spectrum disorders may be divided into several groups. *Behavioral modification approaches* in family and school contexts include applied behavior analysis, pivotal response training, incidental teaching, and embedded learning opportunities. An example of an *augmentative communication approach* is the picture exchange communication system. *Structural environmental approaches* include treatment and education of autistic and related communication handicapped children. Examples of *developmentally based social pragmatics approaches* are developmental, individual difference, relationship-based floor-time model, and relationship development intervention (RDI). Occupational therapy and speech and language therapy are widely used clinical approaches that may be included in an individualized educational program for a student diagnosed with autism.

Although autism is no longer considered a rare disorder, its causes are still unknown. It has now been established that the inability to communicate verbally may coexist with high cognitive abilities. No effective methods, however, have been developed to tap the intelligence and creativity of children with autism, especially of those considered severely affected, and approaches to their education have remained essentially the same. Nevertheless, more and more children and youth with autism are able to succeed, and even excel, in fully included or mainstreamed educational settings. What social and institutional forces are at play in

how autistic students arrive at academic attainment, however, remains unknown. Equally unknown is what social and institutional forces thwart autistic children's and youths' academic success as well as their talents and creativity.

Giftedness and Creativity in Autism

Two trends in the research literature might shed light on the conditions that are likely to thwart the development of talent and creativity of children and youth with autism. The first trend is to see their giftedness and talent as only a savant skill. The second is to use standardized testing, such as the Torrance Tests of Creative Thinking, to study limitations in creativity of children with autism in standardized tasks as evidence for their imagination deficit, one of the diagnostic criteria for autistic disorder and, by an erroneous extension, a sign of impaired creativity in general.

The giftedness and talent of children and teens with autism are often discussed in savant terms. Their exceptional abilities are perceived to arise more from their autism diagnosis and less from their individual characteristics as learners and creative thinkers.

Existing empirical research points to a connection between savant skills, also called savant talent, and autism spectrum disorders. Approximately 9.8 percent of people with autism have savant talent to some degree. Although prevalence of persons with savant talent among those diagnosed with autism is relatively high compared to other clinical populations, it does not mean that all gifted and talented children and youth with autism are savants. A cognitive information processing style characterized by "weak central coherence" that prioritizes parts over a whole across stimuli has been suggested as responsible for savant talent as well as giftedness and creativity of those with autism.

Standardized testing of creativity in autism presupposes a definition of creativity as the generation, manipulation, and transformation of images to produce new representations. One of the experimental procedures in the Torrance Tests of Creative Thinking, for example, involves giving a child a sheet with 30 parallel lines and asking the child to add to these lines to "make lots of different things." Three dimensions of creativity tested by such a procedure are fluency, flexibility, and originality. Children with autism have been reported to show impairments in creativity on such tests, although there are implicit assumptions in these procedures that present serious problems. One is the assumption that creativity is a normative ability that may be compared across groups. Another is that the narrow definition of creativity in such tests underestimates the creative potential of children with autism when they are engaged in an activity of their own choice and in a familiar setting.

At present, understanding of the creative potential and talent of children and teens with autism in their everyday lives comes from small-scale projects designed not to examine but to support their talent and creativity. A "Miracle Project," portrayed in the HBO documentary *Autism: The Musical,* is a theatrical endeavor carried out by Elaine Hall, an acting coach and mother of a boy with autism who became one of the five participants in the Miracle Project musical production. Most of these children would not be considered high functioning; however, through Hall's determination and commitment, each child learned to perform in public, improvise, be creative, and enjoy the theatrical adventure.

The role of the family appears to be paramount in the development of talent in children, teens, and adults with autism. Several successful individuals who have autism diagnosis, such as professor of animal science Temple Grandin, artist Jesse Park, and jazz musician Matt Savage, owe their accomplishments to the direct, consistent engagement of their families in their education. Creativity and talent of children and youth with autism should be examined in context, and the conceptualization of their giftedness should take into account the sociocultural and historical forces that shape the ways in which our culture defines their creative potential and its realization.

Olga Solomon

See also Asperger's Syndrome; Disabilities, Gifted; Learning Disabilities; Social Development; Twice Exceptional

Further Readings

Chilvers, R. (2008). *The hidden world of autism: Writing and art by children with high-functioning autism.* London: Jessica Kinglsey.

Craig, J., & Baron-Cohen, S. (1999). Creativity and imagination in autism and Asperger syndrome. *Journal of Autism and Developmental Disorders, 29*(4), 319–326.

Frith, U., & Hill, E. (2003). *Autism: Mind and brain.* Oxford, UK: Oxford University Press.

Grinker, R. R. (2007). *Unstrange minds: Remapping the world of autism. A father, a daughter, and a search for new answers.* New York: Basic Books.

Mandell, D., Stahmer, A. C., & Brodkin, E. S. (2008). Autism spectrum disorders in childhood. In T. P. Gullotta & G. M. Blau (Eds.), *Handbook of childhood behavioral issues: Evidence-based approaches to prevention and treatment.* New York: Routledge.

Moldin, S. O., & Rubenstein, J. L. R. (Eds.). (2006). *Understanding autism: From basic neuroscience to treatment.* Boca Raton, FL: Taylor & Francis.

National Research Council. (2001). *Educating children with autism* (Committee for Educational Interventions for Children with Autism. Division of Behavioral and Social Science and Education). Washington, DC: National Academy Press.

Autonomous Learner

An autonomous learner is one who has learned to live and work in an independent manner, one who uses information to develop innovative products and who creates opportunities for personal growth and contribution to society.

Profiles of the Gifted and Talented

After several years of research and reviews of literature, George Betts and Maureen Neihart developed an approach for identifying and serving several types of gifted and talented. The goal of this approach is to comprehend the feelings, behavior, needs, and support necessary for developing gifted students into autonomous learners; however, not all students begin as autonomous learners. Betts and Neihart identified six different types, or profiles, of the gifted and talented. They include the following:

1. The successful learner
2. The challenging learner
3. The underground learner
4. The at-risk learner
5. The twice exceptional (multi-exceptional) learner
6. The autonomous learner

Although a major goal in gifted education is the development of students as autonomous learners, not all students are able to achieve this goal. Evidence supports the view that this is the result of the structure of school systems today, and the lack of opportunities to develop creativity and independence, two major components of autonomous learners.

Many gifted and talented students become successful students and work well within the school system by conforming, although they lose a great deal of autonomy and creativity. They become dependent on the directions and knowledge of teachers and parents.

Other students do not conform to school and society but use their abilities to defy the system. Although they do not lose their autonomy or creativity, these students do not develop appropriate social or academic skills. They are known as challenging students. They generally do not accept or respect others, and find themselves in conflict with teachers and parents. Success becomes almost impossible for them unless they are placed in an environment with acceptance, flexibility, and support.

Underground students hide their abilities because their belonging needs become more important than their intellectual needs. Peers may not be accepting of people who are brighter than they are. Because of this need to belong, they receive conflicting messages from different groups in their lives, and they become confused. "Do I get A's or do I become part of the group?" Without appropriate guidance and support they may feel insecure and begin to shut down academically. It is possible to see these students as average students.

Other students are now at risk and are angry at the system and, at times, with themselves. They are "SOS" students, Significantly Out of Sync. They are in a power struggle with authority, and find themselves controlled by frustration and anger. Their abilities are not developed because of frequent

school absences and lack of success. Depression may become a major psychological problem.

Multi-exceptional students have typically been the most difficult to identify. They are in special education because of their identified challenges, but not in gifted education because of their strengths. Conversely, they may be in gifted education but not in special education. They are rarely identified for services in both areas. Their strengths and challenges are not met and they struggle in school. Belonging is another area of difficulty. "Which group do I hang out with?" They live in a world of turmoil if they do not receive positive interventions in school and in the home.

The Goal: The Autonomous Learner

Autonomous learners are independent, self-directed, perceptive, knowledgeable, accepting of self and others, and see their abilities as an opportunity to make a positive contribution to the world. Autonomous learners have developed a positive self-concept and self-esteem, are accepting of others and are successful in school, but are not limited by their school experience. They have combined their creativity and their problem-finding and problem-solving abilities into an independent and self-directed style of learning. Learning is relevant, and incorporates an extremely high level of motivation. The highest level of learning is *passion learning*. The desire for knowledge in a passion area is internally driven, and often becomes an intensely personal quest.

The following list includes the major attributes of autonomous learners:

- Positive self-esteem and self-concept
- Acceptance of others
- Appropriate social skills
- Perceptiveness and understanding
- Effective communication
- Exceptional problem-finding and problem-solving skills
- Creativity
- Great desire for knowledge
- Willingness to fail in the pursuit of knowledge
- Intrinsic motivation
- Desire to pursue passions in depth
- Courage of personal convictions
- Resiliency
- Willingness to work at the edge of competence
- Desire to make positive contributions to the world
- View of learning as a life-long pursuit

Conditions Necessary for Autonomous Learning

Excellent teachers are essential in the areas of content, process, and product in order for students to develop as learners. In order to become autonomous learners, students require the following conditions:

- Advocacy for the learner in the school, home, and community
- Opportunities to develop intellectual and creative friends of all ages
- Opportunities for academic success related to passion areas
- Removal of time and space restrictions
- Implementation of a long-term, integrated plan of study
- Multiple, related, in-depth studies
- Mentorships at a professional level
- Wide variety of accelerated options
- Waiver of traditional school policies and regulations
- Get out of their way and let them be them!

George Betts

See also Creativity, Definition; Curriculum Models; Giftedness, Definition; Optimal Development

Further Readings

Betts, G. T. (2003, Fall/Winter). The autonomous learner model for high school programming. *Gifted Education Communicator,* pp. 2–3.

Betts, G. T., & Neihart, M. (1988). Profiles of the gifted and talented. *Gifted Child Quarterly, 32*(2), 248–253.

Neihart, M. (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

B

Belin-Blank Center

The Belin-Blank Center is one of the most comprehensive centers focusing on gifted education. The Center engages in research, programs for students, professional development for educators, training for graduate students, talent searches, conferences, online programs, invention programs, and international programs for students and teachers. The Center's Assessment and Counseling Clinic is renowned for its work with gifted students who have disabilities (twice-exceptional students). The national report, *A Nation Deceived: How Schools Hold Back America's Brightest Students,* led to the establishment of the Institute for Research and Policy on Acceleration. The Center has a strong commitment to the identification of children with exceptional ability from all backgrounds and to curricular interventions to nurture and develop those abilities.

Beginnings

The Belin-Blank Center started with a box. Not the kind of box that one usually thinks of—the Center actually started with a popcorn box. In the early 1920s, when Myron (Mike) Blank was 11, he began working with his father, Abraham Blank, owner of Central States Theater Corporation of Des Moines, Iowa. It was Mike Blank who developed the system for popping corn so that the smell wasn't offensive—in fact the scent of popped corn is strongly associated with the movies for many of us. The Blank family has been extremely generous with their resources, and in the early 1980s, Mike and Jackie Blank, David and Connie Belin, and Nicholas Colangelo met in Mike Blank's office at Central States Theater Corporation in Des Moines to think outside the box about programming for gifted students.

That thinking led to the Belin-Blank Center, which was established at the University of Iowa by the State of Iowa Board of Regents in the summer of 1988. The Center was made possible by a $1-million endowment that established the Myron and Jacqueline Blank Chair of Gifted Education, held by Nicholas Colangelo.

The Center is named in honor of two of the founders: Jacqueline N. Blank and Connie Belin. The Belin and Blank families have demonstrated remarkable leadership in education, public service, and philanthropy, which has made the Center's programs for students and educators possible. Other major supporters have been H. B. and Jocelyn Wallace (Scottsdale, AZ), who have endowed the Assessment and Counseling Clinic, the Wallace Research Symposium, the rural schools program, and the Recognition Ceremony; and Mary Bucksbaum Scanlan (Woody Creek, CO), who endowed the visual arts program.

In 1999, Myron and Jacqueline N. Blank gave the lead gift to build the Blank Honors Center in the heart of the University of Iowa campus. In January 2004, the Belin-Blank Center and the University of Iowa Honors Program took residence in the new Blank Honors Center.

Timeline

The following brief timeline highlights the Center's evolution from 1988 to 2008.

1988

- The Connie Belin National Center for Gifted Education was established.
- The Iowa Governor's Institute for Gifted & Talented is awarded to the Belin Center.

1989

- Nicholas Colangelo is awarded the Myron & Jacqueline Blank Endowed Chair in Gifted Education.
- Invent Iowa joins the Belin Center.
- A grant from the Myron & Jacqueline N. Blank Education Foundation initiates the ongoing Belin-Blank Fellowship Teacher Training Program.

1990

- First Leadership Institute for TAG (Talented and Gifted) professionals in Iowa is conducted.
- Family Counseling Program begins.
- First Summer Institute for Creative Engineering and Inventiveness is held.

1991

- *Handbook of Gifted Education* (1st ed.), edited by Nicholas Colangelo and Gary Davis.
- First biennial Wallace National Research Symposium on Talent Development.
- College of Education Honors Opportunity Program initiated.
- Advanced Placement Teacher Training Institute (APTTI) initiated.

1992

- Belin-Blank Center approved as a site for State of Iowa Talented and Gifted Endorsement.
- First annual Belin Elementary Student Talent Search is conducted (renamed Belin-Blank Exceptional Student Talent Search).
- Project ACHIEVE program initiated.
- American Regions Mathematics League competition first hosted at the University of Iowa.

1993

- 1,400 attend the first Recognition Ceremony.
- Myron and Jacqueline N. Blank endow student scholarships for the Blank Summer Institute for the Arts and Sciences.
- World Council for Gifted and Talented headquartered at Belin-Blank Center (1995–1997).

1994

- Iowa Talent Project initiated.

1995

- The Belin Center is renamed The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

1996

- Wallace Family endowment for Wallace Policy & Leadership Initiatives.
- First Environmental Health Sciences Institute held.

1997

- *Handbook of Gifted Education* (2nd ed.), edited by Belin-Blank Center, Nicholas Colangelo, and Gary Davis.
- Belin-Blank Center hosts the 12th Biennial World Conference for Gifted Children in Seattle, Washington.
- Partnerships with Gifted Education Research, Resources & Information Centre established, and Australian Primary Talent Search initiated.

1998

- The Iowa Acceleration Scale and Manual is published.
- First Wallace Policy and Leadership Conference is held.

1999

- First Biennial Wallace Conference on Gifted Education in Rural Schools is held.
- First class of National Academy of Arts, Sciences, and Engineering enters the University of Iowa.
- First meeting of the National Advisory Board occurs.

2000

- Design for the Myron & Jacqueline N. Blank Honors Center begins.

2001

- Ground is broken for the Myron & Jacqueline N. Blank Honors Center.
- Twice Exceptional Research Project begins.
- Iowa Online Advanced Placement Academy begins.

2002

- First Korean Gifted Educators Program held.
- Web coursework available to TAG teachers.

2003

- *Handbook of Gifted Education* (3rd ed.), edited by Belin-Blank Center, Nicholas Colangelo, and Gary Davis.
- Asian & Pacific Studies Institute begins.
- Iowa Excellence Program begins.
- Assessment & Counseling Clinic funded by H. B. and Jocelyn Wallace.

2004

- Belin-Blank Center moves into six-story Blank Honors Center on the campus of the University of Iowa.
- *A Nation Deceived: How Schools Hold Back America's Brightest Students* is published.

2005

- Best Practices in Identification of Twice-Exceptional Students project begins.
- The Mary Bucksbaum Scanlan Program for the Visual Arts begins.
- *Developing Math Talent,* by S. G. Assouline and A. E. Lupkowski-Shoplik, is published.

2006

- Davidson Institute for Talent Development Research study is initiated.

2007

- China Belin-Blank Exceptional Student Talent Search (China BESTS) begins with the mission of helping China establish programs for gifted students.
- Gifted students from Yucatan, Mexico, visit the Belin-Blank Center as part of a unique learning and cultural immersion program.
- The John Templeton Foundation awards the Belin-Blank Center a grant to bring international educators to the University of Iowa, thus beginning the Templeton International Fellows program for 2008–2009.

2008

- Templeton International Fellowship Program.
- Iowa Governor's Conference on Advanced Placement.
- 20th anniversary.

The Belin-Blank Center will continue to provide research, training, and service to gifted and talented international students in the years to come.

Nicholas Colangelo and Susan G. Assouline

See also Acceleration/*A Nation Deceived;* Institute for Research and Policy on Acceleration; Teacher Training; Wallace Research Symposium

Further Readings

Belin-Blank Center: http://www.education.uiowa.edu/belinblank/pubs
Institute for Research and Policy on Acceleration: http://www.accelerationinstitute.org/Default.aspx
A Nation Deceived: http://www.nationdeceived.org

Bell Curve

In generic usage, *bell curve* is a term describing the symmetrical shape of a normal distribution. It is more commonly referred to as the normal curve in statistics and measurement, where it serves as a model of relative frequencies or probabilities in a population. *The Bell Curve* is also the title of the 1994 book written by Richard J. Herrnstein and Charles Murray. Through reference to the assumptions of the normal curve, the authors contend that the distribution of intelligence scores in the United States has been undergoing significant change since the beginning of the 20th century. According to Herrnstein and Murray, this time period has witnessed a tremendous increase in the average IQ of students attending the top 12 universities. At the same time, a greater percentage of the population has been able to reap the benefits of a college education. In keeping with this upward shift, the tail of the curve below the mean represents a growing segment of the population whose intellect, educational attainment, and socioeconomic status have progressively declined.

The implications of this proposal have generated a great deal of debate. *The Bell Curve* describes a society where academic achievement and occupational prestige represent criteria by which class structure is partitioned. As proficiency in both realms relies on intellect, neither educational opportunity nor employee training is sufficient for those with lesser cognitive endowment to achieve parity with the best and brightest. A genetic basis for social stratification is explained, one whose genesis the authors trace to the feminist revolution. They claim that the resulting upsurge in career opportunities for gifted young women increased the likelihood of mate selection within the cognitive elite, thus augmenting the already substantial heritability of IQ.

Perhaps the most controversial topic broached in this book is that of disparate mean intelligence scores between ethnic groups. The authors maintain that the very definition of race relies on differentiation according to particular characteristics, and that intellectual fashion has prohibited inclusion of cognitive ability as a distinguishing biological trait. Moreover, after citing the results of various studies on ethnicity and intelligence, they postulate that genetic discrepancies not only exist, but also account for such social inequalities as poverty, unemployment, crime, family size, and single parenthood. The final chapters of the book explore solutions to various social and economic ills that the authors associate with a lower cognitive class, including "the leveling of education," government assistance to low-income mothers, and immigration laws that fail to include standards of competency.

Scholarly opinion on the position explicated in *The Bell Curve* remains sharply divided. Richard Lynn and John Harvey report a worldwide trend toward cognitive decline due to the inverse relationship between intelligence and number of children, known as dysgenic fertility. They attribute the general increase in IQ scores over the latter half of the 20th century to the Flynn effect (increase in intelligence scores due to environmental factors), further maintaining that this progression has reached a plateau or reversed, and that cognitive degeneration on a global basis may ensue. These authors endorse such measures as screening embryos for intelligence and other desirable qualities, issuing parenthood licenses to those who meet established cognitive criteria, and additional means by which deterioration of the world's intelligence might be averted.

Similarly, J. Philippe Rushton and Arthur R. Jensen maintain that the most salient mean group differences in IQ between the Black and White races (based on studies in both Africa and the United States) are reflected in tests of general intelligence. Their interpretation correlates *g* loading not only with academic and occupational performance, but also with the heritable neurological structure and function underlying such performance. Accordingly, they propose that intelligence can be viewed as a characteristic that varies between racial groups in much the same manner as postexercise heartbeat, lactose intolerance, and the incidence of particular diseases, and that such genetic differences must be both acknowledged and respected.

Nevertheless, a number of contemporary researchers have questioned the tenability of the hereditarian model. According to Christopher Winship and Sanders D. Korenman, the effects of education and family background reported in *The Bell Curve* were lower than those reported in many

other studies; in addition, they cited problems concerning data analysis and model specifications in Herrnstein and Murray's research. After correcting these issues, Winship and Korenman estimated an effect of 2.7 IQ points per year of education, more than double the original estimate by Herrnstein and Murray. Other scholars have proposed that certain environmental factors may modify or supersede the role of heredity in determining intelligence. Stephen J. Ceci posited a substantial correlation between IQ and number of years of completed schooling, citing correlations that frequently exceed .80 and proposing strong evidence for a causal mechanism. Joseph F. Fagan and Cynthia R. Holland concluded that race was unrelated to *g* factor, attributing variability in scores on standard tests of intelligence to cultural differences in the provision of information.

Statistical analysis has also revealed interactions between the main effects of heredity and environment. In a study by Sigal Alon, the intersection of gender, race, and social class differentially affected student graduation rates, and was most deleterious in minority populations where overlapping disadvantages existed. Derald Wing Sue and David Sue submitted that African American males (but not females) exhibit a tendency toward disidentification, whereby academic performance is dissociated from self-esteem. Indifference to scholastic achievement in middle and high school may subsequently result in diminished vocational opportunities or in unemployment. In addition, Williams and colleagues have shown low academic and social skills to predict delinquency and substance use. Such findings have been ascribed by proponents of the hereditarian stance to racial- and gender-based variability in general intelligence. However, the competing theories mentioned above offer alternative explanations based on empirical evidence, and nowadays account for a sizable proportion of the literature.

The publication of *The Bell Curve* served to popularize the notion of intelligence as a determinate entity, one relatively impervious to both education and experience. In espousing genes as destiny, Herrnstein and Murray created an upheaval of epic proportions not only among the lay readership, but also within the scientific community. *The Bell Curve*'s greatest contribution to research may well be the furor generated on both sides of the ideological divide, a renewed impetus to fathom the wonders of human cognitive ability.

Barbara Wells

See also Controversies in Gifted Education; Eugenics; Genetics of Creativity; *Genetic Studies of Genius;* Intelligence Testing; Socioeconomic Status

Further Readings

Herrnstein, R. J., & Murray, C. (1994). *The bell curve.* New York: Simon & Schuster.

Sue, D. W., & Sue, D. (2003). *Counseling the culturally diverse: Theory and practice*. New York: Wiley.

Winship, C., & Korenman, S. (1997). Does staying in school make you smarter? The effect of education on IQ in *The Bell Curve*. In B. Devlin, S. E. Fienberg, D. P. Resnick, & K. Roeder (Eds.), *Intelligence, genes, and success: Scientists respond to* The Bell Curve (pp. 215–234). New York: Springer-Verlag.

Best Practices

There is no methodological agreement in gifted education about what criteria make a practice best. The range of specific practices that might be considered for the rank of "best" is large. In *Recommended Practices in Gifted Education: A Critical Analysis* (1991), Bruce M. Shore, Dewey G. Cornell, Ann Robinson, and Virgil S. Ward identified an initial list of 120 practices that they distilled to 101; that list has likely grown somewhat in the 2 decades since that volume was assembled. It was based on a deliberate decision to search for recommended practices in the book and textbook literature on giftedness and gifted education, and then to search the journal and related literature for supporting and challenging literature. An important conclusion was that practices that are "recommended" are not all well supported by scholarly evidence, empirical or otherwise. The inclusion process was reversed in an elaborate project funded by the Javits Gifted and Talented Students Program of the U.S. Department of Education. Ann Robinson, Bruce Shore, and Donna L. Enerson convened a series of delphi panels comprising 14 experts from the field

who identified important issues of practice for which there was consensus that a body of supporting literature existed. The primary sources (journal articles and other research publications) were exhaustively searched and checked, and then the degree of support and ensuing advice was presented, once again in a book, *Best Practices in Gifted Education: An Evidence-Based Guide* (2007), for 29 specific, relatively well-supported practices. These are, however, but two of many ways of arriving at a list of best practices. In this field of study and practice, books provide the major filter for the recognition of best practices.

Approaches

Consider the following as a preliminary list of approaches that have been taken in gifted education.

Advice of a Recognized Authority in the Field

This filter for educational practices most often appears in the form of an introductory or intermediate textbook written by a respected and usually senior member of the community. U.S. examples that contain a strong emphasis on practice have included James J. Gallagher and Shelagh A. Gallagher's *Teaching the Gifted Child* (1994), Joyce VanTassel-Baska's *Comprehensive Curriculum for Gifted Learners* (1994), C. June Maker and Aleene B. Nielson's *Curriculum Development and Teaching Strategies for Gifted Learners* (1996), and Gary A. Davis and Sylvia B. Rimm's *Education of the Gifted and Talented* (2004). International volumes with an emphasis on practice, although all much less comprehensive, include Catherine Clark and Ralph Callow's *Educating the Gifted and Talented* (2002) and Clark and Shore's *Educating Students With High Ability* (2004) for UNESCO. The advice given in these volumes is generally supported by research and authorial preference, but not all the supporting evidence is of the same quality.

Compendia of Models Based on Multiple Authorities

Previous research and practical experience are often gathered by a single editor. The two main examples are Joseph Renzulli's *Systems and Models for Developing Programs for the Gifted and Talented* (1986) and a new edition in press that presents the models as written by the original authors, and June Maker and Shirley W. Schiever's *Teaching Models in Education of the Gifted* (2009), in which all the models are presented in terms of Maker's own template for curriculum adaptation. In general, these compendia do not favor one set of practices over another, but they do present the models with brief summaries of evidence about them. The choice is left to the reader, and selection of defensible practices is still an educated decision, even when a particular model is selected.

Encyclopedic Edited Overviews of the Field

Several resources have summarized the evidence available in the field, including some addressed to specific practices. Major examples include K. A. Heller, F. J. Mönks, Robert J. Sternberg, and R. Subotnik's *International Handbook of Giftedness and Talent* (2000), Nicholas Colangelo and Gary Davis's *Handbook of Gifted Education* (2003), Felicia A. Dixon and Sidney M. Moon's *Handbook of Secondary Gifted Education* (2006), Steven I. Pfieffer's *Handbook of Giftedness in Children: Psychoeducational Theory, Research, and Best Practices* (2008), Jonathan A. Plucker and Carolyn M. Callahan's *Critical Issues and Practices in Gifted Education* (2008), and Larisa Shavinina's *Handbook on Giftedness* (2008). There is no generally recognized standard for inclusion or exclusion of evidence across the contributions within or across these volumes, and there is considerable overlap of authorship. These volumes are a source of potentially supportive primary literature that might help define best practices.

Presentations of Particular Models or Practices

These especially emphasize how to implement the models, and are often teacher-oriented expanded versions of the chapters in compendia. Others concentrate on the research behind specific models or practices. They vary widely in specificity and the degree to which they are based on evidence. Examples include edited works such as Kurt A. Heller and John Frederick Feldhusen's *Identifying and Nurturing the Gifted: An International Perspective* (1985);

S. Thomas Southern and Eric D. Jones's *The Academic Acceleration of Gifted Children* (1991); Volume II of Nicholas Colangelo, Susan G. Assouline, and Miraca Gross's *A Nation Deceived: How Schools Hold Back America's Brightest Students* (2004); descriptions of major programs such as the International Baccalaureate; and authored texts such as Renzulli's *The Enrichment Triad Model* (1977) and *Schools for Talent Development: A Practical Plan for Total School Improvement* (1994), George Betts's *The Autonomous Learner Model for the Gifted and Talented* (1985), and Carol Ann Tomlinson and colleagues' *The Parallel Curriculum: A Design to Develop High Potential and Challenge High-Ability Learners* (2002). There is a remarkably good fit of most gifted education models to inquiry-based, social-constructivist instruction, however, as demonstrated in Mark W. Aulls and Bruce Shore's dual volumes on *Inquiry in Education* (2008). Only a small part of the research base can be represented within these works addressing models or practices.

Formal Meta-Analyses and Systematic Reviews

Statistical meta-analyses are few in number, and especially known in the papers by James A. Kulik and Chen-Lin C. Kulik on acceleration and grouping. Meta-analyses are limited to categories of research with particular experimental and statistical designs. There is an evolving methodological field called systematic review, of which meta-analysis is a subset, that reflects the need to embrace wider methodologies. Systematic review techniques applicable to qualitative studies ranging from classroom processes to thinking processes are not widely developed, and gifted education (and education in general, especially in the United States) continues to debate what the most important outcomes are and when and how in the life of the student these can be evaluated. Gifted education needs to be connected to this methodological development.

The Need for Best-Practice Criteria

Given the variety of types of witness to recommended practice in the field, it is difficult to create a single set of criteria that determines what is a best practice in gifted education. Teacher research, for example, is still scarce in the field. The most defensible strategy in identifying best practices is probably to give priority to *converging, replicable evidence* about the breadth and depth of success of particular practices, whether they are as specific as how to help students learn to ask good questions, or as general as advocating acceleration or teacher identification. It is extremely important not to be distracted by "impact factor" criteria that are inflated by the quantity of studies in an area, a metric that is, in turn, related to the number of people addressing the topic. For example, identification by IQ is widely recommended, widely studied, and widely cited; is it the best practice? Sometimes yes; gifted education best practices need to be suitably nuanced, and rarely will they be one-liners. Nor should best practices be focused on specific models investigated solely by their developers. A process is needed to set the standards for such converging, replicable evidence. The likely outcome will be one of gradual building of a set of best practices. There may be intermediate stages of defensible practices (good evidence, but insufficiently convergent) and recommended practices (promising, anecdotal support, worthy of systematic study and review).

The resources cited above serve as jumping-off points for further research that can help solidify the conclusions and thus continue to define which practices are well supported by research and enter the canon of practice with sufficient evidence; this was an explicitly stated goal by Shore, Cornell, Robinson, and Ward in 1991 and it continues to be important.

Ann Robinson and Bruce M. Shore

See also Classroom Practices; Curriculum Models; Effective Programs; Evaluation of Programs; Meta-Analyses of Gifted Education

Further Readings

Aulls, M. W., & Shore, B. M. (2008). *Inquiry in education: Vol. I. The conceptual foundations for research as a curricular imperative.* New York: Lawrence Erlbaum.

Plucker, J. A., & Callahan, C. M. (Eds.). (2008). *Critical issues and practices in gifted education: What the research says.* Waco, TX: Prufrock Press.

Robinson, A., Shore, B. M., & Enerson, D. L. (2006). *Best practices in gifted education: An evidence-based guide.* Waco, TX: Prufrock Press.

Shore, B. M., Cornell, D. C., Robinson, A., & Ward, V. S. (1991). *Recommended practices in gifted education: A critical analysis.* New York: Teachers College Press.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted learners* (3rd ed.). Boston: Allyn & Bacon.

Bilingualism and Creativity

Throughout the history of human civilization, numerous attempts to understand human creativity have been made. Interest in human creative capacity has never ceased, and contemporary creativity researchers are still debating the nature of creativity. One of the mainstream research paradigms, the creative cognition approach, asserts that geniuses use the processes of normative human cognition. Mundane cognitive functioning goes beyond everyday human capacity and satisfies criteria of creative products: novelty and utility. Yet there is no doubt about the existence of individual differences in creativity. Some individuals produce more creative outcomes than others, and a limited few achieve extreme levels of accomplishment. Although the creative cognition approach admits these differences, they can be understood as variations in the use of specifiable processes and of the richness and flexibility of stored cognitive structures to which the processes are applied. Thus, creativity is perceived as a complex and versatile construct that may be effectively studied by examining the variety of processes and functions involved in a creative work. The methodological application of this paradigm constitutes a psychometric approach in which creativity can be studied using the conventional tools of experimental psychology.

The creative cognition approach postulates that there are cognitive functions employed in everyday problem solving that facilitate creative thinking. There is a meaningful argument in literature that bilingualism may encourage the use of certain functions and processes that subsequently have an influence on creativity. Therefore, a particular interest of the researchers investigating the problem of creativity is devoted to the possible contribution of bilingualism to creative thought. Although there is an apparent theoretical controversy in defining the term *bilingualism,* bilinguals are generally perceived as individuals who are fluent in two languages, and individuals who actively use, or attempt to use, more than one language, even if they have not achieved fluency in their second language. Contemporary research shows a tendency for bilinguals to outperform their monolingual counterparts on various tests of creative thinking. This entry discusses the relationship between bilingualism and creativity in children and adults. Following the creative cognition approach, it looks at the specific factors in bilingual development that facilitate particular processes and the functioning underlying creative thinking. Further, it discusses the methodological problems in bilingualism and creativity research. It ends with a discussion of the contribution of this research to education.

Bilingual Giftedness Across a Life Span

Creativity in Bilingual Children

Most of the studies on the relationship between bilingualism and creativity were conducted with children, and provide support for the positive influence of bilingualism on creative thinking. Specifically, the majority of studies investigating this relationship reported bilinguals' advantages over monolinguals on various divergent thinking tests. According to Joy P. Guilford, divergent thinking occurs in the unconscious mind when attention is defocused and thought is associative. It involves a broad search for information and generation of numerous novel alternative answers or solutions to a problem. Guilford associated the properties of divergent thinking with four main characteristics: fluency (the ability to rapidly produce a large number of ideas or solutions to a problem), flexibility (the capacity to consider a variety of approaches to a problem simultaneously), elaboration (the ability to think through the details of an idea and carry it out), and originality (the tendency to produce ideas different from those of most other people).

Although these studies show an apparent gain of bilingual children over their monolingual counterparts on various divergent thinking traits,

it is entirely possible that the superior creative abilities of the bilingual children do not persist into adulthood.

Creativity in Bilingual Adults

Anatoliy V. Kharkhurin has carried on with investigating this issue and conducted a number of studies on the relationship between bilingualism and creativity in college students. He confirmed the results of the children's studies in his own research by showing that bilinguals have advantages over their monolingual counterparts on the generative and innovative capacities. He defined generative capacity as the ability to activate a multitude of unrelated concepts and work through the concepts already activated. This capacity largely overlaps with Guilford's fluency, flexibility, and elaboration traits of divergent thinking. The innovative capacity accounts for the ability to produce innovative and useful ideas that potentially may result in creative production. This capacity, in turn, resembles the originality traits in Guilford's definition.

Bilinguals' Advantages on Creative Performance

To account for bilinguals' advantages on creative performance, Kharkhurin has proposed a *language mediated concept activation* (LMCA) model. He argues that LMCA may activate unrelated concepts in bilingual memory, which could be manifested in bilinguals' superior generative capacity. The working of the LMCA model is based on the notion that the specific architecture of bilingual memory may facilitate the greater spreading activation between concepts. Research in bilingualism supplies the empirically confirmed perspective that translation equivalents automatically activate each other through shared conceptual representations. Although translation equivalents share most of the conceptual features, these representations are not identical. Variations in the conceptual representations of translation equivalents may result in the simultaneous activation of additional concepts, which eventually may produce a large pattern of activation over unrelated concepts from different categories. Thus, elaborative LMCA may allow bilinguals to process a large number of unrelated concepts from different categories simultaneously, which subsequently results in their superior generative capacity.

In addition, more recent findings show that bilinguals' superior innovative capacity may be determined by various factors in their sociocultural environment. Specifically, it is argued that individualist versus collectivist environmental settings may stimulate originality in thinking.

Methodological Problems With Research

Research relating bilingualism to creative functioning has often been weakened by poor design and poor control of extraneous variables. One of the key challenges in this study was to provide a reliable assessment of bilingualism. In most studies, bilingualism was assessed based on arbitrary criteria, and even in the studies in which precautions were taken to control for bilinguals' selection, only language skills were considered as selection criteria for inclusion in the bilingual group. Besides, most studies compared bilinguals with monolinguals, and no specific attention was devoted to how the variations in bilinguals' developmental factors may have contributed to their cognitive and creative abilities. These studies suffer from a lack of control over participants' degree of proficiency in their languages, their age of acquisition of both languages, and the circumstances under which these languages were acquired. It is entirely possible that the inconsistency in the findings in this area of research can be attributed to a failure to control for these factors.

Only current research has made an attempt to control for some of these potentially confounding variables and to specify a number of contributing factors. Bilingualism was defined as individuals' cross-linguistic and cross-cultural experiences. This research shows that these factors play an important role in bilinguals' creative behavior.

Factors Influencing Creative Thinking

Bilingualism and creativity research shows that bilinguals' proficiency in two languages and age of acquisition of these languages (both assumed as a cross-linguistic experience) as well as participation and experience with the two cultures in which these languages are acquired (assumed as a cross-cultural experience) may have an impact on their creative thinking.

Due to cross-linguistic experience, bilinguals may learn to encode and access knowledge in diverse ways. The repeated switching from one language to another and constant dealing with two code systems (phonological, grammatical, and lexical) may facilitate their dual linguistic perspective. This may account for bilinguals' greater metalinguistic awareness, which presumably facilitates their cognitive flexibility. Moreover, both cross-linguistic and cross-cultural experiences may result in the modifications in the structure of bilingual memory. This specific structure may facilitate bilinguals' diversity of associations, because the same concept is linked to two different linguistic conceptual networks. The diversity of associations is assumed as a key property of divergent thinking, which implies the ability to link unrelated concepts from different categories.

Further, as contemporary research on the conceptual representations in bilingual memory shows, bilinguals may undergo conceptual changes due to experience within different cultural and linguistic environments. These researchers argue that the conceptual system of individuals who acquire more than one language inevitably undergoes adaptations that are influenced by the cultural and social contexts in which these languages were learned. Cultural knowledge (in the form of schemas and frames) modifies conceptual representations and organizations in bilingual memory. New connotations, even entirely new meanings, may develop through acculturation. Thus, experience with two different cultures may cause modifications in the bilingual conceptual system that reflects cross-cultural diversity in conceptual representations. In turn, newly developed conceptual representations may allow bilinguals to see the same phenomenon from different perspectives. As a number of scholars suggest, bilingual individuals who experience and participate in two cultures may well perceive the world through the amalgam of two different conceptual prisms and view events with a wider range of enriched experiences. These enhanced conceptual representations may promote cognitive flexibility, divergent thinking, and novel and creative ways of encoding experience. Moreover, because different cultural commonalities may provide different perspectives on the same phenomena, bilinguals may develop a greater tolerance for ambiguity because they are comfortable with situations in which one basic idea may have various interpretations. Tolerance of ambiguity, in turn, is considered a valuable ingredient of divergent thinking, because unrelated, often contradicting elements coexist during this process.

In sum, bilinguals' cross-linguistic and cross-cultural experiences seem to facilitate cognitive flexibility, tolerance of ambiguity, and diversity of association. These cognitive processes may foster development of alternative perspectives and therefore stimulate creative performance.

Application of Research to Education

The findings of bilingualism and creativity research emphasize the importance of bilingual education. Most of the policy debates over bilingual education have turned on issues relating to implementation, assessment, and whether existing programs provide appropriate job training. Frequently lost in much of the often angry disputes (e.g., the "Unz Initiative"—Prop. 227 in California) is a central question: Does bilingual education have a particular and measurable impact on cognitive functioning? The overviewed research provides a hint of the contribution of bilingualism to cognitive development in children. In particular, cross-linguistic and cross-cultural factors in bilingual education might be beneficial for individuals' cognitive growth and creative abilities. With the latter, the idea that a high level of creative performance can be stimulated by reinforcing the same cognitive functions that are used in everyday activities suggests the importance of encouraging creative factors in education. In this direction, the methodologies of bilingual education should be studied with the potential to look into educational programs that are oriented toward creativity.

Additional Considerations

One important consideration should be added to this discussion. Although bilingualism is shown to have a positive influence on creative thinking by facilitating the generative and innovative capacities, one should keep in mind that it would be premature to equate bilingualism and creativity. The concept of creativity is a broad construct that include goals, tasks, and aesthetic values of creative endeavor. Indeed, bilingualism is argued to

encourage the use of certain cognitive processes in a more efficient way that paves the way for more sophisticated cognitive processing. It may assist bilinguals in finding novel, useful, and original solutions and ultimately result in a truly creative product, but other factors may play a dominant role. As literature on creativity accentuates, such factors in individual development as intelligence, education, expertise, motivation, personality traits, and personal experience, not accounted for by bilingualism, may be necessary components of ultimate creative production. Bilinguals seem to have some predisposition for creativity, but the inability to develop these factors to a greater extent may prevent them from showing superior creative performance.

Anatoliy V. Kharkhurin

See also Cognitive Development; Creativity, Definition; Creativity Theories; Divergent Thinking; Multicultural Creativity; Multilingualism; Originality; Torrance Tests of Creative Thinking

Further Readings

Guilford, J. P. (1967). *The nature of human intelligence*. New York: McGraw-Hill.

Kharkhurin, A. V. (2007). The role of cross-linguistic and cross-cultural experiences in bilinguals' divergent thinking. In I. Kecskes & L. Albertazzi (Eds.), *Cognitive aspects of bilingualism* (pp. 175–210). Dordrecht, the Netherlands: Springer.

Kroll, J. F., & de Groot, A. M. B. (2005). *Handbook of bilingualism: Psycholinguistic approaches*. New York: Oxford University Press.

Ricciardelli, L. A. (1992). Creativity and bilingualism. *Journal of Creative Behavior, 26*(4), 242–254.

Smith, S. M., Ward, T. B., & Finke, R. A. (1995). *The creative cognition approach*. Cambridge: MIT Press.

Sternberg, R. J. (1999). *Handbook of creativity.* New York: Cambridge University Press.

Biographical Assessment of Creativity

Biographical assessment of creativity typically involves assessment of a person's life experiences, activities, education, and family history. It also can include data on interests, motivations, hobbies, social involvement, personality traits, and actual creative achievements. Therefore, the reader should review other sources dealing with assessment of creative personality characteristics, creative environments, and creative products for overlap in assessment methods, instruments, and findings.

There are many definitions of creativity, creative thinking, or creative problem solving in the literature. For the purposes of this entry, the relatively common view is used—that a creative product is something new but also useful and that the new idea or product is judged as a positive contribution in some way. In addition, creative thinking or creative problem solving is considered as a complex and dynamic process involving many skills, such as understanding problems or challenges, generating and evaluating ideas, and planning ways to develop and produce or communicate ideas. This definition represents a more complete view of the creative process promoted by many writers, researchers, and trainers, such as those of the Center for Creative Learning, Inc., Creative Problem Solving Group–Buffalo, the Center for Studies in Creativity, and the Center for Research in Applied Creativity. This variety and complexity in the study of creativity has led to diverse assessment approaches.

Approaches

Biographical assessment of creativity or creative process has taken two broad roads. One is the case study approach. These are detailed studies of individuals engaged in creative work. They might be eminent persons already acknowledged for their accomplishments or they might be young individuals in the beginning or "on the way" in their respective fields. Extensive data are collected from personal interviews of these individuals, their friends and families, coworkers, existing biographical or autobiographical documents, public records of achievements, testimonials and reviews of their work, and recognitions and awards received. References and examples of this approach include Robert S. Albert's *Genius and Eminence,* Mihaly Csikszentmihalyi's *Flow and the Psychology of Discovery and Invention,* Howard Gardner's

Creating Minds, Howard E. Gruber and Doris B. Wallace's *Creative People at Work,* Richard S. Mansfield and Thomas V. Busse's *The Psychology of Creativity and Discovery,* R. Ochse's *Before the Gates of Excellence,* and Dean Keith Simonton's *Genius and Creativity.* Important variables studied include intellectual stimulation and emotional climate in the home, isolation, bereavement, values, parental control styles, education, competition, work habits and styles, personality, opportunities and challenges, and, of course, actual creative productivity.

A second approach involves questionnaires or surveys (typically self-report) of personal and family histories. These instruments ask individuals about their home life, early experiences, and education. Individuals may also comment about or rate themselves as to personal traits, interests, hobbies, attitudes, motivations, social activities, and/or actual creative works. For example, individuals might be asked if they have written short stories, novels, plays; have they drawn, painted, sculpted; have they built furniture, raced cars, led expeditions? Have they published anything, invented or patented anything, received awards or prizes? Do they like challenges, learning new things, visiting different places, reading different types of literature about different subjects? What types of recreational activities do they engage in? How do they find ideas or projects to work on? Who in their family also is creative? Who encouraged them?

These questions can be general as well as specific to domains such as art, music, literature, sciences ("hard" or "soft"), engineering, technology, athletics or sports, spirituality and religion, and more. As suggested above, the general goal of biographical assessment is to identify factors that are predictive of later creative achievement, in the hopes that such knowledge can be used to help others increase their own creativity.

There are many biographical surveys. Among the earliest is Calvin Taylor and R. Ellison's *Alpha Biographical Inventory.* Others include Nicholas Colangelo, Barbara Kerr, Kirk Hallowell, Ron Heusman, and Julie Gaeth's *Iowa Inventiveness Inventory;* Charles Schaefer's *Biographical Inventory: Creativity;* Joseph Khatena and Paul Torrance's *Creative Perception Inventory;* Sylvia B. Rimm and Gary A. Davis's *GIFT: Group Inventory for Finding Creative Talent;* William Michael and Kenneth Colson's *Life Experience Inventory;* Arnold Ludwig's *Creative Achievement Scale;* Dennis Hocevar's *Creative Behavior Inventory;* and Ruth Richards, Dennis Kinney, M. Benet, and A. P. Merzel's *Lifetime Creativity Scales.*

There are other scales for creativity ratings by third parties (e.g., parents and teachers), such as Sylvia Rimm's *Preschool and Kindergarten Interest Descriptor;* Joseph Renzulli, Robert Hartman, and Carolyn M. Callahan's *Scales for Rating the Behavioral Characteristics of Superior Students;* or R. M. Proctor and James Burnett's *Creativity Scale.* There also are broader adolescent and adult personality measures that have been used to profile creative individuals. Examples include George Domino's "creativity scale" of *Gough's Adjective Checklist* or creativity ratings based on James McKeen Cattell and James Butcher's *Sixteen Personality Factor Questionnaire.* More recently, the Openness to Experience scale of the NEO-PI (NEO-Personality Inventory) has been used as an indicator of creativity. These and other instruments vary in their theoretical foundations and applications to education and training. Readers are cautioned to research these and any other instruments before considering their use.

Findings

What do we know from biographical assessments of creativity? Again, the reader must realize no one factor has perfect predictability. But, there are suggestive commonalities among personal characteristics and life experiences that creative individuals report. Among personal qualities and preferences are independence, open-mindedness, curiosity, willingness to take risks, lack of defensiveness, freedom from stereotypes, diversity of interests, self-assurance and self-awareness, and artistic sense. Among cognitive abilities and preferences are good memory; above-average intelligence; ability to think conceptually, globally, as well as specifically; originality; novelty; and complexity. Environmentally and developmentally, factors such as early recognition of potential talents, mentoring or guidance from another individual, availability of resources (such as a library or a wide range of reading materials), specific training, and encouragement and rewards for creative work are identified. In some cases, creative

individuals met serious obstacles or challenges in family or home backgrounds, but were able to persevere.

It is reasonable to conclude, however, that eminently creative persons whose works change our lives in important ways ("Big C" creativity) engage in creative work on a regular basis. Although their productivity may vary in level and degree of success over time, the most valid biographical predictor of future creative work is likely to remain a record of past work and work behaviors. This is the most important contribution of biographical assessment because it suggests that for those of us aspiring to "little c," everyday creative problem solving, the lesson is to practice problem-solving skills and attitudes—be productive—"do" as well as "think." Learn new skills and styles that are supportive of creative work.

John C. Houtz

See also Biographical Methods in Gifted Education; Creative Organizational Climate; Creative Personality; Creativity Assessment

Further Readings

Albert, R. S. (Ed.). (1993). *Genius and eminence* (2nd ed.). New York: Pergamon.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Gardner, H. (1993). *Creating minds: An anatomy of creativity as seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi*. New York: Basic Books.

Hocevar, D., & Bachelor, P. (1989). A taxonomy and critique of measurements used in the study of creativity. In J. A. Glover, R. R. Ronning, & C. R. Reynolds (Eds.), *Handbook of creativity* (pp. 53–75). New York: Plenum Press.

Isaksen, S. G., Dorval, K. B., & Treffinger, D. J. (2000). *Creative approaches to problem solving: A framework for change*. Buffalo, NY: Creative Problem Solving Group–Buffalo, Kendall/Hunt.

Mansfield, R. S., & Busse, T. V. (1981). *The psychology of creativity and discovery: Scientists and their work*. Chicago: Nelson-Hall.

Ochse, R. (1990). *Before the gates of excellence: The determinants of creative genius*. New York: Cambridge University Press.

Plucker, J. A., & Renzulli, J. S. (1999). Psychometric approaches to the study of human creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 35–61). New York: Cambridge University Press.

Simonton, D. K. (1997). *Genius and creativity: Selected papers*. Greenwich, CT: Ablex.

Wallace, D. B., & Gruber, H. E. (1989). *Creative people at work*. New York: Oxford University Press.

Biographical Methods in Gifted Education

Biography is one method of investigating giftedness. By studying the lives of eminent adults, researchers can look for childhood indicators of talent, trace the development of talent in specific individuals over the course of the life span, or examine multiple biographies in content domains to uncover patterns of achievement for writers, scientists, artists, musicians, and political leaders. Biography in gifted education is used in three ways. First, multiple biographies or biographical materials are studied through *historiometry,* the use of statistics to analyze eminence and achievement. Second, individual case studies can be conducted on a single subject of a biography. Third, the use of biography in the curriculum for high-ability learners has been incorporated into several instructional and curricular models in gifted education.

Historiometry and the Study of Eminence

The modern roots of gifted education are often attributed to Sir Francis Galton, a 19th-century polymath credited with numerous contributions to the psychology of individual differences. Among his many investigations, Galton developed a system for classifying fingerprints, noted regression effects in a wide array of variables, and established an "anthropometric laboratory" in London to secure and record data about individuals' abilities. In addition, he analyzed biographies of eminent men to investigate the patterns of eminence in families. Although his work was preceded by Quetelet, who correlated age and achievement in playwrights, Galton popularized the method with the publication of *Hereditary Genius*. His research

often led him to questionable conclusions, but he did establish a method of investigating high ability that continues to be practiced in the field of gifted education. Historiometry, adopted and adapted by James McKeen Cattell, Lewis Terman, and later by Dean Keith Simonton, is one of the types of biographical methods used in gifted education.

A key issue in historiometry is how eminent individuals are selected for study. Galton's early methods for including or excluding individuals were cloudy, but Cattell sought to quantify the selection process and determined the most eminent individuals by measuring the amount of space devoted to persons in English, French, and German biographical dictionaries and compendia. His list formed the basis for the selection of the 301 individuals studied in the second volume of *The Genetic Studies of Genius,* edited by Terman. His colleague, Catherine Cox, used Cattell's list to select individuals and compiled extensive biographical cases from multiple sources. A key purpose of the study was to identify childhood, adolescent, and young adult "mental" milestones and achievements to compare these with developmental norms. Terman and Cox reasoned that by comparing detailed incidents and work samples, they might estimate the childhood IQs of persons who attained eminence. For them, and for other researchers adopting this methodological perspective, eminence was a weak, but serviceable, proxy for intellectual ability.

Individual Biography and the Study of Talent Development

The in-depth case study of a single individual through the examination of multiple biographies and biographical materials has been used by Jane Piirto, Howard Gardner, Howard Gruber, and other researchers investigating talent development. Piirto studied U.S. creative writers, using memoirs, biographies, and interviews for each case study. Gardner used key figures from history to illustrate his eight intelligences. He focused on figures like Sigmund Freud, Pablo Picasso, Mohandas Gandhi, and other creative and influential people who exemplified linguistic intelligence (T. S. Eliot), visual-spatial intelligence (Picasso), interpersonal intelligence (Gandhi), bodily kinesthetic intelligence (Martha Graham), intrapersonal intelligence (Freud), and so on. Howard Gruber turned his attention to the primary source material commonly used by biographers to investigate how creative people work. Gruber's study of the development of Charles Darwin's thinking about his scientific theories is the most extensive example of this kind of close examination of primary source materials to understand the development of an individual's creative and intellectual thought. Working from Darwin's original letters, journals, and papers, Gruber fashioned an intellectual case study. He was careful to distinguish his case study method from biography, but he nevertheless used many methods for organizing and analyzing primary sources that parallel those of biographers and historians. Gruber's students also carried out this method to investigate creativity, and many published their studies.

Biography as Subject Matter for High-Ability Learners

In addition to the perspective that research on giftedness can be investigated through various applications based on biography, practitioners have also used biography as part of the curriculum for high-ability children and adolescents. In the 1920s, Leta Hollingworth worked with two classes of high-ability students in New York City to develop curricular experiences for them based on reading and discussing biography. The students, who ranged in age from 8 to 10 years of age, organized much of their own instruction. Children self-selected biographies and discussed them once a week for approximately 40 minutes. Hollingworth noted that without guidance even high-ability learners did not choose their biographies from a broad range of human accomplishment. She instituted a greater degree of direction by securing a collection of biographies for the classroom and recommended devoting additional time to their reading and study. The rationale for including biography as part of the curriculum for high-ability learners derives from the perspective that the life lessons illustrated by biographies can provide guidance and inspiration for children and adolescents who are developing their talents. Several current models in the field include the study of biography as part of their subject matter.

These include the autonomous learner model, the integrated curriculum model, and the schoolwide enrichment model-reading.

Ann Robinson

See also Autonomous Learner; Biographical Assessment of Creativity; Eminence; Giftedness, Definition

Further Readings

Cox, C. M., & Terman, L. (1926). *Genetic studies of genius: Vol. 2. The early mental traits of three hundred geniuses*. Palo Alto, CA: Stanford University Press.

Gardner, H. (1997). *Extraordinary minds*. New York: Basic Books.

Gedo, J. E., & Gedo, M. M. (1992). *Perspectives on creativity: The biographical method*. Norwood, NJ: Ablex.

Hollingworth, L. S. (1925). Introduction to biography for young children who test above 150 I.Q. *Teachers College Record, 2,* 277–287.

Piirto, J. (2002). *"My teeming brain": Understanding creative writers*. Cresskill, NJ: Hampton Press.

Simonton, D. K. (1984). *Genius, creativity and leadership: Historiometric inquiries*. Cambridge, MA: Harvard University Press.

Terman, L. B. (1940). Psychological approaches to the biography of genius. *Science, 92*(2388), 293–301.

Wallace, D. B., & Gruber, H. E. (Eds.). (1989). *Creative people at work: Twelve cognitive case studies*. New York: Oxford University Press.

Biology Curriculum, Gifted

Since the discovery of the structure of DNA, the biological sciences have made major strides in discovering the basic processes and structures of life. A biology curriculum designed with the needs of the gifted in mind is the key to that realm of knowledge. An effective biology curriculum consists of four elements: concepts and principles; conceptual change; inquiry; and metacognition. Many people think of the first element, concepts and principles, as conveying 98 percent of the value of a curriculum. The other three elements, however, are what distinguish a great and valuable curriculum for the gifted.

Concepts and Principles

Most biology curricula focus on the essential facts, concepts, and principles that make up the content or declarative knowledge of biology. Ineffective curricula present these concepts as a list of unrelated ideas in chapters that are barely connected. Highly effective curricula focus on the structure of knowledge and the rich interrelationships among the concepts and principles.

For example, a given life science textbook might expect a student to know and remember several specific facts about veins and arteries, such as (1) arteries are thicker than veins, (2) arteries are more elastic than veins, (3) arteries carry blood from the heart to the rest of the body, and (4) veins carry the blood back to the heart. Current research has consistently demonstrated that facts like those above, learned in isolation from a larger organizing framework, are quickly forgotten after a test, nor do students readily apply them to new problems and situations. A more effective approach would stress an understanding of veins and arteries as part of the circulation system where the function of the veins and arteries influences and constrains its structure. Knowing that the heart pumps blood in spurts, for instance, makes it easier to see why elasticity would help arteries accommodate the variable pressure of the blood and would also make it easier to function as a one-way valve to prevent the backflow of blood into the heart chambers. The framework of the circulatory system provides an organizing structure for remembering key principles, as well as the facts and concepts that support and instantiate them.

Deep learning in a subject certainly includes adding new declarative knowledge, but it also involves fundamental restructuring of that knowledge into flexible, adaptive knowledge structures that are efficient for problem solving and decision making. This is accomplished by organizing factual knowledge and key concepts around a small set of powerful core principles that can be viewed as conditional statements with predictive power, such as an If–Then statement. Using the vein and artery example above, "If arteries carry oxygen to vital organs, such as the brain, and if oxygen is critical to the functioning of the brain, then cutting off arterial blood flow to the head for very long will injure the brain." A small set of such conditional statements implies both treatment priorities and

techniques in first aid, for example. Also, a conceptual systems view would facilitate solving novel problems, such as designing artificial arteries.

The knowledge schemas provide an organizing structure that facilitates retrieval as well as acquisition of knowledge, and increases the efficiency with which high performers learn. At one time, the main content of biology was cataloging important facts about the plethora of life on Earth. With such an approach, it was easy to lose sight of the forest for the trees, literally. Today, with biological content knowledge expanding at an exponential rate, it makes good sense to organize a biology curriculum around the two pillars of modern life science: the molecular biology of the cell and biological evolution, with the DNA double-helix being the conceptual strand that joins them.

Such a curriculum first lays the groundwork to prepare students for these theoretical frameworks in early childhood and elementary school with study of the characteristics of organisms, the life cycle, and the relationship of organisms and their environment, which are the fundamentals and should begin in elementary school. Middle school builds on these concepts and extends the study of organisms to topics such as structure and function, internal regulation and behavior, reproduction and heredity, diversity and adaptation, and populations and ecosystems. Study of the cell is central to all biology and should begin no later than the first year of high school, followed by matter, energy, and organization of living systems and the interdependence of organisms. From here the study of the molecular basis of heredity and biological evolution comprises the core of the biology curriculum and builds on the foundation begun in the elementary years and continuing up through college.

Conceptual Change

Misconceptions can stifle learning in biology. Misconceptions, preconceptions, and naïve theories are basically wrong or overly simplified ideas about how the world works. For example, many students believe that all bacteria cause disease. Cognitive science has shown that these misconceptions are difficult to change and generally override classroom teaching unless teachers specifically address them. It is not effective simply to tell students that their idea is wrong and that what the teacher presents is correct. Many students will simply give the correct answer on the end-of-unit test and then revert to their misconception. Effective instruction engages the student in investigations putting the misconceptions to critical tests and exploding many myths. Such an investigation might explore the vital role of bacteria in digestion or the bacterial origins of the mitochondria in our cells, which produce the energy we need to live. It might also examine whether healthy people have any bacteria in their mouths, noses, or on their skin. Is the ubiquitous "5-second rule" for dropped food irrational?

Inquiry

Inquiry-based science instruction is the hallmark of an effective biology curriculum. Inquiry teaches students to investigate the natural world in much the same way that biologists do, using authentic tools and methods as far as possible. They make observations, pose questions, design and perform tests, collect and analyze data, create explanations of their findings, share their explanations, and compare these explanations with current scientific knowledge.

For example, the National Science Education Standards present an extended illustration of an inquiry where students examine fossils of two similar but slightly different brachiopods and attempt to answer their teacher's question about whether an evolutionary trend can account for the differences between the two types of fossil. Their investigation begins with close observation, progresses to conjecture, is guided to identification of specific variables, proceeds to measurement of those variables, and to a statistical analysis of sample means. The graph of these data, recorded in a computer database, forms the basis for further discussion and students' written explanations of their findings. These papers are presented to the class in the format of a scientific conference, and the teacher focuses the discussion on the nature of scientific inquiry, with questions about what constitutes evidence and proof in the context of fossil evidence, as well as on questions about the geological and biological principles and concepts studied. This naturally leads students to asking more questions, proposing further investigations, and consulting the findings of scientists. This cycle of inquiry is the essence of the scientific process.

Self-Directed Learning and Metacognition

Cognitive psychologists have also discovered the role of metacognition or "thinking about thinking" in effective learning. The best students in biology have developed strategies for monitoring and controlling their motivation and their thoughts to direct comprehension, problem solving, planning, critical analysis, and decision making. These strategies tell them where they are in relationship to their goal and help them plan adaptively to reach that goal more efficiently. In addition, these students demonstrate highly developed capabilities to direct and regulate their own learning. Effective metacognition is also one of the defining characteristics of an expert.

Excellent teachers plan explicitly to develop the metacognitive capabilities of their students. First, they model metacognitive strategies by "thinking out loud" as they demonstrate how to solve sample problems. Second, they ensure that students have the opportunity to get experience with metacognition through learning activities that pose complex and challenging questions; simple recall of fact used to answer low-level knowledge and comprehension questions is not adequate to exercise metacognitive functioning. Finally, rich, contextual inquiry methods, with their emphasis on skeptical questioning and discourse among students and with their teacher, as well as the opportunity to design their own experiments, provide scaffolding for developing metacognitive thinking.

Benefits

A well-designed, differentiated, inquiry-based biology curriculum will best serve all students, although gifted students will especially benefit. Such a curriculum allows for flexible pacing and difficulty levels, and it provides ample performance-oriented feedback through ongoing evaluation. An ideal learning environment supports alternative paths through differentiated curricular materials that are integrated with other fields of science, mathematics, and technology, as well as the arts and humanities.

Fred Estes

See also Declarative and Procedural Memory; Differentiation; Elementary School, Science Curriculum; Inquiry; Learning; Middle School, Science Curriculum; Science, Curriculum

Further Readings

Bybee, R. (1997). *Achieving scientific literacy: From purposes to practices*. Portsmouth, NH: Heinemann Books.

Donovan, M., & Bransford, J. (2005). *How students learn: Science in the classroom*. Washington, DC: National Academy Press.

Duschl, R., Schweingruber, H., & Shouse, A. (Eds.). (2007). *Taking science to school: Learning and teaching science in grades K–8*. Washington, DC: National Academy Press.

Estes, F. (2007). Inquiry science for young gifted students: The pleasure of finding things out. *Gifted Education Communicator, 38*(4).

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted education* (3rd ed.). Upper Saddle River, NJ: Allyn & Bacon.

Boys, Gifted

In the 1920s, Lewis Terman, a psychologist interested in young people with high ability, took on the serious task of reshaping American society's view of giftedness. In doing so, Terman's landmark longitudinal investigation, *Genetic Studies of Genius,* dispelled the stereotypes of gifted children as frail, underdeveloped, and awkward. Through this comprehensive study, Terman showed that a group of gifted boys had grown to become academically achieving, well-adjusted young men. By the time they reached high school, they had varied interests, were active in extracurricular activities, excelled in school, and maintained high personal and professional aspirations. They went on to excel in prestigious colleges, met early success in their careers, and enjoyed stable and long-lasting marriages. In summary, the gifted boys in Terman's study grew to become healthy, intelligent, well-adjusted, high-achieving professionals who made significant social contributions.

Few psychologists in the decades that followed were willing to question the comprehensive research methods or dispute the findings of Terman, one of the most authoritative psychologists of his day. Gifted education pioneer and psychologist Leta Hollingworth later challenged Terman's views of gifted boys, particularly in pointing out that children with IQs of 160 or above were prone to social

and emotional problems. Terman's views prevailed, however, and Hollingworth's concerns were overshadowed by Terman's renown. As a result, educators and psychologists viewed gifted boys as the well-adjusted, healthy, high-achieving, well-rounded young men who became the leaders in their respective professions, and failed to consider the possible variations within one of the most heterogeneous populations known.

Five decades after the work of Terman and Hollingworth, Robert Albert, a social psychologist, began a longitudinal study of gifted boys in order to examine the personal and environmental systems that enable eminence to emerge. Albert's theory was that individuals who attained eminence were more talented than others in particular domains, had become career oriented earlier than their peers, and came from families that were significantly different from the norm. Albert sought to identify patterns of eminence in two specific populations of gifted boys: boys who were mathematically gifted and a second group of boys who were more verbally talented. Through an 18-year longitudinal investigation, Albert found that the families of both groups of boys were far more educated than the average American family. Moreover, the gifted boys in both groups were more creative than the general population of boys. He also found that the boys attracted to the mathematics and science fields generally disliked the humanities. These math- and science-oriented boys shared similar interests with their fathers and enjoyed strong father–son relationships, whereas boys with strong mother–son relationships were drawn more to the humanities.

Albert's most significant findings involved the boys who were originally identified as strongly math/science- or humanities oriented but who later crossed over into occupations that were not directly related to their strengths. Boys in math and science tracks found it more challenging to shift into the humanities than vice versa; however, for those math- and science-oriented boys who did, their life experiences were richer. Albert found that the gifted boys who broke away from their original domains of talent in math and science and applied these skills to the humanities experienced greater personal growth and psychological maturity than the boys who remained in the same math and science track from boyhood to adulthood.

More recently, researchers have begun to reexamine the lives of gifted boys, and the body of research on gifted adolescent males, though limited, is growing. Barbara Kerr and Sanford Cohn summarized the research of the past century in their book *Smart Boys,* and called for a greater understanding of the conflict in gifted boys between gender role and the fulfillment of their creative potential. Recent research by Thomas Hébert and his colleagues pinpoints a number of important issues central to their development, including identity and belief in self, comfort with psychological androgyny, emotional sensitivity and empathy, and ability to cope with societal expectations. The following discussion highlights these research findings.

Self-Identity

Theorists and researchers have indicated that an important developmental task of adolescence is the formation of a consistent self-identity. In a study of six gifted, high-achieving adolescent males in an urban high school, a strong belief in self was identified as the most significant factor influencing the success of the young men. This belief in self provided the energy, drive, and ambition these young men needed to face the challenges in their lives. They had clear aspirations aligned with their personal characteristics, strengths, and talents, and were driven by an internal motivation to succeed in their urban high school and beyond. The belief in self was nurtured by caring adults, supportive families, and beneficial experiences outside of school that provided them with an understanding of themselves as gifted individuals.

Qualities such as sensitivity, multicultural appreciation, aspirations, and an inner will were interwoven to form this belief in self. These boys were intuitive, caring young men who were comfortable expressing their emotions authentically, and saw their comfort with emotional expression as a quality that would assist them in adulthood. Their sensitivity was evidenced in their aesthetic awareness as well as their intense emotional responses to the hardships and despair they observed in others in their difficult urban environment. These young men also expressed an awareness and appreciation of difference and celebrated the diversity offered by their multicultural high school. The inner will

evident in the young men was an intense determination and belief that they could overcome any hardship in their lives.

The qualities evident in these urban teenagers were consistent with those observed in a slightly older group of gifted adolescent males. A research study of gifted collegiate males pursuing careers in elementary education revealed that the participants in this study also displayed empathic qualities and comfort with their psychological androgyny. They acknowledged and valued in themselves personal characteristics traditionally viewed as feminine, including an authentic nurturing quality. They realized that their empathy gave them an appreciation for children's developmental struggles and that this quality would assist them as teachers in elementary classrooms.

Culturally Diverse Populations

The shaping of identity is also important to gifted young men of color. One study examined the lives of five gifted high-achieving Black males in a predominantly White university setting. Through qualitative research methods, the investigation revealed significant factors that influenced the achievement of these gifted Black young men. Themes uncovered in the data included influential mothers, early recognition of giftedness, and support from significant teachers and mentors. These factors interacted to shape a belief in self and develop internal motivation within this group. In addition, the study revealed that the men's multiple talents were nurtured through extracurricular activities and positive experiences with an integrated peer group throughout childhood and adolescence. The final theme in the data highlighted participants' ability to ignore racist experiences in the university environment and remain focused on their goals.

The inner strength evidenced in the gifted African American males was consistent with another group of culturally diverse adolescent males. A research study examining resilience within a group of gifted, high-achieving Latino high school males uncovered several factors influencing their ability to overcome adversity. These young men developed a strong self-identity that was reinforced by trusting relationships with supportive adults within their community. Their identity as successful achievers was further strengthened through involvement in extracurricular activities and special summer programs on college campuses. These outlets for sharing their talents increased self-esteem and sense of belonging, creating a network of like-minded peers who shared a common bond and worked cooperatively to achieve an important goal. As their resilience and identities as high achievers developed, their aspirations took shape as well. The ability to overcome the adversity in their lives reinforced their determination to reach their personal goals in life. Their dreams, goals, and career aspirations were closely linked to their personal strengths as gifted young men.

In contrast, researchers examining the lives of gifted Asian American males have found challenges facing this population. Using case study methods, researchers found that gifted Asian American adolescent males experienced intergenerational cultural conflict within their families involving two major concerns: parental expectations for academic performance and differing views regarding acculturation. The conflict centered on academic issues included differing views of academic rigor, the value of standardized tests, time spent on the home computer, comparison with classmates, and parents' misperceptions of gifted education. The conflict focused on acculturation issues included values differences, parental expectations regarding obedience and respect, differing views on adolescent autonomy, and the importance of learning the ethnic language. The findings of this study highlight the complex cultural dilemmas faced by gifted boys of Asian descent.

Negative Influences

Results from a national survey of gifted boys conducted by James Alvino in the late 1980s indicated that stereotypical images of males celebrated in American culture negatively influenced the lives of gifted adolescent males. Gifted boys whose abilities and interests were inconsistent with those images often camouflaged their interests in order to excel in a more valued talent domain or simply ignored their intellectual gifts. Researchers have come to understand that, early in adolescence, gifted boys interpret messages delivered by American culture and discover that athletic ability makes intelligence acceptable. Nonathletic gifted

boys may therefore experience social rejection and be labeled with pejorative terms that demean their intellectual abilities, and this social rejection may influence boys to underachieve in the classroom. Researchers have found that in contexts in which the peer group rejects academic achievement, underachievement becomes a strategy for gifted boys to assert their independence from parents and masculinity.

Extracurricular Activities

A recent study examining gifted, high-achieving university students involved in a Greek-letter fraternity highlights the important role athletics may play in the lives of gifted adolescent males. The researchers sought to understand how the fraternity experience shaped the achievement of the collegiate males. The gifted young men in this study had benefited from gifted programs and enjoyed academic success throughout their K–12 school years, and were among the top students in their high school graduating classes. However, their school experiences lacked rigorous academic challenge, and they sailed through high school, focusing on athletics. They were recognized as student athletes; however, they were more concerned with gaining peer group approval for their athletic prowess than for their strong academic records. With reputations as student athletes, they were recruited to the Greek-letter fraternity as intelligent young men who could become important contributors to the group. As brothers in the fraternity, they connected with older males in the fraternity who had established themselves as student leaders.

Following the advice of these older role models, they became involved in a wide variety of extracurricular activities and programs associated with the fraternity and other campus groups involved in philanthropy, campus leadership, and student government. These experiences became new outlets for talent development, and they explored talents beyond athletics. Through the fraternity, the abilities of these gifted young men were nurtured within a culture of intelligent well-rounded males who respected academic achievement and self-improvement.

The findings from this study are consistent with earlier research indicating that gifted boys who are engaged in activities revolving around their self-selected interests and involvement in addressing real-world problems learn to see themselves as young men who can make a difference in their communities. Such activities also enable gifted boys to benefit from mentoring relationships. Research indicates that positive role modeling supports the healthy intellectual, social, and emotional development of gifted boys. A mentoring relationship with a supportive adult expert in a field of interest provides a gifted boy with the opportunity for self-development, and such relationships have proven helpful in reversing academic underachievement.

Thomas P. Hébert

See also Girls, Gifted; Men, Gifted; Sex Differences in Creativity; Sex Differences in Mathematical and Spatial Ability; Single-Sex Schooling

Further Readings

Albert, R. S. (1994). The achievement of eminence: A longitudinal study of exceptionally gifted boys and their families. In R. Subotnik & K. D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 282–315). Norwood, NJ: Ablex.

Hébert, T. P. (1996). Portraits of resilience: The urban life experience of gifted Latino young men. *Roeper Review, 19*(1), 82–90.

Hébert, T. P. (2000). Defining belief in self: Intelligent young men in an urban high school. *Gifted Child Quarterly, 44,* 91–114.

Hébert, T. P. (2002). Gifted Black males in a predominantly White university: Portraits of achievement. *Journal for the Education of the Gifted, 26,* 25–64.

Hébert, T. P. (2006). Gifted university males in a Greek fraternity: Creating a culture of achievement. *Gifted Child Quarterly, 50,* 26–41.

Hébert, T. P., & Olenchak, F. R. (2000). Mentors for gifted underachieving males: Developing potential and realizing promise. *Gifted Child Quarterly, 44,* 196–207.

Kao, C., & Hébert, T. P. (2006). Gifted Asian American adolescent males: Portraits of cultural dilemmas. *Journal for the Education of the Gifted, 30*(1), 88–117.

Kerr, B. A., & Cohn, S. J. (2001). *Smart boys: Talent, manhood, and the search for meaning*. Scottsdale, AZ: Great Potential Press.

Brain-Based Research

The term *brain-based research* reveals a general enthusiasm on the part of education to understand principles of human brain function in order to enrich pedagogy, calibrate intervention, and inform policy more strategically. Historically and in the recent past, several scholars have viewed the relationship between brain research and educational practice with a healthy skepticism due to past examples of overgeneralization and misinterpretation of scientific findings, relegated now to the general category of neuromyth, leaving many scientists wary of practical interpretations by enthusiastic and well-meaning practitioners. John Bruer, president of the McDonnell Foundation, bore down on the policy and education worlds for overgeneralized application of research findings on early development. His now famous analogy of "a bridge too far" between the disciplines is now widely employed as education and neuroscience attempt to form interdisciplinary and transdisciplinary research collaborations. A lack of standardized agreement about the definitions of *talent, creativity, intelligence,* and *giftedness* complicates attempts to link theories with practice. As educational neuroscience matures as a field, questions related to expertise and human ability have the opportunity to be answered, guided by principles of function from the human brain.

Neuroscience and Learning

With burgeoning evidence from various branches of the neurosciences, professionals from multiple disciplines within both education and science are in a better position to understand the nature of the learning process; the ways in which human neurobiology is crafted to learn; and what goes awry in cases of disability, disorder, and disease. Technological advances in the fields of neuroimaging and cognitive neuroscience allow the opportunity to explore how brain structure and brain function give rise to aspects of skill learning related to subjects such as reading and mathematics, motivation, and knowledge acquisition, as well as general perceptual expertise (e.g., attention, working memory). Knowledge about the development of the structural brain across the life span illustrates the dynamical changes that occur in gray and white matter as neural populations prune (the selective weeding out of neural synapses during development to help specify neural function in areas of the brain) or strengthen in various stages throughout life. These stages are thought to underlie the notion of sensitive periods in development, times when the brain is optimally ready to acquire certain types of skills or knowledge, such as language or music.

The distinction between *critical periods* and *sensitive periods* is important. Critical periods are based on the assumption that the brain is incapable of learning a skill or ability outside of a specific time window (e.g., binocular vision), whereas sensitive periods incorporate the notion that the brain is plastic and capable of change and reorganization throughout life, able to learn skills even when more conscious effort and attention are required in order to succeed. These principles of development and growth have the potential to impact how and when we educate children, expose them to languages, teach them to play instruments, engage them in higher-level problem solving, and use assessment for early detection of potential learning obstacles and certain types of disabilities.

Challenges

The nascent field of educational neuroscience is poised to engage in brain-based research, or research to determine aspects of neurological function in the developing brain related to learning, and the potential of educational environments, curricula, and interventions (human and computer) to influence the pace, fidelity, and permanent meaningful plasticity of the brain. There are key differences between the fields of education and neuroscience that make these goals challenging. First, the metrics and values that define and determine reliable and valid empirical research findings vary, as does the scale of research questions likely to be asked. For example, an educator may wonder how grouping strategies influence learning of specific math concepts, while a scientist may ask what neural systems of the brain support calculation abilities such as addition and subtraction. Second, as a result of this metric difference, products of the work are markedly

different. For example, the empirical data of a neuroimaging study, results of processing signal variance in the brain to outline areas that support specific types of function, are peer reviewed by scientists for publication in professional journals. Alternative examples from education involve quantitative and qualitative methods that address questions related to topics such as standardized testing, grouping effects, labeling, and curriculum effectiveness. Finally, core values, norms, and beliefs drive differences in experimental design to impact how the learner is viewed in each setting. A scientist will observe one child at a time in the laboratory as the child plays computerlike game tasks while hooked up to an imaging technology such as an EEG or an MRI. Averaging the brain activity of many individuals will permit a glimpse of how the brain functions on a very specific task (e.g., word recognition to determine competency with phonological awareness) or while using a specific skill to impact performance (e.g., how well a child pays attention).

Current Issues

At present, two issues frame the interest in brain-based research. The first is, Why does it look like we know so much when we know so little? Indeed, until the advent of neuroimaging, members of the animal kingdom such as rats and primates were our "age-old experts." But, it is important to note that evidence about learning and cognition that comes from these sources are analogies or metaphors at best because they are observations and measurements about learning and behavior quantified in other species. Second, there is a need for developing greater scientific literacy across disciplines so that people are equipped with the skill and knowledge to evaluate translated and primary source scientific information when it becomes published in various forms of media.

The institutionalization and practices of cross-disciplinary (collaborative work between fields) or transdisciplinary work (fields joining to create new paradigms) are difficult in part because traditional academic success often is rooted in expertise defined by the academic disciplines. Historically, brain-based research is a term that has housed much controversy over misinterpreted scientific information. At present, it demarcates the space of possibility for the potential impact of cognitive neuroscience on educational practice.

Layne Kalbfleisch

See also Neuroscience of Creativity; Neuroscience of Intelligence

Further Readings

Bransford, J. D., Brown, A. L., Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience and school.* Washington, DC: National Research Council, National Academy Press.

Bruer, J. T. (1997). Education and the brain: A bridge too far. *Educational Researcher, 26*(7), 4–16.

Bruer, J. T. (1999). *The myth of the first three years: A new understanding of early brain development and lifelong learning.* New York: Free Press, Simon & Schuster.

Understanding the brain—The birth of a learning science (2nd ed.). (2007). Organisation for Economic Co-operation and Development—Centre for Educational Research and Innovation (OECD-CERI). Paris: Organisation for Economic Co-operation and Development Publication Office.

Brain Hemisphericity

The brain is divided into two hemispheres, each of which specializes in a different type of task; however, no task uses only one side of the brain. Some people seem to process information and to perform tasks more readily using one side of the brain than the other. The concept of brain hemisphericity in individuals has implications in education and learning theory that extend into gifted learning as well.

Hemisphere History

The hemispheres are the newest part of the brain, evolutionarily, and the majority of reasoned thought is processed in these areas. Hemispheres receive identical information, but each side processes that information differently, leading to specialization. The two hemispheres communicate their perceptions across the corpus callosum, a

strip of neurons that runs between the hemispheres. The corpus callosum transmits messages between the hemispheres and facilitates their integration; human beings then make decisions based on the combination of information from each hemisphere. In addition, the hemispheres have primarily inhibitory connections to lower, more primitive parts of the brain. Together, these connections create rational action and learning in humans.

The earliest ideas of hemisphericity emerged from awareness of motor dominance. Most individuals clearly preferred to use one side of the body more than the other, as demonstrated by the hand used for handwriting, ball-catching, or hair combing. To explore further, researchers performed autopsies of stroke victims to compare the victims' brain structures to their loss of motor functions. They found that loss of brain function on one side of the brain led to loss of motor function on the opposite side of the body. Based on these observations, scientists also began to understand that each hemisphere specialized in different cognitive functions.

Hemisphericity Today

Discussion and research on brain hemisphericity falls into two main categories: task hemisphericity and individual hemisphericity. Certain tasks or stimuli cause more activity in one hemisphere of the brain than in the other, and this specialization has led researchers to designate tasks as left-brained or right-brained. Individual hemisphericity refers to the idea that a person uses more of one side of his or her brain than the other. Researchers investigate individual brain hemisphericity through use of neuroimaging techniques while individuals perform tasks that have been proven to activate one side of the brain. Using this technology, people who rely more on the right hemisphere can be observed using it to process even left-brained tasks, and vice versa.

The left hemisphere is associated with more analytical, rational, and sequential thinking. This side of the brain specializes in linguistics, symbols, speech, and abstract thought. In the popular literature, left-brained individuals typically are characterized as organized, structured, and detail oriented, though less able to grasp the big picture and somewhat averse to change. They process new information step by step and through instruction, thinking primarily in words. As students, they are often better at algebra than at geometry and have facility with languages learned in classrooms.

The right hemisphere is associated with more global, intuitive, and spontaneous thinking. This side of the brain specializes in visual, spatial, holistic, and nonverbal thought. In the popular literature, right-brained individuals typically are characterized as creative, spontaneous, and ideational, though less likely to follow established procedures or complete detailed work. They process new information in whole chunks and devise their own methods of problem solving. As students, they are often better at geometry than at algebra and learn languages readily with full immersion.

Although these descriptions of specializations in each hemisphere have been validated, the concept has been misapplied in the popular literature. As an awareness of brain hemisphericity spread, people began to use the concept to characterize people based on whether they preferred more left-brained or right-brained tasks. Technically, individual hemisphericity describes an individual's hemispheric preference regardless of the task at hand; this phenomenon cannot be observed behaviorally. The definition of brain hemisphericity has become somewhat skewed; however, this way of describing a set of behaviors has now become so common that it might be understood as a nontechnical interpretation of the brain hemisphericity concept.

Implications for the Gifted

Given this understanding of brain hemisphericity, some argue that schools should diversify their teaching strategies, particularly for gifted students. Characteristics of the gifted, such as systemic thinking and natural creativity, seem to mirror descriptions of right-brain tasks. However, teachers currently communicate new material to students through processes that are specialized to the left hemisphere. Lessons are taught step by step; teachers communicate using spoken or written words; and students memorize multiplication tables. All of this disadvantages students who preferentially process information using the right brain. Some suggest that lessons should be taught with an eye toward employing the specialties of the right hemisphere. This might involve allowing

for creative problem solving, focusing on a whole concept instead of on its components, and taking notes as mind maps rather than in outline form.

Gifted children also may have a different structure to their brains. In some gifted, the corpus callosum appears to be thicker than in people of average intelligence, perhaps due to a greater number of connections between the two hemispheres. This suggests that the gifted may have more closely integrated hemispheres, allowing them more balanced use of each hemisphere's specialized processes.

Clearly, brain hemisphericity and preference have been identified and have become part of the common understanding of the mind. More research should be done to determine what connection brain hemisphericity might have to individual learning styles and to giftedness. Neuroimaging will best capture these nuances and lead to a greater understanding of how the brain works.

Henry Woodworth and Tracy Winter

See also Aptitudes; Brain-Based Research; Brain Imaging; Learning Styles; Neuropsychology; Neuroscience of Creativity; Neuroscience of Intelligence; Visual-Spatial Learners

Further Readings

Beaumont, J. G., Kenealy, P. M., & Rogers, M. J. C. (Eds.). (1996). *The Blackwell dictionary of neuropsychology.* Cambridge, MA: Blackwell Publishers.

Webb, N. (2007). *The gifted brain: Practical understanding, accurate assessment, and appropriate interventions*. Presentation at the meeting of the National Association for Gifted Children, Minneapolis, MN. Retrieved January 30, 2008, from the PROLibraries Web site: http://www.prolibraries.com/nagc/?select=session&sessionID=765

Zillmer, E. A., & Spers, M. V. (2001). *Principles of neuropsychology.* Belmont, CA: Wadsworth/Thomson Learning.

Brain Imaging

Neuroimaging research—and its rich historical antecedents—offers incredible promise toward linking brain structure and function to complex behaviors associated with giftedness, creativity, and talent. Neuroimaging can be undertaken to assess brain traits (e.g., using structural magnetic resonance imaging—sMRI; diffusion tensor imaging—DTI; proton magnetic resonance spectroscopy—MRS) and brain states (e.g., using functional magnetic resonance imaging—fMRI; positron emission tomography—PET) associated with task performance. Both the trait and state approaches can be combined to select people scoring high and low on measures of these constructs and then compare the state of their brain functioning as they perform relevant tasks. For example, imaging studies have identified a network of areas where intelligence test scores correlate to brain structure and function. Another approach is to image the state of brain function as it fluctuates in people performing creative tasks—a much more daunting prospect within an imaging environment.

Prior to such technological advances in imaging capabilities, lesion analyses—the careful study of damage to specific brain regions—provided the first clues that specific brain regions were linked to complex human behaviors. Discussions of brain imaging occur within the context of the foundational work of researchers who lacked such tools, including the following: (1) John Harlow, who first described Phineus Gage, a man who suffered profound behavioral change when a tamping iron passed through his frontal lobes; (2) Paul Broca, who described "Tan," a patient suffering from a profound expressive aphasia; and (3) Francis Galton, who first attempted to link intelligence systematically to brain size. Brain imaging complements and augments, but does not replace, the careful observational skill that was used by such giants of neuroscience history.

The size, shape, and composition of the brain are commonly measured with sMRI techniques. Such imaging provides excellent resolution of differences between gray matter (neuronal cell bodies), white matter (axonal processes and myelin sheaths), and cerebral spinal fluid. In spite of the cellular differences reported by Korbinian Brodmann in 1912, the brain is not easily segmented into readily identifiable regions. Thus, analysis methodologies have been developed (e.g., voxel-based morphometry) to segment these

regions into compartments, and then tissue densities or volumes are correlated with behavioral constructs (e.g., intelligence, creativity). The great strength of sMRI techniques as applied to behavioral inquiries includes short acquisition time (i.e., minutes), high reproducibility/reliability, and relatively accessible analysis techniques.

The relative contribution of white matter to higher cognitive functioning has remained relatively understudied as compared to gray matter. One technique particularly suitable to the interrogation of white matter neurochemical integrity is magnetic resonance spectroscopy (MRS). Two major MRS modalities exist—proton and phosphorous spectroscopy (1H and 31P, respectively), which comprise the vast majority of clinical and normal human studies in the research literature. N-acetylaspartate (NAA), the main metabolite visible within the 1H–MRS spectrum, is found only within neurons and mature oligodendrocytes and has been established as a marker of neuronal density and/or viability in numerous disease states. A second major modality by which white matter integrity is measured is diffusion tensor imaging (DTI), an imaging technique that measures the coherence of water movement through the white matter of the brain and that can facilitate in vivo white matter fiber tracking. Both techniques take somewhat longer than sMRI (i.e., 10's of minutes), but have good reproducibility/reliability. Analysis of DTI imaging requires somewhat greater skill, and MRS significantly greater specialized skill as compared to sMRI techniques.

Early research demonstrated that performance of cognitive tasks was accompanied by increases in regional circulation, hypothesized to correspond to changes in gray matter neuronal activity. One of the earliest imaging techniques had subjects breathe oxygen labeled with the short half-life radioactive isotope 133 xenon, the decay of which could be recorded from detectors surrounding the head. Positron emission tomography (PET) evolved from these early studies, allowing for greater sensitivity and spatial localization of neuronal uptake through labeling of glucose utilization or blood flow. Today, PET studies are being undertaken to determine receptor binding of a wide range of labeled metabolites in the brain at the level of the synapse. This imaging technology, therefore, holds great promise for the development of targeted pharmacological interventions for a wide range of neurological and psychiatric disorders.

In 1928, John Fulton, a neurosurgery resident, described a patient who presented with decreasing vision due to an arteriovenous malformation (AVM) in the occipital cortex. Surgical removal of the AVM was attempted but unsuccessful, leaving a bony defect in the occipital bone through which a prominent bruit (i.e., rushing of blood) could be heard that was well correlated with the patient's mental activity. This initial finding foreshadowed the development of fMRI, a neuroimaging technique that exploits the increase in blood flow to the local vasculature accompanying neural activity throughout the brain. A veritable explosion of studies using fMRI has emerged since its inception in the early 1990s, and this technique is now commonly regarded as *the* tool of the cognitive neurosciences, with more than 19,000 publications between 1992 and 2007. The main advantage of fMRI is its ability to articulate a network of brain regions associated with a given cognitive task; its main disadvantage being that it measures, indirectly, neuronal activity through blood flow as opposed to action potentials, synaptic activity, or biochemical exchange.

Most of the neuroimaging research on giftedness, creativity, and talent is in a nascent stage. As shown here, various image-acquisition methods are available to researchers, each with relative strengths and weaknesses. Similarly, various image-processing and statistical techniques also are available, each requiring specific assumptions. The technical issues raised by each approach are quite numerous and complex, and there remains great risk in putting more credence in images than is warranted given the enormous complexity of the brain and the behavioral constructs of interest.

Rex E. Jung

See also Brain Hemisphericity; Intelligence; IQ; Neuropsychology; Neuroscience of Creativity; Neuroscience of Intelligence; Neuroscience of Leadership

Further Readings

Jung, R. E., & Haier, R. J. (2007). The parieto-frontal integration theory (P-FIT) of intelligence: Converging

neuroimaging evidence. *Behavioral and Brain Sciences, 30,* 135–154.

Logothetis, N. K. (2008). What we can do and what we cannot do with fMRI. *Nature, 453*(7197), 869–878.

BRAINSTORMING

Brainstorming is a technique for producing creative ideas in group idea-generation sessions. First developed in the 1930s by Alex Osborn, an advertising executive, it became very popular in the 1950s. Although research on brainstorming effectiveness has yielded mixed results, brainstorming is still widely used in business today. The basis for brainstorming is the idea that creativity is enhanced by participation in groups but may also be reduced because group members are apprehensive about how their ideas will be evaluated by others. To take advantage of the stimulation provided by the group environment while minimizing the inhibiting processes, Osborn laid out a set of rules for group brainstorming. The rules encourage a high degree of innovation, encourage exaggerated thinking, emphasize quantity, forbid criticism, and promote elaboration on the ideas proposed by others (called hitchhiking or piggybacking).

Early Research

Early controlled research on brainstorming addressed two questions. First, do groups instructed in the rules of brainstorming perform better than uninstructed idea-generation groups? The answer was a clear yes. The brainstorming technique apparently counters some of the social processes that reduce creativity. Second, is brainstorming in groups superior to generating ideas alone? Despite the emphasis on quantity, brainstorming in face-to-face groups turned out to be far less productive than brainstorming by isolated individuals. These findings captured the attention of both applied researchers and social psychologists. The results not only had direct implications for organizational practices but also presented a theoretical puzzle: What could account for the failure of groups to live up to their potential? Also perplexing was the finding that the quality of ideas produced by brainstorming groups was no better, and often worse, than the quality of ideas produced by individuals.

Research identified two kinds of inhibiting factors. Most important appears to be what came to be called *production blocking*. Production blocking occurs when, for example, an idea occurs to a group member but another individual is talking at the same time. This at least slows down the entry of the idea into the group. Or the idea may be forgotten while the group member is waiting for a turn to speak and may never become part of the group's product. Further, holding the idea in memory may prevent the production of new ideas.

The second category of inhibitory forces involves social factors. Despite the rules of brainstorming that prohibit criticism of proposed ideas, group members still withhold ideas because of apprehension about the reactions of fellow members. In addition, it has been shown that a low level of production becomes normative in groups. That is, group members typically expect others to generate ideas at a high rate. When such a level of production is not observed in the group session, they reduce their own production to match what seems to be the norm of the group.

The application of computer technology to group tasks in organizational settings during the 1980s spawned an electronic version of brainstorming. In electronic brainstorming, group members sit at computer stations and generate ideas. Meanwhile, the ideas being produced by other group members can be displayed on the computer screen. Production blocking is mitigated because the competition for air time is reduced. In many applications, the ideas produced by other group members are displayed in pull-down windows that a group member can consult at will. That procedure prevents individuals from being distracted but allows stimulating ideas to be viewed whenever they might be helpful. Moreover, by physically separating individuals, the procedure reduces the immediacy of any anticipated criticism.

Current Approaches

Because electronic brainstorming addressed both kinds of inhibiting factors, it was greeted with some enthusiasm by practitioners. Once again, research data did not live up to the promise that the technique seemed to have. When the number of ideas produced was the criterion, electronic brainstorming

narrowed the gap between brainstorming performed by isolated individuals and brainstorming in groups. However, groups were still shown to underperform except when the groups consisted of 10 or more members. Moreover, the gap between groups and individuals in the quality of the ideas generated was not much affected by the use of electronic brainstorming.

These findings reignited the search for inhibiting factors in groups. This time the researchers turned to cognitive factors. An unquestioned assumption of brainstorming in groups was that the ideas produced by one group member could stimulate creative thinking in other members. They in turn would be able to contribute ideas that were more creative.

Recent work has validated the critical assumption about cognitive stimulation, but the cognitive process underlying group brainstorming has been found to be complex. The assumption of the cognitive approaches to understanding group brainstorming is that creative ideas ultimately are based on ideas held in memory that can be associated with the topic at hand. Some associations come to mind easily, but they are usually the less creative. Novel associations can be stimulated by others, resulting in creative ideas.

Based on cognitive theories, researchers have been trying to devise ways to promote (a) sufficient attention to the ideas of others so that they can stimulate new ideas, (b) exploration of a sufficient breadth of categories of ideas, and (c) thinking deeply enough about each category to get beyond the less novel ideas that come to mind most easily. Perhaps an appreciation of these very basic processes will help group brainstorming to at last fulfill its potential as a mechanism for innovation and creativity.

Richard P. McGlynn

See also Cognition; Creative Productivity; Divergent Thinking; Group Dynamics; Originality

Further Readings

Brown, V. R., & Paulus, P. B. (2002). Making group brainstorming more effective: Recommendations from an associate memory perspective. *Current Directions in Psychological Science, 11*(6), 208–212.

Dennis, A. R., & Williams, M. L. (2003). Electronic brainstorming: Theory, research, and future directions. In P. Paulus & B. Nijstad (Eds.), *Group creativity: Innovation through collaboration* (pp. 160–178). New York: Oxford University Press.

Osborn, A. (1953). *Applied imagination: Principles and procedures of creative problem solving*. New York: Scribners.

Paulus, P. B., & Nijstad, B. (Eds.). (2003). *Group creativity: Innovation through collaboration*. New York: Oxford University Press.

Bullying

Although U.S. scholars and the general public focus on physical aggression, the reality of bullying in a gifted youth's life could be more variable. Bullying can manifest itself as physical aggression (i.e., punching, choking, kicking); verbal aggression as evidenced through threats, hate speech, and taunting; intimidation; written aggression; or systematic social exclusion. Although there is no agreed-upon definition of bullying, common elements include a (sometimes obscure) power differential, repeated exposure, a desire to hurt, and perceiving one's self as oppressed. Bullies can be a gifted student's peers, both gifted and not. Moreover, any adult with whom the child comes in contact, including a parent or family member, could potentially be a bully. A bully might also be a teacher, coach, or administrator. Tracy Cross describes a bully as a person who uses authority and intimidation to circumscribe the thoughts, behaviors, and feelings of another. Thus, a bully may be an educator who discourages gifted students from asking questions or impedes students' pursuit of their passions. A bully may be a mother who shows disdain for a gifted student's choice of academic over athletic prowess. A bully may also be an administrator who refuses, out of dislike, to provide effective educative accommodations for gifted students. Any experience that is perceived as threatening in the mind of the gifted student and therefore interrupts the child's normal development can be considered a form of bullying.

Bullying as a psychosocial school phenomenon has only just begun receiving scholarly attention in the United States. Moreover, bullying has not been empirically addressed in gifted-education literature. Jean Sunde Peterson and Karen E. Ray recently undertook to fill this gap. Eighth graders identified

as gifted were surveyed about their experience with bullying. Findings revealed that 67 percent of the students, or 73 percent of the males and 63 percent of the females, had been or were currently subject to at least 1 of 13 types of bullying. Twenty-three percent of the sample (33% male and 22% female) admitted to bullying someone at some point during their time in school. Name-calling was identified as both the most common manner of bullying and the form of bullying that was also the "worst case." Being teased about one's physical appearance was the only form of bullying that was hurtful across more than one grade in school. Though bullying had lessened for many of the young men in the sample by the seventh and eighth grades, the same could not be said for the young women.

Interviews conducted by Peterson and Ray revealed that students were prone to taking on the responsibility of ameliorating bullying, and they became more adept at coping with bullying as they matured. Though students could be deeply distressed by bullying, including the nonphysical types, this distress did not express itself in their academic performance. These three findings allow bullying to be largely invisible to the adults in their lives. Gifted students who had been bullies could decide not to bully further, and some aspects of giftedness (i.e., being different or introverted) could make students more subject to bullying.

Peterson and Ray were particularly concerned that 41 percent of the gifted youth felt unsafe in school. It should be noted that the Peterson and Ray study was conducted the year after the terrorist attacks on the World Trade Center in New York City and the Pentagon in Washington, D.C. Cross further placed a gifted child's fear within contemporary context. Today, both real and perceived threats are continuously showcased. New technology, which many gifted children embrace, links gifted youth to graphic details and pictures of violence in children's homes, schools, and communities. The copious number of news networks, the Internet, newspapers, and magazines also bombard readers with possible threats against the United States in general. These all serve to affirm children's fears and reinforce the perception that they are not safe. It is within this milieu that gifted children understand their world and the actions of those around them. This deluge of information can reinforce children's perception that the possibility of violence is almost imminent and may in turn inform their response to bullying.

Related to feelings of fear are feelings of violence. Cross noted that in his interviewing of gifted youth over the course of 15 years, a motif of "rage" due to suffering or unfair treatment could be found throughout dozens of interview responses. Interviews with gifted youth about the shootings at Columbine High School in Colorado made this theme salient. Youth reported that, though the shootings were heinous and unpardonable, they knew how the shooters felt. Peterson and Ray reported a similar finding. In particular, violent thoughts increased in occurrence from kindergarten on, and youth in eighth grade (37% of males and 23% of females), the oldest students in the sample, reported the highest levels of violent thoughts. Eleven percent of the 432 students reported they responded violently to bullying.

Gifted children and concerned adults must understand that bullies come in all shapes and sizes. Although the behaviors of some bullies are intentional, others may be unaware that their behavior constitutes bullying. It is then imperative that American conceptions of bullying encompass more than physical aggression. Against this backdrop, gifted youth and their advocates may learn to name bullying in its many guises and seek help in addressing this desire to disrupt and control.

Andrea Dawn Frazier and Patricia Gillespie

See also Character and Moral Development; Conduct Disorder; Social Development; Stigmatization

Further Readings

Cross, T. L. (2001). The many faces of bullies. *Gifted Child Today, 24*(4), 36–37. (ERIC Document Reproduction Service No. EJ637256)

Cross, T. L. (2001). The rage of gifted students. *Gifted Child Today, 24*(2), 43–45.

National Youth Violence Prevention Resource Center: http://www.safeyouth.org/scripts/topics/bullying.asp

Peterson, J. S., & Ray, K. E. (2006). Bullying among the gifted: The subjective experience. *Gifted Child Quarterly, 50,* 252–269.

Peterson, J. S., & Ray, K. E. (2006). Bullying and the gifted: Victims, perpetrators, prevalence, and effects. *Gifted Child Quarterly, 50,* 148–168.

Canada, Gifted Education

Canada is a diverse nation of close to 33 million people. Geographically, it is the second largest country in the world. Canada is officially bilingual (English and French), unique in its ethnocultural mosaic, and progressive and inclusive in its honoring of immigrant populations. Politically, the country is divided into 10 provinces and three territories.

Under the terms of the 1867 British North America Act, education became a provincial responsibility. This was done initially to ensure that the linguistic Francophone minority in the province of Quebec could govern its own education system. To this day there is no federal office of education, although the federal government does play a significant role in funding bilingual education (English and French) at the elementary and secondary level; in the management of some apprenticeship and training programs; in the funding of some postsecondary institutions; and in the education of First Nations (Aboriginal) pupils (funding schools on reserves and pupils' education off reserves—including the postsecondary level). There are now 13 distinct provincial/territorial Ministries of Education, and each sets its own guidelines for policy, practice, teacher accreditation, and curriculum development. With some minor variation, all provinces and territories provide compulsory schooling from ages 5–7 through 16–18, in elementary schools (K–Grade 8) and secondary schools (Grades 9–12).

Because education is a provincial/territorial responsibility, the provisions made for gifted learners vary. Although all provinces and territories have some legislation mandating programs for learners with special needs, gifted or highly able learners are not always included under the Special Education mantle. Inclusion is widely practiced, and thus gifted learners are very often found in regular classrooms.

The Canadian Educational System

Provincially/territorially developed Standards of Practice for the teaching profession are carefully articulated and implemented. These guidelines serve to regulate teachers, support their efforts, encourage their engagement in professional development initiatives, and drive their understandings of what teaching and learning are all about. The emphasis is on such key aspects as commitment to students; roles and responsibilities; personal growth; appreciation of and respect for diversity; and a solid grasp of the knowledge, skills, and values that are necessary for meaningful learning to take place. Although the guiding principles that govern the practice of teaching may vary from province to province, or even school to school, there is an overriding sense of the importance of a caring, supportive approach, and a vision for exemplary practice.

Canada does not have a national gifted-related organization such as the National Association for Gifted Children in the United States, nor is there any kind of nationwide educational thrust such as

the No Child Left Behind legislation that is having an impact on gifted education there. The Council for Exceptional Children has affiliations in Canada, and there are some independently functioning groups such as Educators of the Gifted Organization (EDGO, located in Ontario) and Lower Mainland Gifted Contacts (LMGC, located in British Columbia), and other teacher associations that enable members to gather together from time to time to discuss gifted-related matters. Research on gifted and talented students is supported by such federal funding agencies as the Social Sciences and Humanities Research Council and the National Sciences and Engineering Research Council. The Canadian Society for the Study of Education includes members who present research on the psychology and education of gifted learners at their annual national conference. There is a university-affiliated Center for Gifted Education in Calgary, Alberta, that shares resources and research findings throughout Canada and beyond, and the World Council for Gifted and Talented Children has recently established its new headquarters at the University of Winnipeg, in Manitoba. Parent advocacy organizations with chapters spread across Canada have many members who are active in providing widespread resource access, support, and community liaison opportunities. Association for Bright Children (ABC) and Gifted Children's Association of British Columbia (GCABC) are two such organizations.

All provinces offer teacher education programs in concurrent or consecutive formats at the baccalaureate level, with some offering teacher preparation programs at the master's level. Universities educate teachers, but the provinces certify them. Reciprocal agreements exist in most provinces. Ongoing teacher education is supported in various ways, from Ontario's university-based Additional Qualification (AQ) program to district-based professional development initiatives. Ontario teachers can acquire an Additional Qualification Certification in Special Education, of which the education of gifted learners can be a part. British Columbia teachers can join a provincial specialists' association focused on gifted learners. Educators across Canada can access professional development opportunities through a network of school district and university personnel with expertise in gifted education. A handful of universities offer graduate level courses on teaching and programming for gifted learners. From a general perspective, however, teacher training in the area of gifted education tends to be sporadic, and although it is evolving in pockets across Canada, there is no established national learning network for targeted preservice or inservice training in giftedness and high-level development. Professional development focusing on teachers' abilities to hone strategic applications for gifted learners is frequently hit or miss, and at the whim of university, district, and school-based administrators who may or may not consider it a priority given the many competing agendas in today's educational arena.

Gifted education in Canada is evolving in response to research-driven findings in order to meet the needs of exceptional learners. Learning options are flexibly targeted to special needs, and designed so as to include all students for whom they are appropriate. Enhanced understandings of individual developmental differences, adaptive instruction, support mechanisms, and a mastery orientation are starting points for optimal growth for gifted education within the broader Canadian educational milieu.

Education and the Diverse Canadian Culture

Educational practices vary from place to place, and Canada's unique culture with its countless multicultural dimensions lends powerful and intriguing influences to curricular programming and learning opportunities from kindergarten through to secondary school and university. Toronto is the largest multicultural city in the world; Vancouver's population is 51 percent non-English speaking; and Montreal also has a very strong multicultural identity. Traditionally, Canadians' heritage was predominantly Aboriginal, British, or French, but immigration has changed the face of the ethnic mosaic relatively rapidly. According to Statistics Canada, nearly one half of Canada's non-Aboriginal population is now of non-European origin, coming primarily from Asia, Africa, the Caribbean, and Central and South America.

Canada's Charter of Rights and Freedoms guarantees linguistic rights of the founding English and French cultures, Aboriginal rights, the right to an equitable education for all children, and the preservation and enhancement of our multicultural

heritage. The foundations are in place for ensuring that the gifts and talents of all children are developed to their fullest. Although Canadians are beginning to see ethnic diversity reflected in gifted education and in research, such as that conducted by Yatta Kanu and Constantine Ngara, there are still challenges. Very few students of Aboriginal ancestry are included in programs for gifted learners, and there is still much to learn about the conceptions of giftedness held among the individual cultural groups in Canada. As the field moves toward recognition of culture as a critical component in definitions of competence (as emphasized by Robert J. Sternberg and Elena L. Grigorenko), efforts to understand and value different ways of conceptualizing giftedness are critical. These efforts may constitute a first-order approach to moving the country closer to multicultural gifted education.

However, there is also an inherent risk to ethno-specific approaches as a long-term strategy. Leonie Sandercock points out that ethno-specific approaches are important as a first step in ensuring inclusion. These approaches help immigrants to settle and integrate, and they can also afford opportunities to gifted learners from different ethnic backgrounds. Nevertheless, in our 21st-century world it is also necessary to develop an intercultural perspective, both socially and educationally. As communities become increasingly global, visionaries need to think about intercultural exchange and collaboration. Immigrants to Canada do not want to be what Sandercock refers to as "hyphenated Canadians"; neither should gifted learners acquire hyphenated labels. A great deal can be gained from cross-cultural collaboration in expanding understandings of giftedness, and programming strategies and options. In the educational context, the aim is for Canada to embrace its truly multicultural society fully—to identify, encourage, and support different manifestations of giftedness within cultural groups as well as to work toward a broader, intercultural conception of competence.

Sample Programs

In most locations, provincial authorities have given local district school boards considerable autonomy over programming for highly able students, and there tends to be a continuum of placements available in many locations, ranging from in-class to in-school to congregated options for gifted and high-ability pupils. Some boards have implemented Advanced Placement and International Baccalaureate Programs as programming provisions, and though these are not "gifted" placements, they are presented as programming alternatives for gifted students. Also, numerous universities offer cross-disciplinary enrichment experiences for high-ability learners who are still in secondary school.

There are other unique educational options available to gifted learners in Canada. For example, the University Transition Program in Vancouver is a radically accelerated program for highly gifted early adolescents who are committed to early university entrance. The program is a tri-institutional partnership between the Vancouver School Board, the University of British Columbia, and the British Columbia Ministry of Education. The only one of its kind in Canada, the program is 2 years in length. It focuses on academic preparation for university, social-emotional development, and career exploration, using curriculum compacting, concept gap-based instruction, relationship skills, community service, and mentorship approaches. Vancouver teachers and professors from the University of British Columbia constitute the instructional team. Typical entrants to the program are between the ages of 13 and 15 who have completed Grade 7 but not yet completed Grade 11, and who have academic and intellectual abilities above the 99th percentile as well as personal qualities that predict success in a demanding program. Program graduates do exceptionally well at university. Their academic awards profiles are outstanding, and many go on to prestigious graduate schools and careers.

Canada has several national schools dedicated to talent development, including the National Ballet of Canada School and the Royal Winnipeg Ballet School. Within provincial district school boards, magnet schools exist for highly able, scientifically, artistically, and athletically talented students. With the exception of schools for students who are blind, deaf, and learning disabled, there are no provincially administered schools for other exceptional pupils, including academically able students. There are, however, privately funded schools for gifted children in several provinces, including Ontario, Quebec, Alberta, and British Columbia.

There are also sponsored summer learning options for gifted students. For example, the Shad Valley Program, which focuses on science, technology, and entrepreneurship, is offered in conjunction with various universities in 10 sites across Canada through a not-for-profit consortium. And, there are numerous other learning and leadership opportunities affiliated with Canadian-based business corporations, art galleries, museums, science centers, government agencies, and online venues.

Service Provision

In Canada, gifted education is about service provisions that address a level of subject mastery that is exceptional for a child's age or grade level, and educational programs and adaptations may take many forms. For example, programming options include enrichment both in and outside of the regular classroom, full- and part-time congregated gifted settings, subject-specific acceleration, mentorships, extracurricular activities, and a variety of other approaches that attend to individual learning differences. Educators are taught the value of differentiated instruction; they are encouraged to use above-level testing; and they recognize the importance of providing a wide range of learning opportunities that can be flexibly matched to students' requirements. Canada has a wealth of resources that can be directed at meeting the diverse needs of its gifted learners.

Joanne F. Foster, Marion Porath, and Elizabeth Smyth

See also Best Practices; Cultural Conceptions of Giftedness; Diversity in Gifted Education; Effective Programs; Inclusion; Individualized Instruction

Further Readings

Education @ Canada: http://www.cmec.ca

Kanu, Y. (2006). Getting them through the college pipeline: Critical elements of instruction influencing school success among Native Canadian high school students. *Journal of Advanced Academics, 18,* 116–145.

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators.* Scottsdale, AZ: Great Potential Press.

Matthews, D., & Smyth, E. (2000). Gifted learners in Ontario enter the new millennium: Common sense style. *Journal of the Gifted and Talented Education Council of the Alberta Teachers' Association, 14*(2), 60–71.

Porath, M. (2006). The conceptual underpinnings of giftedness: Developmental and educational implications. *High Ability Studies, 17,* 145–157.

Sandercock, L. (2004). *Sustaining Canada's multicultural cities: Learning from the local* (Breakfast on the Hill Seminar Series). Ottawa, Canada: Canadian Federation for the Humanities and Social Sciences.

Statistics Canada. (2003). *Ethnic diversity survey: Portrait of a multicultural society.* Ottawa, Canada: Author.

Sternberg, R. J., & Grigorenko, E. L. (2004). Why cultural psychology is necessary and not just nice: The example of the study of intelligence. In R. J. Sternberg & E. L. Grigorenko (Eds.), *Culture and competence: Contexts of life success* (pp. 207–223). Washington, DC: American Psychological Association.

Career Counseling

Providing career counseling to talented people is some of the most challenging work that counselors can undertake. Trait-factor models of career counseling, which match a person's interests to corresponding work environments, often fail to recognize the profound abilities, specific values, and creative flow that many talented people possess. As a consequence, scholars have devised career counseling models that support the exceptional people's talents, which in turn help them to choose careers that are both satisfying and challenging. Multipotentiality, specific abilities, and creativity are areas that career counselors need to address with their bright clients.

History

Specialized interventions for gifted and talented people began in the 1920s with the work of Leta Hollingworth and Lewis Terman, two pioneers in the field of gifted education, who advanced the understanding of the needs and development of talented people. Terman focused on the qualities of talented people, and worked to dispel the myth that exceptional people are weak or needy. Hollingworth noted that exceptional young people are often thwarted in fulfilling their potential when adults

believe that they do not need additional support, or when they are not challenged by their studies. She also determined that many gifted students have difficulty choosing from their many interests and narrowing their focus to a few activities, a phenomenon that was later termed *multipotentiality*.

It was not until the 1950s that the counseling needs of exceptional people began to be addressed: the Wisconsin Guidance Laboratory for Superior Students, the Guidance Institute for Talented Students, and the Talented Youth Project were the first guidance programs for gifted people. Since then, counseling and guidance laboratories have emerged to support the educational, vocational, social, and emotional needs of gifted people. Barbara Kerr's Guidance Laboratory for Gifted and Talented at the University of Nebraska–Lincoln and Linda Silverman's Gifted Child Development Center at the University of Denver were established in the 1980s and extended the work of the Wisconsin Guidance Laboratory. The Belin-Blank International Center for Gifted Education and Talent Development at the University of Iowa focused on psychological assessment, career development, and personal and family counseling. In the 1990s, Kerr's (Talented At-Risk Girls: Encouragement and Training for Sophomores) TARGETS and GEOS (Gender Equity Options in Science) programs at Arizona State University focused on the career identity, self-esteem, and self-efficacy of talented, at-risk girls. In 2005, the Counseling Laboratory for the Exploration of Optimal States (CLEOS), cofounded by Barbara Kerr and Robyn McKay, became the latest addition to a successful line of counseling laboratories geared toward the vocational and educational needs of creative people, including writers, artists, musicians, inventors, actors, creative scholars, and other innovators.

Multipotentiality and Specific Abilities

When multipotentiality and specific interests are acknowledged and understood, talented people seem to be more prepared to navigate their career paths, and better equipped with skills that will help them to navigate their personal and professional endeavors. Multipotentiality is characterized by high, flat, career interest profiles, which indicate career indecision and distress about career choices. Because multipotentiality gives the impression that a person can be whatever he or she wants to be, it tends to be viewed as an asset. However, multipotential people may find their abilities problematic as they sacrifice the time and effort demanded by expertise development in an effort to become well-rounded adults. In fact, underemployment and sustained productivity are common difficulties for multipotential adults. Other bright people possess specific abilities, such as exceptional ability in language, math, or science. Though there is no evidence that a young person's interest in one specific area will impair his or her career decision-making capabilities, career counselors need to ensure that a young person with a specific talent or ability does not fall behind in other coursework.

Traditional Career Counseling Models

For most of the 20th century, career counselors used trait-factor career theories to match a person's interests with an appropriate work environment. In fact, *trait-factor theory* continues to influence career counseling theory and practice: current career counseling models highlight personal awareness of one's traits (attitudes, abilities, ambitions, and limitations), as well as the factors that contribute to the successful performance of a job (the advantages, disadvantages, and opportunities in different work environments). Such models, including John Holland's *career typology*, represent a rational approach to career decision making, which was appropriate when career paths were linear and the job market was stable.

Most high school and college-level career centers continue to use a career-interests inventory that yields a Holland code (Realistic, Investigative, Artistic, Conventional, Social, and Enterprising) combined with a personality assessment, such as the Myers-Briggs Type Indicator. This standard model of career counseling seems to be useful for people of average ability whose career choices are limited. However, for creative and talented people, whose abilities tend to be much broader or much more highly specified than their average peers, traditional career counseling models are inadequate. Therefore, those working with creative people may find it useful to take a postmodern approach, which considers people's subjective experiences such as their needs, values, and creative flow.

Trilateral Model of Adaptive Career Decision Making

Unlike bright people who pursue well-defined career tracks in fields such as accounting, engineering, medicine, and law, those who choose careers in the arts, invention, and entrepreneurialism encounter uncertain career paths and unpredictable vocational trajectories. How does one become a music producer, a videogame designer, or a playwright? How does one subsist on the sometimes-meager income of a promising creative writer or an actor's sporadic employment? Creative and talented people have unique needs that go beyond the apparent financial disparities that sometimes accompany careers in creative fields. An acknowledgment of unclear career paths, the role of chance in creative accomplishments, and the challenges inherent to multipotentiality are themes that ought to be addressed in career counseling for creative people.

In the mid-1990s, vocational psychologists began to offer postmodern career counseling approaches. In contrast to traditional career counseling methods that involved simply matching an individual's interests with a congruent work environment, postmodern methods took into account people's experiences such as their life stories, values, and creative pursuits. The reason for the change in career counseling theory and practice has much to do with the globalization of the world market. To adapt to the dynamic world marketplace, leaders in vocational psychology recommend that people take advantage of their personal experiences and abilities. As a response to these recommendations, Tom Krieshok, Michael Black, and Robyn McKay advanced the *trilateral model of adaptive career decision making,* a postmodern career theory that includes rational and intuitive decision-making modes, and career engagement. People who are engaged in their career paths participate in activities that contribute to their personal fund of information and experience about the world. Involvement in career development and enrichment activities is thought to contribute to people's ability to make flexible and adaptive decisions in the changing work climate. Then, after a career decision is made, people who actively network, continue their education, and use visualization and goal setting to advance their career paths are able to take advantage of unexpected events that might mean the difference between an ordinary position and an extraordinary one.

Recently, Kerr and McKay proposed that the trilateral model of adaptive career decision making is an appropriate theory to guide the career development of creative people. Specifically, the trilateral model provides a cohesive approach to career counseling that considers the role of intuition and career engagement, two characteristics that tend to be present in creative people. The creative personality is one that resolves polarities most often through intuition and insight. Purely cognitive or rational approaches may not be appealing to people who spend so much of their lives in the intuitive mode. Second, for the multipotential person, the trilateral model also permits focused activities that encourage enrichment, networking, and exploration. For people who are passionate about a domain, the model provides affirmation and encouragement to follow one's deepest interests and values by being attuned and flexible with regard to career outcomes. The trilateral model also provides a nonlinear approach to decision making that likely appeals to the cognitive complexity that is present in the creative personality. Finally, the career ladders for creative people are often unclear: Proponents of the model recommend that people take responsibility for their own career paths, particularly given the uncertain marketplace. Furthermore, serendipity and chance events often redirect career paths of successful people. An acknowledgment of the role of serendipity, of being flexible and open to new experiences typically reflects the experiences of successful creative people. The trilateral model has characterized a model of decision making that, at least anecdotally, creative people use in the first place. By affirming the approach to careers that creative people are already using intuitively, career counselors may be able to improve agency and self-efficacy among their creative clients. Thus, career counseling grounded in the principles of the trilateral model is appropriate for creative people.

Assessments and Interventions

CLEOS interventions and assessments are targeted specifically to bright people who possess creative abilities in the areas of the spatial/visual arts, and

linguistic, mathematical/logical, musical, and social intelligences. Though an assessment of personality and interests is useful, they are often not enough to differentiate the variety of career paths that multipotential people may find interesting. Bright people often have the ability to excel in many different areas, and a clarification of values is an important step toward helping them to distinguish careers that will allow them to support and nurture their ideals. When individuals make career decisions based on what they consider important, they are less likely to be waylaid by careers that they may be good at, but that do not support their underlying values. Thus, in addition to a personality assessment such as the Personality Research Form or the Six-Factor Personality Questionnaire, career counseling should include an inventory of personal values. Also, a discussion of the role of creative flow and the creative personality are other ways career counselors can help creative people to bring their career aspirations into focus.

In keeping with the principles of the trilateral model of adaptive career decision making, interventions that engage both rational and intuitive cognitive processes seem to be particularly useful. For instance, the Future Perfect Day Fantasy is a guided imagery experience that engages intuitive processes; goal-setting exercises distill career development experiences into tangible, attainable milestones, which supports rational processes. Individual counseling sessions are useful because they help bright people to integrate information about their personality needs, vocational interests, creative flow, and values. Finally, goal-setting exercises should incorporate tangible, attainable milestones as well as pictures and imagery that represent the client's values; personality peaks and valleys; creative flow; and other social, emotional, and vocational needs. Finally, creative people need to know people who are working successfully in the fields that they themselves are considering. Thus, the identification of mentors and role models is another important aspect of this particular model of career counseling.

Career Development

The world of work, particularly for creative people, extends beyond the realm of local industries or solo practices to the considerable global economy. As jobs are outsourced or eliminated, research shows that the people who fare the best with regard to finding new positions quickly are those who took responsibility for their career trajectories, and who were persistently engaged in their career paths. Though these are new developments for most workers, creative people always have had to manage their career paths, and often must contend with the uncertainty that accompanies the creative life. It therefore stands to reason that creative people may be well suited to thrive in a dynamic and often unpredictable economy.

Career counseling for creative people needs to emphasize the adaptive and flexible perspective that many successful creative people seem to have mastered. Though parents and counselors believe they have a creative child's best interests in mind when they suggest careers with smooth career paths, such as medicine, accounting, and the law, it is becoming evident that some creative people are not well suited for such careers. Therefore, specialized career counseling for creative people is some of the most important and challenging work that counselors can undertake. Encouraging creative people's talents while at the same time helping to narrow and focus their goals is a daunting task. Mentors, specialized coursework, and summer camps are other resources that can enrich and support the career development of creative people. Counselors should not expect creative people to fit into a single career category, much less into a predefined position. Open-minded curiosity and a willingness to imagine career possibilities are important attributes that a counselor can develop to better support the career development of creative people.

Robyn McKay

See also Coaching; Creative Personality; Flow; Multipotentiality

Further Readings

Counseling Laboratory for the Exploration of Optimal Studies: http://www.cleoslab.org

Kerr, B. A. (2007). Science, spirit, and talent development. In S. Mendaglio & J. S. Peterson (Eds.), *Models of counseling gifted children, adolescents, and*

young adults (pp. 231–250). Waco, TX: Prufrock Press.

Kerr, B. A., & Sodano, S. (2003). Career assessment with intellectually gifted students. *Journal of Career Assessment, 11,* 168–186.

Krieshok, T. S. (1998). An anti-introspectivist view of career decision making. *Career Development Quarterly, 46,* 210–229.

Rysiew, K. J., Shore, B. M., & Leeb, R. T. (1999). Multipotentiality, giftedness, and career choice: A review. *Journal of Counseling and Development, 77,* 423–430.

CARTOONING

Some individuals, despite above-average intelligence, have difficulties understanding others' thoughts, desires, and beliefs, and using this information to predict and explain behavior. Gifted students who also have autism spectrum disorders such as Asperger's syndrome may not have a *theory of mind,* an idea introduced by Simon Baron-Cohen. Theory of mind indicates an ability to read or awareness of others' mind-set such as thoughts, beliefs, desires, or intentions. Understanding others minds is essential for social interactions because most people need to interpret others' thoughts based on verbal and nonverbal information, including facial expression, voice tone, gestures, posture, and more. Therefore, the lack of theory of mind indicates the deficit of social understanding and skills.

Many interventions have been designed to address theory of mind challenges. Among them is the visual strategy known as cartooning. According to Ellyn Arwood and Carole Kaulitz, cartoons use visual symbols used to enhance social understanding by turning abstract and elusive events into concrete and static items that permit reflection. Used as a generic term, cartooning has been utilized by speech/language pathologists for many years to enhance understanding in their clients. Others have created programs using cartooning strategies. These include Comic Strip Conversations,™ developed by Carol Gray, and pragmaticism, proposed by E. L. Arwood and M. M. Brown.

Comic Strip Conversations

As one type of visual strategy, a comic strip conversation developed by Gray is an illustrated ongoing communication by drawing situations or short conversations between two or more people. This strategy helps individuals who have difficulties in understanding social situations or interactions identify "what other people say and do." Furthermore, Comic strip conversations enable the person to understand "what other people might think" through the process of drawing with other people.

Although no studies have been conducted to validate the steps that should be used in cartooning, recommendations have been made on the sequence of its use. Specifically, Gray proposed the following guideline for users:

1. Introduce the concept of cartooning as well as its component parts (i.e., thought bubbles) to the student. The adult demonstrates how to draw situations while talking.
2. Draw small talk. After introducing cartooning, it is helpful to start with small talk to ensure rapport before beginning to illustrate a social situation.
3. Draw the given situation. The following information should be gathered:

   Where were you?

   Who else was there?

   What were you doing?

   What happened?

   What did other people do?

   What did you say?

   What did other people say?

   What did you think when you said that?

   What did other people think when they said that/did that?
4. Interpret the cartoon and ensure that student understands the depicted situation.

Six studies have been conducted on cartooning and/or its elements; each is unique in the manner in which it investigated the impact of this intervention. All had positive findings.

The first investigation on cartooning was by Candida Peterson and Michael Siegal, who conducted a study to determine whether individuals with autism spectrum disorders could understand theory of mind using standard cartoon thought bubbles; all participants correctly identified the role of thought bubbles as an aid in interpreting the depicted situation. The authors inferred that participants could recognize (a) the meaning of thought bubbles, (b) the function and use of thought bubbles related to an unknown reality, (c) the diversity of thoughts (different people can have different thoughts).

Several researchers also used cartooning interventions to increase appropriate social interactions or decrease behavior problems. Targeting individuals with autism spectrum disorders, each study yielded positive results. It should be noted, however, that three studies out of five combined cartooning with other visual supports and peer-training interventions.

Limited empirical evidence supports the use of cartooning as an effective medium for teaching social skills. Additional research is needed to identify core features of cartooning that are salient to success as well as on the use of the strategy across individuals and environments.

Brenda Smith Myles and Hyo Jung Lee

See also Art Education; Asperger's Syndrome; Twice Exceptional

Further Readings

Arwood, E., & Brown, M. M. (1999). *A guide to cartooning and flowcharting: See the ideas*. Portland, OR: Apricot.

Baron-Cohen, S. (1995). *Mindblindness*. London: MIT Press.

Gray, C. (1994). *Comic strip conversations™: Colorful, illustrated interactions with students with autism and related disorders*. Jenison, MI: Jenison Public Schools.

Center for Gifted Education

In 1987 the College of William & Mary began a commitment to the education of gifted students, hiring a scholar of national distinction and creating a new center for research and development in gifted education. The Center for Gifted Education was to be a model for defining ways to address the needs of an often neglected group of learners in public schools: gifted students. Joyce VanTassel-Baska was appointed as the Jody and Layton Smith Professor in Education and the founding director of the Center for Gifted Education. She came to the college with a vision for gifted education and more than 20 years of experience in the field. She created an environment that supported graduate studies, research and development, and a laboratory for working directly with high-ability students.

Twenty years later, the Center for Gifted Education represents the realization of VanTassel-Baska's vision. Today the Center is nationally and internationally recognized as an organization that develops and disseminates research-based curriculum materials for K–12 students and offers quality graduate programs for master's and doctoral candidates in a context that provides opportunities for working with school districts and precollegiate learners to foster talent development.

The statement that "the Center for Gifted Education is a learning community that values and fosters the talent development process of individuals over the life span" became the Center's mission and its foundation for the clear articulation of its goals. With some revisions, the following goals have remained constant beacons to initiate and illuminate best practices and to guide work at the Center:

- To provide graduate education for individuals interested in teaching gifted students and assuming leadership positions in the field of gifted education
- To provide a learning laboratory for precollegiate learners and those who facilitate their learning
- To engage in research and development work that promotes effective learning within gifted and talented populations
- To serve as a community resource for gifted students, their families, and educators through outreach programs and services
- To disseminate innovative and exemplary methods and materials

In 1994 the Center produced its first formal Strategic Plan, establishing specific action plans for each goal and anticipated outcomes for the next several years.

Graduate programs in gifted education are offered at the master's and doctoral levels. Each program is embedded in a corresponding program area. The master's program is within the Curriculum and Instruction program for teachers, and the doctoral program's emphasis is within Educational Policy, Planning, and Leadership. The Center also has provided courses for teacher endorsement in gifted education to Virginia school districts over the past 20 years as well, many of them conducted on site.

Early research at the Center focused on the study and development of effective programs, curriculum, learning strategies, and teaching models in gifted education.

Curriculum Projects

The first national curriculum project implemented at the Center, in 1989, addressed issues related to programs and gifted services for underrepresented groups of students. Project Mandala, funded by the U.S. Department of Education, was a comprehensive initiative that provided a national laboratory for the development of programs that identified and served preschool and young adolescent students who were both gifted and culturally, economically, or physically disadvantaged. Education and support services were implemented to help parents and families provide the essential nurturance of the special talents of these children and to guide teachers in working with at-risk students in school. A 1991 publication by VanTassel-Baska, James Patton, and Douglas Prillaman, titled *Gifted Youth at Risk,* was published by the Council for Exceptional Children, providing a national perspective on the state of gifted programs and services for culturally diverse and economically disadvantaged gifted youth.

Federal funding also provided support for the development of a K–8 Science Curriculum for Gifted Learners, initiating a series of curriculum units in science used in schools across the nation and in international settings. The units incorporated the core concept of systems, interrelated science processes using problem-based learning, and connections to the work of practicing scientists and the national standards for science education.

Another curriculum project funded by the U.S. Department of Education was in Language Arts, which supported the development of language arts curriculum materials, including concept papers, a K–8 curriculum framework, and units of study organized around the common theme of change. These units paralleled the science units with an emphasis on integrated components.

A few years later the Center received funding from the U.S. Department of Education to pilot and field-test exemplary social studies curricula for economically disadvantaged high-ability students in Grades 2, 4, and 7. Project Phoenix, conducted in collaboration with Norfolk Public Schools, also emphasized professional development, parent–community involvement, and research and dissemination. Results showed significant learning gains in critical thinking and conceptual reasoning for all learners exposed. Results also suggested that using curriculum developed for high-ability learners can work effectively with all learners. Eight units of study were developed for dissemination through this project.

As a follow-up to the elementary and middle school curriculum development effort in social studies, the Center received a grant from the Arthur Vining Davis Foundation to develop additional units in social studies for use in 9th and 10th grades. In addition, new differentiated study guides for books commonly taught at grade levels across the nation were introduced. More than 10 *Navigators* (a collection of questions and activities intended to support group or independent study of a selected novel or picture book) were introduced in the first year of development.

Professional Development

The need for effective teacher training in the content areas was recognized and addressed in what would become annual summer institutes and national curriculum conferences. Originally funded by the State Council of Higher Education in Virginia, summer institutes (1987–1991) focused on working with teachers in adapting instruction in mathematics and science for gifted learners and in teaching research and problem-solving skills. These yearlong teacher-training

efforts served as a model for future professional development activities, including regional and onsite workshops.

A statewide conference on comprehensive curriculum in gifted education was held in 1988, introducing participants to the *integrated curriculum model* (ICM). This model became the cornerstone for Center curriculum development, representing the research available on differentiation features needed in a curriculum for gifted learner.

The Center expanded its professional development efforts in 2000 with the establishment of a partnership with the College Board Southern Regional Office in sponsoring an Advanced Placement (AP) Summer Institute. This program, which continues today as an ongoing part of the Center's outreach efforts, offers teachers new to the AP program an opportunity to attend a 5-day program, working with expert teachers to prepare for teaching these challenging courses.

Programs for Students

For 20 years precollegiate programs have provided a laboratory setting for best practices in gifted education as well as direct service to gifted students. The Saturday and Summer Enrichment programs established a context where the Center's research, teaching, and curriculum development initiatives could be implemented and studied. Graduate students were given the opportunity to develop their skills as teachers and curriculum developers, and parents were encouraged to take a more active role in their children's education. These enrichment programs have continued to grow over time.

The programs started with 60 students the first year and have expanded to serve over 1,000 students today, coming to the William & Mary campus from more than 60 school divisions and private schools in Virginia. Students from preschool to 10th grade have received a wide variety of learning opportunities through courses that emphasized problem-solving skills and the application of higher-level thinking skills to specific areas of inquiry. The Howard Hughes Medical Institute provided funding for science, mathematics, and technology courses and some scholarships in the enrichment program across 15 years of the program.

The Center also administered summer residential programs during the early years, including a program for middle school students. During the period 1990–1995, the state Governor's School for the Gifted in Math, Science, and Technology was administered by the Center, providing a summer residential program for junior and senior high school students. The successful implementation of this program involved the collaboration of core William & Mary faculty from arts and sciences, law, and education.

During the years 1993 through 1995, the Center also directed the NASA-VIMS Internship Program, a 5-week residential program for students talented in science. Students worked with scientists at both facilities during the day and returned to campus for other educational and social activities in the evening and on weekends.

Focusing on the Future, designed for secondary students and their families, was initiated 11 years ago. This one-day conference included career and academic planning for high-ability students in Grades 6–12 and their parents. Its purpose was to encourage students to explore possible careers, to establish opportunities for interaction with professionals in those fields, and to inform parents of considerations for academic planning and for college and career planning. In 1998 this program was designated as exemplary by the U.S. Department of Education.

The Center also introduced a writing talent search for Virginia students in Grades 4–12, which was offered for 4 years. Students submitted short stories, poems, and nonfiction writings, which were then judged by William & Mary undergraduates from the campus Writing Center. Winners in each category were invited to campus for an annual award ceremony and writing workshop with William & Mary professors and local writers.

Special Projects

The Center received a contract from the state of South Carolina to create a set of performance tasks and rubrics as a value-added option to traditional norm-referenced aptitude and achievement measures in the identification of low-income and minority students. Developed by the Center, the performance tasks were adopted statewide in 2000.

Results suggested that Project STAR helped the state in its attempt to find more low-income and minority students as well as uncovering many other students with domain-specific abilities in the nonverbal area.

The Center has also been involved in a series of gifted program evaluations in local districts, state departments, and universities.

Joyce Lenore VanTassel-Baska

See also Center for Talent Development; Curriculum Models; Professional Development; Summer Programs

Further Readings

Center for Gifted Education at William & Mary: http://cfge.wm.edu

VanTassel-Baska, J., & Robbins, J. (2008). *A 20-year history of the Center for Gifted Education at William & Mary.* Dubuque, IA: Kendall/Hunt.

VanTassel-Baska, J., & Stambaugh, T. (2008). *What works: 20 years of curriculum development and research for advanced learners.* Waco, TX: Prufrock Press.

Center for Talent Development

The Center for Talent Development (CTD) is a center within the School of Education and Social Policy at Northwestern University, Evanston, Illinois. It is one of four regionally based centers providing services to gifted children based on the *talent search model* developed by Julian Stanley at Johns Hopkins University. The CTD is one of the largest providers of services to gifted children and their families in the Midwest and in the country.

The CTD began in 1982 as the Midwest Academic Talent Search and became a Center in 1984. It is accredited, since 1994, by the North Central Association of Colleges and Schools (NCA) as a special function school for the gifted. The model consists of above-grade-level testing and assessment of gifted students' abilities through the use of tests such as the ACT and SAT with middle school–aged children. Other similar centers exist at Johns Hopkins University (the Center for Talented Youth), Duke University (the Talent Identification Program), and the University of Denver (the Rocky Mountain Talent Search). The mission of CTD is to serve academically talented children and their families throughout the Midwest and the entire United States and to provide leadership to schools and the educational community regarding gifted education.

A basic premise underlying CTD's work is that children should be given educational experiences that match their abilities, interests, and readiness to learn and not based solely on their chronological age or grade in school. A major focus of CTD is to develop innovative program models that serve gifted students in a variety of venues (e.g., summer programs, distance learning) and that meet their developmental, social-emotional, and educational needs. Current services at CTD include the Midwest Academic Talent Search, which involves 31,000 students annually in Grades 3 through 9; the Saturday Enrichment Program, which involves 2,400 students annually at three sites in the Chicago area; the Gifted Learning Links distance education program, which involves more than 1,000 students in Grades 3 though 12 in online courses; four summer programs (Leapfrog for Grades preK through 3, Apogee for Grades 4–6, Spectrum for Grades 6–9, Equinox for Grades 9–12) that involve more than 3,000 students annually; a program of parent education consisting of seminars on Saturdays and an annual family conference in the summer; seminars and workshops for educators; a master's program in gifted education; the Civic Education Program, which combines service learning with classroom exploration of social issues and involves 200 students annually in the summer Civic Leadership Institute and 125 students in the academic year Civic Week program; Project EXCITE, which serves underrepresented gifted students in elementary and middle school to prepare them for advanced tracks in high school; and other grant-funded projects that serve primarily underserved gifted students, either low-income or minority or both. The Center's accreditation with NCA enables it to offer high school credit for high school–level courses offered throughout its various programs. The CTD has a strong program of research that focuses on assessing the effectiveness and transferability of various program models, such as the fast-paced model that

underlies some of the summer program classes or model for identifying and serving underrepresented minority gifted students in Project EXCITE.

Paula Olszewski-Kubilius

See also Midwest Academic Talent Search; Saturday Programs; Talent Development; Talent Identification Program; Talent Searches

Further Readings

Ebmeier, H., & Schmulbach, S. (1989). An examination of the selection practices used in the talent search program. *Gifted Child Quarterly, 33,* 134–143.

Olszewski-Kubilius, P. (2005). The Center for Talent Development at Northwestern University: An example of replication and reformation. *High Ability Studies, 16*(1), 55–70.

Stanley, J. C., Keating, D. P., & Fox, F. H. (1974). *Mathematical talent: Discovery, description and development*. Baltimore: Johns Hopkins University Press.

Character and Moral Development

Character and moral development is the process of exploring, refining, and embracing the core values deemed necessary for survival in a culture. Exemplars of such values include compassion; caring and empathy for others and their feelings; honesty; respect for life; tolerance of differences; fairness and forgiveness; justice and a clear sense of right and wrong; spiritual sensitivity and faith; and altruism. Character and moral development are relevant to the study of giftedness because it is broadly recognized by prominent researchers in the field (e.g., Michael Piechowski, Linda Silverman, and Donald Ambrose) that the cognitive complexity and personality traits of gifted individuals often enable them to have heightened sensitivity and reasoning concerning moral issues both as children and as adults. An analysis of the topic includes a review of the pertinent history, discussion of gifted rationale and research, current programs and theories, and suggested applications for character development.

History

Issues regarding character, moral development, and related values and their importance in society have been addressed dating from the ancient Greeks. Socrates believed that individuals could ascertain their essence and the world's meaning through intellectual processing; Plato argued that only through debate and dialogue could "truths" emerge. In the 1600s, John Locke postulated that the mind of a young child could be described as a tabula rasa on which to carve all future views and behaviors; society's obligation was to supervise the process properly. Jean-Jacques Rousseau built upon this theory in the 1700s with his belief in the purity of children and their promise for the future.

During the first part of the 20th century, Lewis Terman studied the social adjustment and emotional sensitivities of highly able students involved in his longitudinal research because he recognized that such development was connected with their advanced cognition. Likewise, Leta Hollingworth in the 1940s acknowledged her gifted students' preoccupation with worldly issues and concerns of life and death. John Dewey's research into character, which he termed a "measurement of mental power," enumerated five qualities: reflection, mastery of truths and laws, love of beauty in nature and art, strong human sympathy, and unswerving moral rectitude. According to Linda Silverman, many researchers from Immanuel Kant to Jean Piaget to Sigmund Freud and Carol Gilligan have described a theory of moral and character development in the form of two opposing frameworks: one is a partnership mode consisting of cooperation and moral sensitivity, and the other is a dominator mode relying on competition, power, and moral insensitivity. In the 1970s, Lawrence Kohlberg investigated dilemmas and related moral reasoning, and theorized that moral development evolved in six sequential stages; he concluded that the stages were invariant, and that although some individuals might progress if they were coaxed through them, most individuals never advanced beyond the fourth stage. In the 1990s, David Loye, a social psychologist, explored a biological base for moral sensitivity, which he concluded was crucial to the preservation of the species. Most recently, the research of Alfie Kohn, Thomas Lasley, and Denis Doyle has criticized the popular

but superficial character education programs that exist in schools today; the theorists' analysis reveals that individuals are not being exposed to making relevant choices in actual situations.

Gifted Rationale and Theories

Many researchers involved in the field of character and moral development have focused on its link with highly able learners. Overall, their findings underscore the strong correlation between high levels of intellect and strong moral development, including emotional intensity and sensitivity, compassion for others, and a preoccupation with right and wrong. Christy Folsom refers to this as the confluence of intellectual and moral dimensions; she points out that both are needed to promote self-actualization and the healthy development of self. Researchers such as Linda Silverman, Michael Piechowski, and Annemarie Roeper have noted that gifted individuals frequently express an interest in humanitarianism, global events, and altruism at an early age; they are in tune with their inner voice that helps them to dialogue and advocate for those in need. There are many personal accounts by parents, teachers, and researchers of precocious 5- and 6-year-old children who read newspapers and cry over articles depicting man's inhumanity to man, who are disturbed by radio accounts of war, or who become vegetarians as a reaction to killing animals.

Researchers such as Deirdre Lovecky, Robert Coles, and Annemarie Roeper note that some young gifted children express spiritual sensitivity and insights into their developing sense of self. Their introspection permits them to examine different belief systems and to feel an acute sense of responsibility to advocate for others and to relieve others' suffering. Some individuals undergo a "transcendent" experience (an inner awakening of wonder and awe), which further allows them to develop deep faith and compassion. Kathleen Noble has described this process as the growth of spiritual intelligence. Yet another complex theory of moral and character development was explored by Kazimierz Dabrowski, and resulted in his philosophy of positive disintegration and asynchrony. Based on his studies of sensitive, highly intelligent and creative individuals, Dabrowski identified hypersensitivities in five areas: psychomotor, sensual, imaginational, intellectual, and emotional. He termed them *overexcitabilities* (OE), and concluded that the greater the intensity of the OE, the greater the individual's potential for ethical and compassionate behaviors as an adult. Dabrowski emphasized the importance of the early identification of these gifted individuals because their asynchronous development (young age vs. advanced development) left them vulnerable; he saw the need for them to receive encouragement and nurturing for their successful development.

Current Theories

School districts have largely abandoned the value-neutral philosophy embraced during the last half of the 20th century, partly in response to an increase in bullying episodes in classrooms as well as student-generated violence. Manufactured character education programs have progressively been instituted in schools. These values approaches include daily strategies such as "Tuesday Is Honesty Day"; pledges, including "Never Tell a Lie"; and operant techniques that afford extrinsic awards such as ice cream parties for reaching predetermined goals. Other strategies include motivational assemblies and school awards for Student of the Month competitions. Recently researchers, including Doyle, Kohn, and Lasley, have questioned the effectiveness of such efforts. They criticize teaching nonnegotiable behaviors and values (e.g., honesty and respect) in isolation from any process where individuals have to make actual moral choices and experience real consequences.

Lasley suggests that teachers may have difficulty teaching values they themselves have yet to learn. Other researchers, such as Sylvia Rimm and Gary Davis, state that some students are at a higher level of reasoning than their teachers. It is recommended that schools provide a program of character and moral development for staff and community members, with trained facilitators, so that a dialogue can be established beforehand concerning shared values and process, as a prelude to developing a values curriculum for students.

Suggested Applications

Theorists have indicated that the cognitive complexities of learning and the moral dimensions

should not be experienced in isolation, but should be merged to blur arbitrary lines of distinction. Current research suggests that true moral reasoning must be embedded in meaningful context. Techniques employed should be conversational rather than didactic, and individuals should be exposed to moral issues that are ambiguous—they should be encouraged to provide solutions that promote thoughtful and empathetic reasoning. Kohn suggests that only realistic dilemmas and actual problems should be addressed, because true decisions are determined by the specific situation in which individuals find themselves. An example would be students taking a position on a current event (e.g., cloning, vandalism) and discussing their stance in the appropriate science, social studies, or health setting. Kohlberg's *moral development model* would also provide the proper discussion context for debate and dialogue, as would William Glasser's *classroom meeting model.* William Kilpatrick encourages teachers to provide students with challenging and meaningful stories from books and newspapers in order to provide them with a common reference point. Students then discuss and debate values, dilemmas, and morals as they emerge, and apply the concepts to themselves individually. The use of fables is also recommended for discussion among young children.

Piechowski and Roeper believe that emotional and moral development continue to evolve throughout adulthood. Both Don Ambrose and Joyce VanTassel-Baska encourage individuals to be aware of the sensitive social issues surrounding certain areas of science, government, and economics, and the potential moral and ethical consequences. Finally, despite individuals' high intelligence and a concomitant heightened moral structure, maturity is frequently needed before they can translate concerns into moral action; guidance is often required from parents and respected mentors. It is also important to note that not all highly intelligent individuals are morally advanced, and those who have been emotionally damaged (through neglect or trauma) may be insensitive and pose a danger to society.

Abbey Block Cash

See also Aspiration Development and Self-Fulfillment; Asynchrony; Attitudes Toward Religion and Spirituality; Bullying; Moral Development; Overexcitabilities; Positive Disintegration; Spiritual Intelligence

Further Readings

Folsom, C. (1998). From a distance: Joining the mind and moral character. *Roeper Review, 20,* 265–270.

Kohn, A. (1997). How not to teach values: A critical look at character education. *Phi Delta Kappan, 78*(6), 428–439.

Lovecky, D. V. (1998). Spiritual sensitivity in gifted children. *Roeper Review, 20,* 178–183.

Piechowski, M. M. (1991). Emotional development and emotional giftedness. In N. Colangelo & G. A. Davis (Eds.), *The handbook of gifted education* (pp. 285–306). Boston: Allyn & Bacon.

Silverman, L (1993). The moral sensitivity of gifted children and the evolution of society. *Roeper Review, 17,* 110–116.

Chemistry Curriculum, Gifted

Chemistry is deeply rooted in common daily activities and has scientific depth as well as broad technological application, which make this subject particularly interesting for gifted education. This fact has been reflected in a number of curricula and enrichment programs. For instance, approximately 15 percent of all enrichments feature direct or indirect references to chemistry. Yet the significance of the subject with respect to gifted education is not equivalent across all countries and cultures. The emphasis placed on this topic is reflected in the results of the last International Chemistry Olympiad, where the first 20 places were occupied by teams from 10 Asian countries, 7 countries from the former Eastern Bloc, and 3 Western countries.

International comparisons demonstrate that chemistry curricula vary greatly from country to country, but parallels are also in evidence. Differences concern the age at which the subject is introduced scholastically (in some countries in primary school, in others not until high school), how the field is presented to students (sometimes as an independent scholastic subject, sometimes embedded in general courses on the natural sciences), and the number of instructional units (national standards call for between 70 and 280 instructional units during a normal educational career). Similarities are discussed according to the four basic elements of curricula: (1) content, (2) anticipated learning processes, (3) teaching, and (4) assessment.

Basic Elements

Content

Should chemistry be introduced relatively early, this is typically best accomplished in the context of concrete phenomena. The later the curriculum is addressed, and the higher the level of talent among the pupils, the more closely the introduction should be oriented to a fundamental understanding of the field. The sequence of topics and units remains the same.

At the start, three themes are particularly well suited. (1) Substances that are known from everyday experiences: Experiments should investigate fundamental properties and deal with the identification of groups of chemical substances. This also helps to develop fundamental skills associated with experimentation and the proper handling of laboratory equipment. (2) Alloy substances and pure elements: The objective here is not merely to mediate factual knowledge, but practical experience should also be accumulated. For example, students should learn that alloy substances can be dissolved (distillation, decantation, filtration, etc.) because of their properties. (3) Chemical reactions: Various examples addressing syntheses and analyses are to be worked through.

Topics that follow the basic chemical knowledge include the composition of matter, the periodic system of elements, basic chemistry of substances (e.g., oxygen, alkali metals), quantitative relationship (e.g., the mathematical relationships in measurement such as between mass and volume), electron donor–acceptor concepts such as redox reactions and an introduction to organic chemistry. Included among the more advanced themes are the speed of chemical reactions and chemical balance, electrochemistry, and significant materials such as dyes and plastics.

Anticipated Learning Processes

Learning in the subject of chemistry is characterized by a high degree of cross-disciplinary integration and the diversity of forms of knowledge. For instance, an object is typically considered from multiple perspectives and within various relations. Accordingly, oxygen is an important component of both organic chemistry and inorganic chemistry. It is examined in one capacity as an element, and in the other as a catalyst for, or an integral part of, organic alloys. In chemistry the demands for not only declarative knowledge (the "what" or content of learning), but also procedural knowledge (the "knowing how" to accomplish a task; e.g., how an experiment is conducted), and conditional knowledge (the contexts and situations, when knowledge is correct and when procedural knowledge is promising) are higher than in just about any other academic subject.

The necessity for access to integrated and elaborated knowledge is an important reason why chemistry has been successful in shedding its former image as a subject learned primarily through rote memorization. The necessity for advanced learning strategies and also the emphasis placed on procedural and conditional knowledge makes chemistry especially interesting for curricula for the gifted.

Teaching

Although international studies showed that chemistry curricula are strongly teacher oriented, this is less pronounced than in other academic subjects. Particularly in gifted curricula, increasingly diverse instructional methods find application, such as cooperative learning, project-driven learning, discovery learning, or self-regulated learning. In addition, the curricula developed for instruction in chemistry are definitely of a more spiral nature than those applied in other subjects; in other words, material is repeated on various learning steps and under more and more elaborated perspectives.

Assessment

Despite wide diversities in instructional activities and content concerning chemistry curricula, measurements of scholastic achievement are still made in accordance with traditional guidelines. The dominant tools are oral and written examinations, which are seldom standardized. Occasional exceptions include practical demonstrations, projects, or portfolio assessments.

Opportunities for Gifted, Creative, and Talented Pupils

The subject of chemistry opens many opportunities for the learning processes of gifted pupils.

Spiral-formed curricula, interdisciplinary learning, knowledge elaboration, and more, are significant building blocks of curricula developed specifically for the gifted. A further advantage of the subject is that it is superbly suited to integrate measures proven to be effective in gifted education into scholastic curricula. For example, there are always opportunities to address the subject matter more broadly, or in more depth, without forfeiting any of the vitality of the subject or making it less challenging. This is the predominant reason why enrichment programs often base their content in this field. This particular characteristic of subject matter in chemistry also facilitates the formation of ability groups within learning communities, since they can be constructed in accordance with the level of difficulty of the material being addressed. Material-oriented pull-out programs can be realized just as easily, whereby one day a week can is set aside for gifted pupils to participate in additional instructional activities. Finally, the structure of the subject matter is conducive to the development of individualized activities and independent learning in the form of personally realized projects, which are particularly advantageous for the gifted.

Risks for Gifted, Creative, and Talented Pupils

One of the risks of chemistry curricula for gifted pupils concerns the role of prior knowledge. The Janus effect associated with prior knowledge refers to the phenomenon that gifted persons usually start chemistry instruction with a healthy supply of prior knowledge. At first this leads to high levels of motivation and achievement; yet because prior knowledge in many cases is drawn from common everyday experiences, it often is inaccurate. The result is that gifted pupils with a large degree of prior knowledge in the field, after one year of chemistry instruction, often demonstrate poorer levels of motivation and achievement in comparison with gifted pupils with a lower degree of prior knowledge, the reason being that they have to relearn wrong information that had been internalized. Current curricula do not take these prior knowledge effects into account.

A further problem is that teachers tend to present the material without giving enough emphasis to relationships, elaboration, and associations with other disciplines because they fear that a large proportion of the class will be overchallenged. One consequence is that the aspects of the subject that are most interesting for the gifted are often omitted.

A seriously neglected problem is that accelerative measures (covering the curriculum at a quicker tempo) must be more cautiously conducted in chemistry than in other subjects. Although the gifted are able to learn the material in brief periods of time, this knowledge will not be as properly related to other disciplines or as elaborated, and fewer connections will be established to common, everyday activities. In this case, additional effort and support on the part of the teachers is called for.

Heidrun Stoeger and Albert Ziegler

See also Academic Talent; Creativity in Science; Mathematics, Curriculum; Science, Curriculum

Further Readings

Pyryt, M. C. (2000). Talent development in science and technology. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of research and development of giftedness and talent* (2nd ed.; pp. 427–437). Oxford, UK: Pergamon.

VanTassel-Baska, J. (2000). Theory and research on curriculum development for the gifted. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of research and development of giftedness and talent* (2nd ed.; pp. 345–367). Oxford, UK: Pergamon.

VanTassel-Baska, J., Bass, G., Ries, R., Poland, D., & Avery, L. (1998). National study of science curriculum effectiveness with high ability students. *Gifted Child Quarterly, 42,* 200–211.

Chess

The game of chess has generated perhaps more scientific research than any other field of expertise, to the point that it has been called the *Drosophila* of cognitive psychology. There are several reasons for this state of affairs: Competitive chess players' skill levels are precisely measured by the Elo rating system, there is a large population of chess players, the chess environment enables

elegant experimental manipulations, and research on chess psychology has benefited from cross-fertilization with research on computer chess and artificial intelligence.

Most chess players consider world champions such as Bobby Fischer, Garry Kasparov, and Viswanathan Anand to be more gifted than their less successful peers. However, there are relatively few scientific studies on the link between talent and chess. Rather, research has focused on the mechanisms and the time needed to reach master and grandmaster level. Classical works by Adriaan De Groot in 1946 and William Chase and Herbert Simon in 1973 have highlighted the fact that chess players have acquired large amounts of domain-specific knowledge (both declarative and procedural). This knowledge is perceptual in nature and is mediated by perceptual chunks—units of both perception and meaning. Neuroimaging evidence suggests that chunks are stored within neural networks located in the inferior temporal cortex, networks that do not appear to be particularly lateralized. The knowledge acquired by chess players is highly domain specific, and, accordingly, studies have failed to find evidence that abilities acquired when playing chess transfer to other domains such as mathematics and language. Thus, contrary to popular belief, a chess grandmaster is not necessarily good at mathematics.

Though De Groot, Chase, and Simon emphasized the role of practice to acquire domain-specific knowledge, they were open to the possibility of individual differences with respect to talent. By contrast, Anders Ericsson and his colleagues have taken a more extreme position and argued that, with the exception of motivational differences, there is no such thing as talent for cognitive activities like chess. Instead, top-level performance is determined by the amount of deliberate practice that individuals devote to their domain of choice. Deliberate practice is characterized by goal-directed and repetitive activities for which immediate feedback is available. These activities, performed individually, require a considerable amount of effort and are usually not enjoyable. Anecdotal evidence about chess masters' practice activities as well as controlled studies using retrospective questionnaires about the amount and type of dedicated practice shown by chess players of various skill levels have supported the assumption that it takes a large amount of practice (about 10,000 hours on average) to reach master level. Yet deliberate practice is only part of the explanation: It accounts for less than 40 percent of the variance in skill, there exist vast individual differences in the amount of deliberate practice necessary to reach high levels of skill, and skill level does not increase monotonically with the number of hours of practice.

Research on intelligence has produced mixed results. Some studies have shown a correlation between skill level and IQ and others have failed to find such a correlation. Surprisingly, visuospatial memory does not predict skill. However, there exists some direct empirical evidence supporting the role of talent in chess. A possible marker of chess talent is handedness: Chess players are less likely to be right-handed than the population at large, and their degree of handedness is weaker. Another potential marker is month of birth: Chess players are more likely to be born in late winter and in spring than non-chess players. Personality differences have been identified as well; for example, children taking up chess as a hobby score higher with respect to Intellect/openness and Energy/extraversion than children not playing chess. Finally, starting age has also been shown to be a predictor of the likelihood of reaching master level. A plausible hypothesis is that, just as with first language acquisition, there is a critical period for starting playing and practicing chess. The presence of this critical period may be due to a decrease of neural plasticity with development. In this respect, it is interesting that the age at which players obtain their first grandmaster results has declined in the last decades, with a player like Magnus Carlsen (who in 2007 was 17 years old and number 5 in the world) having obtained the grandmaster title at the age of 13 years and 4 months.

Another (indirect) argument supporting the hypothesis of talent in chess is that, chess being highly competitive, it is likely that top players optimize their practice activities, which should lead to a leveling of the playing field. Only half a dozen players currently dominate the chess arena. In addition to the markers of talent just mentioned, it should also be pointed out that the *Matthew effect* may be at play as well: Small differences at the beginning of a player's career—be they differences due to environmental and coaching facilities, to talent (e.g., in the speed of acquiring new chunks),

or to sheer luck—may result in significant differences years after. Finally, the substantial individual differences between women and men (in 2007, there was only 1 female player among the 150 best players in the world) seem to be explained by differences in participation rates (there is only 1 female player for every 20 male players in the rating list of the International Chess Federation), although the reason for this difference in participation rates is open to debate.

Fernand Gobet

See also Brain Hemisphericity; Cognition; Creative Problem Solving; Expertise; Imagery; Intelligence; Problem Solving

Further Readings

Cranberg, L. D., & Albert, M. L. (1988). The chess mind. In L. K. Obler & D. Fein (Eds.), *The exceptional brain: Neuropsychology of talent and special abilities* (pp. 156–190). New York: Guilford Press.

Gobet, F., & Campitelli, G. (2007). The role of domain-specific practice, handedness and starting age in chess. *Developmental Psychology, 43,* 159–172.

Gobet, F., de Voogt, A. J., & Retschitzki, J. (2004). *Moves in mind: The psychology of board games*. Hove, UK: Psychology Press.

Grabner, R. H., Stern, E., & Neubauer, A. C. (2007). Individual differences in chess expertise: A psychometric investigation. *Acta Psychologica, 124,* 398–420.

Children, Middle School

The middle school years, approximately ages 10–15, can be a turbulent period for all early adolescents. The process of growth and change during the transition from childhood to young adulthood, however, provides unique challenges to gifted children who experience this developmental stage (alternatively called tweens, preteens, early adolescence, or transescence) differently from their chronological age peers. These differences involve all aspects of their lives: physical, social, emotional, intellectual, academic, and familial. At the crux of these differences is the uneven or asynchronous development among these separate areas in a single gifted individual.

Middle schools typically include some combination of Grades 4 through 9, though the predominant model is Grades 6 through 8. A 2004 Joint Position Statement issued by the National Middle School Association (NMSA) and the National Association for Gifted Children (NAGC) affirmed the commitment of both organizations to increase understanding of gifted early adolescents and collaboration in developing middle schools that meet their needs.

The Physical Dimension

Physical growth and rapid change are the hallmarks of early adolescence, even though the timetable for these changes varies tremendously among individuals. Puberty contributes to awkwardness, restlessness, and the need for movement. For gifted adolescents, these changes may present the first time they feel out of control. For children who were grade-accelerated, their later physical maturation and child's body may make them more noticeable to their peers at a time when fitting in feels newly important. Their peers' sudden intense interest in sex and friendships may be puzzling for those who are prepubescent. Participation in competitive athletics may be limited by age or size, regardless of talent or determination. But early physical maturation may also compound a gifted child's difference from typical peers, again at a time when conformity is particularly valued. This advanced physical development may not arrive at the same time as the social and emotional readiness to handle the social issues it raises. The development of gender and sexual identity are made more complex by the stereotypical roles imposed on both gifted girls (to be less assertive and athletic, to hide their intellect) and gifted boys (to hide their artistic and creative temperament, to excel in competitive athletics, to take risks).

At this stage, physical activity is important for healthy growth, to counteract obesity, to establish lifelong exercise habits, and to reduce stress. The tendency of many gifted students to focus on reading and academic pursuits as well as computer use and other passive electronic pastimes make them vulnerable to a sedentary lifestyle. Early adolescents, especially girls, may also develop eating

disorders as a result of perfectionist tendencies, as a means of establishing control, or as part of efforts to conform.

The Social Dimension

According to Eriksonian theory, people develop through the resolution of eight psychosocial crises. Erik Erikson asserts that during the middle school years, the primary tasks of early adolescence focus on identity and the challenges for young people to progress from Industry versus Inferiority, through Identity versus Identity Diffusion, and into Intimacy versus Isolation. Giftedness intensifies and complicates the experience of these crises.

During early adolescence, being different is particularly painful. At this stage, children shift their need for social acceptance from adults to the peer group. While in the elementary grades, school achievement and being smart leads to satisfying social acceptance by parents and teachers. In middle school, however, the approval of peers is more important, and that is derived less from academic success and teachers' praise than from athletic achievement, the "right" fashions, and the "right" friends. The conflict of needing both to belong and to achieve is intense for gifted students, who often experience social isolation. The middle school social scene emphasizes cliques, friendships, and conformity in behavior, thought, and appearance. Gifted girls are particularly at risk as they seem to pay a higher price than their male counterparts for their giftedness.

The middle school movement and the emphasis on heterogeneous grouping derived from such documents as the Carnegie Report, *Turning Points 2000,* have resulted in limitations to the amount of time gifted students spend with their intellectual peers in daily gifted programs or honors classes. Where these exist, gifted preteens have an additional resource to help them develop the sense of belonging and affiliation that are essential to healthy adolescent development. Pull-out programs may stigmatize students, and the gifted label feels particularly burdensome to some students during this period. When there is no programming at all, gifted students may feel socially isolated as they try to connect with chronological peers who have different interests, vocabulary, concerns, or senses of humor.

The tendencies of gifted students to strive for deeper understanding of human problems, to insist on fairness, and to pursue a passion with single-minded energy create distance between them and the typical middle school student. Their sophisticated intellectual problem-solving strategies are not always helpful in resolving the dilemmas created by irrational and rapidly changing fads, social groups, slang, and styles. Caring adults and middle school communities can help gifted adolescents become increasingly independent and find a peer group that encourages individual strengths and diverse achievements.

The Emotional Dimension

Many gifted adolescents are exceptionally sensitive, and their emotional and social development may lag behind their advanced academic and intellectual abilities.

Criticism is particularly hard to take at a time when young teens feel vulnerable and struggle to develop a sense of identity that will carry them from childhood into young adulthood. Middle schoolers can be particularly mean to those who don't fit in, including the academically and artistically gifted. The question "Where do I belong?" is intensified as gifted adolescents struggle to be part of multiple groups.

Gifted adolescents' heightened sensitivity makes them particularly vulnerable to stress from a variety of sources: boredom, feeling different, competition, and/or multipotentiality. Boredom arises when students' school experiences do not provide adequately challenging academic content, frequent contact with intellectual peers, interest-based learning opportunities, or a rapid instructional pace. Multipotentiality describes the dilemma gifted students face when they have talent and ability in multiple areas and feel they have to use them all. These children may feel that they have a special responsibility to be the best all the time, never make mistakes, be leaders and participate in everything (sports, music, academics), and act on their perceived significant obligations to others. They are frustrated by their limited power to change the injustices they intensely perceive around them. They fear they will not live up to their potential. This pressure to excel may come from an inner drive or from external sources.

At the same time, some may experience the *imposter syndrome,* the fear that they will somehow be revealed to be just ordinary. Under this stress, some gifted adolescents may retreat into depression, may find themselves exhausted, and may become suicidal. Others may become locked into patterns of procrastination and underachievement.

Yet this same intensity can lead to increased self-awareness of their own emotional lives and more a deeper understanding of relationships and morality. With appropriate adult support, gifted middle schoolers can develop a sense of balance in their lives and the ability to distinguish between healthy striving for excellence and destructive perfectionism. Young adolescents can overcome their feelings of awkwardness and vulnerability when they are affirmed as valuable by their environment. At this stage, preteens need to reconcile their desire to impact the world around them with their realistic limitations while they are "stuck" between the worlds of childhood and adulthood. Empowerment can come from the development of knowledge, skills, and attitudes that will allow them to reach their goals and safely grow into adulthood.

The Academic Dimension

There are very few role models for gifted middle school students who show how others who are their age manage the conflicting forces of their lives. Although typical progress through Piaget's stages of cognitive development would place early adolescents in the Concrete Operations stage, many gifted students may have already achieved the Formal Operations stage, using abstract and hypothetical reasoning. Though generally self-motivated and eager to learn, they are academically and intellectually advanced beyond their peers, and middle schools cannot always provide adequate academic opportunities. Teachers (and parents) may feel frustrated too by the combination of a gifted student's academic potential and the impulsivity and lack of organizational and planning skills that are typical of this chronological age, especially among males. Some students face their first substantive academic challenges in middle school advanced content and courses. If elementary school was easy for them, they may not have devoted time to homework or studying because it was unnecessary for academic success. Long-range planning skills remained undeveloped or underdeveloped if procrastination still resulted in an A project or paper. Support is essential for gifted preteens to continue to meet high expectations, use critical thinking, and develop greater abstraction abilities. This support may include the opportunity to develop the habits of mind and study skills necessary to succeed and assistance in learning that effort and hard work do not mean a person is not smart. Without these, gifted students may underachieve, lose interest in school, or drop out of advanced classes and academic opportunities.

There are very few counselors, teachers, or administrators in middle schools who have been trained to deal with the gifted at this transitional stage. Middle schools often lack the skilled gifted intervention specialists who are more prevalent in elementary schools. A fit between the needs of gifted early adolescents and the schools in which they find themselves is necessary to maximizing these students' potential. The positions expressed in the National Middle School Association's *This We Believe: Successful Schools for Young Adolescents* are consistent with many guidelines for effective schools for early adolescent gifted students.

The Familial Dimension

Families of gifted early adolescents are often confused by the changes in their gifted child as he or she moves into middle school. Parents who previously had close relationships feel rejected as the peer group and friendships become more important in the gifted child's life. Parents who have defined themselves by their child's academic successes may put undue pressure on the student for continued straight A's and perfect test scores despite the teen's changed interests or goals. Early adolescence is a time of exploration, and young teens are beginning to both widen and focus their interests and energies. While a young teen is investigating new ideas, experimenting with identities, and questioning and testing value systems, parents may feel that the child is not living up to his or her potential, or that they are "losing" their child. It is important that parents cultivate greater acceptance for their child and his or her increasing independence and learn not to measure children

solely by their academic accomplishments. When parents pressure their children to be the best in everything, they can stymie the important explorations and self-examination of this developmental stage. Gifted minority and children from low socioeconomic status environments may face additional family conflicts because the adolescent may be perceived to be rejecting the family's status, values, and traditions.

Additional Issues

A number of additional issues compound the dilemmas faced by gifted children in middle school. Those who are twice-exceptional, minority students, English Language Learners, gay or lesbian, or female face particular challenges in overcoming social pressures, stereotypical thinking, and barriers to learning opportunities. Gifted early adolescents need to develop confidence that among others of their gender, race, economic status, and culture, there are gifted people like them.

Susan Rakow

See also Adolescent, Gifted; Asynchrony; Boys, Gifted; Girls, Gifted; Middle School, Literature Curriculum; Middle School, Mathematics Curriculum; Middle School, Science Curriculum; Middle School, Social Studies Curriculum; Middle School, Writing Curriculum; Middle School Enrichment; Middle School Movement

Further Readings

Bireley, M., & Genshaft, J. (Eds.). (1991). *Understanding the gifted adolescent*. New York: Columbia University Press.

Dixon, F. A., & Moon, S. M. (Eds.). (2006). *The handbook of secondary gifted education*. Waco, TX: Prufrock Press.

George, P. S., Renzulli, J. S., & Reis, S. M. (1997). *Dilemmas in talent development in the middle grades: Two views*. Columbus, OH: National Middle School Association.

Jackson, A. W., & Davis, G. A. (2000). *Turning points 2000: Educating adolescents in the 21st century*. New York: Teachers College Press.

Kerr, B. A. (1994). *Smart girls: A new psychology of girls, women, & giftedness* (Rev. ed.). Scottsdale, AZ: Great Potential Press.

Kerr, B. A., & Cohn, S. J. (2001). *Smart boys: Talent, manhood, and the search for meaning*. Scottsdale, AZ: Great Potential Press.

Meeting the needs of high-ability and high-potential learners in the middle grades: A joint position statement of the National Middle School Association and the National Association for Gifted Children. (2004). Retrieved January 8, 2009, from http://www.nmsa.org/ and http://www.nagc.org

National Middle School Association. (2003). *This we believe: Successful schools for young adolescents*. Columbus, OH: National Middle School Association. Retrieved January 8, 2009, from http://www.nmsa.org/AboutNMSA/ThisWeBelieve/tabid/1273/Default.aspx

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Rakow, S. (2005). *Educating gifted students in middle school: A practical guide*. Waco, TX: Prufrock Press.

Rimm, S. (2005). *Growing up too fast*. Emmaus, PA: Rodale Press.

Steinberg, L. (2005). *Adolescence* (7th ed.). New York: McGraw-Hill.

Tomlinson, C. A., & Doubet, K. (2006). *Smart in the middle grades*. Columbus, OH: National Middle School Association.

China, Gifted Education

Gifted education in China is a relatively recent development based on Western conceptions of giftedness. However, the Chinese tradition of valuing gifted and talented children can be traced as far back as the Western Han Dynasty (206 BCE–25 CE) when systematic procedures for identifying *shen-tong* (prodigies) evolved into the establishment of *Tong-Zi-Ke* (Children Examination System) for selecting gifted children for government positions and scholarly pursuits in the imperial court. This examination system became more rigorous in the Tang Dynasty (618–906) with a focus on literary abilities, and continued to be employed in subsequent dynasties. The general view in imperial China was that gifted children possessed *tian-cai* (heavenly ability), which was an inborn ability or a natural endowment from heaven. The term *tian-cai* as in

tian-cai-er-tong (gifted children) continues to be used by the public today.

Gifted Education in Mainland China

The year 1978 marked a milestone in the development of gifted education in Mainland China when Chinese psychologists gathered to form the Cooperative Research Group of Supernormal Children of China (CRGSCC). Rather than using the term *tian-cai-er-tong* with a nature-over-nurture connotation, CRGSCC adopted the term *chao-chang-er-tong* (supernormal children) to define gifted children whose performances are two standard deviations above the average children on IQ and cognitive ability tests developed for screening and identification purposes, and emphasized the inclusion of information from parents and teachers as well as from interview and observation in identification.

This milestone year also marked the beginning of the establishment of *shao-nian-ban* (youth classes) at universities, allowing gifted children to be admitted 2 to 3 years earlier than the average children. Specifically, the first youth class of 30 gifted students (aged 11 to 16) from different provinces was set up at the University of Science and Technology of China in Beijing. In 1985, 12 universities, including Beijing University, Qinghua University, Beijing Normal University, and Xian Jiaotong University, followed suit and had their own youth classes.

In subsequent years, there has been a downward extension of youth classes to special or experimental classes in key-point schools (e.g., Beijing No. 8 Middle School; Beijing Yumin Primary School) where gifted students may complete their primary and secondary grades faster than the usual duration. Experimental classes were also extended to kindergartens in 2004.

Parallel to this development of talent search and provisions of accelerated options in preuniversity education, enrichment options have also been provided for gifted children in Olympiad schools, special schools, and Children's Palaces. Olympiad schools admit students who are winners in competitions such as Mathematics Olympiad, Physics Olympiad, and Chemistry Olympiad; special schools and Children's Palaces, on the other hand, generally provide after-school or weekend programs for students gifted in specific domains such as athletics, painting, calligraphy, theater, sculpture, music, ballet, dance, and foreign languages. Overall, the general focus of gifted education has been on academic giftedness in science, mathematics, and technology, and the provision of accelerated options for gifted students to enter universities. Reports of unsuccessful and even tragic stories of some students from youth classes have highlighted the need to attend to the social and emotional development of gifted students. Recent experimentation in Shanghai with integrated curriculum and curriculum compacting along the line of Joseph Renzulli's *schoolwide enrichment model* (SEM) has also underlined the need to broaden the notion of giftedness.

Gifted Education Outside Mainland China

Outside the mainland, a broadened notion of giftedness with enrichment options has been advocated in the Hong Kong Special Administrative Region (SAR) since the issue of the first policy statement on gifted education in the 1990 report of the Education Commission. The report defines gifted children (*zi-you-er-tong*) as those with exceptional achievement or potential in one or more areas of general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual and performing arts, and psychomotor ability. This is basically the 1972 U.S. Marland Report definition. The SAR government promotes implementing three levels of services for students in schools, akin to the SEM-types of activities. Level-one services consist of generic enrichment programs where higher-order thinking skills, creativity, and personal social competence are immersed in the curriculum for all students in the regular classroom, and specialized programs where differentiated teaching for specific subjects is targeted for students appropriately grouped in the regular classroom. Level-two services are school-based pull-out programs targeted for smaller groups of selected gifted students. These pull-out programs may be general programs for systematic training, or specific programs for students with outstanding performance in specific talent areas. Finally, level-three services are offered to exceptionally gifted students who require resource support outside their school settings. Since 1994, about 56 schools have joined the pilot scheme implementing level-one and level-two

services, and further expansion and networking of these schools with other schools to form regional clusters to pool efforts and resources is under way. Level-three services for school-nominated exceptionally gifted students have been offered in collaboration with local universities to provide programs to nurture leadership and to enhance learning in science, mathematics, information technology, and social sciences and humanities. The Hong Kong Academy of Gifted Education, established in 2007, will orchestrate these level-three services.

Future Development

To date, China is struggling with many of the same issues confronted by other countries, issues of how best to define giftedness, to develop gifted programming, to evaluate program effectiveness, to offer counseling services to students and parents, and to train teachers of gifted students. An integrated articulation of school-based enrichment with talent search procedures and accelerated options will certainly be a major task in the future development of gifted education in China.

David W. Chan

See also Cultural Conceptions of Giftedness; Diversity in Gifted Education; Giftedness, Definition; Talent Development

Further Readings

Chan, D. W. (1998). The development of gifted education in Hong Kong. *Gifted Education International, 13,* 150–158.

Shi, J., & Zha, Z. (2000). Psychological research on and education of gifted and talented children in China. In K. Heller, F. Mönks, R. Sternberg, & R. Sutbonik (Eds.), *International handbook of research and development of giftedness and talent* (2nd ed., pp. 757–764). Oxford, UK: Pergamon.

Classical Languages Curriculum, Gifted

When classical education attained its definitive form during the Hellenistic period in Greece around 300 BCE, it was founded on the language arts trivium of grammar, logic, and rhetoric and grounded in a "great works" literary canon with a broad liberal and moral basis. Its aim was to inculcate *facilitas,* the ability to speak extemporaneously and appropriately about any subject, before any audience, and on any occasion. This ability depended upon both creativity and judgment, faculties developed by means of a pedagogical method combining precepts, models, and practice in analysis, composition, and public speaking. When the Romans conquered the Greek world, they merely adopted this curriculum, but made it bilingual. This curriculum then remained the institutional model with only minor variations for nearly 2 millennia in those countries influenced by Greco-Roman culture.

History

The father of this curriculum, or *paideia,* was Isocrates (436–338 BCE), a rival schoolmaster of Plato (428–347 BCE). The contrast between Isocrates' and Plato's educational programs puts in relief the differing philosophies of each and the reasons Isocrates' became more influential. While Plato favored educating the naturally gifted, Isocrates believed that precept, imitation, and practice would enable students with lesser gifts to improve and those with greater gifts to excel. While Plato taught only aristocrats, Isocrates opened his school to all who could pay. While Plato rigidly separated the cognitive and the verbal into two disciplines, Isocrates joined them as two dimensions of language. While Plato emphasized theoretical learning, especially mathematics, logic, and philosophy, taught in a setting isolated from the world, Isocrates emphasized the language arts, situated within social arenas. While Plato sought to produce philosopher-kings or advisors to kings, Isocrates sought to equip pupils for life through a general education that would impart creative problem solving, good judgment, skillful communication, and practical ethics. At the center of Isocrates' philosophy was the belief that reason and speech were the two faculties that separated humankind from beasts and that it was in the perfection of these two faculties that humans, then, became fully human.

Many after Isocrates contributed to the body of precepts and exercises collected to form the Hellenistic curriculum, but it is Isocrates' philosophy and methodology that give the *paideia* its shape and focus. Marcus Tullius Cicero (106–43 BCE), who went to Greece to study, as many Romans of his generation did, was instrumental in making this curriculum available in Latin, translating *paideia* as *humanitas,* from whence derives Renaissance "humanism" and our modern "humanities." A century later, the Roman schoolmaster Marcus Fabius Quintilianus (c. 35–c. 95 CE) records in his *Institutio Oratoria* the whole course for educating a child from birth to adulthood, providing the most complete description now extant of this curriculum.

Content and Methodology

The curriculum was organized into three stages. At the primary level, boys and girls learned reading, writing, and arithmetic. At the secondary level, they studied grammar, style, and literary interpretation and began practicing the early composition exercises: the fable, the tale, the *chreia* (elaboration of a famous person's speech or deed), and the proverb (elaboration of a maxim). When the children were ready, they advanced to the third level and to the study of logic and rhetoric, progressing through the remaining 10 preliminary composition exercises (the *progymnasmata*), which consisted of the confirmation, refutation, commonplace (denunciation for punishment), praise, vituperation, comparison, speech-in-character, description, *thesis* (defense of a general question), and legislation (praise or denunciation of a law). Then they practiced declamations (*gymnasmata*)—the *suasoria* (specific advice to a specific person) and the *controversia* (a plea either in defense or prosecution)—and real-life speeches, whether display pieces, advisory arguments, or forensic pleadings.

Instructional activities for any level integrated reading, writing, and speaking into a method of study known as "Imitation." The schoolmaster would choose a model passage from which to teach the designated principles. This text could be of any genre—poetry, drama, history, philosophy, epistle, oratory—and the length would depend upon the age and abilities of the scholars. The master would introduce the text by reading it aloud. Next, he would guide the students through a close analysis, noting ideas and authorial strategies in grammar, logic, and rhetoric. Then the students would memorize the passage. Once the text was memorized, the students began writing activities that transformed the original in various ways. They would translate from one language to another and back again, paraphrase the original either by reducing or expanding its length, transpose verse to prose or prose to verse, and produce a text of their own by keeping the subject of the original but changing its form or changing the subject while preserving the form. The students were taught methods for adding to, subtracting from, and substituting for textual features. For example, one can alter a fable by adding descriptions, giving speeches to the characters, pulling in a parallel from history or myth, moving the moral from the end to the beginning, retelling the tale by starting in the middle or at the end, or changing details of the narrative so as to illustrate a different moral. Once their new compositions were drafted and revised, the students would deliver them orally before schoolmaster and peers, who would give feedback. Advanced pupils would give extemporaneous speeches before real audiences, often in competitions. In these reworkings of texts, students were reminded that they were to vie with and surpass the artistry of the original authors. They were also reminded that artistry resides not in the styles or ideas alone, but in the congruency achieved between the ideas, words, strategies, and the text's speaker, purpose, audience, subject, occasion, and world. As students advanced, they would also be given poor models to contrast with the best in order to develop further their critical acumen. Focusing on the appropriateness of an author's decisions, this training aimed to develop not mimicry, but both creativity and wisdom, assuming that insight and artistry arise not as a spontaneous revelation without origin, but from the new, yet appropriate collection and rearrangement of available materials.

Application for Gifted

Although gifted students are not taught using the classical curriculum, gifted students are often very attracted to classical languages. Classical language

instruction provides challenge and excitement as gifted students begin to understand the linguistic foundations of English and the Romance languages. Joyce VanTassel-Baska describes how classical language instruction can benefit verbally precocious youth and secondary-school gifted students. Elements of the classical curriculum can be translated into gifted programming, including language instruction, rhetoric, and Great Books discussions.

Nancy L. Christiansen

See also Classics/Great Books; Creativity Theories; Critical Thinking; Curriculum Models; Language Arts, Curriculum

Further Readings

Bonner, S. (1977). *Education in ancient Rome*. Berkeley: University of California Press.

Kennedy, G. A. (2003). Progymnasmata: *Greek textbooks of prose composition and rhetoric*. Atlanta, GA: Society of Biblical Literature.

Marrou, H. I. (1956). *A history of education in antiquity*. Madison: University of Wisconsin Press.

Murphy, J. J. (2001). *A short history of writing instruction: From ancient Greece to modern America*. Mahwah, NJ: Lawrence Erlbaum.

Quintilian. (1980). *The* Institutio Oratoria *of Quintilian: Vols. 1–4* (H. E. Butler, Trans.; Loeb Classical Library). Cambridge, MA: Harvard University Press.

VanTassel-Baska, J. (2004). Quo vadis? Laboring in the classical vineyards: An optimal challenge for gifted secondary students. *Journal of Secondary Gifted Education, 4,* 20–25.

Classics/Great Books

Classics are literary works of enduring excellence that represent the highest level of talent development and creativity. Originally, classics were literary works from ancient Greece and Rome, but in recent years the definition of a classic has expanded to include literature from all around the world. Classics are particularly relevant for gifted individuals because they are intellectually challenging to read and understand, representing quality writing across a broad time span of human history.

Classics also refers to a branch of the humanities that deals with the language, literature, and art of the ancient world, particularly focusing on ancient Greece and ancient Rome during classical antiquity from 1000 BCE to 500 CE. The ancient Greeks created the tradition of a "canon" in which superior and high-quality works were collected and preserved for future generations. Traditionally, the study of classics focused on ancient Greece and Rome, but it later expanded to include the ancient Mediterranean World. Early Christian leaders redefined the canon to classify authoritative texts from the New Testament.

Although the canon has religious origins, it has come to extend to works of the Western tradition. Most lists of classics include John Milton's *Paradise Lost,* William Shakespeare's tragedies, The Bible, Dante Alighieri's *The Divine Comedy,* Homer's epic poems, Miguel de Cervantes's *Don Quixote,* Jane Austen's *Pride and Prejudice,* and Emily Dickinson's poetry. The literary canon is elite but not a "closed" classification; books continue to flow in and out of the classic status. In modern times, the definition of a classic has expanded to include high-quality works from many different cultures and time periods.

Classics are difficult to define, except as works of lasting and great quality. Classics present universal truths about human nature, the best voices and visions available in the literary tradition. The established canon of literary works represents different historical periods and is a constantly changing and evolving entity. The canon is an arbitrary list, and scholars debate this cumulative list of books. Attempts to define a literary canon are somewhat subjective and controversial.

In recent years the Western canon has expanded to include women's, African, Hispanic, and Asian writings. In this day and age it is not possible to read and master the canon due to the large volume of works that have attained classic status.

Classics are particularly appropriate for gifted learners because they promote critical thinking skills, reading comprehension, and higher-level thinking. Individuals who read classics develop an understanding of their cultural heritage while being intellectually challenged. Educated readers develop an understanding of good ideas, characters, well-developed plots, originality, complex thoughts, imagination, and meaning while reading

books that have lasting quality and value. The Junior Great Books Program sponsored by the Great Books Foundation in Chicago, Illinois, is a curriculum that provides 12 readings at each grade level that are enduring classics, and promotes critical thinking through structured discussion techniques. Reading classic works is a stimulating experience for gifted individuals seeking to develop their intellect and critical thinking skills to the highest level possible.

Suzanna E. Henshon

See also Elementary School, Literature Curriculum; Gifted Readers; Middle School, Literature Curriculum; Secondary School, Literature Curriculum

Further Readings

Bloom, H. (1995). *The Western canon: The books and school of the ages*. New York: Riverhead Books.

Bloom, H. (2000). *How to read and why*. New York: Simon & Schuster.

Burt, D. S. (2001). *The literary 100: A ranking of the most influential novelists, playwrights, and poets of all time*. New York: Checkmark Books.

Calvino, I. (1999). *Why read the classics?* New York: Pantheon.

Denby, D. (1996). *Great books: My adventures with Homer, Rousseau, Woolf, and Heinemann*. New York: Simon & Schuster.

Thompson, M. C. (1995). *Classics in the classroom*. New York: Royal Fireworks Press.

Classroom Practices

Many academically talented students do not receive appropriate levels of challenge in their classrooms or schools. Recently, several studies conducted by researchers at The National Research Center on the Gifted and Talented investigated classroom practices in U.S. classrooms for high-ability students, finding a pattern of little challenge and differentiation for academically talented students. The Classroom Practices Survey conducted by Francis Archambault and a team of researchers examined the extent to which these students receive differentiated education in regular classrooms. Approximately 7,300 third- and fourth-grade teachers in public and private schools were randomly selected to participate in this research; more than 51 percent of this national sample responded to the survey. Sixty-one percent of public school teachers and 54 percent of private school teachers reported that they had no training in teaching gifted students. The major finding of this study is that classroom teachers made only minor modifications in the curriculum to meet the needs of gifted students, and this result was consistent for all types of schools sampled and for classrooms in various parts of the country and for all types of communities.

The Classroom Practices Observational Study led by Karen Westberg examined the instructional and curricular practices used with gifted and talented students in regular elementary classrooms throughout the United States. Systematic observations were conducted in 46 third- or fourth-grade classrooms identified by school superintendents and principals. Two students, one high-ability student and one average-ability student, were selected as target students for each observation day, and the types and frequencies of instruction that both students received through modifications in curricular activities, materials, and teacher–student verbal interactions were documented by trained observers. Results indicated little or no differentiation in the instructional and curricular practices, including grouping arrangements and verbal interactions, for gifted students in the regular classroom.

A third study, The Curriculum Compacting Study, led by Sally Reis, examined the effects of using curriculum compacting to modify the curriculum and eliminate previously mastered work for high-ability students. More than 400 teachers participated in this study, identifying 783 students as gifted and in need of curriculum differentiation. Students took the next chronological grade-level Iowa Test of Basic Skills in both October and May. When classroom teachers in the group eliminated between 40 and 50 percent of the previously mastered regular curriculum for high-ability students; no differences were found between students whose work was compacted and students who did all the work in reading, math computation, social studies, and spelling. In science and math concepts, students whose curriculum was compacted scored significantly higher than their counterparts in the

control group. Accordingly, teachers could eliminate as much as 40 to 50 percent of material without detrimental effects on achievement scores.

A lack of challenge in reading was also found to exist. Reis and her colleagues in 2004 investigated the type and nature of reading instruction provided for talented readers through use of in-depth qualitative comparative case studies. A team of researchers conducted multiple observations in 12 third- and seventh-grade reading classrooms in both urban and suburban school districts over a 9-month period. These observations focused on whether talented readers received differentiated reading curriculum and/or instructional strategies. Talented readers were defined as students reading at least two grades above their chronological grade placement who also had advanced language skills and advanced processing capabilities in reading. Researchers studied daily reading practices in reading classrooms to determine frequency and type of usage of various differentiation practices, such as curriculum compacting, interest or instructional level grouping arrangements, acceleration opportunities, and the nature of independent reading and any independent study work completed by talented readers. Results indicated that talented readers received some differentiated reading instruction in only three of the 12 classrooms. In the other nine classrooms, no challenging reading material or advanced instruction was provided for these students during regular classroom reading instruction. Appropriately challenging books were seldom made available to talented students in their classrooms, and they were rarely provided with more challenging work. Different patterns did emerge across districts, as the three classroom teachers who did provide some level of differentiation taught in suburban schools.

When this absence of differentiation occurs, equity in classrooms fails to be achieved. The lack of differentiation increases the likelihood that academically talented students will underachieve in school. In a longitudinal study, Sally Reis found that academically talented students who underachieved in a large high school consistently acknowledged that the easy curriculum they encountered in elementary and middle school failed to prepare them for the rigors of challenging classes in high school, and most mentioned a lack of challenge in reading. They consistently reported that their classes and academic tasks were "too easy," and discussed "breezing" through elementary school, indicating that schoolwork required no effort. Gifted programs can help to provide higher levels of challenge and ensure that students receive the level of curriculum differentiation and advanced services that they need to realize their potential. Equity must be provided in all classrooms to enable gifted and talented learners to make continuous progress.

Sally M. Reis

See also Differentiation; Gifted Readers; National Research Center on the Gifted and Talented; Talented Readers; Teachers of Gifted

Further Readings

Archambault, F. X., Jr., Westberg, K. L., Brown, S., Hallmark, B. W., Emmons, C., & Zhang, W. (1993). *Regular classroom practices with gifted students: Results of a national survey of classroom teachers* (Research Monograph No. 93102). Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Reis, S. M., Hébert, T. P., Díaz, E. P., Maxfield, L. R., & Ratley, M. E. (1995). *Case studies of talented students who achieve and underachieve in an urban high school* (Research Monograph 95120). Storrs: University of Connecticut, National Research Center for the Gifted and Talented.

Reis, S. M., Westberg, K. L., Kulikowich, J., Caillard, F., Hébert, T., Plucker, J., et al. (1993). *Why not let high ability students start school in January?: The curriculum compacting study* (Research Monograph 93106). Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Westberg, K. L., Archambault, F. X., Jr., Dobyns, S. M., & Salvin, T. J. (1993). *An observational study of instructional and curricular practices used with gifted and talented students in regular classrooms* (Research Monograph 93104). Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Cluster Grouping

Cluster grouping involves placing a group of 6 to 12 or more elementary students identified as gifted, high ability, high potential, or high achieving into

a classroom for the express purpose of providing them with full-time educational services targeted to their advanced learning needs. Throughout the literature these terms are used interchangeably, but this entry uses the term *gifted* to refer to these students. Cluster grouping is an important topic in gifted education because it is an often-recommended and commonly used practice. In recent years its use has become increasingly popular because of inclusive heterogeneous grouping practices and budget cuts that have resulted in elimination of gifted programs. The following sections provide an overview of the background, applications, themes, outcomes, and future directions of cluster grouping.

Background

The practice of cluster grouping can be found in the literature as early as 1960. Applications of this practice exist from that time through the present in both the research and the practitioner literature. Early research was limited to descriptive accounts of cluster group programs, follow-up surveys of students, and surveys of teacher uses of cluster grouping. Through the 1990s and into the new millennium, researchers used quantitative and qualitative methods to study cluster grouping. This research revealed positive effects of cluster grouping on student achievement and identification and on teacher practices. These findings coupled with increased emphasis on accountability and tightened budgets have led many elementary schools to implement the practice of cluster grouping in an effort to improve student achievement while at the same time providing services to gifted and talented students. Most textbooks that address programming options for gifted students describe, suggest, or define cluster grouping as a viable option for meeting their needs. Recently, more research has focused on investigating various aspects of cluster grouping and its effects on student learning and affective outcomes.

Applications

Simple

The applications of cluster grouping vary widely from school to school and from district to district. In its most simple form, cluster grouping focuses on the needs of students identified as gifted, by placing them together in a designated classroom for the purpose of providing them with a differentiated education. A teacher with experience, training, and a willingness to work with gifted students is designated to teach this "cluster class." In a simple application of cluster grouping, little thought is given to the composition of the remainder of this class or to that of the rest of the classes in the grade level or building. The learning outcomes for identified gifted students form the basis of program effectiveness evaluation, which addresses whether the cluster grouping program effectively serves the identified students. This narrow focus is reflective of many practices in gifted education that seek to serve the gifted students without regard for how such services affect other teachers, students, and programs.

Inclusive: Special Needs Groups

Other applications of cluster grouping are more inclusive and take into account the role that cluster grouping has in the grade level and in the school. These applications might go so far as to cluster other groups of special needs learners such as English language learners or students with learning disabilities into designated classrooms. Such applications of cluster grouping take the model one step farther than the simple applications by considering the needs of other special needs students when developing classroom student composition. Program evaluation of such implementations would include components measuring learning outcomes for all special-needs learners who were cluster grouped and might include components that describe how cluster grouping functions as a program within the context of the school. This broadened focus recognizes that cluster grouping involves more than just the identified gifted students.

Complex: Total School

Finally, some more complex applications of cluster grouping are implemented as total school models in which the identification, placement, and achievement of all students are considered in developing the program. Students at all achievement levels (i.e., low, low-average, average, above-average, high) are identified to facilitate their

placement into classrooms. Educators use a combination of achievement and classroom performance data to identify student achievement levels, and then use the identification categories to develop classroom lists that specifically reduce the number of different achievement levels in each class. One nuance that has been recommended in this more complex application of cluster grouping involves placing gifted students or high achievers in one classroom and a group of above-average students in *other* classrooms, thus providing each classroom with a group of students that achieves at levels above the average. These more complex applications of cluster grouping thoughtfully place students of all achievement levels into classrooms in a manner that increases their opportunity for educational success. Reducing the range of achievement levels in each teacher's classroom makes planning lessons and differentiating instruction more efficient, because as teachers plan for fewer ability levels, they have time to develop higher-quality lessons focused on the specific achievement levels of the students in their classrooms. Program evaluation of more complex applications of cluster grouping is therefore concerned with how the use of cluster grouping affects all students and educational programs within the school.

Common Themes

Full-Time Services

Regardless of whether the implementation of cluster grouping is simple, more inclusive, or complex, general themes and rationale exist for its use. First, cluster grouping provides full-time services to gifted students by placing them full-time with a teacher who has agreed to modify curriculum and instruction based on their special learning needs. Other gifted programs in elementary schools often consist of only a few hours of service each week, with students placed in general classrooms for the majority of the school week. Whether gifted students' educational needs are addressed in general classrooms depends on their teachers' knowledge, skills, and willingness to adjust curriculum and instruction to the advanced learning needs of these students. Thus, in general classrooms, how well gifted students' needs are addressed varies widely.

Qualified Teachers

Second, cluster grouping places gifted students with a qualified teacher who takes responsibility for appropriately challenging them with curriculum and instruction suited for their advanced learning needs. Grouping identified students with qualified teachers helps ensure that students' needs are more consistently met, and provides teachers with several students who require advanced planning. It is more efficient for a teacher to plan for a group of advanced learners than to plan activities for one or two such learners.

Intellectual and Age Peers

Third, cluster grouping provides gifted students with intellectual peers and a challenging learning environment. The literature clearly indicates that gifted students need to spend large parts of their day with others of similar ability. Cluster grouping facilitates this need, while at the same time providing them with opportunities for continued interaction with their age peers.

Low Cost and Efficient

Fourth, cluster grouping provides an efficient way to group students and increase the chances that their learning needs will be met without additional cost to the district. Special programs for gifted students are often nonexistent or underfunded. With school budget constraints and funds directed toward accountability, supporting additional staff to address the special learning needs of gifted students is frequently viewed as an impossible luxury. Cluster grouping requires no additional staff, but rather a simple reconfiguration of how students are placed in classes to provide full-time services to gifted learners.

Complementary Programming Practice

Fifth, cluster grouping provides one program on a continuum of gifted education services. It works well in conjunction with other programming options for gifted students, including but not limited to pull-out programs, self-contained classrooms, magnet programs, flexible achievement grouping in subject areas, and specific models such as the *schoolwide*

enrichment model. Cluster grouping is not designed as a stand-alone model to replace existing services, but rather as an additional effective programming practice that can enhance existing services. Cluster grouping often provides schools with a means of offering services to additional students who may not qualify for placement in the magnet school, or whose parents may not want to bus them to another school, or who might be placed on a waiting list due to a limited number of spaces in a "more exclusive" program. As such, cluster grouping offers schools the opportunity to provide more inclusive gifted education services to their students.

Flexible, Inclusive, Identification

Sixth, cluster grouping allows educators to identify and serve gifted students without limitations placed on the program based on how many spaces are available in the program. Simply put, cluster grouping can be used to accommodate any number, and varying numbers, of identified students even if these numbers increase as the students in the school progress through the grade levels. Yearly identification is recommended in cluster grouping models because it facilitates the recognition of students whose achievement increases. Thus, cluster grouping has the potential to address the long-standing problem of underidentification of students from specific populations as gifted; namely, students from low socioeconomic backgrounds or of African American, Native American, or Latina/Latino ethnic backgrounds.

Outcomes

Cluster grouping has been shown to result in more students being identified as gifted and fewer students being identified as low achieving over time. In addition, cluster grouping has resulted in the increased achievement of all students in the school as they progress through the grade levels. Thus, cluster grouping seems to meet the needs of high-achieving students while offering the opportunity for other students to grow, develop, and emerge as achievers.

Implementing a complex model of total school cluster grouping has been shown to increase all teachers' knowledge and use of gifted education and talent development strategies. This means that classroom teachers responsible for students other than those identified as high achieving engaged in the use of strategies typically reserved for gifted students, such as acceleration, curriculum compacting, independent study, and student-directed inquiry. This enriched teaching and advanced use of differentiation by many teachers undoubtedly benefits all students in the school.

Future Directions

Elementary school personnel should consider learning more about implementing a complex version of cluster grouping in their efforts to help all students reach their potentials. When viewed in the larger context of school reform and extending gifted education services to more students, cluster grouping has been shown to reach and benefit students and their teachers. This reach extends beyond just those students identified as gifted to all students in a school. Thus cluster grouping may offer elementary educators a win-win opportunity by helping them better address the diverse learning needs of all their students while providing direct services to students identified as gifted.

Research concerning the use of cluster grouping is currently limited to studies conducted on elementary applications of cluster grouping. Thus, before generalizations can be made concerning the use of cluster grouping in middle schools, research is needed to help inform practice. Elementary schools and middle schools are quite different from one another, with elementary students placed in a classroom for most of the day with a single teacher, and middle school students moving hourly from one subject area teacher to another. Thus, the practice of cluster grouping, which works well in the elementary setting, may not work in the same manner or may not work at all in a middle school environment.

Marcia Gentry

See also Differentiation; Elementary Enrichment; Inclusion; Schoolwide Enrichment Model; Talent Development

Further Readings

Gentry, M., & Mann, R. L. (in press). *Raising student achievement through total school cluster grouping*

and differentiation. Mansfield Center, CT: Creative Learning Press.

Gentry, M., & Owen, S. V. (1999). An investigation of total school flexible cluster grouping on identification, achievement, and classroom practices. *Gifted Child Quarterly, 43,* 224–243.

Kulik, J. A. (2003). Grouping and tracking. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 268–281). Boston: Allyn & Bacon.

Reis, S. M., & Brody, L. E. (2004). *Grouping and acceleration practices.* Thousand Oaks, CA: Corwin Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Rogers, K. B. (2002). *Re-forming gifted education.* Scottsdale, AZ: Great Potential Press.

Tieso, C. L. (2003). Ability grouping is not just tracking anymore. *Roeper Review, 26,* 29–36.

Tieso, C. L. (2005). The effects of grouping practices and curricular adjustments on achievement. *Journal for the Education of the Gifted, 29,* 60–89.

Cluster Grouping for English Language Learners

The practice of cluster grouping allows gifted students, including English language learners, Hispanics, and other culturally and linguistically diverse students to participate fully in gifted education services in any school. In a gifted cluster model, all identified gifted students receive services, regardless of their area(s) of identification or levels of ability, achievement, or English language proficiency. In this model, identified gifted students are clustered into classrooms with a teacher who has been designated as the gifted cluster teacher for that grade. The designated gifted cluster classroom also consists of non-gifted students at other ability and achievement levels, with the exception of students who are extremely needy academically. There is usually one classroom at each grade level in which the grade's gifted identified students are clustered to create a strand of gifted cluster classrooms in the school.

The *schoolwide cluster grouping model* (SCGM) represents a comprehensive and inclusive model for providing gifted education services. The SCGM may be implemented at one school or throughout a district. This model places students in classrooms to create a balance of ability and achievement levels throughout the grade level. In this structure, all students are purposefully distributed among the grade-level sections with no classroom having students at both extremes of the learning continuum. This model slightly narrows the range of abilities in each classroom (see Figure 1). Careful balancing of the classes at each grade level and focused training for the cluster teachers allows for success in the model.

Because gifted students are as far removed from the "norm" as are students with significant learning difficulties, it is necessary for teachers to have specialized training in how to teach these exceptional students. In the SCGM, the district and/or school must provide ongoing teacher training in gifted education. Offering training opportunities to all teachers in the school helps prepare those teachers who do not have the gifted cluster group for when they might rotate into the strand another year.

Effective gifted education programs should enfranchise all gifted students. This entry includes recommendations for administrators, teachers, and parents to increase efforts in promoting equity

30 Students in 3 Classes in a Single Grade	Group 1: Gifted	Group 2: High Achieving	Group 3: Average	Group 4: Below Average	Group 5: Far Below Average
Classroom A	6	0	12	12	0
Classroom B	0	6	12	6	6
Classroom C	0	6	12	6	6

Figure 1 Example of a Classroom Composition for the Schoolwide Cluster Grouping Model

so that culturally and linguistically diverse (CLD) gifted students can receive services commensurate with their ability. The SCGM provides access to gifted education services for *all identified gifted students* regardless of English language fluency or achievement levels, while also providing improved learning opportunities for all other students.

Professional Development

The entire school staff benefits from having training on the SCGM and learning how it is effective with CLD gifted students. Professional development in schools with high non-White student populations should include training in gifted education and emphasize teaching strategies for gifted clustered students who have varying levels of English language proficiency. The training should also consider the distinctive cultural norms of the groups represented in the school. These professional development offerings can be provided through district- and site-based workshops, teacher inservices, staff meetings, and by promoting university coursework in gifted education.

Professional development geared specifically to the school district's gifted population should target and address the immediate needs of the district. This training represents a key element in the SCGM. When school districts support teachers with specialized training that builds professional capacity, the teachers are more likely to remain loyal to the district. Teachers with experience and training in gifted education and in teaching culturally and linguistically diverse students improve gifted education services, enfranchise CLD students and their families, and strengthen the entire district.

Suggested formats for professional development include the following:

Book studies. Gifted cluster teachers meet weekly or monthly for discussion and to develop strategies and skills learned from the week's reading. The facilitator should select books that target immediate concerns of the school's cluster teachers.

Classroom observations. Beginning or potential cluster teachers observe experienced cluster teachers using differentiation strategies in a gifted cluster classroom. School administrators should provide time for the observing teacher to dialogue and ask questions of the teachers being observed.

Time at staff meetings to discuss the SCGM. This allows for input from the staff members, and validates the gifted cluster as an important component of the total school program. Dedicating staff meeting time shows that the administration values contributions of teachers who do not have the gifted clusters.

Regularly scheduled meeting time. Present and potential cluster teachers meet and plan throughout the school year. A gifted cluster teacher, Gifted Education Specialist, or school administrator can lead the training.

The school should provide professional growth credit to teachers to encourage participation and should respect teachers' time commitment. Placing identified gifted students into classes as a cluster group constitutes the first step to an appropriate education for gifted students. Teachers must become highly skilled in learning about gifted students' behavioral characteristics and traits, and understand how gifted children learn differently from their grade-level peers. They must also become comfortable using compacting and differentiation strategies on a consistent basis.

In all professional development offerings, the focus should be on how gifted students learn and which specific teaching strategies are likely to keep them highly motivated to be productive in the classroom. For gifted CLD students, strategies that strengthen thinking processes and communication skills necessary for developing potential in the curricular areas constitute a necessary component. This approach not only helps students develop their strengths, but also identifies areas needing further attention, such as those that follow.

Goals for training gifted cluster teachers in schools serving diverse populations include helping teachers learn to

- Recognize and nurture behaviors usually demonstrated by CLD gifted students
- Create conditions in which all students will be stretched to learn
- Allow students to demonstrate and get credit for previous mastery of concepts and standards regardless of the students' level of language mastery

- Provide opportunities for faster pacing of new material, along with reinforcement of language development
- Incorporate students' diverse interests into their independent studies
- Provide flexible grouping opportunities for the entire class

Enfranchising Culturally and Linguistically Diverse Students and Their Families

School structures and customs that are foreign to CLD students may result in feelings of alienation. These feelings may be even stronger for gifted CLD students, who have a strong innate drive for learning. Gifted CLD students are more willing to open up to teachers when they feel accepted. Once trust has been established, students are more likely to exhibit attributes reflective of their giftedness. Gifted cluster teachers' training enables them to recognize the students' actual learning abilities, and increases the likelihood that instruction will build on the students' inherent abilities and undeveloped talents.

As interaction between the teacher and student builds, the teacher should work closely with the parents to help inform them of the academic and social/emotional needs of their gifted children. Some parents of gifted CLD students may not realize the significance of their children's exceptionalities, or the possibilities and opportunities available to their children. Many parents need education on understanding the learning potential and distinctive affective concerns of their gifted CLD children. Helping parents develop an understanding of giftedness as related to the mainstream dominant culture encourages them to advocate for services that fit with the families' cultural expectations and practices.

Staffing

Three key roles exist in the schoolwide cluster grouping model: gifted cluster teachers, gifted specialist, and gifted coordinator. At the instructional level are the gifted cluster teachers, one assigned to each grade level at a school. The gifted specialist, or gifted mentor, provides support to gifted cluster teachers at each school. The district-level gifted coordinator oversees administration of the SCGM. Individuals filling these roles should hold or pursue gifted education certification. This may involve university coursework and professional development in gifted education, a teaching practicum, and/or experience in teaching gifted students.

The Gifted Cluster Teacher

The designated gifted cluster teacher follows expectations determined by the school or district, which combine with regular responsibilities of the classroom teacher. The gifted cluster teacher is trained to differentiate curriculum for gifted students, while serving the learning needs of other students in the class. Gifted cluster teachers become familiar with the characteristics of all types of gifted learners, including those who are CLD.

The Gifted Specialist

The gifted specialist at each school ideally holds a gifted endorsement or teaching certification in gifted education. An individual filling this role should have experience teaching gifted students, understand the learning and behavioral needs of gifted learners, and be familiar with students from diverse cultures if employed in a school district serving diverse populations. Typically, the gifted specialist has full-time responsibilities as a classroom teacher or administrator and serves as a resource to gifted cluster teachers.

Facilitating professional development at the site constitutes an important role of the gifted specialist. He or she models lessons for cluster teachers and assists in their efforts to differentiate instruction for gifted students. The gifted specialist leads monthly gifted cluster teacher meetings at the site. Cluster teacher meetings should include time where teachers can share lesson ideas, resources, and teaching strategies. The gifted specialist should use the strengths of the staff, the needs of the school's population, and available school resources to guide his or her efforts. The gifted specialist also oversees gifted testing procedures at his or her school. It is critical that the gifted specialist monitor the nominating process to be sure that it fairly accounts for the school's ethnic population.

The Gifted Education Coordinator

The gifted education coordinator oversees implementation and administration of the model. This person serves as a supportive link between the schools and the district. The gifted coordinator holds monthly meetings with gifted specialists. During these meetings, teachers examine how to

- Provide unity of purpose by focusing on the needs of the district's gifted students
- Maintain attention to the special learning needs of gifted CLD students
- Provide teacher training according to the school's needs
- Administer gifted testing that is free of culture and language barriers
- Document student progress and monitor academic achievement of gifted students
- Maintain positive communication with parents

For optimal assistance to the community, the gifted coordinator serving students in a Hispanic community should be able to relate to parents in Spanish. This need to communicate is vitally important to the growth and development of gifted CLD students, especially those whose parents lack information about their gifted children's learning needs. Holding evening parent meetings in English and in Spanish and providing child care increases parent participation in these meetings. Through continued interaction among the parents, students, teachers, school administrators, and support staff, a vertical team evolves and results in enfranchising and supporting gifted students of culturally and linguistically diverse backgrounds.

Dina Brulles, Susan Winebrenner, and Kim Lansdowne

See also Cluster Grouping; Cultural Conceptions of Giftedness; Cultural Values; Diversity in Gifted Education; Teachers of Gifted; Teacher Training

Further Readings

Castellano, J. A. (2003). *Special populations in gifted education: Working with diverse gifted learners*. Boston: Pearson Education Company.

Castellano, J., & Diaz, E. I. (2002). *Reaching new horizons*. Boston: Pearson Education Company.

Ford, D. Y., & Harris, J. J. (1999). *Multicultural gifted education*. New York: Teachers College Press.

Rogers, K. B. (2002). *Re-forming gifted education: Matching the program to the child*. Scottsdale, AZ: Great Potential Press.

Udall, A. J. (1989). Curriculum for gifted Hispanic students. In C. J. Maker & S. W. Schiever (Eds.), *Critical issues in gifted education: Defensible programs for cultural and ethnic minorities* (pp. 41–56). Austin, TX: Pro-Ed.

Winebrenner, S. (2001). *Teaching gifted kids in the regular classroom: Strategies and techniques every teacher can use to meet the academic needs of the gifted and talented*. Minneapolis, MN: Free Spirit.

Winebrenner, S., & Brulles, D. (2008). *The cluster grouping handbook*. Minneapolis, MN: Free Spirit.

COACHING

As healthy, well-adjusted people seek ways to maximize their personal and professional potential, the fields of personal and professional coaching have burgeoned. Establishing and maintaining an alliance with a coach is one way for talented people to recalibrate their mission and purpose; to establish new goals; and to seek relief from boredom, discouragement, and dissatisfaction in their work and in their lives.

Though there is no unifying definition for the title of coach, both personal and professional coaching involve an ongoing alliance between an individual and a coach. In general, coaches are professionals who support their clients in clarifying their personal or professional vision for their success, identifying and renewing their passions, and taking action toward their goals and dreams. In turn, those who employ coaches do so to refine their goals and to enhance their personal and professional well-being. They are typically healthy and capable, and have a proven capacity to set and attain their academic, personal, and professional goals.

Coaching Versus Psychotherapy

Although the fields of coaching and psychotherapy provide different services to distinctive clientele, there is some debate about the apparent overlap between coaching and the practice of

psychotherapy. To be clear, coaching is not psychotherapy. Nevertheless, similarities between coaching and psychotherapy are evident at the levels of theory and practice. For example, theories of humanistic psychology, such as Abraham Maslow's *theory of self-actualization* and Victor Frankl's existential approach to finding meaning and purpose in one's life, influence coaching philosophy and practices as well as some forms of psychotherapy. In addition to the related theoretical underpinnings, the alliance or relationship between the client and his or her coach or psychotherapist is a key element of both coaching and psychotherapy that contributes to the client's behavioral changes. Finally, like some forms of brief psychotherapy, personal and professional coaching tends to be solution focused, goal directed, and strengths based.

The purpose for which an individual might seek coaching rather than psychotherapy distinguishes the two fields. Psychotherapy is typically useful for patients whose psychological symptoms interfere with their capacity to function normally. Patients who undergo treatment in psychotherapy may have situational or chronic mental health problems such as severe depression or uncontrolled anxiety that prevent adequate daily functioning. That is, such patients may not be able to attend work or school, or may have difficulties in their interpersonal relationships as a result of their psychological symptoms. Furthermore, individuals with clinically significant personality disorders and other severe mental illnesses such as schizophrenia or bipolar disorder are likely to be more appropriate candidates for long-term psychotherapy than for a coaching alliance. In contrast, coaching provides a means for well-functioning people to seek achievement motivation, self-fulfillment, and other experiences that lead to positive change.

Usually, individuals who select a coaching alliance seek a holistic form of wellness. To that end, coaching styles tend to be present- and future oriented, and to promote the client's positive growth. The goals established in a coaching alliance focus on what the client wants to create in his or her life experience. It follows, then, that there is the expectation that the client will be fully committed to his or her goals and well-being. The coach serves as a sounding board and a personal compass that enables the individual to stay on track with his or her intentions.

Personal Coaching

Personal coaching focuses on life transitions that healthy, well-functioning people pass through at various times during their lives. Personal coaching may take place in person, over the telephone, or via Internet video conferencing; and is typically time limited and goal specific. For instance, the goals of personal coaching may involve assisting an individual in restructuring her work–life balance after a marriage or the addition of a child. The client's spiritual growth or the resolution of existential questions also may be the focus of personal coaching. To support the client's goals, a coach may use a variety of interventions, including reading assignments and educational tools, appreciative inquiry and values clarification, identification of strengths and abilities, guided imagery and visualization, meditation practices, journaling, and solution-focused questioning.

Coaching for Executives and Professionals

The focus of executive coaching is on work-related fulfillment and effectiveness for business executives. Specifically, executive coaching may involve a clarification or enhancement of clients' values, vision, and goals. Executives typically expect a coach to provide straightforward and honest feedback and suggestions for action. The coach, in turn, provides challenges and helps to identify blind spots and barriers to the executive's success. Other themes that may be addressed by an executive coach include the following: time management strategies, managerial and executive skills, leadership qualities, identification and implementation of the executive's strengths and abilities, and improving emotional intelligence. Executive coaching may be conducted at the executive's office, on the telephone, and in other unusual locations such as on the golf course or overseas during executive development programs.

Coaching for Creative and Innovative People

Creative people, such as writers, artists, and musicians, as well as some innovative scientists, physicians, and engineers may find coaching a particularly useful means to achieve peak

performance and creative renewal. Performance anxiety, writer's block, and artist's block are some of the challenges that creative people encounter during the creative process. Creative people may be more open to alternative, novel forms of helping, such as visualization and goal setting, relaxation, hypnosis, eye movement desensitization and reprocessing (EMDR), and mindfulness practices.

Innovative scientists, engineers, and physicians often dedicate their professional lives to the study and practice of their chosen fields. At some point during their careers, innovators may express dissatisfaction with their work, and feel underappreciated and misunderstood by their peers, employers, and family members. Innovators may find assessments of their strengths and abilities a valuable means of remembering what drew them to their fields of study to begin with, and use their strengths to reconnect or redirect their vocational interests. Communication strategies and mindfulness practices are two methods that may be particularly helpful to innovators when their coaching goals involve experiencing deeper satisfaction and meaning with their work.

Credentialing for Coaches

Although there currently are no licensure or credentialing requirements that coaches must fulfill, the International Coach Federation is one organization that provides training and credentialing for prospective coaches. Coaching also seems to be a natural fit for mental health professionals whose training positions them to transition out of mental health practices and into coaching. To that end, some universities in the United States offer coursework and certifications in executive and professional coaching. The American Psychological Association's Divisions 13 (Consulting Psychology) and 14 (Society for Industrial and Organizational Psychology) provide resources for psychologists who are considering entering the field of coaching. Internationally, Coaching Psychology Units have been established at the University of Sydney in Australia, which offer a master's degree in Organizational Coaching; and City University London, which focuses on coaching and coaching psychology research. Finally, the Society for Coaching Psychology is an international organization that promotes the theory, research, and practice of coaching psychology.

Robyn McKay and Thomas Kirsch

See also Career Counseling; Creative Personality; Guidance

Further Readings

Auerbach, J. E. (2001). *Personal and executive coaching: The complete guide for mental health professionals.* Ventura, CA: Executive College Press.

Grant, A. M. (2001). *Towards a psychology of coaching.* Retrieved June 29, 2008, from http://www.psych.usyd.edu.au/psychcoach/Coaching_review_AMG2001.pdf

Peltier, B. (2001). *The psychology of executive coaching: Theory and application.* New York: Brunner-Routledge.

Cognition

The term *cognition* encompasses a vast, diverse array of terms, concepts, processes, and meanings. Descriptions of this term can be found in the domains of linguistics, psychology, philosophy, and phenomenology. Cognition is synonymous with thinking itself, and in a sense defines the experience of being human as proposed by numerous schools of philosophy. Components of cognition such as the ability to generalize and analogical and metaphorical thinking are characteristic of intelligent, creative minds and are useful for an understanding of the intellectual characteristics of gifted and creative thinkers. Cognition as a topic of study is truly interdisciplinary, of interest to numerous fields of inquiry.

Mind and Matter

René Descartes (1596–1650), 17th-century natural philosopher and mathematician, searched for the meaning of the human experience. This culminated in an "Aha!" experience, expressed in Latin as *cogito ergo sum,* which translates to "I think, therefore I am." Descartes initiated the mind–body problem. Cartesian dualism essentially proclaims

that we are composed of two distinct and basic substances, namely the mind and matter. Matter was the material substance that extended into the world and took up space, whereas the mind was a thinking substance, which was not "localizable" in space. In much older Eastern traditions, such as the Vedanta tradition, the totality of the human experience is expressed in Sanskrit as *Tat twam asi,* meaning "That art thou." In other words, the cognizing subject cannot be separated from the object being cognized.

Generalization

In psychology, cognition typically means the study of specific mental functions such as representation, decision making, abstraction, and generalization. The Soviet psychologist Vadim Andreevich Krutetskii analyzed the generalization ability of both "normal" and gifted students in a series of experiments. Krutetskii (1976) viewed the ability to generalize as one manifestation of the creativity of the individual. He hypothesized that "students with different abilities are characterized by differences in degree of development of both the ability to generalize mathematical material and the ability to remember generalizations" (p. 84). One of the attributes of students who were able to generalize mathematical ability was the capacity to switch from a direct to a reverse train of thought (reversibility), which capable students performed with relative ease. The mathematical context in which this reversibility was observed was in transitions from usual proof to proof via contradiction (*reductio ad absurdum*), or when moving from a theorem to its converse. Based on his experiments with 19 students, Krutetskii concluded that more "capable" students were able to form mathematical generalizations both rapidly and broadly. He noted that these capable students were able to discern the general structure of the problems before they solved them. The "average" students were not always able to perceive common elements in problems, and the "incapable" students fared poorly in this task. These results led Krutetskii to examine "gifted" students separately, followed by an examination of incapable students. The final experiment was a study of 24 "gifted," 22 "average," and 8 "incapable" students. Based on these series of experiments, Krutetskii identified four levels of generalization as a function of the ability of the students.

> *Level 1:* Inability to generalize based on essential features in spite of help and cues provided.
>
> *Level 2:* Ability to generalize based on essential features with help from the experimenter. Numerous intermediate errors made by the subject.
>
> *Level 3:* Ability to generalize based on essential features, independently, with very few (insignificant) errors. Proper faultless generalization comes with insignificant promptings and leading questions from experimenter.
>
> *Level 4:* Ability to generalize correctly and immediately, "on the spot," without experiencing difficulties, without help from experimenter and without special practice in solving problems of a single type (pp. 254–255).

Krutetskii came to the conclusion that in order for students to formulate generalizations correctly, they had to abstract from the specific content and single out similarities: the structures and relationships. The ability to generalize consists of two aspects:

1. subsuming a particular case under a known general concept and
2. the ability to deduce the general from particular cases (in this instance the generality is unknown).

The process of generalization is not only an intriguing and fascinating aspect of the mind but also a crucial aspect of mathematical thinking, especially higher-order mathematical thinking, and thinking in general.

Marvin Minsky (1985), the cofounder of artificial intelligence, devised the metaphor of *uniframes* as a way to understand how the mind creates generalizations. Simply put, a uniframe is a "description designed to represent common aspects of a group of things that can be used to distinguish them from other things" (p. 331). One formulates generalizations by linking together a sequence of uniframes that show common aspects but suppress details that are superficial or insignificant. In other words, uniframing is the process by which the mind compares information from a variety of

sources to a priori frames of reference. For instance, we may have a uniframe for the notion of a tree based on various trees seen in a specific geographic location (say North America). Supposing we encounter a tree in the tropics, with hanging roots, which does not completely fit our uniframe of a tree. In this event we compare this new information to an a priori frame of reference and either classify this new tree as an exception to the uniframe of a tree, or we modify our uniframe to accommodate (or link) trees with hanging roots. In order to link trees that do not fit the superficial notion of a tree, the generalized notion of a tree in our tree uniframe would contain the underlying structural (botanical) properties of a tree. Another simple example is a young child's uniframe of a bird, which typically contains the property of flying until the child encounters a nonflying bird like an emu or an ostrich. In order to accommodate these atypical birds, superficial properties in the uniframe of bird would have to be suppressed and replaced by more appropriate common structural properties.

Analogical Reasoning

Another related way in which we learn and generalize is through the use of analogies and analogical reasoning. The human ability to find analogical correspondence is a powerful reasoning mechanism. Defined in a general sense, analogy is the ability to reason with relational patterns. Being able to detect patterns, to identify recurrences of the patterns in the face of variations in their elements, to abstract from the patterns, and to communicate these abstractions is a basic human achievement. According to Douglas Hofstadter, a well-known cognitive scientist, analogy lies at the core of human cognition and appears to be closely linked to the development of general representational ability.

The powerful role of analogies in communicating, exploring, or transferring ideas has been well recognized since early times. Around the 2nd century BCE, the Greek Stoic Chrysippus first used water waves to suggest the nature of sound, and in 1630, Galileo used the known orbit of the moon as the basis for his theory that the Earth moves. Analogies are equally important in today's society. We use analogies in many walks of life, such as decision making in law, business, and politics; scientific reasoning in the laboratory; and problem solving in daily living. Usha Goswami claims that even children as young as 1 and 2 years of age display an ability to reason analogically, where they use their understanding of familiar situations to help them construct new knowledge. For example, consider the analogical reasoning of two 5-year-olds, Elliott and James, in a preschool classroom where they are applying their knowledge of the human anatomy to interpret how trees function:

James: The tree's so fat. It's got lots of blood in it.

Elliott: Because inside the wood there's some very liquid black stuff and I know that's blood.

James: No, water! The water goes in the tree and it could easily…The water goes under, in the roots, and it goes up in the tree and gets blood.

Teacher: Why do you think the trees need to have blood?

James: Cos [*sic*] if they didn't have blood they would die.

Teacher: What does the blood do, do you think?

James: Helps them stay alive.

The above example illustrates, albeit in an elementary sense, the analogical processes involved in transferring relational information from one system, the *base,* to another system, the *target.* In this instance, the children are transferring their understanding of basic human anatomy (the base) to the functioning of trees (target). This transfer of knowledge is achieved through matching or mapping processes, which involve finding the relational correspondences between the base and target. The analogical reasoning processes also play a key role in students' mathematical learning, for example, when they use any form of representational system to develop an understanding of a mathematical concept or process. The use of various diagrams to represent fractional ideas or manipulative materials to illustrate our base-10 system, for example, requires students to understand the structure of the source, that is, the representational system, and be able to recognize the correspondence between it and the target, that is,

the mathematical idea or process to be learned. Importantly, the mapping or correspondence to be made between the source and target must be unambiguous—if not, students are not likely to understand the intended mathematics.

Analogical reasoning is also a powerful tool in problem solving, where the relational structure of a problem that has already been solved (i.e., the source problem) is mapped onto a new problem (i.e., the target) and is used to help solve this new problem. In more recent studies, Lyn English reports that there is more to such *analogical transfer* in problem solving than the mapping of one structure to another. Effective problem solvers must know the generalizable relational structure of the source problem, and if this problem has to be retrieved from memory, then it must be done so in terms of its relational structure (not its surface features). Second, the problem solvers must know to look for and must then be able to identify the relational correspondence between the target problem and the source problem. Third, the problem solvers must know what to do with the relational commonalities between the source and target problems. That is, they must know how to reason analogically and must appreciate the benefits of doing so. This is particularly important when the target problem is not completely isomorphic with the source, that is, when the solution model from the base problem has to be adapted in some way to account for the unique aspects of the target problem.

Metaphorical Reasoning

Reasoning with metaphors is similar to reasoning analogically and is also an important cognitive learning mechanism. Such reasoning is considered a fundamental way of human thinking and communication, as can be seen in everyday use of abstract ideas such as time and change. We use statements such as, "Time is money," "The time for a decision is drawing to a close," and "It suddenly dawned on us that we could take a quicker route to solving the problem." We understand metaphor by finding a mapping between the target domain, that is, the topic of the metaphor, and the source domain. The connection between the two domains, however, is usually implicit. Like analogical reasoning, metaphorical reasoning can generate new inferences and lead to development of significant conceptual understanding, and is an integral part of thinking.

Bharath Sriraman and Lyn English

See also Cognitive Abilities; Cognitive Development; Consciousness; Genius; Gestalt Psychology and Creativity; Giftedness, Definition; Habits of Mind; Intelligence; IQ; Problem Solving; Spirituality

Further Readings

English, L. D. (2004). Mathematical and analogical reasoning in early childhood. In L. D. English (Ed.), *Mathematical and analogical reasoning of young learners* (pp. 1–22*)*. Mahwah, NJ: Lawrence Erlbaum.

Gentner, D., Holyoak, K. J., & Kokinov, B. N. (Eds.). (2001). *The analogical mind: Perspective from cognitive science*. Cambridge: MIT Press.

Krutetskii, V. A. (1976). *The psychology of mathematical abilities in school children* (J. Teller, Trans., & J. Kilpatrick & I. Wirszup, Eds.). Chicago: University of Chicago Press.

Minsky, M. (1985). *The society of mind*. New York: Simon & Schuster.

Sriraman, B. (2004). Reflective abstraction, uniframes and the formulation of generalizations. *Journal of Mathematical Behavior, 23*(2), 205–222.

Sriraman, B., & Benesch, W. (2005). Consciousness and science: An Advaita-Vedantic perspective on the theology-science dialogue. *Theology and Science, 3(*1), 39–54.

Weisberg, R. E. (1993). *Creativity: Genius and other myths* (2nd ed.). New York: Freeman.

Cognitive Abilities

Since French psychologists Alfred Binet and Theodore Simon developed the first intelligence test, attempts at mapping out and measuring a wide range of cognitive abilities have continued to the present. A test of cognitive abilities consists of a set of cognitive tasks that sample specific types of human performance of interest. These tests can be group or individually administered. Although various tests are developed to measure hypothetical or latent constructs of cognitive ability, they typically range from basic processes or capacities such as

processing speed or perceptual accuracy, to higher-order processes and abilities such as complex problem solving or analytic thinking, sometimes involving specific modes of representations (e.g., spatial vs. verbal) and functional contexts (e.g., academic vs. practical). The measurements derived from standardized cognitive ability tests are norm-referenced standard scores that rank order individuals on certain dimensions of latent cognitive ability.

There are historical linkages between the development of cognitive ability tests and the gifted education movement. Louis Terman adapted Binet and Simon's test for use in the United States for identifying gifted students, whom he defined as having an IQ score of 140 or above. Cognitive ability tests have remained as a major vehicle for identification purposes to date, though how test results should be interpreted and used has become increasingly controversial. There are at least three main issues regarding predictive and construct validity of cognitive ability tests.

Validity of Cognitive Ability Tests

Born or Made?

Cognitive abilities measured by conventional psychometric tests are traditionally seen as aptitudes or natural abilities (or even labeled "intelligence"), sharply distinguished from achievement tests. Now the consensus seems to be that there is at least a substantial overlap between the two kinds of measurements; that is, cognitive abilities so measured are developed or acquired, rather than innate. Scholars differ, however, as to whether the distinction between ability and achievement measures should be maintained. Some scholars view cognitive abilities as a form of developing competence, not that different from what is seen as achievement. Others argue for the distinct characteristics of cognitive abilities versus achievement, such as malleability (i.e., how easily they can be changed) in their development and generality (e.g., how widely they can be applied) in their functioning. The problem can be partially solved by looking at items in cognitive ability and achievement tests to see what kinds of knowledge base and cognitive processes these items tap into. The key issue is construct representation. To the extent that content knowledge is the focus of a test, it can be seen as by and large an achievement test; to the extent that a test demands the use of knowledge for reasoning and problem solving, cognitive abilities are involved. With regard to predictive validity, the best predictor of future achievement in a domain is the current achievement in that domain. Thus achievement can be treated as an important "aptitude" for future learning in that domain. The ability to reason in the symbol systems of a domain constitutes another important predictor of future success.

How Many?

Besides the ability–achievement distinction, there has been a perennial debate over how many cognitive abilities exist, and how broad or narrow these abilities are. Some researchers prefer parsimony; hence Charles Spearman's *g* or Raymond Cattell's broad distinction between fluid and crystallized intelligence. Others, from L. L. Thurston to Howard Gardner, prefer diversification of mental functions rather than some general, central capacity. John Carroll's *three-stratum hierarchical model,* which specifies three levels of cognitive abilities from the narrow to the broad, provides a compromise. A misconception that easily follows is that the hierarchical structure of cognitive abilities so defined reflects the structure of mind. In fact, it is merely a convenient classification system or taxonomy that helps organizing a wide range of tests rather than a psychological model. A true dilemma facing development of cognitive ability tests is the consideration of practical utility versus construct representation. The broader the range of tasks involved in a test (e.g., traditional IQ tests), the more practically useful, but the more obscured in its psychological meaning. Nevertheless, both interindividual differences in levels and intra-individual patterns of cognitive abilities are predictive of future achievement and developmental trajectories, suggesting the utility of using a more differentiated, multifaceted approach to ability measurement.

How Stable?

The third issue concerns stability and change of psychometrically defined cognitive abilities. Cognitive ability measures are subject to regression

to the mean, a tendency for high scorers on a test to have lower scores if tested again over time. Measurement errors and statistical artifacts aside, there are developmental and contextual reasons for the phenomenon. Developmental changes in cognitive abilities may not be linear; spurts of development may occur at different points in time for different individuals. Contextually, any subtle change in the content or testing condition can introduce performance variations. Given the changing nature of performance on cognitive ability tests, using scores on cognitive ability tests as the sole gifted identification criterion once and for all is scientifically unjustified.

Conceptualizations

Cognitive ability of various sorts as we know it through testing is traditionally conceptualized as trait, describing an enduring characteristic of the person in question. With the emergence of cognitive science, ability is examined as performance, subject to a detailed task analysis that permits a breaking down of components and processes. Attempts at elucidating underlying processes of specific cognitive abilities, however, are largely unsuccessful. David Lohman attributes this failure to the fact that cognitive psychologists partition variations in performance as a function of task conditions, whereas differential psychologists partition variations in performance as a function of person. He argues that they represent two contrasting modes of thought: essentialist versus population thinking.

Critics of the psychometric approach to cognitive ability testing with its nomothetic assumption of trait distribution argue that, by assuming structural regularities of cognitive abilities, the approach decontextualizes human functioning. Another criticism is that the psychometric view of cognitive ability is distinctly "ability-centric" in that it assumes that the "perform-on-demand" testing condition could be generalized as to how humans function cognitively in natural settings. Sensitivity to problems and the inclination to follow through are not well covered in these tests. Comparison of testing and natural performance conditions prompts a distinction between maximal performance typically seen in the former and typical engagement in the latter.

Implications for Education

The practical utility of cognitive ability tests needs to be reconsidered in light of the new insights. It is important to distinguish between testing, a process of obtaining measurements, and assessment, a process of obtaining critical information for practical decisions. Defined as such, testing assists but cannot substitute for assessment. A clinical approach would take a test score as a piece of information that would help put all pieces of the puzzle together, but is in and of itself not self-evident and sufficient. Ironically, this is how Binet thought cognitive ability tests should be used. Because psychometric tests are measuring "static" traits, dynamic testing and assessment can supplement psychometric test information in reaching sound educational decisions about individuals' placement and education.

David Yun Dai

See also Aptitude Assessment; Aptitudes; Cognition; Cognitive Development; Intelligence

Further Readings

Angoff, W. H. (1988). The nature-nurture debate, aptitudes, and group differences. *American Psychologist, 43,* 713–720.

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart context? Cognition, ability, and talent development in an age of situated approaches to knowing and learning. *Educational Psychologist, 37,* 165–182.

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies.* Cambridge, UK: Cambridge University Press.

Cattell, R. B. (1971). *Abilities: Their structure, growth, and action.* Boston: Houghton Mifflin.

Gardner, H. (1983). *Frames of mind.* New York: Basic Books.

Lohman, D. F. (2006). Beliefs about differences between ability and accomplishment: From folk theories to cognitive science. *Roeper Review, 29,* 32–40.

Lohman, D. F., & Korb, K. A. (2006). Gifted today but not tomorrow? Longitudinal changes in ability and achievement during elementary school. *Journal for the Education of the Gifted, 29,* 451–484.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years. *Perspectives on Psychological Science, 1,* 316–345.

Messick, S. (1992). Multiple intelligences or multilevel intelligence? Selective emphasis on distinctive properties of hierarchy: On Gardner's Frames of Mind and Sternberg's Beyond IQ in the context of theory and research on the structure of human abilities. *Psychological Inquiry, 3,* 365–384.

Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational Researcher, 27*(3), 11–20.

Cognitive Abilities Test

The Cognitive Abilities Test™ (CogAT®), published by Riverside Publishing Company, is the most widely used group ability test in the United States and the United Kingdom. Its 11 test levels span kindergarten through Grade 12. CogAT consists of three test batteries measuring the three aspects of fluid reasoning ability that are the primary cognitive aptitudes for academic learning: verbal reasoning (V), quantitative reasoning (Q), and figural/nonverbal reasoning (N). Each of the three batteries can be administered independently. However, the profile of scores across all three batteries provides much additional information for educators.

In the spring of 2000, the sixth edition of the test was co-normed with the Iowa Tests of Basic Skills® (Grades K–8) and the Iowa Tests of Educational Development® (Grades 9–12). When administered with either of the Iowa tests, CogAT offers predicted achievement scores for all students who are tested. In addition to assisting in the identification of children whose academic performance lags behind their tested ability, the use of jointly normed ability and achievement tests allows for better identification of academically talented children than either test alone can provide.

CogAT reports both national age- and grade-normed scores for all three reasoning scores, three partial composite scores (VQ, VN, and QN), and an overall (VQN) composite score. When screening children for academic giftedness, users are also encouraged to request local norms from the publisher. Although the VQN composite score is useful for some purposes, educators have always been cautioned not to use it for screening. Children with extremely high (or low) scores are much more likely than other children to show large differences among the three battery-level scores. Such students will often be excluded from the talent pool because the weaker score will pull down the composite.

Verbal, quantitative, and nonverbal reasoning scores are estimated by two or three subtests. Using more than one format enhances the validity of the scores. Items on the Primary Edition (Grades K–2) are paced by the teacher and require no reading. Tests on the verbal battery of the Multilevel Edition (Grades 3–12) require some reading and are administered with time limits. Testing time for the entire Multilevel Edition is 90 minutes.

The seventh edition of CogAT is currently under development. Although it will preserve many of the features of the current edition of CogAT, the new edition is designed to better accommodate the needs of children who are not native speakers of English, especially at Grades K through 3. Tests at these grades have been replaced with new tests that blend seamlessly with tests at Grades 4 and above. A computer-administered form of the test will also be provided.

The most important uses of CogAT scores are (1) to guide efforts to adapt instruction to the needs and abilities of all students; (2) to provide a measure of cognitive development that usefully supplements achievement test scores, course grades, and teacher ratings; and (3) to identify for further study students whose predicted levels of achievement differ markedly from their observed levels of achievement. The first use is supported through several teacher guides and a Web-based system for matching the level and pattern of a student's scores to specific instructional recommendations. Recommendations are based on 50 years of research on adapting instruction to individual differences. Using CogAT in this way stems from the long-held belief that test scores should be potentially useful for every child who takes the test, not merely as a way to screen for gifted children.

CogAT differs from other group-administered ability tests in its concern for improving the users' understanding of what ability tests measure and cautioning them when test scores might be undependable or invalid. In addition to the *Research Handbook* (104 pages) and *Norms Booklet* (128 pages), there are an extensive *Interpretive Guide for Teachers and Counselors* (166 pages) and an *Interpretive Guide for School Administrators* (134 pages). *A Short Guide for*

Teachers is available at no charge on the CogAT Web site. Scores on Form 6 are flagged if they appear unsound in any of nine different ways. One of the innovative features of CogAT6 is the introduction of confidence intervals for each score. In this way, users are warned if the pattern of a student's scores is inconsistent within or between subtests in a battery.

Comparisons of CogAT with individually administered ability tests show that CogAT test scores are more reliable than corresponding scores on tests such as the Wechsler scales and the Woodcock-Johnson. Comparisons with other group-administered tests show that the standard error of measurement on CogAT Verbal and Nonverbal scores is approximately half the size of corresponding scores of group tests such as the Otis-Lennon and Naglieri Nonverbal Ability Test (NNAT). For example, the 90 percent confidence interval for a student who receives a score of 100 on the NNAT is 88 to 112—a range of 24 points. For the CogAT Composite score it is 95.6 to 104.4—a range of 8.8 points.

Although CogAT is not an IQ test, normative scores on CogAT (e.g., age percentile ranks and Standard Age Scores) show the same mean and relative variability as scores on individually administered tests, at least until Grade 6. Thereafter, nonrandom dropout from school makes the school-going population relatively more able than the population at large. Normative scores on other group-administered tests are generally not as dependable. For example, comparison with the Raven Progressive Matrices and NNAT showed that the U.S. Raven norms were approximately 10 IQ-like points too high. For NNAT, the basic NAI score had the expected mean of 100, but the standard deviation varied from 23 to 15, resulting in substantial overidentification of gifted students, especially in the primary grades.

CogAT has long been viewed as a model for group ability tests because of its psychometric qualities, the extensive research on its three test batteries, and the authors' persistent efforts to assist practitioners in making the best use of the information it provides.

David F. Lohman

See also Cognitive Abilities; Identification; Intelligence

Further Readings

Cognitive Abilities Test (Form 6): http://www.cogat.com

Lohman, D. F. (2005). The role of non-verbal ability tests in identifying academically gifted students: An aptitude perspective. *Gifted Child Quarterly, 49,* 111–138.

Lohman, D. F., Korb, K., & Lakin, J. (2008). Identifying academically gifted English language learners using nonverbal tests: A comparison of the Raven, NNAT, and CogAT. *Gifted Child Quarterly, 52,* 275–296.

Lohman, D. F., & Lakin, J. (2007). Nonverbal test scores as one component of an identification system: Integrating ability, achievement, and teacher ratings. In J. VanTassel-Baska (Ed.), *Alternative assessments for identifying gifted and talented students*. Waco, TX: Prufrock Press.

Riverside Publishing Company: http://www.riverpub.com

Cognitive Development

Development occurs in three broad domains: physical, emotional/social, and cognitive. The focus of this entry is on the cognitive domain, because cognition is a central aspect of giftedness, creativity, and talent. Cognitive development is a lifelong process of intellectual growth gained through perception, ideas, and feedback. There are several stages to cognitive development. These periods of human development are prenatal, infancy and toddlerhood, early childhood, middle childhood, adolescence, early adulthood, middle adulthood, and late adulthood. Although each period has its own unique opportunities and demands, each individual varies and continuously develops in unique ways. Cognitive development is influenced by a mixture of biological, social, and psychological factors, and it can lead to both growth and decline. It is not a given that an individual is constantly improving; rather, an individual's experiences and thoughts can lead to cognitive decline as well as cognitive improvement. This highlights the plasticity of the human brain and its effect on cognitive development.

Cognitive development is the result of multiple interacting factors such as genetics, history, and life experiences. History is a factor in that people born in a certain era share similarities unlike those of other eras due to technological

advances, cultural and societal factors, and world events such as war, epidemic, and mass immigration. Age-related influences are fairly predictable developmental factors, such as language development during preschool years. Nonnormative influences are atypical in that they affect individuals in different ways. These irregular events happen to just one or a few people as opposed to a group of people as a whole and consist of things such as educational and personal experiences unique to the individual. Many ideas have been put forth to explain human cognitive development, and they take into account various factors.

The British philosopher John Locke viewed children as tabulae rasae, or blank slates, to be written on by their experiences and environment. Development was a continuous process in which children were no more than passengers on a rollercoaster. This passive view of child development has since been discarded for the belief that children actively interact with their environment, playing a key role in their cognitive development. Jean-Jacques Rousseau was a French philosopher who believed that children were naturally endowed with a sense of right and wrong, and had an innate desire for orderly and healthy growth. He believed that children had inborn morals and ways of thinking and feeling, with their development occurring in distinct stages. In addition to the early childhood theories of Locke and Rousseau, there have been several early theories of cognitive development throughout adulthood and aging.

The psychoanalytic perspective to personality development emphasizes each individual's unique life history. Both nature and nurture play a role in development, and early experiences set the course for later development. People are seen to move through a series of stages in which they confront conflicts between biological drives and social expectations. The resolution of these conflicts ultimately determines an individual's ability to learn, to get along with others, and to cope with anxiety. Erik Erikson and Sigmund Freud each posited theories of development. Freud believed in five psychosexually oriented stages of child development, and Erikson posited psychosocial stages lasting from birth to late adulthood.

Building on the principle of conditioning, Albert Bandura emphasized observational learning as the means of cognitive development. His social–cognitive approach emphasizes how we think about ourselves as well as others, with the ultimate goal of social-cognitive development being personal self-efficacy.

Jean Piaget has had arguably the greatest influence on child cognitive development theory. His cognitive development theory posits that children actively construct their knowledge of the world through exploration and manipulation. He believed that the mind adapts and develops to fit better with the external world. Children automatically attempt to achieve equilibrium between their internal cognitive structures and their encounters in the everyday world. As experiences expand and the brain develops, children go through four distinct stages. These distinct stages are sensorimotor, preoperational, concrete operational, and formal operational.

More recent theories have been influenced by the field of cognitive psychology. The earliest of the recent theories is known as *information processing*. This theory proposes a continuous series of development in children and adults as they gradually improve in perception, memory, attention, and problem solving as the result of brain growth and new environmental demands.

Ethology and evolutionary developmental psychology claim that there are adaptive behaviors that have evolved in order to help individuals deal better with the environment. There are also sensitive periods during which certain cognitive capacities emerge and in which the individual is especially responsive to environmental influences. Evolutionary developmental psychology attempts to understand the adaptive value of cognitive development with age. The evolutionary and genetic benefits of behavior are believed to be strongest in the first half of life; as people age, social and cultural factors become increasingly important.

Lev Vygotsky's *sociocultural theory* focuses on how culture is transmitted to the next generation through social interaction. This is necessary in order for children to acquire the ways of thinking and behaving consistent with a community's culture. *Ecological systems theory* sees cognitive development within a complex system of relationships, which is acted upon by multiple interacting levels of the individual's environment. These systems include the microsystem, mesosystem, exosystem, and macrosystem.

A final major theory of human cognitive development is the *life span perspective*. This posits a continuous series of gains and declines, as well as the stage-wise emergence of new cognitive abilities. Cognitive development is influenced by multiple interacting biological, psychological, and social forces that vary from person to person. This perspective has led to cognitive development theories of young adulthood, adulthood, and the elderly. Theories of cognitive development of young adults such as those of William Perry have been useful in understanding the kinds of changes that people experience when challenged intellectually; this theory is particularly useful in understanding the thoughts and judgments made by gifted adolescents and young adults as they master difficult philosophical, scientific, and literary material.

All of the major theories of cognitive development believe that nature and nurture play important and interactive roles in cognitive development. How one cognitively grows shapes the giftedness, creativity, and talent of each unique individual. The advent of functional brain imaging techniques has allowed researchers to watch the brain while it is working on various tasks and in various settings. Known as developmental cognitive neuroscience, this area of research brings together researchers from biology, medicine, neuroscience, and psychology in order to study the individual's cognitive development.

Samuel Loren Deutch

See also Cognition; Cognitive Abilities Test; Learning; Optimal Development; Social Development

Further Readings

Berk, L. E. (2007). *Development through the lifespan* (4th ed.). Boston: Allyn & Bacon.

Flavell, J. H. (1985). *Cognitive development* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Perry, W. G. (1999). *Forms of ethical and intellectual development in the college years*. San Francisco: Jossey-Bass.

Raeff, C. (Ed.). (2003). *Social and cognitive development in the context of individual, social, and cultural processes*. New York: Routledge.

Thomas, R. M. (1991). *Comparing theories of child development* (3rd ed.). Belmont, CA: Wadsworth.

Collaborative Learning

Numerous eminent thinkers of our time have said that their contributions to innovation, technology, science, and social change were the result of the cooperation of many minds. Humanity's evolution indicates that we have survived and thrived by cooperating with one another, with the group overcoming individual deficits. The pedagogical notion of collaborative learning can be traced back to the writings of John Dewey and Lev Vygotsky, among others. The image of an isolated and solitary learner is a thing of the past, because most 21st-century professions in industry require the ability to work collaboratively on projects in groups or teams where communicating, sharing, and synthesizing ideas is paramount to success, and accountability is accorded to the group. In the United States, the urgency of preparing today's students adequately for future-oriented fields is being increasingly emphasized at the university level. Both the National Research Council (NRC) and the National Science Foundation (NSF) in the United States are increasingly funding universities to initiate interdisciplinary doctoral programs between mathematics and the other sciences, with the goal of producing scientists who are adept at interdisciplinary research and are able to work in large-scale projects requiring coordination and cooperation among numerous teams of researchers.

Collaborative learning is based on a social constructivist theory of learning where individual subjects and the realm of the social are intricately connected. According to Paul Ernest, who put forth a social constructivist philosophy of mathematics education, there is no underlying metaphor for the wholly isolated individual mind. Instead, his metaphor for learning is that of persons in conversation and in meaningful linguistic interaction and dialogue. Social constructivism draws on the seminal work of Lev Vygotsky and Ludwig Wittgenstein by regarding language as the shaper of, as well as the "summative" product of, individual minds. The learning theory associated with social constructivism puts an emphasis in the essential and constitutive nature of language and social interaction. According to social constructivism it is impossible for an individual to acquire knowledge of the external world without social

interaction, and learning occurs in the Vygotskian zone of proximal development (ZPD).

Secondary mathematics is usually the gateway for an exposure to both breadth and depth of mathematical and science topics. However, most traditional mathematics curricula are still anchored in the traditional treatment of mathematics viewed as an individualistic pursuit involving drill and practice, as opposed to an interdisciplinary and modeling-based approach of mathematics involving teams of students working on projects similar to scenarios in the real world. Barbara Kerr writes that high school mathematics also serves as the gatekeeper for many areas of advanced study, and the traditional treatment of mathematics with little or no emphasis on modeling-based activities that require team work and communication have historically discouraged gifted girls from pursuing 4 years of high school mathematics. This deficit is difficult to remediate at the undergraduate level and results in the effect of low numbers of students capable of graduate-level work in interdisciplinary fields such as mathematical biology and bio-informatics. Any educator with a sense of history foresees the snowball effect or the cycle of blaming inadequate preparation for high school onto middle school onto the very elementary grades, which suggests we must work bottom up. That is, initiate and study the modeling of complex systems that occur in real life situations from the very early grades.

According to Richard Lesh and Bharath Sriraman, in projects such as Purdue University's Gender Equity in Engineering Project, when students' abilities and achievements were assessed using tasks that were designed to be simulations of "real-life" problem-solving situations, the understandings and abilities that emerged as being critical for success included many that are not emphasized in traditional textbooks or tests. Thus, the importance of a broader range of deeper understandings and abilities and a broader range of students naturally emerged as having extraordinary potential. Surprisingly enough, these students also came from populations (females and minorities) that are highly underrepresented in fields that emphasize mathematics, science, and technology; and this was true precisely because their abilities were previously unrecognized. In fact, nearly all of the NSF-funded reform-based mathematics projects in the 1990s that resulted in the writing of integrated modeling mathematics curricula were based on the underlying philosophy and pedagogy of collaborative learning in which students worked on problems in teams of 3 or 4. Students in groups were assigned individual roles (which rotated) such as team leader, quality controller, recorder, reader, and so on, in order to simulate team-based settings in industry. Numerous studies involving students of mixed abilities on the effectiveness of modeling-based integrated mathematics high school curricula as reported by Christian Hirsch and colleagues offer empirical evidence that students learning mathematics through such cooperative curricula perform particularly well (and better than the comparison students in traditional curricula) on measures of conceptual understanding, interpretation of mathematical representations and calculations, and problem solving in applied contexts.

The grouping of students for collaborative learning can be done in numerous ways. Two of the most commonly used methods are heterogeneous and homogeneous grouping: Homogeneous grouping refers to the grouping of learners at the same ability level, whereas heterogeneous grouping allows for learners of mixed ability levels to work together on ongoing class activities, projects, and the like. Sometimes the term *exclusive grouping* is used to refer to homogeneous or same-ability grouping. The research indicates that gifted students benefit from both types of grouping, although some researchers have found that gifted students may become easily bored in groups with extreme disparity in abilities and call for homogeneous grouping to keep them challenged. Where groups are formed such that there is only one gifted student in a group, that student may end up with a disproportionate amount of the work. In order to keep gifted students from playing the role of leader, teacher, or workhorse for the others at the expense of their own challenge, it may be best for gifted students to work in homogeneous groups. In addition, these groups provide practice for a future of collaboration in groups of gifted, highly competent professionals and scholars.

Bharath Sriraman

See also Cluster Grouping; Creative Communities; Group Dynamics

Further Readings

Ernest, P. (1996). Varieties of constructivism: A framework for comparison. In P. Cobb, G. Goldin, B. Greer, P. Nesher, & L. Steffe (Eds.), *Theories of mathematical learning* (pp. 335–350). Hillsdale, NJ: Lawrence Erlbaum.

Hirsch, C. R., & Weinhold, M. L. W. (1999). Everybody counts—Including the mathematically promising. In L. Sheffield (Ed.), *Developing mathematically promising students* (pp. 233–241). Reston, VA: National Council of Teachers of Mathematics.

Kerr, B. A. (1997). Developing talents in girls and young women. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 483–497). Boston: Allyn & Bacon.

Lesh, R., & Sriraman, B. (2005). John Dewey revisited—Pragmatism and the models-modeling perspective on mathematical learning. In A. Beckmann, C. Michelsen, & B. Sriraman (Eds.), *Proceedings of the 1st International Symposium on Mathematics and Its Connections to the Arts and Sciences* (pp. 32–51). Berlin: Franzbecker Verlag.

Minsky, M. (1985). *The society of mind.* New York: Simon & Schuster.

VanTassel-Baska, J., Landrum, M., & Peterson, K. (1992). Cooperative learning and gifted students. *Journal of Behavioral Education, 2*(4), 405–414.

College Creativity

Children identified by creativity measures as gifted have not always produced significant creative works as adults. Indeed, it is during the college years, at the time of transition from childhood to adulthood, in a university environment rich with resources that creative individuals may be both the most vulnerable to underachievement and the most likely to develop the specific knowledge and skills needed to channel their talent into creatively productive careers.

The definition of *creativity* is elusive. Though most creativity researchers agree that creativity includes such components as novelty, appropriateness, and social value, they have not agreed on a single definition. Many of the available creativity measures identify divergent thinking or ideational fluency but fail to predict future creative behavior. Other creativity measures identify personality traits of creative people, the most prominent of which include autonomy, introversion, and openness to experience. In *Understanding Those Who Create,* Jane Piirto found that artists tend to be more spontaneous than other creative people; writers more nonconforming; musicians more introverted; and inventors and engineers more well adjusted on the whole. Yet, little is understood about the process by which creative children become eminent adults.

College Creativity in Context

Theresa Amabile encouraged creativity researchers to go beyond the assumption that individual creativity depends primarily on talent and to consider environmental influences on creative production. Her *componential model of creativity,* which proposes three major components of creativity—skills specific to the task domain, general creativity-relevant skills, and task motivation—provides a useful way to conceptualize the importance of the college environment for creativity. College departments offer domain-specific educational programs for mastery of knowledge and skills that are required for entry into specific fields. In a groundbreaking examination of creative people, Mihaly Csikszentmihalyi studied 100 adults who had produced works that were publicly acknowledged as creative and who had all affected their culture in some important way. In this study of scientists, artists, writers, educators, politicians and social activists, engineers, and religious leaders, he found that the first and foremost characteristic of creative adults is this mastery of a domain of knowledge or skill. Without it, diverse thinking or ideational fluency are not likely to lead to creative products. These profoundly curious and self-guided individuals had little good to say about their educations prior to college. In college and advanced training, however, they found a match between their interests and those of others, in mentors and significant teachers who provided the knowledge they desired so intensely.

The second component is creativity-relevant skills, which are those skills that contribute to creative performance across domains, such as divergent thinking, imagination, and ideational fluency. Programming specifically designed for talented college students often is housed in honors programs via

honors colleges. Honors colleges offer opportunities to develop critical thinking skills and domain-specific knowledge at an accelerated rate appropriate for highly creative students. The final component is intrinsic task motivation, the component most influenced by social environment. Research shows that college students who feel rewarded by the creative process itself are more likely to continue creating than those who create in order to receive external rewards.

Challenges to Creativity in College Students

The College Transition

Social anthropologist Arnold Van Gennep posited that the successful movement of individuals from membership in one group (e.g., creatively talented child) to that in another group (e.g., creatively eminent adult) was signified by three separate stages. The first stage, separation, involves the separation of the individual from past associations and involves the movement of a person from one place to another, whether physically or ceremonially. In this stage, individuals often feel emotionally weak and isolated. In the second stage, transition, the individual learns the knowledge required to interact with members of the new group to which membership is sought; and, in the third stage, incorporation, he or she establishes competency as a member of the new group. The creative adolescent's transition into college is similar to the new tribal member's transition into the new group. Both experience a period of particular vulnerability that could lead to underachievement or failure.

Substance Abuse

College students often experiment with drugs and alcohol, and some develop addictions that impede their aspirations. Creative college students are at particular risk. Creative individuals often are considered to "live on the edge" and generally choose more independent lifestyles; this may lead to substance abuse and other self-destructive behaviors that dull creativity. Creative people often spend large periods of time alone during the creative process. It has also been proposed that creative people use alcohol because their work, uncertain and plagued by rejection, is difficult, stressful, and anxiety provoking. Whether self-medicating as a response to depression or succumbing to a genetic predisposition, creative people often have long periods of time alone to drink and develop addictions without the knowledge of others.

Psychological Challenges

There is also evidence that a high proportion of creative writers, artists, and musicians suffer from symptoms of mood disorders, especially bipolar disorder. The peak age of onset of bipolar disorder is adolescence through age 20, precisely when individuals are transitioning into college. Although there is some evidence that moderate manic states may enhance creative production due to increased range and speed of associated concepts, perseverance, increased energy, reduced sleep, and overt focus on the self, manic psychosis and depression destroy all motivation and productivity.

Multipotentiality and Career Indecision

Highly creative college students may also be at risk for underachievement due to career indecision. Gifted students' abilities to achieve in multiple domains can lead to indecision and lack of commitment in college if they cannot integrate a diverse set of interests and abilities. If multipotentiality is a problem in college, good career counseling with a professional can help these creative students clarify their values, narrow their interests by weighing the pros and cons of various career paths, and set high career goals commensurate with their creative talents.

Camea J. Gagliardi-Blea
and A. Michael Zimmerman

See also Career Counseling; College Gifted; Creative Productivity; Creativity and Mental Illness; Multipotentiality; Relationship of Creativity to Intelligence

Further Readings

Amabile, T. (1989). *Growing up creative: Nurturing a lifetime of creativity.* New York: Crown.
Csikszentmihalyi, M. (1990). *Flow.* New York: Cambridge University Press.
Piirto, J. (1998). *Understanding those who create* (2nd ed.). Scottsdale, AZ: Gifted Psychology Press.

College Gifted

The quest to understand high-ability individuals has been ongoing since Lewis Terman and Melita Oden began their landmark *Genetic Studies of Genius* in 1921, which subsequently shed much light on the importance of the college years in the development of giftedness. This study of 1,528 gifted children with IQs of 135 and above demonstrated that intellectually superior children, contrary to opinion at the time, were not puny and weak but were, by and large, emotionally and physically strong and seemingly well positioned to fulfill their potential as adults. Some failed to do so. Midlife follow-up comparisons between occupationally successful and unsuccessful participants (*success* defined as achievements in college and later career) showed that differences between the two groups in academic achievement and persistence first began to emerge in high school and starkly diverged in college. It became clear that factors other than intellectual ability influenced which gifted individuals would become productive adults. It is during the college years, in a university environment rich with resources, that gifted individuals may be both the most vulnerable to underachievement and the most likely to develop their giftedness at an appropriately challenging pace and channel it into creative and ambitious careers.

No universally agreed-upon definition of giftedness or talent exists, and controversies abound in the conceptualization and measurement of it. The vast majority of this type of research has focused on gifted children and eminent adults, resulting in little information on gifted individuals between the traditional college ages of 17 and 22. In the small body of research that does exist, gifted college students have usually been defined as academically talented college students. Most of this research has focused on honors colleges and exceptional groups, such as the profoundly gifted (i.e., IQ of 180 and above) and those students who enter college early in life and/or who accelerate through it rapidly. Less is known about the more typical academically gifted college students.

Honors Colleges

By college age, there is a well-established pattern of academic performance that can be used to predict future achievement. These studies normally define gifted college students as those who perform at the 95th percentile and above on college admission tests, such as the SAT and ACT, and those who receive cumulative high school grade-point averages of 3.5 or higher on a 4.0 scale, the primary criteria often used in admission to college honors programs. Indeed, gifted college students are most often defined in the research literature as those students belonging to an honors program or honors college at the collegiate level.

Research demonstrates that students of high academic ability have different educational expectations and needs from their less gifted peers, and they have different social and emotional experiences. Honors colleges, small communities within the larger institutions, have been instituted in many large universities and small colleges to address the unique social and intellectual needs of gifted college students. Moderately and highly gifted students expect to be challenged academically in college in the form of both independent study and honors coursework, and they expect to be highly involved in extracurricular activities and leadership opportunities. Students find the greatest advantages to participation in an honors college to be smaller, more challenging classes; more contact with faculty; and the generally superior academic environment.

The Profoundly Gifted, Early Entrance, and Acceleration

The most intellectually elite college students have been shown to create noteworthy literary, scientific, or technical products by their early 20s. In a 10-year follow-up study of the profoundly gifted, adolescents identified before the age of 13 as having exceptional mathematic or verbal reasoning abilities (top 1 in 10,000) pursued doctoral degrees at rates more than 50 times base-rate expectations. According to the work of David Lubinski, these students strongly preferred highly challenging educational opportunities, and 95 percent of them used some form of acceleration to individualize their education.

Among the options for gifted students to obtain appropriately challenging instruction is early entrance to college. High schools are often not able to offer gifted students the strong academic rigor they need to be challenged intellectually. Despite the common assumption that students who enter college early will suffer academically, socially, and emotionally, research has shown that early entrants are generally academically successful and well adjusted both socially and emotionally. The younger the early entrant, the more important it becomes to choose an early-entrance program that incorporates a transition year to help with academic and social integration.

Challenges to Academic Success in Gifted College Students

College Attrition

Departing any college prior to degree attainment runs counter to both individual and institutional expectations, but attrition may be viewed as even more unexpected in honors college students. In *Leaving College: Rethinking the Causes and Cures of Student Attrition,* Vincent Tinto argued that the process of student persistence in college is functionally similar to that of becoming successfully incorporated into the life of human communities generally. In other words, he argued that adolescents are more likely to become successfully integrated into the academic and social systems of college if they successfully let go of past associations in the interest of fully adopting new associations and new behavioral norms.

Of the handful of research studies that do exist on the persistence of honors college students, aloneness—whether positively connoted (e.g., "introversion") or negatively connoted (e.g., "loneliness")—is commonly cited. Emotional stability has also been shown to be predictive of persistence with gifted college students. This finding is commensurate with a large body of research on gifted high school students and gifted children. It appears that although studies of emotional adjustment in the most highly academically gifted students (e.g., IQ above 180) show that the very highest levels of intelligence are associated with more emotional adjustment problems, studies of moderately gifted students demonstrate that these students are at least as well adjusted emotionally as average students. Academic self-concept, goal commitment, and predicted effort also predict academic persistence with these students.

Career Indecision and Multipotentiality

Gifted college students may also be at risk for underachievement due to career indecision. Many gifted students have problems with multipotentiality—the ability to select and develop numerous career goals. Gifted students' abilities to achieve in multiple domains can lead to indecision and lack of commitment in college if they cannot integrate a diverse set of interests and abilities.

University Environment

Students who view the university environment positively and who perceive a good fit between themselves and their university culture are more likely to persist in college. Academically talented women may feel particularly vulnerable in a college environment that they may experience as cold, uninviting, and isolating. Highly gifted women may feel that they must choose between their academic talent and being found attractive and socially valuable.

Counseling for the College Gifted

Research shows academically talented college students have special needs that may be attenuated with counseling, particularly in light of the research that shows honors students who drop out of college tend to do so in relative isolation, without consulting faculty, academic advisors, or even friends. These gifted students often struggle with perfectionism and fear of failure in addition to the more typical college problems of integrating into the social and academic university environments. If multipotentiality is a problem in college, good career counseling with a professional can help these gifted students clarify their values, narrow their interests, and set high career goals commensurate with their exceptional abilities.

Camea J. Gagliardi-Blea

See also College Creativity; Honors Programs; Intelligence; IQ; Men, Gifted; Mentoring Gifted and Talented Individuals; Multipotentiality; Perfectionism; Women, Gifted

Further Readings

Rinn, A. N., & Plucker, J. A. (2004). We recruit them, but then what? The educational and psychological experiences of academically talented undergraduates. *Gifted Child Quarterly, 48*(1), 54–67.

Tinto, V. (1993). *Leaving college: Rethinking the causes and cures of student attrition* (2nd ed.). Chicago: University of Chicago Press.

Competencies for Teachers of Gifted

Teachers of gifted students must possess competencies not required of general educators. They have the same foundational competencies as other educators (e.g., classroom management skills, organization, lesson plan development), but must add other competencies to their repertoire when teaching gifted students. These competencies include the knowledge, skills, and dispositions that provide appropriately paced education with sufficient depth and complexity for gifted students to make reasonable yearly progress in their academic development. Discussing these competencies here is important because teachers' influence in their classrooms is a significant factor affecting student progress. This entry examines the competencies from varying perspectives: teacher, students, parents, program, colleagues, and the larger community.

Teachers must first know themselves as the major resource for the gifted student. This includes what they have learned about the content of their profession, such as teaching methods, content in the subject area they teach, and about giftedness. Although knowledge is not a sufficient condition to produce an effective teacher, it is a necessary one. Teachers of the gifted also understand the many additional skills they have learned for working with gifted students and when and how to apply them. Teachers of the gifted are able to teach higher-order thinking skills, problem solving, and creativity. Examining unconscious attitudes is important, especially when the subject, in this case, giftedness, often generates ambivalence. Therefore, teachers of the gifted have examined their attitudes about giftedness and explored what their own experiences with gifted people have been. They are often gifted themselves, and they have examined what that has meant to them and how their giftedness has affected them positively and negatively. Effective teachers of the gifted demonstrate a genuine regard for gifted learners, are patient, and use humor. They have the ability to make the classroom environment welcoming to bright students, especially those who might have been hiding in a general education classroom. Their classroom is a safe place to explore what it means to be different because of having higher levels of ability, to make mistakes, and to find joy in learning. As all good teachers do, they provide support as they challenge students and foster an enjoyment of learning, but they also understand how much it takes to challenge gifted students. They know their own cultural, educational, and personal background and how it affects their students as well as how people from various backgrounds view giftedness. They consistently engage in self-reflection and self-improvement, improving their knowledge, skills, and dispositions throughout their careers.

Teachers of the gifted understand gifted learners. They have studied theories of intelligence and apply them appropriately in different situations. They understand that intelligence may present differently in different cultures and that various levels of intelligence are also quite dissimilar. Thus, they use varying methods of recognizing and identifying giftedness. Exceptional teachers remember that gifted students may vary across domains (asynchronous development), having differing levels of accomplishment in psychomotor, cognitive, and emotional realms. They understand normal development in these areas and the variations in development resulting from higher levels of intelligence, cultural background, and asynchronous development. They are also aware that, because of the scarcity of gifted individuals, students may have a pressing need for interaction with their gifted peers and facilitate those connections. They know that students' affective needs are an intrinsic part of education and so use lessons that integrate affective and cognitive elements. They are adept at increasing

intrinsic motivation in students. Because gifted students are a heterogeneous group, their teachers differentiate instruction to address differing cognitive, social, and emotional needs. In fact, teachers of the gifted need competencies in other areas of diversity because giftedness is found in every socioeconomic group, in all racial-ethnic groups, and in people with varying abilities or disabilities, and is displayed in different ways across groups.

Teachers of the gifted realize that parents are significant figures in students' lives. They engage parents as partners in education, eliciting their questions, input, and cooperation. When parents are viewed as partners, the competencies displayed include communication, providing information about giftedness, and directing parents toward other resources when needed. Teachers of the gifted are experts at gathering information from parents and sharing information with parents.

Teachers of the gifted need competencies working with their colleagues: fellow teachers, administrators, counselors, support staff, and members of their boards of education. They must know how to advocate for gifted education with colleagues who are ambivalent or negative. By accumulating sufficient knowledge for working with gifted students, teachers of the gifted become resources for other adults in the school. They can become expert enough to provide professional development for their colleagues. Individual case consultation regarding gifted students is another useful service they provide to educators in their districts.

Competencies for teaching gifted students also focus on program issues at the classroom, building, district, and community level. Teachers understand and support their district goals for gifted education. They know how students are identified and monitored in gifted education. They assess readiness, interests, and learning styles in order to create appropriate learning activities. They maintain adequate records to provide input about their students to parents and district personnel. Teachers of the gifted are able to implement various curriculum models, matching curriculum to the learner's needs. They are skilled in adjusting, or differentiating, instruction either by content, process, product, or learning environment. Further, they maintain awareness of the activities and resources provided by organizations outside of the local district, such as the National Association for Gifted Children, the Council for Exceptional Children, or the National Research Centers on the Gifted and Talented.

Karen E. Ray

See also Professional Development; Teachers of Gifted; Teacher Training

Further Readings

Chan, D. W. (2001). Characteristic and competencies of teachers of the gifted learners: The Hong Kong teacher perspective. *Roeper Review, 23,* 197–202.

DeLisle, J. (2002). *Barefoot irreverence: A collection of articles on gifted child education.* Waco, TX: Prufrock Press.

Ford, D. Y., & Trotman, M. F. (2001). Teachers of gifted students: Suggested multicultural characteristics and competencies. *Roeper Review, 23,* 235–239.

McCoach, D. B., & Siegle, D. (2007). What predicts teachers' attitudes toward the gifted? *Gifted Child Quarterly, 51,* 246–255.

COMPETITIONS

A competition is a contest wherein two or more individuals or groups vie for some type of incentive (e.g., prizes, awards, recognition). Contests may be skill oriented, knowledge oriented, or luck oriented. In education, there are knowledge- and skill-based competitions available for students of all ages in academic areas, fine and performing arts, leadership, service learning, and athletics. These may be in a single discipline or multidisciplinary, as part of the school curriculum or extracurricular. There are local, regional, national, and international competitive opportunities for individuals or groups/teams of students. This entry discusses the types of competitions available to gifted students, the ways in which these competitions enhance the education of bright students, and ways to integrate competition into gifted education.

Competitions and Gifted and Talented Students

Competitions are part of a continuum of approaches for identifying and meeting the needs

of gifted and talented students. Therefore, they serve a dual purpose: the *identification* of special abilities, and the *development* of knowledge and skills. In the United States, more than 275 competitions have been identified for gifted and talented students. Three types of competitions are available for gifted and talented students: teams working together; long-term independent research projects, often facilitated by a mentor; and series of tests, often above level, for identifying exceptionality. Competitions may be performance based, with a set of criteria against which one's performance is judged, or they may be head-to-head, with the goal being to outperform and defeat one's opponents. In other words, participants may be competing against the skills and knowledge of others, or against their own abilities based on an external entity like a timer or problem to be solved.

One of the longest-standing *team competitions* for gifted and talented students is Future Problem Solving, developed by E. Paul Torrance in 1974. This is an international program serving thousands of students throughout the world with both competitive and noncompetitive options, including Team Problem Solving, Community Problem Solving, and Scenario Writing. Studies undertaken in Australia and the United States indicate that a majority of participants in Future Problem Solving report positive impacts upon their ability to think about solutions to global issues and problems.

One of the best-known *long-term, independent, project-based competitions* is the Intel Talent Search (formerly Westinghouse), which started in 1942 and involves more than 1,500 secondary school students each year. Follow-up surveys conducted by the sponsors of this competition indicate that three National Medal of Science winners, nine MacArthur Foundation Fellows, two Fields Medalists, and six Nobel Laureates are included in the finalists from the past six decades. Intel also sponsors the International Science and Engineering Fair, which annually brings over 1,500 students from 40 countries together to compete in science projects.

Among the longest-standing *testing competitions* are the Olympiads, which date back to as early as 1894 when the first mathematical contests were organized in Budapest, Hungary, followed by the first ever mathematical Olympiad in St. Petersburg, Russia, in 1934. These regional, and mainly European, contests provided the platform from which international competitions were launched, beginning with the International Mathematics Olympiad, which was first held in Romania in 1959. Other disciplines followed suit, with the development of international Olympiads in physics (1967), chemistry (1969), informatics (1989), biology (1990), and astronomy (1996).

Retrospective studies involving winners of the United States Mathematics, Chemistry, and Physics Olympiads were conducted by Professor James Campbell and his colleagues in the late 1990s. Their findings indicated that these gifted and talented individuals had completed degrees in prestigious institutions, with many pursuing doctoral degrees and engaging in academic careers. Studies undertaken in New Zealand with mathematics and chemistry students reported enhanced peer interactions, motivation and stimulation, and study skills and work habits.

Why Competitions?

Education and competitions are inextricably linked in at least three ways. First, children naturally compete; therefore educators have utilized competitions to motivate, encourage, and spark learning. As early as the late 1st century BCE, a Roman teacher, Marcus Verrius Flaccus, is credited with introducing competition as a pedagogical tool by awarding antiquarian books as prizes. More current theory indicates that competitions can spark short-term and long-term motivation. Second, in the "adult world" there is an expectation of competitiveness, and many societies teach their children to compete. This was evident in early Sparta, where there was a focus on teaching physical education mainly through contests, which resulted in top honors at the early Olympic Games. A more contemporary example is evident in countries such as Singapore, England, and Japan, where the national education systems encourage competition in examinations for scholarships to universities. Finally, competitions are designed as a way of developing talent for the workforce, complementing educational initiatives in securing and developing a nation's economic health. For example, in the United States several high school competitions in science, mathematics, and technology were developed following the launch of *Sputnik*.

Further to these rationales for embedding competitions in education, there is a growing body of literature supporting and advocating the use of competitions for gifted and talented students. It should be noted, however, that there is limited empirical evidence to support or refute the potential benefits or problems for students participating in competitions. Research related to the effectiveness of competitions in meeting the social, emotional, intellectual, cultural, and creative needs of gifted and talented students is scarce. Most of the potential issues around competitions are in relation to individual students' experiences, but there also are advantages for schools. The most often cited advantage is the opportunity to raise the public profile of giftedness and talent within a community, and this in turn increases awareness of school-based initiatives and programs.

Competitions provide opportunities for students to further develop and enhance their content knowledge, process skills, and product design and dissemination. They provide opportunities for the development of specific skills, including communication, creative problem solving, leadership, critical thinking, and service learning. Some competitions provide practice in cooperative learning when groups of students or teams work together. They also serve as opportunities for self-directed learning, which leads to more responsibility in planning, setting, and achieving goals. Designing, displaying, and disseminating products, such as experiments, essays, films, paintings, inventions, photographs, posters, songs, and sculptures, to appropriate audiences and for constructive critique by experts can be achieved through competitions. They can give opportunities to experiment with some new and different ways of expressing knowledge, skills, and ideas. Other benefits can be awards such as cash prizes, scholarships, ribbons, trophies, certificates, travel, and other incentives.

Personal skills can be honed and enhanced through participation in competitions: time management, punctuality, following directions, and planning are developed. Competitions provide a forum to meet and greet new and different students and adults, often of like mind, and serving as networking resources. Being placed in a competitive environment, with adequate supports, gives students the chance to learn about individual differences, cope with diversity, aspire to excellence, accept mistakes or failure, and receive recognition for their unique abilities. Competitors can gain a sense of what lies before them in the real world through the challenges presented and as they explore career possibilities.

These challenges can, however, have some potentially negative effects. Students who develop extreme competitiveness may experience stress, frustration, and feelings of failure in their desire to succeed, and perhaps even fall prey to perfectionism, to their detriment. If too much emphasis is placed on winning by the student, parents, teachers, and/or peers, competitions can be hurtful to students. For example, Sylvia Rimm feels that competition can lead to underachievement if too much emphasis is placed on winning. It is important that students have well-planned competitive goals and a balanced perspective on winning and losing. They need to learn how to deal with winning and losing, specifically how to interpret wins and losses appropriately. Others should help students understand that taking the risk of preparation, involvement, and participation makes all the contestants "winners," by placing emphasis on the process rather than the outcome.

Other potential weaknesses associated with competitions are in relation to costs for entry, travel, materials, sponsors, training, and so on-some of which may be hidden costs. In addition to this, the availability of competitions and time for involvement in them could also be potential barriers. There is potential for inequitable opportunities for participation and recognition if students do not have adequate financial, educational, and familial resources and support. To right these potential wrongs, students participating in competitions should have adequate supports in place, through planned approaches to their selection and delivery in the school setting.

Facilitation of Competitions in the Development of Talent

The facilitation of student involvement in competitions, both as a way to identify and to address special abilities and qualities, is enhanced by careful selection and planning. First, schools should endeavor to carefully search, collate, and distribute competition information to students, their parents, and the wider community. Key factors to consider

include competition goals and objectives, age level, curricular focus, criteria for entry, guidelines for participation, costs, and deadlines. If schools are encouraging student participation, it is important to ensure alignment of competition goals with the school's broader program goals and philosophies, as well as an allocation of physical, fiscal, and human resources. Of ultimate importance is the placement of competitions within a wider range of differentiated provisions; competitions as a stand-alone option for gifted and talented students is unjustifiable. Embedding competitions within a curricular scope and sequence, with specific outcomes for participation, is important.

Finally, for competitions to be effective there must be critical evaluation. The benefits and disadvantages of competitions for the identification and development of talent are mainly speculative. Research into their effectiveness, focusing on the experiences and outcomes for participants and other stakeholders, is warranted.

Tracy L. Riley and Frances A. Karnes

See also Evaluation of Programs; Future Problem Solving; Talent Searches

Further Readings

Hoagies' Gifted Education: http://www.hoagiesgifted.org/contests.htm

Karnes, F. A., & Riley, T. L. (2005). Competitions: What parents of gifted students must know. *Understanding Our Gifted, 17*(3), 8–10.

Karnes, F. A., & Riley, T. L. (2005). *Competitions for talented kids*. Waco, TX: Prufrock Press.

Riley, T. L., & Karnes, F. A. (2005). Problem-solving competitions: Just the solution! *Gifted Child Today, 28*(4), 31–35.

Riley, T., & Karnes, F. A. (2006). Competitions. In J. VanTassel-Baska (Ed.), *Alternative programs and services for gifted learners: Issues of equity and excellence*. Waco, TX: Prufrock Press.

Conduct Disorder

Conduct disorder, as defined in the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders, Text Revision* (*DSM-IV-TR*), includes evidence of a chronic and persistent pattern of rule-violating behavior on the part of an individual, typically a child between the ages of 10 and 18 years. The behavior is of a significant nature and typically involves the violation of the rights of others or violation of age-appropriate societal norms.

Children with giftedness, creativity, or talent are not protected from the possibility of experiencing conduct disorder or some associated disorder. Past and current literature suggests that children who are gifted, creative, or talented suffer from mental illness or disorders in numbers similar to the general population. In addition, children who may be gifted, creative, or talented may go unidentified due to presentation of conduct disorder behaviors that mask their unique abilities. Furthermore, gifted, creative, or talented children who have been identified as such may experience an interruption of valuable school-based services due to excessive office discipline referrals, school suspensions, or school expulsion that may be associated with conduct disorder behaviors that cause subsequent significant problems in the school setting. Consequently, in both cases these children fail to meet their life potential due to lack of social/emotional/behavioral adjustment. It should also be noted that high intelligence may make the behaviors of the conduct disordered child more planful, dangerous, and complex. Whereas the average conduct disordered child might simply aggress against people in the nearby environment, the gifted conduct-disordered child might engage in such aggressive activities as hacking into computers, engaging in cyber-bullying, and planning elaborate ways of breaking rules or laws. It is therefore critical that conduct disorders of gifted students be identified early so that interventions can be developed to protect both the student from his or her risk taking as well as to protect family, school, and community from the student's potential aggression.

Diagnostic Criteria

There are four different groupings of diagnostic criteria of conduct disorder in the *DSM-IV-TR*. The diagnostic groupings and examples of respective behaviors within each grouping include aggression to people or animals (e.g., bullying or threatening behavior, physical cruelty to people or animals,

initiating physical fights, forcing someone into sexual activity, stealing while confronting a victim), destruction of property (e.g., deliberate fire setting, willful destruction of others' property), deceitfulness or theft (e.g., breaking into someone's home, building, or car; lying, shoplifting), and serious violations of rules (e.g., violating curfew rules before age 13, running away from home, school truancy before age 13). There are 15 total behaviors in the four groupings, of which 3 or more behaviors must have been present for at least 12 months and at least one behavior during the past 6 months. There must be significant social or academic impairment as a result of the presenting behaviors, onset can occur either in childhood (i.e., before age 10) or during adolescence or at some unspecified or unknown age, and typically, it is not diagnosed in children over 18 years of age. When a diagnosis of conduct disorder is warranted, severity (i.e., mild, moderate, or severe) is specified as well, depending on the number of presenting behaviors and the significance of the effects of those presenting behaviors. Conduct disorder is not to be confused with oppositional defiant disorder, which is marked by less severe forms of inappropriate behaviors including negative defiant behavior, hostility toward authority figures, significant limit testing, frequent and intense temper tantrums, and spitefulness, to name a few.

It is important to note that other disorders may be associated with conduct disorder or may be diagnosed concurrently, including attention deficit hyperactivity disorder (e.g., predominantly hyperactive-impulsive type, predominantly inattentive type), learning disorders (e.g., reading disorder, math disorder), anxiety disorders (e.g., social phobia, obsessive compulsive disorder), mood disorders (e.g., depressive disorders, bipolar disorders), and substance-related disorders (e.g., alcohol dependence, caffeine-induced anxiety disorder).

It is also equally important to note that children with conduct disorder may qualify for services in schools under the serious emotional disturbance disability category as delineated in the Individuals with Disabilities Education Improvement Act of 2004. The criteria for identifying a child with serious emotional disturbance include (a) an inability to learn that cannot be explained by intellectual, sensory, or health factors; (b) an inability to build or maintain relationships with other children and adults; (c) inappropriate behaviors or feelings under normal circumstances; (d) pervasive mood of depression or unhappiness; and (e) development of physical symptoms or fears associated with personal or school problems. Simply having the diagnosis of conduct disorder does not automatically qualify one for services under serious emotional disturbance. The individual must meet one or more of the aforementioned five criteria and must be exhibiting such behaviors to a significant degree and over a long period of time.

Characteristics

A remarkable characteristic of children with conduct disorder is aggression. Children with conduct disorder typically engage in proactive and reactive aggression. A child who engages in proactive aggression uses physical aggression to obtain desired goals and typically has difficulty making and maintaining peer social relationships. Reactive aggression involves resorting to aggression in response to perceived frustration or provocation. Typically, children with conduct disorder have problems perceiving the intent or motives of others as in social interactions. They will often perceive that others have malicious or dubious motives and will aggress preemptively or reactively. Children with conduct disorder perceive threat when there is none and tend to lash out aggressively in response.

Furthermore, these children lack empathy and regard for the welfare of others, and they tend to lack remorse or guilt associated with their aberrant or inappropriate behavior. Lawrence Kohlberg would suggest that these individuals operate at the preconventional level of morality in that they base their moral behavior on what they perceive as best for themselves; engage in moral behavior if there is the possibility of a greater return to them; and define right and wrong in terms of the perceived consequences only.

Treatment and Intervention

Appropriate intervention and treatment are paramount in order to have these individuals meet life goals effectively. Treatment should be comprehensive (school, community, family, and individual) and multicomponent in nature, involving but not limited to family therapy, behavioral parent training,

skills training in social skills and peer interaction, school-based programming, anger management training, and cognitive behavioral therapy. With such a comprehensive approach, treatment outcomes are much more likely.

D. Joe Olmi

See also Bullying; Creativity and Mental Illness; Criminal Gifted; Depression; Disabilities, Gifted; Emotional Development; Psychotherapy; Social Development; Supporting Emotional Needs of Gifted

Further Readings

Evans, D. L., Foa, E. B., Gur, R. E., Hendin, H., O'Brien, C. P., Seligman, M. E. P., et al. (Eds.). (2005). *Treating and preventing adolescent mental health disorders: What we know and what we don't know.* New York: Oxford University Press.

Mash, E. J., & Barkley, R. A. (Eds.). (2006). *Treatment of childhood disorders* (3rd ed.). New York: Guilford Press.

Mash, E. J., & Barkley, R. A. (Eds.). (2007). *Assessment of childhood disorders* (4th ed.). New York: Guilford Press.

Confratute

In July 1978, University of Connecticut Neag School of Education Professor Joseph Renzulli created a new summer program called *Confratute*. Renzulli blended the words *conference, fraternity,* and *institute* into a new word that describes one of the longest-running summer institutes of its kind in gifted education. Renzulli's expanded definition of giftedness (the three-ring conception of giftedness) enabled a broader population of students to be identified and receive services and was considered a bold, and somewhat controversial, idea in the 1970s.

Confratute is sponsored by the Neag Center for Gifted Education and Talent Development; for the past 30 years this summer program has attracted classroom teachers, gifted education specialists, counselors, school psychologists, and principals. Confratute is based on the premise that enrichment, enjoyment, and encouragement can be offered to a broader population of students. That philosophy is what Confratute offers its 1,000 annual participants, many of whom are repeat attendees at this gathering of innovative and creative educators.

Confratute occurs in an informal learning environment where participants interact on a first-name basis with strand coordinators. It is a place where everyone is involved and committed to gifted education and talent development. Participants attend keynotes and select from more than 90 strands or weekly classes. They also meet on the patio with others who share similar interests and concerns. Many make plans to stay in touch with new friends and colleagues or visit other people's schools. Most of all, Confratute is a community of adult learners with shared passions and interests.

At Confratute, every effort is made to bring the best available practitioner experts and to arrange the many options from which participants can choose so they complement one another. Persons with various strengths and perspectives are recruited for the Confratute faculty in an attempt to explore a wide variety of issues, ideas, and differentiated teaching practices. All faculty and staff share a belief in the importance of high-end learning for all students according to their individual abilities, interests, and styles of learning and expression. The Confratute faculty also acknowledges the importance that kindness and enjoyment play in all learning experiences.

The second ingredient that has helped make Confratute a success has been the dedicated and enthusiastic participants who have brought with them (collectively) thousands of years of diverse experience in education and a willingness to share this experience through active involvement in formal and informal Confratute activities. Many diverse participants attend Confratute from throughout the United States, Canada, and many overseas nations—teachers, administrators, parents, and people with varying interests, ages, backgrounds, and ideas. It has been this diversity and the acknowledgment and celebration of differences that have helped make Confratute a truly memorable experience for so many persons.

A unique part of the Confratute concept is that it is more than a summer course, more than formal instruction, for it is a careful blend of a conference and an institute with a good deal of

fraternity in the middle. Confratute is total immersion and involvement in enrichment teaching and learning. It is the excitement of new ideas, the satisfaction of hard work, the joy of creating and producing, and the happiness that comes from making new friends, having fun, and learning a little bit more about oneself as well as how to teach gifted and talented students, as well as all other students, more effectively.

Joseph S. Renzulli

See also Elementary Enrichment; Enrichment Triad Model; Middle School Enrichment; Schoolwide Enrichment Model

Further Readings

Renzulli, J. S. (1977). *The enrichment triad model.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S. (2007). (Ed.). *Systems and models for developing programs for the gifted and talented.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence.* Mansfield Center, CT: Creative Learning Press.

Consciousness

Consciousness is derived from Latin words meaning "to know along with." Consciousness is the ultimate subjective experience, so an objective definition is almost impossible to conceive. Psychologists believe that the internal experience of self develops in humans around the age of 3 years. Many people consider consciousness as simply the state of being awake. Advances in medical technology, however, have made it possible for people in vegetative states to be "awake" without being responsive to external stimuli, and patients under anesthesia can be conscious or aware of sounds and conversations around them without being awake. Even the ordinary understanding of the term can no longer be held. Consciousness as self-awareness was once thought to be a characteristic only of humans, but now a number of other species seem to have consciousness. A common test of conscious self-awareness is to paint a spot on the forehead of a human child, a chimpanzee, another of the great apes, or a monkey, and then present a mirror. Three-year-old humans, chimpanzees, and most of the great apes will recognize themselves in the mirror, and attempt to wipe off the spot. Monkeys, however, as well as dogs, cats, and most other creatures considered "intelligent" will not. On the other hand, there is more controversial evidence that dolphins, whales, and gray parrots may also have some form of self-awareness based on these kinds of experiments.

Where Is Consciousness?

People have speculated about the location of consciousness throughout history. Some societies believed consciousness resided in the heart, some the stomach, but most have located consciousness in the head. Eastern religions held that consciousness emanated from the "eye" in the forehead, from the sixth chakra, or in the one neural bundle in the brain that is singular rather than duplicated on each side, the pineal gland. René Descartes also believed that the pineal gland was the seat of the soul. Split-brain studies, in which one side of the brain is separated from the other by severing the connecting corpus callosum (an operation done to prevent life-threatening seizures), have shown, however, that consciousness is distributed across the hemispheres. In addition, neuroimaging studies do not point to any particular location as the place from which consciousness derives. It may be, therefore, that consciousness is a process rather than a place. Francis Crick and his colleagues have developed a theory of the process of consciousness that depends on a form of short-term memory and also on a form of serial attentional mechanism. This attentional mechanism helps sets of the relevant neurons to fire in a coherent semi-oscillatory way, at a frequency of about 40–70 Hz, so that a temporary global unity is imposed on neurons in many different parts of the brain.

What Is Consciousness?

Behaviorism in the 20th century impeded the study of consciousness because it was considered too subjective to be investigated, a "black box" that could not yield to accurate observation. Cognitive

scientists and philosophers in the 1990s challenged the idea that consciousness could not be studied rigorously, and a new science of consciousness was born. In 1994, David Chalmers challenged philosophers, psychologists, neurophysiologists, and anthropologists to study the basic question, What is consciousness? Until that point, most of research on consciousness explored what he called "the easy problems": that is, the search for the neural correlates of phenomenal consciousness. However, new methodologies and findings in neuroscience and artificial intelligence changed the focus of the problem to what Chalmers called the "hard problem"—that is, to explain how subjective experience arises from the objective activity of brain cells. A series of biennial conferences in Arizona (Consciousness I—Consciousness XI) brought together all of these professions to discuss the hard problems.

Most scientists, however, prefer the easy problems and leave the hard problems to philosophers. Stephen Pinker went so far as to suggest that the mind is a computer made of meat; Francis Crick suggested that with advancing technologies, consciousness would be revealed as material in nature, just as he and his colleagues revealed the chemical basis of heredity to be. Antonio Damasio pioneered the imaging of the brain through functional magnetic resonance imaging (fMRI) and proposed that emotion and cognition interact to produce consciousness. In his book, *The Feeling of What Happens,* he showed how the mind–body division that had been the basis of medicine and psychology was a false dichotomy.

Nevertheless, there are scholars such as Susan Blackmore who insist that consciousness is irreducible; that no matter how much progress is made in understanding the mechanisms of awareness, there will still remain a mystery that cannot be resolved because of the impossibility of entering into others' subjectivities. The scholars of "nonlocality" and quantum theories such as Dean Radin claim that this impossible threshold has and can be breached, and that the hard problem will be solved by a completely new paradigm, not only in psychology, but in physics. Needless to say, those who would enter this controversy must be prepared to be open in mind and rigorous in method.

Many psychologists and philosophers have attempted to understand the various states of consciousness. In a case of an idea that was truly before its time, Roland Fischer in the journal *Science* in 1971 proposed a "cartography" of ecstatic and meditative states. His breakthrough was to conceptualize all states of consciousness on a continuum of arousal states ranging from the lowest arousal states (sleep–dreaming–meditation) through rational, or ordinary consciousness to higher arousal states (excitation–ecstasy–Samadhi). Parallel to this continuum were found EEG states ranging from dominant alpha to dominant beta to dominant theta states. Also parallel to changes in arousal were changes in one's sense of one's relationship to the world outside one's skin. Fischer conceptualized this continuum as one of subject/object differentiation, with clearest differentiation at the rational state, where one feels completely separate from objects around one, and with complete fusion at the both the highest and lowest ends of the continuum, where one feels completely fused, "at one" with the universe. Fisher's model was only slightly modified over the next 30 years, perhaps because technological means did not yet exist that would allow researchers to test the model.

Recently, however, some advances in the study of consciousness have made it possible to refine and expand his cartography. Charles Tart and Imants Baruss, most notably, provided means of understanding the brain's electrical activity, the physiological correlates, and the phenomenology of different states of consciousness. New information about sleep multiplies the possible consciousness states. Certainly the flow state described by Mihaly Csikszentmihalyi needs to be inserted in the continuum. Flow is the state of consciousness during creative activity when an individual is working at the peak of his or her capacity, feels challenged and yet just competent enough to meet the challenge, and when time seems to stand still and the work seems to flow out and through the creating person. Studies of all of the other states including dreaming, hypnosis, meditation, relaxation, excitement, ecstatic states, and transcendent states are now multiplying as these become acceptable topics for study.

In the field of creativity studies, consciousness is a concept that is important to the understanding of the "Aha!" experience of insight, of flow states, of peak experiences, and of spiritual intelligence.

Most people who have attempted to define spiritual intelligence, including Robert Emmons and Kathleen Noble, have referred to the capacity to attain different or higher levels of consciousness. Barbara Kerr claims that that ability to deliberately alter consciousness and to manage consciousness states is the sine qua non of spiritual intelligence. Recent studies show that creative young people who score in the highest range on "absorption" and on "openness to experience" on personality tests seem to have a greater capacity than average people to enter into altered consciousness states. Not only shamans, but great healers, teachers, and leaders seem to have this ability not only to alter their own consciousness, but to induce trance states, dreams, flow states, and ecstatic states in others. It is likely that psychologists will continue to study these altered states as well as the vehicles used to attain them, because it is these states that seem to be responsible for some of the highest attainments of the human mind, such as creativity, intuition, and enlightenment.

Barbara Kerr

See also Cognition; Creativity, Definition; Neuroscience of Creativity; Spiritual Intelligence

Further Readings

Baruss, I. (2003). *Alterations of consciousness: An empirical analysis for social scientists*. Washington, DC: American Psychological Association.

Blackmore, S. (2001). *Consciousness: An introduction*. Oxford, UK: Oxford University Press.

Chalmers, D. (1996). *The conscious mind*. Oxford, UK: Oxford University Press.

Damasio, A. (1998). *The feeling of what happens*. New York: Harcourt Brace.

Dennett, D. C. (1991). *Consciousness explained*. Boston: Little, Brown.

Controversies in Gifted Education

For many years, teachers and professors have noticed that some students remember better than others, reason better than others, create new ideas better than others. These students have been referred to as gifted in honor of suspected inherited gifts and have been treated as a subgroup requiring different educational services and approaches.

However, there have been many controversies swirling around such students, their nature, their origin, their proper education. Because these points of argument usually take place in an evidence-free environment it is likely that the controversies will continue for some time to come.

The identification of such students had previously been based upon scores on an IQ test, which had the effect of also limiting the number of such students because there were assumptions as to how many students would score over 130 IQ or 140 IQ on a given test. Now the definition is more fluid, concentrating on rapid development for one's age in one or more developmental area to the extent that different educational approaches are necessary to help one reach one's potential.

The following questions represent 12 major controversies in gifted education today. For each there is a brief description of the various points of view that can be found in the literature of gifted education.

1. *Are there one or many intelligences?* Some have held that because many such students are excellent in many different developmental areas, there must be a general "g" factor in intelligence. Others have pointed out that some students show marked superiority in one area relative to others (i.e., mathematics, artistic) and therefore the concept of multiple intelligences should be accepted. The available evidence would suggest that there is merit on both sides, depending on the individuals being discussed.

2. *From whence does giftedness spring?* For many years such abilities were considered to be largely genetic in nature. The evidence springs from two sources. One, the fact that monozygotic (identical) twins seem closer in measures of ability than dizygotic (fraternal) twins, and dizygotic twins closer in ability than unselected pairs of students. Two, the presence of prodigies or youngsters who show abilities expected of much older youths or adults. Such youngsters may play musical instruments well at age 3 or competitive

chess at age 6 or create poetry while their age-mates are learning to read. Since no one can construct an environment that could generate the prodigy performance, it has been assumed to be genetic in nature.

However, there is now the opinion that such genetic advantages need to take place in a favorable environment (supportive family, early stimulation of developmental talents, good education, etc.) if the full gifts of such students are to be realized. This also means that the number of gifted students is dependent on these favorable environments.

3. *Are there ethnic, gender, or racial differences in intelligence?* This question arises because of marked differences in high performance in subgroups of the student population. Girls appear less frequently than boys at the highest level of mathematical prowess. There are clear differences in racial and ethnic membership in special programs for gifted students. Such differences have traditionally been accounted for by differential encouragement and opportunity rather than based on native abilities. For example, when girls are given opportunity and encouragement in mathematics, their performance rises markedly.

4. *Does emotional instability accompany giftedness?* Longitudinal studies suggest that identified gifted students are as emotionally stable, if not more so, as their age-mates. Similarly, the rates of suicide (a prime indication of emotional stress) are about the same in high-ability students as in other students. It is also clear that giftedness is no protection or inoculation against emotional problems, which tend to occur in the same fashion and with the same dynamics in their families as in other families.

5. *Is there less financial support for programs for gifted than for other children with special needs?* There is a marked difference in special funding in elementary and secondary schools, with the majority of special support going to programs for students who are in academic difficulties. The *equity* (all students should have equal opportunities to achieve) versus *excellence* (students with special gifts and talents should be encouraged to develop them) policy equation seems to be currently weighing in on the equity side. The No Child Left Behind legislation, for example, focuses primarily on achieving equity or basic competence in the schools. Programs for children with disabilities are more easily funded than those for gifted students. On the other hand, there are many scholarships and financial aids for students with special talents once they have completed their basic schooling.

6. *Where should they be taught?* The current philosophy impacting on the public schools is that of inclusion. That is, all students, regardless of differences in ability or learning potential, should be educated in the regular classroom. Such a philosophy has emerged mainly because children with disabilities had been seen to be educated in inferior settings, similarly to children from low-income or ethnically different families. The result of such a philosophy of inclusion has meant that gifted students have probably been underchallenged in the typical program and such students, when interviewed, report they are bored with the regular program and would wish more challenge. An increasing number of parents of gifted students have chosen homeschooling or charter schools as alternatives to the regular school program.

7. *What should they be taught?* There is clear agreement that if gifted students have already mastered the general curriculum, they should be provided with *differential curriculum.* Advanced Placement courses and honors courses at the secondary level have been pointed to as an example of such differentiation. Special programs in mathematics and creative writing are sometimes offered in elementary schools, though such efforts seem to depend on individual school systems to provide special experiences. An exception to this conclusion is a special, well-organized program—the *International Baccalaureate*—that provides rigor and broader curriculum offerings than found in the typical school system.

One other way of changing where students are educated is the process of *educational acceleration,* meaning that students are advanced through the system at a more rapid rate in order to try to place them with students of comparable abilities. Such devices as grade skipping, earning college credit in high school, earning credit through examination rather than course taking, early entrance to college, and grouping students so they completed 3 years in

2 have all been used to shorten the time for gifted students to complete their studies. This shortening of programs becomes important when one observes that such students taking advanced graduate or professional programs (medicine, law, Ph.D. programs in the sciences) could well spend a quarter of a century in our educational systems and be 30-years-old before beginning their careers.

There have been objections to educational acceleration on the grounds that moving students from their age group to place them with older, more physically mature, students runs the risk of creating social adjustment problems that could interfere with their adult adjustment. Recent evidence suggests that the harm that educational acceleration does to individual students has been much exaggerated and that such procedures, when well planned, result in favorable educational and personal outcomes.

8. *Are there special skills gifted students are expected to master?* One of the emphases in special programs for gifted students has been to stress the learning of skills to enhance their creative abilities. Such approaches as *problem-based learning,* which places the emphasis on creating a learning environment and assignments where the students are encouraged to discover for themselves important ideas rather than passively take notes from their teachers have been gaining in popularity. Various attempts to foster *discovery learning* have been popular.

9. *Can a student be gifted and disabled at the same time?* Such students have been called "twice exceptional" and have received much recent attention. Students can clearly be both gifted and learning disabled, with specific blocks in auditory or visual perception or the ability to master some mathematical processing or even spelling. Other students have been identified as having Asperger's syndrome, a form of autistic spectrum disorder that interferes with social skill development and communication, with the student clearly being outstanding in some areas of learning. Twice-exceptional students need to have individual plans and special programming to help them reduce their disability and free their high abilities for more effective use. Obviously gifted students who have conditions of visual or auditory impairment have achieved impressive results when recognized and stimulated.

10. *Are there cultural differences in giftedness?* The wide diversity of students and families in the current American society has resulted in several difficulties in answering this question: How to find talented youngsters from immigrant families or from less favored cultural backgrounds? The second question is: Once found, what is the most favorable approach for enhancing the ability of such students? Should they be embedded in current programs for gifted students? Should such programs be expanded and modified to take into account different levels of abilities and different interests? There has been general recognition that there is much hidden talent in our society, disguised by many different environmental and cultural factors, and a determined effort is being made to find that talent and enhance it. The results of such efforts remain unclear, although individual successes have been noted.

11. *What happens to gifted students at maturity?* The question here is: Do their special abilities flame out in adulthood or do they continue superior performance for the rest of their lives? A series of longitudinal studies has indicated clearly that students who perform well in school continue to perform well in adulthood and to achieve at the community level, in scientific endeavors, or wherever their particular talents take them. They represent substantial assets to society. There is a subgroup referred to as *gifted underachievers* who never seem to reach the performance level their aptitude measures would suggest for them. There seems to be a variety of personality and motivational factors that account for such underachievement. Deliberate and planned attempts to help these students reach higher performance have been modest in results.

12. *What does the future hold for the education of gifted students?* Although there is a widespread understanding of the importance of such students to the future American society, the distance in time between such educational programming and the resulting adult performance seems to interfere with positive policy action at the education level. International competition in the world arena in the

arts and sciences may be the stimulus for more specific policy actions for special programming on the topic of gifted education.

James J. Gallagher

See also Boys, Gifted; Differentiation; Diversity in Gifted Education; Girls, Gifted; High-Stakes Testing; Legal Issues for Gifted

Further Readings

Colangelo, N. (Ed.). (2004). *Templeton national report on acceleration: A nation deceived*. Iowa City, IA: Bolen & Blank International Center for Gifted Education.

Colangelo, N., & Davis, G. (Eds.). (2003). *Handbook of gifted education* (3rd ed.). Boston: Allyn & Bacon.

Plucker, J., & Callahan, C. (Eds.). (2008). *Critical issues and practices in gifted education*. Waco, TX: Prufrock Press.

VanTassel-Baska, J., & Stamburgh, T. (2007). *Overlooked gems: A national perspective on low-income promising learners*. Washington, DC: National Association for Gifted Children; Williamsburg, VA: College of William & Mary, Center for Gifted Education.

Webb, J., Gore, J., Amend, E., & Devries, A. (2007). *A parent's guide to gifted children*. Scottsdale, AZ: Great Potential Press.

Council for Exceptional Children—The Association for the Gifted

The Council for Exceptional Children (CEC) is the largest international professional organization whose goal is to improve educational outcomes for individuals with exceptionalities, students with disabilities, and/or gifted. Established in 1922, CEC sets professional standards, provides professional development, assists professionals in obtaining resources for effective professional practice, advocates for historically underserved individuals with exceptionalities, and advocates for appropriate governmental policies. In 1976, CEC formed a partnership with the National Council for Accreditation of Teacher Education (NCATE) for approving teacher preparation programs and subsequently developed a systematic procedure for validating knowledge and skills standards for each of the 17 divisions within the CEC organization. Each of CEC's divisions focuses on a single facet of special education, bringing together professionals who are interested in research, exchanging ideas, developing expertise, advocacy, and political action.

One of these divisions within CEC is The Association for the Gifted (TAG). Organized in 1958, TAG's primary purpose is to promote the welfare and education of children and youth with gifts, talents, and/or high potential. It identifies the following specific goals:

- Strive to improve educational opportunities for individuals from all diverse groups with gifts, talents, and/or high potential
- Sponsor and foster activities to develop the field of gifted education, such as the dissemination of information, the conduct of research, and other scholarly investigations
- Support and encourage specialized professional preparation for educators of individuals with gifts, talents, and/or high potential, as well as for professional persons in related areas
- Work with organizations, agencies, families, or individuals whose purposes are consistent with its own

The TAG division is governed by a Board of Directors that is elected by the membership or appointed by the president. The Board consists of the president, past president, vice president, secretary, treasurer, two representatives to the CEC Assembly, up to five general members, the journal editor, the newsletter editor, technology coordinator, parent coordinator, and Children and Youth Advocacy Network (CAN) coordinator. The Board meets twice a year to conduct its business—once in the fall, usually in conjunction with a state conference, and once in the spring during the CEC's annual convention. The TAG division also has the following standing committees that meet periodically to assume responsibilities for addressing specific goals: membership, publications, governmental relations, student, nominations and elections, awards, and finance.

Organizations that are concerned with promoting the welfare and education of children and youth with gifts, talents, and/or high potential may affiliate with CEC and TAG. Chapters, branches, or federations of CEC or local, state, provincial, or other organizations apply by submitting a letter of application for affiliation, accompanied by a copy of their bylaws and/or constitution, to the Board, which approves by a simple majority vote.

Since 1968, TAG has published a scholarly journal, the *Journal for the Education of the Gifted,* that is disseminated quarterly. This publication includes original research, theoretical position papers, descriptions of innovative programming, reviews of literature, and historical articles. TAG also publishes a quarterly newsletter, *TAG Update,* to keep the membership informed of current activities of the Board and issues in the field of gifted education.

Given its past history and relationship to CEC, TAG is particularly committed to advocating at the national level and has supported expanding the Javits Program for Children with Gifts and Talents and the use of assessments that consider the educational needs of children with gifts and talents. TAG also provides assistance to schools in developing programs that honor diversity, promote development, and magnify differences among persons. Aligned with these commitments, TAG has published a book and a position paper on inclusion that address equity and excellence.

In its book, *Diversity and Developing Gifts and Talents: A National Action Plan,* TAG describes the need for a national plan on diversity that is based on knowledge of the compatibility of diversity and excellence and the continuing and significant underrepresentation of specific groups that receive educational services for gifted and talented. Action is proposed in three areas: preparing teachers, developing appropriate learning environments and curriculum, and recognizing student potential.

A similar emphasis is found in TAG's position paper on inclusion that champions programs that reform the "general" education program to be more responsive to diversity and embrace individual student variations in rates of learning, development in some domain, advanced knowledge in areas related to that domain, and a seriousness about learning.

As members of NCATE, one of CEC and TAG's major roles has been in reviewing the quality of university programs in the area of special education. Beginning in 2004, TAG and the CEC collaborated with the National Association for Gifted Children (NAGC) in developing and validating a revised set of initial standards for professionals in the field of gifted education. Using CEC's systematic procedure for validating knowledge and skills standards, a committee made up of members from both organizations involved all stakeholders (e.g., PreK–12 teachers and administrators, university professors, policymakers, professional organizations, and parents) in reviewing the emerging standards. Each standard was also evaluated in terms of research-, literature-, and practice-based information. Using this process, 32 knowledge and 38 skills standards were developed with 34 overtly addressing diversity. The standards were approved by the NCATE Specialty Areas Studies Board in November 2006 and provide a framework for course development in universities or alternative preparation programs and for professional development in public and private schools. Both organizations collaborated in developing guidebooks for universities and for PreK–12 educators in implementing the standards.

In addition to its advocacy work, publications, and development of teacher standards, TAG sponsors a symposium, a strand, and professional development sessions during the CEC's annual conference, and cosponsors Edufest with the Iowa Talented and Gifted Association.

Susan K. Johnsen

See also Curriculum Models; Effective Programs; Giftedness, Definition; National Association for Gifted Children

Further Readings

Council for Exceptional Children. (2003). *What every special educator must know: Ethics, standards, and guidelines for special educators* (5th ed.). Washington, DC: Author.

Initial knowledge and skills standards for gifted education. (2006). Retrieved July 17, 2007, from the Association for the Gifted Web site: http://www.cectag.org

Journal for the Education of the Gifted. Abstracts retrieved July 17, 2007, from the Association for the Gifted Web site: http://www.cectag.org

National Council for Accreditation of Teacher Education. (2006). *Professional standards for the accreditation of schools, colleges, and departments of education*. Retrieved March 19, 2007, from the National Council for Accreditation of Teacher Education Web site: http://www.ncate.org

TAG (The Association for the Gifted). (2001, April). *Diversity and developing gifts and talents: A national action plan*. Washington, DC: Author. Retrieved July 17, 2007, from the Association for the Gifted Web site: http://www.cectag.org

Creative Classroom Techniques

The 21st century will require creative minds to produce solutions to complex problems facing society; therefore, the cultivation of creativity is essential to prepare students to meet the challenges of the 21st century. Classrooms with teachers who value creativity and celebrate flights of fantasy, random insights, and off-beat analysis that force one to reconsider the wisdom of convention provide a safe haven for students to explore, thus nurturing creativity. This entry presents some techniques that can be used in classrooms to encourage creative thinking.

Paul Torrance's work defines and expands the identification of giftedness to include students who are creatively talented and have the ability to generate many different ideas. The Torrance Tests of Creative Thinking provide a scaled score to measure fluency, generation of numerous ideas at a time; flexibility, an ability to generate many different kinds of ideas; originality, ideas that are unique and innovative; and elaboration, attention to and inclusion of detail. Students who are identified for gifted programs using these criteria benefit from being placed in classrooms that capitalize on and expand these strengths.

SCAMPER activities introduce and enhance the creative thought process. Students are encouraged to look at things from new perspectives. The acronym comes from the seven modifiers of: (1) substitute, (2) combine, (3) adapt, (4) modify, magnify, or minify, (5) put to other uses, (6) eliminate, and (7) reverse or rearrange. For example, students may be asked to speculate about the elimination of currency in our society, possible outcomes of the South winning the Civil War, or the impact of increased sensory perception on the human body. SCAMPER modifiers can be applied to content in all subjects from the arts to mathematics.

Lateral thinking, a deliberate thought process that combines creativity, insight, and humor, and offers an approach that provides for the generation of many new ideas and problem solutions, differing from vertical thinking that yields only one solution. The nine-dot problem (three rows of three dots each that must be linked using only four straight lines without lifting the pencil off the paper) is an example of a lateral thinking problem. The solution gives a visual of out-of-the-box thinking, which becomes another name for this thought process. Lateral thinking is about paradigm breaking; freeing the mind from prisons of accepted concepts and constructs. Judgment is delayed in favor of exploration of the idea.

Brainstorming is a practice frequently used by classroom teachers as a means of simply generating as many ideas as possible. Judgment is suspended because all ideas, both sensible and improbable, are welcome. Brainstorming opens the door to unexpressed thoughts that may be deemed silly or wild. Students learn to take risks and to play with the divergent solutions presented. An excellent introduction to a brainstorming event is to ask students to create a list of things that were once considered impossible: the Internet, cell phones, space travel, and so on.

Programs that teach and develop creativity in group settings can also be incorporated. Destination ImagiNation®, Odyssey of the Mind®, and Future Problem Solving, a program started by Torrance, require collaboration and imagination and are designed to nurture these abilities and demonstrate that creative levels can be elevated with practice. These open-ended activities stretch students' minds and allow them to draw from and incorporate their individual strengths in finding solutions to problems posed. Importantly, these programs help students develop their convergent and divergent thought processes by generating numerous solutions and critically examining each.

Considering the dynamics and power structure of the classroom, a highly innovative child may be seen as a troublemaker by a more conventional teacher. Classroom climates that reflect the styles of all students are essential. Essays that may not be mechanically correct but have depth of thought, insights, or challenge conventional thought can be given equal prominence with those that are traditional and precisely executed. Works in progress displayed on the walls spotlight creativity as a process. Pictures drawn with illogical colors resulting in sensory jolting yet pleasing effects can be proudly exhibited with realistic masterpieces.

Janice B. DeLisle

See also Creative Problem Solving; Creative Process; Creative Productivity; Creativity in the Workplace; Creativity Training

Further Readings

De Bono, E. (1970). *Lateral thinking*. New York: Harper & Row.

Eberle, B. (1996). *SCAMPER*. Waco, TX: Prufrock Press.

Osborn, A. F. (1963). *Applied imagination* (3rd ed.) New York: Scribner.

Torrance, E. P. (1962). *Guiding creative talent*. Englewood Cliffs, NJ: Prentice Hall.

Creative Communities

The myth exists that creators, especially in visual arts and creative writing, are loners, seek solitude, write or paint in their attic garrets, wander alone throughout the world, that they are crotchety and their utterances may be simulated by Greta Garbo's iconic words, "I vant to be alone." This is far from the truth. Jane Piirto, in her rendition of the Piirto Pyramid of Talent Development, listed five environmental "suns," among which is the "sun of community and culture." She showed, in the domains of visual arts, architecture, creative writing, music, science, entrepreneurship, mathematics, acting, dancing, and athletics, that creative communities do exist and have a major influence on the work of creators in these domains.

Ensembles and Teams

The ensemble—or team—is paramount in the areas of acting, dancing, and athletics. Even when the performer performs alone, the solo performance is part of a team score, as in ice-skating, diving, or track. Solo dancers or solo actors are supported by large behind-the-scenes companies doing everything from set design to lighting and costumes—all essential to the production of the performance. Athletes have trainers, caddies, equipment assistants, groundskeepers, and other behind-the-scenes workers. Collaboration is the hallmark of creativity here. Though individuals are themselves creative in their various domains of costume, lighting, set design, directing, accompanying, and such, the performance as a whole is collaborative, with each individual subsuming his or her creativity and putting it to the good of the whole performance.

Before the Actors Theater, there was the Group Theater in the 1930s in New York City. The Group Theater modified the Stanislavski system. The Group Theater was built on the idea of "ensemble"; that is, no one actor was more important than another, but all were essential cogs in the machine, parts of the whole, members of the collective. This idea coincided with the worldwide rise of socialism as a political system. The presence, at that time, of the Left Wing attraction to communism is evident in the theories of the Group Theater; they felt that the whole company must live together in a communelike existence. In fact, many of them were later blacklisted during the infamous McCarthy hearings of the House Un-American Activities Committee in the 1950s. Actors blacklisted included Edward G. Robinson, Zero Mostel, Leo Penn (the father of Sean and Chris Penn), Will Geer, Burgess Meredith, Paul Robeson, and Lee Grant.

By the 1960s, Judith Malina and Julian Beck had founded the Living Theater. Malina and Beck modified the purpose of the theater to include dramatic social consciousness. They believed that theater transformed the participants as well as the audience, and many of the plays were staged with students, factory workers, schoolchildren, and other nonactors, as well as the members of the company. The actor's technique was subsumed to the social message of the play. The emotional impact of the plays was often so strong that the

audience joined the actors in protest, marching out of the theater with them.

Peter Brook and Paul Scofield founded the Theater of Cruelty. The Theater of Cruelty emphasizes improvisation and the collective lives of the actors in company. Brook's company for *The Mahabharata* included actors of many ethnicities.

Schools, Institutes, and Artists Communities

Going to art school seems to be a common thread for musicians and writers as well as artists. It is interesting to speculate on how many rock stars met in art school. According to Victor Bockris, Rolling Stone Keith Richards's biographer, John Lennon, Ray Davies, Pete Townshend, Jimmy Page, Ron Wood, and David Bowie were all students in British art schools. Perhaps some creative people view art school as a place where one can be freer than in traditional colleges.

The influence of community and culture upon the development of visual art talent is illustrated by another example. Georgia O'Keeffe and her fellow students at the Art Students League often went together to see the latest galleries and shows, and this is how she met Alfred Stieglitz, her future husband, when she was 20 and he was 44. When she came back to New York several years later to study to be a fine arts teacher with Alon Bement at Teachers College, she and her friends continued to be avidly interested in art. All kinds of art were available in New York at that time. A new gallery, 291, run by Stieglitz, opened. Here, Georgia O'Keeffe, Constantin Brancusi, Francis Picabia, Georges Braque, Pablo Picasso, and John Marin had exhibitions. Galleries function as community centers for artists.

Some communities such as Taliesin and Taliesin West, founded by Frank Lloyd Wright, function not only as schools but also as comprehensive communal experiences of living and learning. At Taliesin, apprentices not only learn architecture but also develop an "organic" philosophy of life based on their full involvement in the culture of Taliesin.

Hanging Around With Friends

Hanging around with friends is also important, especially in music. Pianist Gary Graffman, in his memoir *I Really Should Be Practicing,* said that his best friends were always musicians. As high school students they would go down to the jazz clubs in Greenwich Village or meet at each other's houses and play for each other. The insular world of the talented individual is often restricted to others who have similar talents and thus similar interests. Biographies are rife with the cross-fertilization between artists of the same genre and those of others. An illustration of the cross-fertilization that takes place in the creative arts is an image from the movie *Impromptu*. In the movie, novelist George Sand (played by Judy Davis) is lying under the piano of Chopin (played by Hugh Grant) listening rapturously to him while he plays. They are spending a month at an estate outside Paris. In the film, artist Eugène Delacroix, writer Alfred DeMusset, composer Franz Liszt, and their mistresses also joined the fun.

Synergy

Community and culture are most obvious in the necessity among musicians for collaboration, playing together, communicating with each other, and being part of a musical group. When musicians play they often reach a state of synergy, where they may feel outside of time. Even though music is structured in time (even improvisational music), the musicians, while playing together, may be carried on a wave of energy and group communication through the music. The whole they create is greater than the individual parts they are playing. Playing often becomes effortless, the sense of self as being separate from the experience and the group disappears, and the experience seems to take on a life of its own.

The nature of each creative community contains rules, both stated and implicit. If one is not a team player, in that cliché of business and sport, one will suffer and so will the team. Each community has its own culture, and so creative people must look for a good fit.

Jane Piirto

See also Creativity, Definition; Creativity and the Economic System; Eminence; Eminent Women;

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Piirto, J. (2004). *Understanding creativity.* Scottsdale, AZ: Great Potential Press.
Piirto, J. (2007). *Talented children and adults: Their development and education* (3rd ed.). Waco, TX: Prufrock Press.

Creative Leadership

Many writers and scholars have attempted to define and study both leadership and creativity, yet there are no universal definitions of either concept. If creativity is the making and communicating of meaningful new connections, and leadership can be approached as an influence process, then creative leadership is that kind of influence process that results in meaningful, new connections.

Historically, the study of leadership was initially approached single-dimensionally—the search for the traits and characteristics of great leaders. This was followed by two-dimensional approaches that examined leadership style as a blend of concern for people with a concern for tasks. More recently, the study of leadership has taken a multidimensional approach—including leader-member exchanges, relationships, contingency, and situational theories.

When one considers innovation, transformation, and growth, the kinds of challenges managers and leaders face require creativity. The tasks tend to be more ambiguous, ill defined, or fuzzy rather than clearly structured or well defined. The potential solutions and ways of solving them tend to be complex, unknown, or untested rather than known, predetermined, or simple. This situation demands creativity—the making and communicating of something new and useful.

Creative leadership is an inclusive influence process in which the leader functions as a catalyst for navigating change along its full spectrum. This conception of creative leadership includes behaviors related to both leading and managing.

There is a great deal of debate and tension between the roles of leader and manager. Leading seems to be focused on the future and on all the strategically important things, whereas management is seen as merely dealing with day-to-day maintenance functions. These distinctions between leading and managing are interesting and important, but only insofar as they encourage mindfulness. If the distinctions breed the outright discounting of management, then organizations will necessarily see creativity as linked only to leading and not to managing.

Rather than having one best style, approach, or answer, the leader must have the capacity for great flexibility in behavior. This flexibility includes being aware of the factors in the situation, including the general orientation of the people involved in the task, the nature of the desired outcomes, the context or culture surrounding the task, and the method being applied. In short, the creative leader must work together with constituents to invent meaningful and new responses to many, varied, and unique situations, demands, and challenges. This increased range of behaviors applies to concern for task as well as for people and transforms the traditional role of the leader.

The skills and abilities required for creative leadership are rather broad. Recent research by Michael Mumford and colleagues has identified that creative leaders must be able to define problems and missions that are worth pursuing, and they must also create a work environment that enables generating and transforming ideas into action.

The model for creative leadership integrates what is known about leadership, creativity, and change and contains three basic dimensions: a focus on tasks, a focus on people, and a concern for change (see Figure 1).

Change occurs on a continuous spectrum ranging from total and continuous change on the one end, and moving toward no change on the other. The spectrum of change entails the full range, from evolution to revolution. Using this spectrum of change, the full range of creative leadership can be better understood.

Creative leadership includes management competencies, leadership practices and strategies, and leading at the edge of chaos. The situation and needs determine where one is on the change spectrum, and therefore the most appropriate default position for behavior. Leaders and managers must be able to use a variety of styles and behaviors that are contextualized to fit the interaction of people and tasks.

Ensuring the appropriate management competencies are present can assist creative leadership

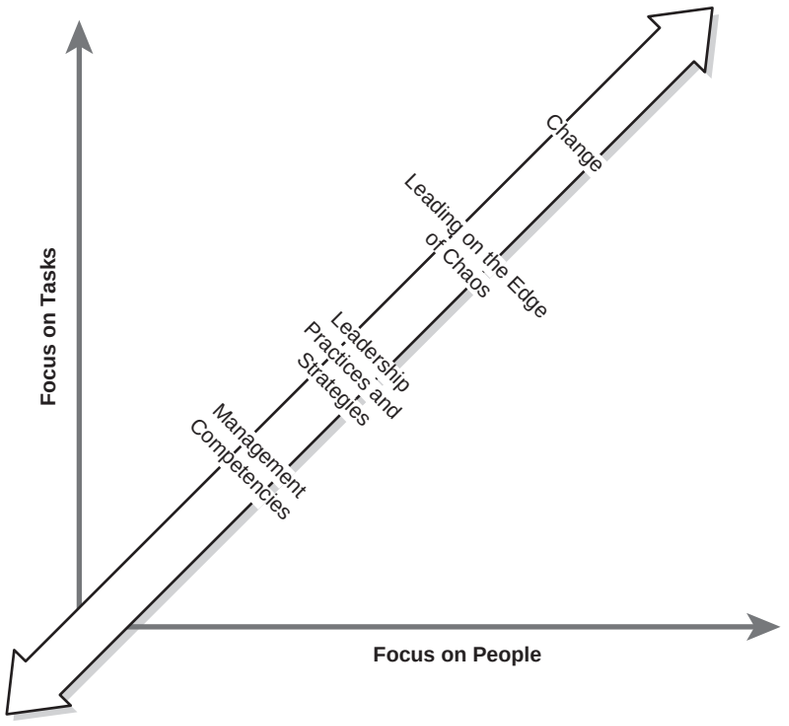


Figure 1 The Full Spectrum of Leadership Behavior

Source: The Creative Problem Solving Group, Inc. Reproduced by permission.

within a relatively stable situation, one that is lower on the change spectrum. Well-established managerial competencies like searching for and processing information, concept formation, conceptual flexibility, managing interaction, oral presentation ability, and the like, would seem to be sufficient for making improvements and modifications within a relatively stable environment.

Rather than minimizing or marginalizing management, this approach recognizes that creative change can and does occur here. New policies and procedures are developed and implemented. Improved planning and control procedures are often put in place that more effectively integrate people and tasks. Creative leadership also occurs here as very dramatic and significantly useful changes can bring new ways of making the current system run more efficiently and effectively. Providing effective management and introducing appropriate change that focuses on improving existing products, services, and processes establishes the foundation and resources for making more radical changes.

Creative leadership is often related to accomplishing extraordinary results, outcomes that are both new and useful. Leadership practices and strategies are patterns of behaviors that help people in teams and organizations to do more than function well within a stable system. These behaviors help people to create and deal with a range of change, including making major new improvements for existing lines of work to creating entirely new lines of business.

The very high end of the change spectrum has been likened to white water, turbulent times, and the edge of chaos. There is an emerging view among those who write about life in today's organizations that traditional and established views of leadership may not be sufficient for dealing with the future. Our concepts of leadership are being influenced by the new sciences that challenge the 17th-century's mechanistic view of the world.

At the high end of the change spectrum, the need is for high levels of performance within the entire system of people, outcome, method, and place. The full spectrum of leading and managing is needed in order to create organizations that will be versatile and nimble. The kind of creative leadership discussed here illustrates the need for building these capacities and potentials into the very fabric of organizations and has important implications for those charged with the development of future leaders.

Scott G. Isaksen

See also Creative Organizational Climate; Creative Personality; Emotional Intelligence

Further Readings

Bennis, W., Spreitzer, G. M., & Cummings, T. G. (Eds.). (2001). *The future of leadership: Today's top leadership thinkers speak to tomorrow's leaders*. San Francisco: Jossey-Bass.

Isaksen, S. G., & Tidd, J. (2006). *Meeting the innovation challenge: Leadership for transformation and growth*. Chichester, UK: Wiley.

Mumford, M. D., Hunter, S. T., Eubanks, D. L., Bedell, K. E., & Murphy, S. T. (2007). Developing leaders for creative efforts: A domain-based approach to leadership development. *Human Resource Management Review, 17,* 402–417.

Yukl, G. (2002). *Leadership in organizations* (5th ed). Upper Saddle River, NJ: Prentice Hall.

Creative Organizational Climate

If creativity is the making and communicating of meaningful new connections, then what kind of environment promotes this kind of activity? This is a key issue for those who teach, train, lead, and manage; particularly due to the increasing demand for creativity and innovation.

Environment, or climate, is a measurable concept. It could be considered the state within which an individual finds him- or herself; the team or group situation; the conditions within a family, school, or community; the atmosphere within an organization; a national or cultural milieu; or even the global environment. The environment includes physical surroundings, the invisible force of history and tradition, and explicit and implicit values and norms. Many are finding it useful to define and differentiate culture from climate.

The following are general suggestions for establishing a creative climate:

- *You can influence the climate.* Realize that those who lead and manage others have an important influence on the climate. Many studies have found that leadership behavior exerts a profound influence on the perceptions others have regarding their working environment. These can be formal leaders in very visible positions, or others who are perceived as role models or opinion leaders.

- *Create opportunities for challenge and involvement.* Generally, the more opportunities people have to be involved in tasks, goals, and visions, the higher the degree of intrinsic motivation and energy. The more motivated people are, the more they are committed to making contributions to the success of the team, division, or organization. Lower levels of challenge and involvement breed alienation and indifference and can lead to apathy and lack of interest in work, interactions, and more.

- *Provide appropriate levels of freedom.* Freedom in the environment is characterized by independence in behavior or the degree of autonomy people perceive is available to them. In this kind of climate people are given autonomy to define much of their own work. People are able to exercise discretion in their day-to-day activities. They have the freedom to take the initiative to acquire and share information, and they make plans and decisions. In situations with low levels of freedom, people work within strict guidelines and roles. People carry out their work in prescribed ways with little room to redefine their tasks.

- *Promote emotional safety in relationships.* When there is a high degree of trust, individuals

can be genuinely open and frank with one another. People have a sincere respect for one another and can count on each other for personal support. Where trust is missing, people are suspicious of each other, and therefore closely guard themselves and their ideas. People also find it extremely difficult to communicate openly with each other.

- *Allow time for reflection and elaboration of new ideas.* When people feel that they can (and do) use time this way, possibilities exist to discuss fresh suggestions that are not planned or included in regular or standard ways of working or thinking. There are opportunities to take the time to explore and develop new ideas. Flexible timelines permit people to explore new avenues and alternatives. In the reverse situation, every minute is booked and specified. The time pressure makes thinking outside the instructions and planned routines impossible.

- *Encourage playfulness and good-natured joking.* Playfulness and humor allow spontaneity and ease to be displayed within the environment. A relaxed atmosphere where good-natured jokes and laughter occur often is indicative of a lighthearted and easygoing atmosphere. People can be seen having fun and relieving tension in productive ways. The opposite climate is characterized by gravity and seriousness. The atmosphere is stiff, gloomy, and cumbrous.

- *Reduce interpersonal conflict and tension.* The presence of personal and emotional tensions in the team, organization, or situation can often result in gossip, slander, and even deliberate harm being done to others. When personal tension is high, individuals and groups may dislike or even hate each other. Interpersonal warfare can include setting traps for each other, plotting to diminish the value and dignity of others, as well as power and territory struggles. In the opposite case, people behave in a more mature manner; they have psychological insight and control of impulses. People accept and deal effectively with diversity.

- *Treat people who share ideas with respect.* People pay attention to the ways new ideas are treated. When ideas and suggestions are received in an attentive and professional way, people listen to each other and encourage initiatives. Possibilities for trying out new ideas are created. The atmosphere is constructive and positive when considering new ideas. When idea support is low, an automatic "no" prevails. Every suggestion is immediately refuted by a destructive counterargument. People focus on finding fault and on pointing out the weaknesses of new ideas or how and why an idea will never work.

- *Encourage sharing different points of view.* In general, creative environments tolerate idea tension (as opposed to personal tension). The occurrence of encounters and disagreements between viewpoints, ideas, and different experiences and knowledge often yields new associations that can be very valuable. When many voices are heard, people are keen to put forward their ideas for consideration and review. People can often be seen discussing opposing opinions and sharing a diversity of perspectives. Where debate is not allowed, people follow authoritarian patterns without questioning.

- *Encourage appropriate risk taking.* Appropriate risk taking allows people to make decisions and take initiative in the face of uncertainty and ambiguity. When there is an acceptable level of risk taking, bold new initiatives can be taken even when the outcomes or results are unknown. People feel as though they can take a gamble on some of their ideas. People will often go out on a limb and will put an idea forward. Quick learning from mistakes and failures is the aim. In a risk-avoiding climate there is a cautious, hesitant mentality. People try to be on the safe side. They make decisions by sleeping on the matter. They set up committees, and they cover themselves in many ways before making a decision.

Scott G. Isaksen

See also Creative Leadership; Creative Problem Solving; Creativity in the Workplace; Leadership

Further Readings

Denison, D. R. (1998). What is the difference between organizational culture and organizational climate?—A native's point of view on a decade of paradigm wars. *Academy of Management Review, 21,* 619–654.

Isaksen, S. G., & Ekvall, G. (2007). *Assessing the context for change: A technical manual for the SOQ—Enhancing performance of organizations, leaders and teams for over 50 years (*2nd ed.). Orchard Park, NY: Creative Problem Solving Group.

Schein, E. (1992). *Organizational culture and leadership* (2nd ed.). San Francisco: Jossey-Bass.

Creative Personality

Throughout history, famous creative individuals have been recognized for infamous personality traits. Albert Einstein was often viewed as eccentric, Jackson Pollock was prone to violent outbursts, and Vincent Van Gogh struggled with deep depression. At times, the stereotype of the mad scientist or depressed artist does not seem to be undeserved. In fact, it begs the questions: Is there a specific set of personality traits that allow one to be truly creative? Can those with creative potential be identified by their personality traits? To answer these questions, researchers in the social sciences have explored personality and creativity from a variety of different angles. The research in this area is vast and currently yields two overarching areas of exploration—identifying creative personality traits and identifying and enhancing the personality trait of creativity in everyday people.

This entry consists of two sections reviewing these overarching themes. Because creative products provide humanity with a means to progress and adapt, understanding how personality inspires the creative process is a worthwhile endeavor and may allow for enhancement of this process.

Creative Personality Traits

Creativity is often defined as behaviors or products that are viewed by leaders in a specific field as providing new insights, novel directions, and unique solutions to problems. Creative individuals can be identified by their contributions, such as inventions, poetry, theories, and artwork. Researchers have utilized a variety of quantitative and qualitative methods to explore the personality of these individuals to identify common personality traits. This research has provided patterns and lists of traits that can be useful in identifying and understanding the personality of individuals who have or may provide unique contributions to society. The research provides a basis for support and nurturance of creative endeavors.

The most frequently used model for describing broad personality traits is called the Big Five. This model of personality posits that all personality traits can be organized into five broad dimensions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. In 1998, Gregory Feist conducted a meta-analysis of research exploring personality traits in scientific and artistic creativity. Utilizing the Big Five traits as common variables, Feist was able to combine research findings from many studies on creative personalities. The results of Feist's analysis show that creative people are more open to new experiences, less conventional and conscientious. In addition, this study found creative individuals are more self-accepting, self-confident, dominant, hostile, ambitious, and impulsive than their less creative counterparts. This research highlights the different personality traits of creative scientists and artists.

In addition to the meta-analysis focused on creativity and the Big Five personality traits, other researchers have been exploring creative personality traits quantitatively. In 2006, Zorana Ivcevic and John Mayer explored a narrower selection of creative personality traits, including emotions and motivation, cognition, social expression, and self-regulation. This study produced profiles of creative traits and behaviors that discriminated between the conventional person, the everyday creative person, the artist, and the scholar. The results of this study suggest that the personality traits of creative individuals may influence the field they enter. Researchers

identified openness to experience, creative role, persistence, trait hypomania (the ability to work with intense energy in a specific area of study for long periods of time), and intellectual curiosity as traits that are more prevalent in creative individuals. They also identified a creative scholar cluster of traits that included risk taking, divergent thinking, and intrinsic motivation. The results of this study are important because they suggest that there are different personality traits among groups of creative people and that these traits may influence the domain in which an individual is able to be creative.

In addition to quantitative work exploring the personality traits of creative individuals, extensive qualitative research has also been conducted in this area. Researchers have interviewed, examined, and explored the lives and personalities of creative individuals, and many have published lists of common traits. John Dacey and Kathleen Lennon add to this list of creative personality traits. They explore 10 personality traits that have been identified as contributing to the creative process: (1) tolerance for ambiguity, (2) ability to think outside of the box, (3) ability to imagine how things can be used outside of their intended purpose, (4) a flexibility that allows for change, (5) a willingness to take risks, (6) a preference for disorder and complexity, (7) a willingness to delay gratification, (8) freedom from gender role stereotyping, (9) a capacity to endure frustration and overcome obstacles, and (10) the courage to pursue creative endeavors despite consequences. This list provides a seemingly comprehensive image of the creative personality. However, it is by no means exhaustive.

Others have added lists of traits to the literature. Charles Vervalin identified openness to experience and emotion, freedom from inhibitions and stereotyped thinking, aesthetic sensitivity, and flexibility. Morris Stein stated that the creative person is an aggressive achiever, motivated by a need for order, self-sufficient, intuitive, self-assertive, curious, and empathic. Frank Barron described creative individuals as having independence in judgment, greater expression of impulses, and a preference for complexity. Teresa Amabile included deferment of rewards, self-motivation, and perseverance when frustrated. This list could go on, because many other researchers have contributed to the understanding of the personality traits creative individuals have in common, yet what emerges from these lists is a clear sense that the creative personality is highly complex and full of opposites and contradictions.

In his 1996 book, Mihaly Csikszentmihalyi studied creative people, discussed the contradictions evident in their personality traits, and provided a list of 10 paradoxical traits of creative individuals. These traits include: (1) having a great deal of energy, but also being quiet and at rest, (2) a tendency to be smart and naive at the same time, (3) the ability to combined playfulness and discipline, (4) alternating between imagination and reality, (5) being both introverted and extraverted, (6) being both humble and proud, (7) an avoidance of rigid gender role stereotyping, allowing for progress to be made in fields where traditional roles would have prevented entry, (8) being both rebellious and conservative, (9) having a passion for work and the ability to view it objectively, and (10) an openness that allows for both suffering and joy. In addition to these traits Csikszentmihalyi also stated that individuals who are truly creative become absorbed in the process of creating, not just focused on the product. This, paired with the tension that is created by the 10 paradoxes listed above, seems to provide a personality foundation for creativity. The ambiguity found appears to be a necessary component of the creative process.

Although it may not be always clear which personality traits are indicative of the creative personality, due to the number of traits and contradictions produced by both quantitative and qualitative research, it is clear that the personality of a creative person is deeply complex. Research aimed at understanding the personality traits of creative individuals allows for a better understanding of the creative process. This in turn provides a foundation for identification of creative individuals and provision of nurturance to those with creative potential.

Everyday Creativity

Another focus of research on creativity assumes that creativity is a personality trait that exists in everyone, a personality style. Although not

everyone may be destined for novel ideas, groundbreaking inventions, and fame, the ability to problem solve creatively may be fostered, to a certain degree, in "everyday" individuals. Thus rather than highlighting the personality traits of exceptionally creative individuals, this vein of research focuses on the general populations' creative ability and provides an understanding of how to maximize this potential. In their 2005 article, Edwin Selby, Emily Shaw, and John Houtz suggest that by shifting the focus of research from "how much creativity does this person have" to "in what ways is this person creative," a new understanding of the creative personality variable emerges.

This perspective provides a new window into nurturing creative aspects of personality. To this end, Edwin Selby, Donald Treffinger, Scott Isaksen, and Kenneth Lauer have developed a framework that allows for the identification of one's approach to new stimulus, providing a personality profile for creative problem solving. Developers are identified as individuals who prefer to make the system better from within, whereas Explorers prefer to break new ground and work outside of the old system. Another dimension identified by these researchers is the way in which people process information. Do they think about the problem by themselves or talk with others to digest new situations and develop solutions? In addition, a third dimension focuses the priorities of those making the decision. Are they focused on the impact on other people or do they prioritize doing what is necessary to get the job done?

This model provides an outline that appears very similar to several of the Big Five traits described earlier. Openness to experience and Developers–Explorers appear to have much in common, as do Extraversion and External-Internal processors. What is different about this new model is that there are no preferred personality traits to enchase creativity. Rather, all traits are viewed as strengths that, if known, can be utilized to solve problems and create new solutions effectively.

In addition, the environment in which one exists appears to play a role in fostering everyday creativity. In his 1986 study, Arthur Richardson found that environments that are satisfying and include opportunities for competition allowed for increased creativity, while environments high in friction and difficulty hindered students' creative abilities.

This new view of a creative personality variable in no way negates the importance of the study of those personality variables common to "famous" creative individuals. It does, however, add a new level to understanding how different aspects of personality affect the ability to be creative when faced with a new problem. This, in turn, provides educators and employers with a new framework for helping others work to their strengths and develop creative solutions.

Other Factors

Two approaches to studying the creative personality have been described. Both approaches to exploring the creative personality provide additional insight into the traits that allow for continued progress in society and research. By understanding the specific personality traits that are common among famous creative individuals, it may be possible to gain a better understanding of the process of creativity and to nurture this potential and increase the creative presence in society. Conversely, by defining creativity as a personality trait that exists in everyone, these styles of approaching new situations and problems can be enchased, leading to individuals' increasing their ability to solve problems creatively.

Though personality plays a large role in determining the creative potential of individuals, there are other factors that influence a person's creativity. Most notable is environment. Without the appropriate environment, individuals with the personality traits conducive to creativity may not be able to succeed. Thus, research in this area allows for an increased identification of individuals who may thrive in different environments. This may then allow for the production of ideas and inventions that cannot be currently imagined.

Selby M. Conrad

See also Creative Problem Solving; Creativity Assessment; Creativity Theories; Creativity Training; Eccentricity and Temperament

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: The work and lives of 91 eminent people.* New York: HarperCollins.

Dacy, J. S., & Lennon, K. M. (1998). *Understanding creativity: The interplay of biological, psychological, and social factors.* San Francisco: Jossey-Bass.

Eysenck, H. J. (1993). Creativity and personality: Suggestions for a theory. *Psychological Inquiry, 4,* 147–178.

Feist, G. J. (1998). A meta-analysis of personality in scientific and artistic creativity. *Personality and Social Psychology Review, 2,* 290–308.

Ivcevic, Z., & Mayer, J. D. (2006). Creative types and personality. *Imagination, Cognition and Personality, 26,* 65–86.

Rank, O., & Atkinson, C. F. (1989). *Art and artist: Creative urge and personality development.* New York: W. W. Norton.

Russ, S. W. (1993). *Affect and creativity: The role of affect and play in the creative process.* Hillsdale, NJ: Lawrence Erlbaum.

Selby, E. C., Shaw, E. J., & Houtz, J. C. (2005). The creative personality. *Gifted Child Quarterly, 49,* 300–313.

Creative Problem Solving

Creative problem solving that characterizes great accomplishment is based upon "regular" problem-solving skills. Problem solvers need to have extensive detailed knowledge of a subject matter before they begin to solve a problem, because problem solving relies upon application of prior knowledge and expertise. Creative problem solvers do more, however: They apply that extra something that allows them to transcend the past and the ordinary to produce something extraordinary. This is exemplified by NASA's evaluation of problem solving by its employees in Calvin Taylor's study: NASA's lowest evaluation of problem solving was applying existing and prior technologies to find an immediate solution to a problem. Conversely, NASA's highest evaluation of problem solving was producing ideas that lead to major research projects.

Both regular problem solving and creative problem solving involve prior knowledge, but creative problem solving requires a higher degree of expertise and motivation than does regular problem solving. Further, an individual's prior knowledge in regular problem solving and the ability to transcend personal experience and knowledge is essential in producing something truly new in the creative problem-solving process.

Continuity and Discontinuity

The role of expertise in problem solving is critical because problem solving requires detailed knowledge in the domain of the current question. Regular problem solving is based on continuity with the past by matching a problem and the problem solver's prior knowledge. This continuity can result in the retrieval of a possible solution. Failure results in feedback that initiates a new memory search that produces a new solution. The transfer of prior knowledge to a new problem depends on the problems having elements in common so that a new situation reminds the person of a previous experience.

Robert Weisberg explained that in the process of invention, creative thinking begins with what is already known based on an analogy to the current problem. However, the process requires going beyond the already known. A discontinuity in thought occurs when a change is made to a new direction of work. When the new information triggers a switch to the direction of a solution, discontinuities are produced. These discontinuities can be classified into different types: those caused by an external stimulus, and those caused by critical analysis of one's own work. Thus, regular problem solving can be changed into creative problem solving on the basis of the development of deep expertise in a particular domain combined with a critical analysis of one's own work. History is rife with such examples of major advances based upon prior inventions: for instance, James Watt's steam engine, which was based upon the work of Thomas Newcomen; and Thomas Edison's kinetoscope, which was based upon his phonograph. When there is no prior human knowledge to build upon, nature is often used as a source of ideas, such as when the Wright Brothers used birds' wings in flight as the basis for wing-warping.

Stages

The creative process is a special case of problem solving in that the creative process has been identified as a typical sequence of stages that people go through while solving a problem. In 1926, Graham Wallas formulated an often-cited four-stage model of the process of creative problem solving based on the reports of Henri Poincaré. Those stages are (1) preparation, (2) incubation, (3) illumination, and (4) verification. These four stages, though distinguishable, possess considerable overlap.

Wallas's first stage, preparation, is where the facts necessary for achieving a solution to a problem are gathered. Preparation includes searching for relevant facts, exploring, experimenting, and, if necessary, reformulating the problem. Preparation often involves long periods of intense conscious work with little success, yet this is the stage in which potentially useful ideas are evaluated.

Wallas's second stage, incubation, is when the problem is set aside and no longer given conscious attention. Without active attention, potentially useful ideas from the preparation stage may be combined in new ways without the active interference of prior solutions. Thus, incubation involves unconscious processing that may result in a sudden illumination. Many creative achievers have reported that they were not actually working on the problem when a solution came to them. R. Ochse explained that the role of incubation may be to dispel fatigue or to help problem solvers disperse the effects of prior directions that set them on a rigid path. Individuals have a tendency to perceive problems in a particular way and to persist in using a particular strategy for solving a problem even if the strategy does not work. Therefore external, or even internal, stimuli to which problem solvers are exposed during the incubation period may cause a change in mind-set or provide a hint to the problem solver.

Wallas's third stage, illumination, is the sudden experience of insight into the solution of the problem. If the incubation stage is successful, the problem solver experiences a sudden illumination that produces a new method for solving the problem. The illumination or "Aha!" stage is generally regarded as a critical incident of creative thinking. Once this insight has been achieved, the person can then begin verifying the solution that has been revealed.

Wallas's last and fourth stage, verification, involves checking, editing, and generally making the solution fit for public presentation. The illumination stage usually produces only a glimmer of the ultimate solution, yet verification of that glimmer evolves into the ultimate solution and tests the accuracy of the insight.

Problem Finding

Recently, problem finding, a preliminary stage not included in Wallas's problem-solving model, has become the subject of special psychological interest. Many researchers believe that finding the problem is the most crucial aspect of creative problem solving. Albert Einstein stated that the formulation of a problem is often more important than its solution. Ochse explained that problem finding has been defined in terms of discovering some gaps or inconsistencies in existing knowledge. Patterns, orders, and structures based on existing knowledge enable individuals to build mental models of reality. Problem finding occurs when a current perception does not match this model. The more complete a mental model, the better basis it provides for finding problems. Discovering important problems is a field of creative endeavor that necessarily depends on prior knowledge and experience to build elaborate models of reality to be tested. Problem-finding abilities develop through the desire to excel by improving upon existing knowledge.

David Carson and Mark Runco explained that creative problem finding and creative problem solving are related. Problem finding entails the ability to imagine, construct models, compare reality against such models to identify discrepancies and contradictions, entertain new hypotheses about old problems, and finally to generate entirely novel questions or problems to be solved. Creative problem solving is essential to the resolution of tension or disequilibrium and for successful adaptation. Thus, creative problem solving relies on originality but does not exclude fit or appropriateness. Truly creative problem solving is original and adaptive.

Models

The creator of brainstorming, Alex Osborn, formulated a strategy to help people solve or find

ideas for problems using models of creative problem solving. Sidney Parnes followed Osborn when he developed the *creative problem solving (CPS) model*. The Osborn-Parnes's CPS model is a widely used method of creative problem solving. It is easily taught and requires both creative and critical thinking, though Osborn maintained that higher success was attained when these two kinds of thinking were separated. Teachers routinely use creative problem-solving methods in regular and gifted programs. Teachers and trainers use the CPS model for curriculum, instruction, and organizational interventions for solving pre-identified problems and capitalizing on opportunities.

Donald Treffinger and Roger Firestien explained that the CPS model consists of six steps that form a dynamic and flexible system for solving programs. The process calls for great divergence to occur at all stages, followed by a convergent phase during which insightful elements are selected and synthesized. The original problem-solving process of the CPS model consists of five steps of divergent (creative) and convergent (critical) action: (1) Fact Finding, (2) Problem Finding, (3) Idea Finding, (4) Solution Finding, and (5) Acceptance Finding. The first stage, Fact Finding, was later divided into Mess Finding and Data Finding so that the CPS model now consists of a total of six steps: (1) Fact Finding focuses on examining many facts or data about the situation to form the basis for the next step and is usually separated into Mess Finding and Data Finding. (2) Problem Finding helps generate many possible restatements of the problem. (3) Idea Finding helps generate promising ideas and possible solutions for the problem. (4) Solution Finding develops criteria to evaluate those ideas and solutions. (5) Acceptance Finding helps generate ideas for facilitating implementation of the most promising alternatives and building these ideas into a plan of action. Brainstorming is an essential component of each step: (1) to avoid dead ends later in Fact Finding; (2) to explore all aspects of the problem and to discover the essence of the situation in Problem Finding; (3) to find ideas in Idea Finding; (4) to generate criteria and to evaluate ideas generated in Solution Finding; and (5) to determine ways to implement the solution in Acceptance Finding. Each of these steps involves divergent thinking to generate new ideas and possibilities and convergent thinking to select insightful elements, synthesize, or refine. The CPS model emphasizes harmony and balance between divergent or creative and convergent or critical thinking.

Characteristics of Creative Achievers

Ochse concluded that creative thinking skills are not sufficient to predict life performance or to choose exceptional problem solvers. Persistent motivation is the most salient characteristic of creative achievers. Creative ability does not emerge spontaneously from inherent qualities, it is not a special intellectual process, and it is not a gift. Instead, creative ability is a hard-earned prize. Creative problem solvers have a strong desire to succeed and are highly committed to their chosen field. They are willing to work and possess creative ability. Thus, the creative ability and motivation are necessary, but not individually sufficient, for the production of creative work.

Creative problem solving that characterizes great accomplishments is based on common problem-solving skills. Problem solving requires a detailed knowledge of the problem and the application of prior art. It is the application of something extra to the process that makes the solution creative, that something extra that makes the solution original. Creative problem solving involves the reformulation of, and sometimes even ignoring, prior art to provide unique solutions. The CPS model indicates that it is in the "illumination" or the "Aha!" stage where something uniquely creative happens. Creative problem solving is also highly dependent upon the motivation of the problem solver to solve a particular problem.

Kyung Hee Kim

See also "Aha!" Experience; Creativity, Definition; Creativity Training

Further Readings

Carson, D. K., & Runco, M. A. (1999). Creative problem solving and problem finding in young adults: Interconnections with stress, hassles, and coping abilities. *Journal of Creative Behavior, 33,* 167–190.

Firestien, R., & Treffinger, D. J. (1983). Creative problem solving: Guidelines and resources for effective facilitation. *Gifted Child Today, 26,* 2–10.

Ochse, R. (1990). *Before the gates of excellence: The determinants of creative genius.* Cambridge, UK, & New York: Cambridge University Press.
Treffinger, D. J., & Firestien, R. L. (1989). Update: Guidelines for effective facilitation of creative problem solving. Part one. *Gifted Child Today, 12,* 35–39.
Treffinger, D. J., & Parnes, S. J. (1980). Creative problem-solving for gifted and talented students. *Roeper Review, 2,* 31–32.
Wallas, G. (1926). *The act of thought.* London: Watts.
Weisberg, R. W. (1993). *Creativity: Beyond the myth of genius.* New York: Freeman.

Creative Process

The creative process (also referred to as creative processes) can be broadly defined as the set of cognitive or mental processes that determine the production of ideas that are both novel and useful. Philosophers have long speculated about the possibility that such processes result from irrational rather than rational ideas, and the belief that creative processes arise in trancelike experiences where individuals have little control over their thoughts and behaviors has been widely endorsed for centuries. However, scientific explanations of the creative process have attempted to explain the exact psychological mechanisms by which people create, and have included more than irrational processes.

Creative processes have constituted an area of psychological research for more than a century. Although the literature is scattered, there is no doubt that the processes underlying creativity are complex and multidetermined. Joy P. Guilford, a leading figure in creativity research for most of the past century, argued that the creative processes comprise a wide range of elements, including fluency, flexibility of thought, originality, sensitivity to problems, the capacity to transform the known, cognition, memory, and personality traits.

In an attempt to account for all these components, the creative process has sometimes been explained as the result of the convergence of three major factors, namely:

1. Attentional factors: higher openness or receptivity to both the environment and one's inner world (thoughts and ideas)
2. Motivational factors: higher willingness to defy the status quo and produce original products
3. Ability factors: higher levels of cognitive ability and the capacity to express complex and unusual ideas

Rather than examining these factors simultaneously, however, psychologists have tended to focus on one or the other. Indeed, psychological investigations into the creative process can by and large be classified according to their focus on either attentional, motivational, or ability factors. This entry is structured accordingly.

Attentional Factors

The idea that creative processes are triggered by differential patterns of attention, specifically perceptual anomalies, most certainly predates psychology. In psychiatry, this idea was first formalized in the 1850s by Bénédict Morel, who conceptualized the creative process in terms of a "degeneration" of the mind and closely related to mental illness. In fact, Morel saw degeneration as the very cause of what would later be defined as schizophrenia. Decades later, Giacomo Lombroso, a Darwinian criminologist who understood genius as a form of hereditary insanity, described degeneration as a morbid vanity that causes mystical interpretations of simple facts and exacerbated self-focus.

Although Morel's concept of degeneration had a short life in creativity research, there has been longstanding support for the link between creativity and psychopathological tendencies. Most notably, Hans Eysenck, a personality psychologist of the past century, postulated that creativity and being prone to psychosis share the same underlying cognitive style of "overinclusiveness," characterized by a failure to inhibit irrelevant information. Likewise, it has been suggested that creative processes are caused by an attentional shift from external sensory stimuli to internal ideational stimuli. Thus, creative processes differ from normal thinking processes in that they are produced by free association rather than logical reasoning, at least initially.

Although evidence for Eysenck's theory has been mixed, the idea that creative processes can be induced by altered states of consciousness has also

been supported by nonclinical studies, including hypnosis studies with children and LSD studies and EEG studies showing higher right-hemisphere activation for creative than noncreative tasks. Likewise, educational psychologists have long argued that creative processes occur spontaneously and effortlessly. For instance, in the 1960s, a *Harvard Educational Review* on the U.S. educational system noted that children's creativity begins as a spontaneous, almost accidental, thinking process that differs clearly from typical thinking patterns and is not influenced by the censorship of cultural stereotypes.

Conceptualizations of the creative process as spontaneous and irrational have had a clear impact on the measurement of creativity. One of the most widely used psychometric tests of creativity is the Remote Associations Test (RAT), which requires test-takers to make unusual associations on the basis of incidental or peripheral stimuli. For instance, participants may be required to complete the following sequences: rat–blue–cottage–??? wheel–electric–chair–??? Experimental studies have shown that coaching participants on the RAT can improve their creative performance. This is consistent with studies on brainstorming, the process whereby individuals are instructed to come up with ideas or express solutions without previous evaluation, and another example of how conceptualizations of the creative process as spontaneous and irrational have influenced techniques for the assessment of creativity. Brainstorming has been found to encourage both fluency and originality of responses. However, given that performance on brainstorming tasks is largely determined by the type of instruction (e.g., asking people to "be creative"), motivational factors are likely to intervene.

Motivational Factors

Although differential attentional processes may open the door to the creative process, motivational factors are necessary to direct attention to creative stimuli (i.e., anything that inspires or triggers the creative process) and transform spontaneous ideas into creative products. This willingness to be creative is what distinguishes psychotic ideas from creative ones. In fact, even if schizophrenic and creative individuals can be characterized by the same cognitive mechanisms (e.g., overinclusiveness or reduced latent inhibition), schizophrenic individuals may be unable to exert control over these processes and to utilize them in a creative way. In that sense, creative processes are also needed to transform spontaneous and irrational ideas into desirable products. This idea defined the psychoanalytical conceptualization of the creative process and was described extensively by Sigmund Freud, the founder of psychoanalysis.

Freud's famous essay on creativity was a case study on Leonardo da Vinci, where he hypothesized that da Vinci's lack of sexual activity was the direct result of his enormous creative and scientific productivity. Thus Freud regarded the creative process as an adaptive defense mechanism, called *sublimation,* whereby the creator transforms unconscious sexual impulses (expressed in the form of fantasies) into socially acceptable products. According to Freud, this cathartic or therapeutic property of the creative process is manifested in the everyday creative acts, not just in artists.

According to Freud, the creative process could be regarded as an adaptive symptom of the unconscious, but surely one that requires some degree of control and determination. Thus creative individuals may have every intention to produce original associations, whereas psychotic individuals may have little alternative and little control over their original, unusual, or eccentric ideas. This is congruent with EEG studies reporting higher levels of alpha waves, a type of brain wave commonly found during periods of relaxation and closed eyes (though not while individuals are asleep), in the creative inspiration phase rather than the creative elaboration phase of the creative process. This suggests that the creative process can be split into two very different phases: a first phase dominated by irrationality and spontaneity, followed by a second phase that is more rational and deliberate.

Several dispositional factors or personality styles have been proposed to account for motivational determinants of the creative process, most notably tolerance of incongruity and sensation seeking (which includes susceptibility to boredom), and openness to experiences, a personality trait characterized by favorable attitudes toward art and culture and the strongest personality correlate of creativity

measures. All these factors commonly highlight the fact that the creative process requires more than just spontaneous irrationality because a great deal of determination is necessary to be creative. At the same time, creative processes seem most successful when individuals are *intrinsically motivated,* that is, focused on the task rather than its potential rewards.

Ability Factors

There is a long-standing psychological debate as to whether creative ability represents a distinct type of cognitive ability. Preliminary studies comparing the creative abilities of more and less creative people described the creative process in terms of a reorganization and recombination of ideas, which is a central idea of the Gestalt structuralist school of psychology founded in Germany during the early decades of the past century.

Conceptually, psychologists have long distinguished between creative and other higher cognitive processes based on the fact that the former requires divergent thinking, whereas the latter (e.g., cognitive ability) require convergent thinking. Although this distinction is often attributed to Guilford, it had already been conceptualized by Gestalt psychologists. Thus Max Wertheimer differentiated between two broad types of thinking, namely *reproductive* and *productive thinking*. Reproductive thinking is problem solving based on previous experience and what one knows already. Productive thinking, on the other hand, is problem solving based on insight. The concept of insight represented the Gestaltic view of the creative process par excellence and is commonly known as the "*Aha!" experience,* though its exact underlying mechanisms are still to be understood.

Tests of divergent thinking—pioneered by Guilford—have been widely used in creativity research to measure creative performance in terms of ideational fluency, originality, elaboration, flexibility, and adequacy. A common example is the Alternate Uses Tests, where test-takers are asked to provide "as many uses as possible" for different objects (e.g., paperclip, pen, or brick). Unlike traditional cognitive ability tests, such as IQ tests, that require participants to provide a single response to a given problem (and are therefore measuring convergent thinking), divergent thinking tests require participants to produce multiple responses for every problem. Scores on convergent and divergent thinking tests are positively correlated, albeit modestly.

Thus, divergent thinking may be necessary only at the initial phase of the creative process, with convergent thinking playing a more prominent role at subsequent stages. In simple terms, then, the creative process requires one not only to generate multiple ideas or solutions, but also to choose the right one.

Integrative Approaches

Future progress in understanding the creative process will require studies to opt for an integrative approach to examining the various determinants of creativity (attentional, motivational, and ability).

Some preliminary evidence for the interaction between these factors has been provided by recent studies. For instance, recent evidence suggests that reductions in latent inhibition, that is, the tendency to block previously experienced stimuli from conscious awareness, if combined with higher IQ levels, is related to higher creativity. Furthermore, creative processes are simultaneously affected by personality and situational factors (e.g., pressure and evaluative threat) and independent of other cognitive processes, such as convergent thinking.

Finally, it is noteworthy that the study of creativity comprises more than creative processes, but for space constrains the present entry did not deal with any of the other major areas of psychological research into creativity, namely *creative products, creativity measurement,* and the *creative personality.* Western psychological approaches to creativity have tended to focus more on those areas rather than on actual creative processes, which, conversely, have always received widespread attention in Eastern cultures, where there is a long-standing tradition to conceptualize creative processes as an intrinsic element of personal growth and psychological well-being.

Tomas Chamorro-Premuzic

See also "Aha!" Experience; Creative Problem Solving; Creativity and Mental Illness; Creativity Assessment; Creativity Theories

Further Readings

Amabile, T. M. (1985). Motivation and creativity: Effects of motivational orientation on creative writers. *Journal of Personality and Social Psychology, 48*(2), 393–397.

Carson, S. H., Peterson, J. B., & Higgins, D. M. (2003). Decreased latent inhibition is associated with increased creative achievement in high-functioning individuals. *Journal of Personality and Social Psychology, 85*(3), 499–506.

Chamorro-Premuzic, T. (2007). *Personality and individual differences*. Oxford, UK: Blackwell.

Chamorro-Premuzic, T., & Furnham, A. (2005). *Personality and intellectual competence*. Mahwah, NJ: Lawrence Erlbaum.

Freud, S. (1957). *Leonardo da Vinci and a memory of his childhood* (Standard Edition). London: Hogarth Press. (Original work published 1910)

Guilford, J. P. (1962). Factors that aid and hinder creativity. *Teachers College Record, 63,* 380–392.

Martindale, C., Hines, D., Mitchell, L., & Covello, E. (1984). EEG alpha asymmetry and creativity. *Personality and Individual Differences, 5*(1), 77–86.

Wertheimer, M. (1945). *Productive thinking*. New York: Harper.

Creative Productivity

Creativity is often discussed in one of four categories of definitions: the creative person, process, product, or environment. The creative person usually has high levels of creative potential that is expressed through his or her creative products. The creative process is the set of steps a person takes to produce creative work. The most well-known creative process was described by Graham Wallas in his 1926 work, *The Art of Thought,* as having four steps: preparation, incubation, illumination, and verification. A creative product is usually discussed as having attributes such as originality, elaboration, and novelty, but also social value. Many researchers define a creative product as something new that has been brought into existence purposefully. The creative environment is usually described as either a social or psychological context that is necessary to the development of creativity. Some environments may support creative works, and others repress them. Creative productivity usually refers to the need, desire, and actions taken by individuals and groups to create new and original work that will have a significant impact upon a field or area of work.

Background

It is impossible to identify the incidence of creative productivity in talented adults, because it occurs across so many domains and in so many different ways. Even indicators, such as the 176,089 patents issued in 2000 in the United States, merely skim the surface of the range of creative productive acts. However, much of what is valuable in society can be considered the product of creative acts, and some, if not most, highly creative work is completed by those who also have high levels of talent.

Theories

Abraham Maslow described 15 characteristics of self-actualized persons; most relevant here, Maslow suggested that self-actualizing persons actively used their potential to become whatever they are capable of becoming. In more recent years, other theories of creativity and creative productivity have suggested various components of the potential to produce.

Robert Sternberg and Todd Lubart, for example, offered a three-facet model of creativity, defining it as an intersection among intelligence, cognitive style, and personality/motivation. Sternberg and Lubart view creativity as a type of giftedness in itself, rather than as one dimension of intelligence. They propose that a person's "resources" for creativity enable a process of creative production to occur. Because they believe that six separate resources combine interactively to yield creativity, they find creative giftedness to be a rare occurrence because so many components must interact at once. Sternberg and Lubart's six resources succinctly describe many of the traits of creative individuals, including (1) *intellectual processes,* such as insight (selective encoding, selective comparison, and selective combination) to solve problems, and divergent problem-solving strategy; (2) *knowledge* of domain; (3) *intellectual (cognitive) styles,* such as a legislative style (creating, formulating, and planning) and a global mode of processing

information (thinking abstractly, generalizing, and extrapolating); (4) *personality* attributes that are conducive to creative giftedness, such as tolerance of ambiguity, moderate risk taking, willingness to surmount obstacles and persevere, willingness to grow, and belief in self and ideas; (5) *motivation,* a task-focused orientation that is a drive or goal that leads a person to work on a task, as opposed to a goal-focused orientation that exists often in creatively gifted individuals; and an (6) *environmental context* that includes surroundings that promote creativity and a reward system for creative ideas.

Mihaly Csikszentmihalyi defines creativity as requiring a talented person who experiences a period of training; a person who is adventurous, and perhaps even insubordinate; an encouraging domain or discipline within which the individual works; and an audience that decides the quality of the creations. In his more recent work, Csikszentmihalyi discussed *flow* as the complete involvement in an activity to such an extent that nothing else seems to matter and the experience is totally enjoyable. Flow may be key to continuing creative productivity.

Howard Gardner's conception of a creative individual is one who *regularly* solves problems or fashions products in a *domain,* and whose work is considered both novel and acceptable by knowledgeable members of a field. Creativity, according to Gardner, should not be regarded as a construct in the mind or personality of an individual; rather it is something that emerges from the interactions of intelligence (personal profile of competencies), domain (disciplines or crafts within a culture), and field (people and institutions that judge quality within a domain).

Joseph Renzulli's theory about the three clusters that contribute to the creative productive giftedness of an individual is widely recognized in the area of talented individuals. In his *three-ring conception of giftedness,* he identified the interaction between above-average ability, task commitment, and creativity as the necessary components for "gifted behaviors" resulting in creative productivity. He later added a "houndstooth" pattern to the background of the model, representing a host of other factors (personality and environmental) that must be taken into account to explain what causes some persons to display gifted behaviors at certain times and under certain circumstances. Many of these factors can be investigated through the examination of the lives of creative people. Renzulli discussed the differences between "high intellectual ability or potential" and "high creative ability or potential" as two broad categories, which he referred to as either "schoolhouse or high academic giftedness" and/or "creative/productive giftedness." Schoolhouse giftedness refers to taking tests, learning lessons, or academic giftedness. Individuals who fall into this category generally score well on more traditional intellectual or cognitive assessments and perform well in school. Creative/productive giftedness, on the other hand, is reflected in individuals who tend to be producers (rather than consumers) of original knowledge, materials, or products and who employ thought processes that tend to be inductive, integrated, and problem oriented.

Mark Runco suggested that two broad personality and cognitive "transformations" occur in the development of high levels of creativity and creative productivity in persons of high ability. The first is the development of outstanding creative ability during the first 2 decades of life, and the second begins in adolescence and entails the transformation of creative abilities into an integrated set of cognitive skills, career-focused interests and values, specific creative personality dispositions, and moderately high ambitions. Runco also discussed the viability of an implicit theory of creativity as a specific conception of creativity that exists in one's mind, and that can serve a prototype of creativity used by persons within a field to decide if either a product or a person is creative.

Sally Reis found that some gender differences exist in creative productivity in talented women, as compared to men. She suggested that some talented women tend to diversify their creative efforts or feel obliged to diversify their efforts into several different areas including relationships, work related to family and home, personal interests, aesthetic sensitivities, and appearance, and found different periods of creative productivity that may exist in the lives of some highly creative and productive women.

For many years the study of creativity focused on the individual and the identification of personality traits of talented, creative people with the implication that creativity was essentially innate. More recent research suggests creative productivity occurs when opportunities, resources, and

encouragement interact with the innate creativity in persons with the desire to become creative producers. Over time, researchers have begun to study the traits that distinguish creative productivity in different domains such as science and the arts.

Creative productivity enables some people to create a product that a knowledgeable audience recognizes as unique and distinctive, while others make products that may be commercially successful or popular without being creatively distinctive. Certain characteristics of creative productivity most likely occur because of the environment and the presence or absence of blocks to creative expression.

Development and Enhancement

The development and enhancement of creative productivity is a dynamic process that occurs during an interaction of creative persons with creative processes, products, and environments. A highly creative producer invests time in work and finds many ways for creative work to emerge. More research is needed to understand how this occurs across domains. New directions are needed for developing creative potential in talented adults because too few talented people have opportunities as adults to engage in sustained creative work. The loss of fulfillment of these potential innovators and creators is beyond measure. From what is known about creative persons, processes, products, and environments, what can be suggested to promote creativity in adults? Many more adults have the potential to produce creative products of many types. Some of these persons may need encouragement to utilize these skills, a place in which to use them, and some rewards for beginning efforts. Colleges, businesses, and nonprofit organizations, as well as government-sponsored organizations, can create various types of structures to encourage creative efforts—from scholarships for those tested or recommended as having creative potential, to think tanks that provide the space, resources, and security for the especially gifted to utilize those gifts in supportive places. People have to believe in themselves, and this self-efficacy for creativity probably will need many years of nurturing as well as opportunities for persons to develop the work ethic and task commitment that will be required to change high creative potential into creative work.

Many creative processes involve various types of problem solving at more complex levels of effort. People can be taught how to consider divergent ideas in combination, to break out of the box of conventional solutions, and to seek new ways of seeing old problems. Some researchers believe it is possible to teach techniques of creative thinking. It is an empirical question as to whether people who use these techniques will actually produce creative new products, but it is fairly certain that if they do not use them, there is little likelihood of creative work evolving.

Talented adults might be able to be encouraged to find those stepping stones to the development of highly creative products. The first task is to imagine what products would be desirable, and then to figure out ways to try to accomplish their development. The role of environment is critical to the development of creative products. A place where people can work without criticism and where they feel safe to take a creative leap or risk is essential. Having safe support for creative work is critical for the development of high levels of that work. Creating a supportive, caring environment is critical for the development of creative productivity and new ideas and to give approval for those innovative efforts.

If our society is to increase the number of productive creative adults, we must make more attempts to value creative work, and strive to create workplaces that nurture creative potential and minimize barriers. We must be wary of gender stereotyping, of cultural bias, and of trying to minimize creative differences in persons, processes, and products. We must accept and celebrate differences and understand the value to our world when talented persons are given the time, environment, and encouragement, both financially and emotionally, to create. Imagine what this world would be like without Beethoven, Pasteur, O'Keeffe, or Bernhardt? Now imagine what would happen if some of the most talented creators in our civilization were forced to conform and given little support. If we are not conscious of ways to help these individuals pursue their creative productivity, both at the early and later periods of their lives, we must consider the great American novel not written, the poem not conceived, the cure not developed, and the war not averted. This is the reason that we have to continue our explorations

in understanding how to promote creative productivity in both adults and children.

Sally M. Reis and Joseph S. Renzulli

See also Creativity, Definition; Cultural Conceptions of Giftedness; Talent Development

Further Readings

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York: Harper & Row.

Gardner, H. (1993). *Creating minds.* New York: Basic Books.

Renzulli, J. S. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 53–92). New York: Cambridge University Press.

Sternberg, R. J. (Ed.). (1988). *The nature of creativity* (pp. 325–339). Cambridge, UK, & New York: Cambridge University Press.

Wallas, G. (1926). *The art of thought.* New York: Harcourt Brace Jovanovich.

Creative Teaching

The specific ways an educator engages creative learning in the classroom are varied and multidimensional in nature. The educational dialogue regarding creativity often focuses more on the degree to which creativity is important to education and less on defining the specifics of creative teaching. In its simplest form, creative teaching can be defined as the act of teaching in a new and useful way. It can also include teaching creativity as the content of the learning. Teaching *creatively* and teaching *creativity* are the focus of this entry.

Words like e*xceptional, unique,* and even *creative* might be used to describe a master educator. The expertise, skills, and abilities that are described as successful attributes of an extraordinary teacher varies. The learner's needs, the focus of the educational system, and cultural norms all come into play. Certain attributes such as superior communication skills, content expertise, and grasp of pedagogy would universally be considered important for successful instruction. There is less agreement with regard to the essential strategies of instruction, the selection of the content, and to what degree creative teaching is a necessity.

Creativity and the Act of Teaching

Teaching can be described as a creative act. The problem-solving strategies used to reach learners include assessing the needs, monitoring progress, adapting, communicating, and delivering the content to meet the learners' needs. Although it is essential for a teacher to learn and to apply successful strategies consistently, the delivery varies according to the needs of the learners. Teachers who have mastered their discipline stay current in the field and continue to learn and utilize new ways of teaching to improve instruction. Helping students excel requires that teachers not only assist with knowledge acquisition but provide an environment that challenges students to master complex learning, engage in new thinking, and produce original thoughts and outcomes. These are some of the dimensions that describe the act of creative teaching.

Beyond Originality

A misconception regarding creativity is that it involves only originality. Originality in the delivery of a lesson is not sufficient. If the resulting outcome is not useful, the delivery of the learning lacks creativity. In teaching creatively, the delivery has a degree of originality, results in meeting the learning goals and, at its highest form, is elegant in form and content. To nurture creativity in students, delivering a lesson in a more creative way is only the beginning. Teachers who consistently teach in a more creative manner work hard to consider all aspects of creative learning. Creative teaching results in cognitive and affective growth in students, including the skills and attitude to continue to acquire, utilize, and formulate new knowledge in the future.

Considering the Development of Everyday and Eminent Creativity

Creative learning in a discipline or area of talent can result in each person living his or her life each day in a more creative way. At the highest levels of

creative productivity, it may result in eminent creative performance through new thinking and acting that influences a society. Creative teaching assists the learner to strive for a high level of positive daily functioning and the development of high levels of performance.

Modeling Creative Behavior and Delivering Creative Learning

How a teacher teaches creatively can vary greatly. From meeting everyday concerns to assessing and implementing long-term change involves a teacher's creativity. To infuse in the delivery of a lesson or unit of study novel approaches that excite learners, deepen the learning beyond where they have gone before, and inspire the production of new thought and action is to teach creatively. Planning for outcomes that are rich and complex, original, and expressive is to teach creatively. Creative teaching requires moving from a focus on imparting knowledge to knowledge acquisition, providing opportunities for the learner to engage in deep thought and productive action.

Many of the characteristics of effective teachers are also those of creative teachers. These include attributes such as inspiring, bringing a love of learning to the classroom through their sense of curiosity, and enthusiasm for new learning. Creative teachers express themselves creatively by looking at old lessons in new ways, assessing gaps in student learning, being willing to try new methods, and by continuous reflection and improvements of their craft. Creative teachers approach issues and challenges proactively and positively. Ideally, they enjoy engaging in complex, interesting tasks and expressing themselves through the development of talents in and out of their classroom. Creative teachers take delight in new thinking, holding off judgment long enough to consider novelty, keeping open to possibilities.

Setting Up the Conditions for Diverse Creative Personalities to Thrive

Some students may show high degrees of enthusiasm and curiosity, some may have a deep desire to engage in complex thinking, and still others may be avid risk takers and delight in thinking and acting on new ideas. Some may be fluent in their thinking and be exceptional original thinkers. Each aspect of the creative personality brings with it opportunities and challenges in the classroom. Harnessing these natural gifts and developing creative behavior in students requires tolerance and understanding, because not all creative traits are easy to manage in the classroom.

Developing a classroom that consistently supports creative learning takes deliberate planning. Availability of resources, varied space for engaging in activities, color and texture of the surroundings, and lighting are important considerations for setting the physical stage for creative learning. Providing a challenging environment, holding to standards while providing freedom of choice, encouraging trust and respect, providing time to think and play with ideas, and supporting new thinking by allowing students to take risks are part of the psychological climate for creativity.

Teaching Creativity as the Content of the Learning

It is generally accepted that one can teach creativity. Teaching creativity as the content of learning starts with the identification of the specific dimensions of creativity for instruction. This may include, for example, creative processes, dimensions of the creative personality, and affective and cognitive skills that facilitate creativity. Creativity may be the focus of a lesson and/or woven into a lesson that focuses on another content area. Rather than assuming creativity is a natural part of the learning process that will "just happen," teaching creativity allows for greater clarity around the essential concepts, the formulation of assessments to examine the degree to which the creativity goals and objectives are met, and deliberate planning for the learner's creative growth.

Deliberate approaches to teaching creativity vary and require a theoretical foundation and frame work for creative learning to be more effective. Otherwise, creative learning can be haphazard, focusing too broadly or narrowly overemphasizing a particular skill or dimension. In order to deepen the learning regarding creativity methods and processes, connections need to be made to uses in various contexts and areas of learning.

Teaching Aspects of the Creative Personality and Dimensions of the Environment

The creative personality is complex and varied. Fluency, flexibility, originality and elaboration, risk taking, curiosity, and many other traits characterize the creative personality. Awareness and understanding of both the context in which creativity occurs as well as the wide variety of characteristics of the creative personality are important. The diversity of problem solving and learning preferences one might have for engaging in creative learning is also a productive focus of learning. Learners can be taught to identify creative strengths, potential deficits, and the ways to engage with other learners who have different problem-solving and learning preferences.

Deliberate Methods, Processes, and Programs for Creativity

The focus of creative learning embraced more than any other in the educational system is creativity methods, programs, and processes for creativity. These include deliberate processes for creativity, such as creative problem solving and synectics. Programs for teaching creativity have included the Productive Thinking Program, the Future Problem Solving Program, Cort Thinking Program, Invention Conventions, Odyssey of the Mind, and Destination Imagination. Deliberate teaching for creativity is also the focus of Torrance's *incubation model of teaching and learning*, simultaneously teaching creativity skills and subject matter content.

A creative learning model by Donald Treffinger suggests starting with the deliberate teaching of techniques to generate and evaluate options as the content of the learning and then moving toward the utilization of those techniques within the frame work of a creative problem-solving process. The developmental progression of the learning moves from understanding and developing skill in technique and process to utilizing the techniques and problem-solving framework for metacognitive thinking, solving real problems, and engaging in a wide variety of productive thinking tasks within any content or area of endeavor. In this case, the creative learning moves from "out of context" (or focusing on the creativity aspect as the content) to "in context" applications (or a focus on another content area of learning using the creative process as the delivery method for other learning goals).

Creativity as Content and Subject Area Content in One Lesson

Paul Torrance identified a creativity skill set and developed a model for weaving creativity into any content of learning. Some of the skills include putting ideas into context, glimpses of the future, letting humor flow, and highlighting the essence. Learners can be taught strategies to take a mental shift to many, varied, and unusual perspectives; engage in playful thinking; tolerate ambiguity to explore deeper; and synthesize complex aspects of learning to extract the essence.

Setting up for the "Aha!" or illumination of learning can be enhanced by weaving creativity into the content of learning. Torrance's incubation model of teaching and learning is one of the few models that deliberately teaches creativity by weaving creativity into subject area content. In that model the learner's anticipation is heightened, setting the purpose and motivation. The learner is then taken to new depths of thinking, and extending the learning then occurs to set the conditions for continuing to incubate and think beyond the time frame of the lesson. This is done while teaching a subject area content and integrating a creativity skill through each stage of the lesson.

Bringing a More Creative Trend to Education

Proponents of creativity as essential to learning argue the current U.S. educational system lacks the depth and breadth of creative learning necessary for the future needs of society. With rapidly changing knowledge and the increasing need for acquisition of new thinking and new ways of operating, creative learning and teaching plays an essential role in the growth of a society. To enhance the creative teaching abilities of educators, an understanding and appreciating of the worth of creativity to society and its essential connection to learning is necessary. Appreciation of the role of creativity in education allows for a greater use of the talents and abilities of diverse learners beyond the traditional focus of education. To do this, teachers must be educated in creativity

to better support creative behavior and creative productivity.

Susan Keller-Mathers

See also Creative Personality; Creative Process; Creative Productivity; Creativity Training; Effective Programs

Further Readings

Al-Girl, T. (Ed.). (2007). *Creativity: A handbook for teachers*. Singapore: World Scientific.

Amabile, T. M. (1989). *Growing up creative: Nurturing a lifetime of creativity*. New York: Crown.

Millar, G. (1995). *E. Paul Torrance, "the creativity man": An authorized biography*. Norwood, NJ: Ablex.

Parnes, S. (1999). Programs and courses in creativity. In M. A. Runco & S. Pritzker (Eds.), *Encyclopedia of creativity* (pp. 465–477). San Diego, CA: Academic Press.

Scottish Executive Education Department. (2006). *Promoting creativity in education* (A report by SEED). Retrieved February 27, 2008, from http://www.hmie.gov.uk/documents/publication/hmiepcie.html

Starko, A. J. (2004). *Creativity in the classroom: Schools of curious delight*. White Plains, NY: Longman.

Treffinger, D. J. (Ed.). (2004). *Creativity and giftedness*. Thousand Oaks, CA: Corwin Press.

Creativity, Definition

Creativity can be understood only if it is clearly defined. In the case of creativity, that definition must allow for variation. This is because creativity may be expressed in different ways in different domains of performance and at different ages. Gifted children may express one kind of creativity and eminent adults another. This entry reviews the different definitions of creativity.

Key Attributes

Two things can be said with certainty when defining creativity. First, creative products are always original. Different labels are used, including novelty, unusualness, or uniqueness, but in one form or another all creative things are original. If something is not original, it is not creative. The second thing that can be said with certainty when defining creativity is that creative products are more than just original. They are fitting, apt, or in some way effective. If creativity is employed to solve a problem, the solution will in fact solve the problem. Original things that are not effective, fitting, or apt are not creative; they are merely original. Similarly, effective things that solve problems or are useful but are not original are not creative. They may be mundane, commonplace, or tried and true. Creative things must be both original and effective.

Beyond those two claims, there is a fair amount of debate and even ambiguity surrounding definitions and theories of creativity. The effectiveness of creative things, for example, is extremely difficult to operationalize. Ideas and solutions that are effective in one context (e.g., environmental, social, cultural, historical) are often not effective in others. Effectiveness may be quite personal, and sometimes it is aesthetic rather than functional. This is quite obvious in the creative arts. Effectiveness cannot really be defined in an absolute way. One must always ask, "Effective for whom?"

The word *creativity* was used outside of the social and behavioral sciences well before it became a legitimate and accepted concept for research and theory. This may partly explain why it is so difficult to define creativity. Words originating in the sciences (e.g., reaction time, operant, bits, reinforcer) tend to be more operational and are easier to define than those first used outside science and then brought to the sciences. Creativity may also be difficult to define because its meaning has changed a number of times through history, and there are cultural differences in many of the behaviors that are related to it (e.g., individuality and nonconformity). Yet the term *creativity* has also remained slightly ambiguous because what is being labeled—actual creative behavior—is also varied and complex.

Diverse Expressions of Creativity

The diverse expression of creative behavior is probably most obvious in historical change. Consider, for example, that art at one point was not intended to express the feelings of the artist, and was not expected to be original. It was, instead, representative. In many societies and in

most eras, artists were judged on the basis of how well their work captured the ideals of society. Art was not individualist, self-expressive, or challenging. Art was not supposed to be original. That is very different from today's art.

Maturational differences in artwork also suggest dramatic variation and diversity. Children's art is entirely self-expressive. They will often finger paint or draw something that makes sense only to them and no one else. If it is novel, it is original; and if it does capture a worthwhile idea, it is fitting—for the individual child. Children's creativity, then, fulfills both the effectiveness and originality requirements relative to the individual child. The creativity is personal rather than social. Admittedly that makes things difficult for behavioral science, and it is no surprise, then, that this definition of creativity is not without critics. It certainly is not entirely objective, but the alternative is to reject all of the imaginative things children do just because, compared to larger social norms, these products are not original. At least as important, there are reasons to believe that the underlying capacities that allow children to be creative may be involved years later in mature creativity. Adult creativity may reflect experience and crystallized abilities in addition to originality, but there very likely is a bridge between childhood and adult creativity.

There is an overarching difficulty in defining creativity that follows from the fact that originality is always involved. Original things have not occurred before and are difficult if not impossible to predict. After all, predictions are usually based on past occurrences or *base rates*. Things that occur frequently are likely to appear again soon, and things that do not often occur are unlikely to occur regularly. Unpredictable things have no base rates, or at least none that apply directly. One might say that there is no baseline with which to predict original things. Hence one of the major goals of science—to offer accurate prediction—does not apply well to creativity. Creativity must be defined with some latitude because the subject itself is also varied and complex. It has even been called a syndrome or complex.

One extreme view recommends not using the word *creativity* as a noun, at least in the sciences. The idea here is to use only the adjectival form, *creative*. Because adjectives require nouns, this recommendation would force everyone to be very specific. Research and discussion could examine creative *traits,* creative *potential,* creative *solutions,* and creative *places,* but not just *creativity.*

Definitions of Creative People, Processes, and Products

Other attributes of creativity are sometimes mentioned in addition to originality and effectiveness. Sometimes other characteristics are mentioned, such as open-mindedness or unconventionality. This is especially true when the focus is on the creative person or creative personality. Other major perspectives on creativity include process views, press theories, or product theories. Process views pinpoint cognitive skills that facilitate original and effective thinking. Some include social processes whereby an individual may produce something that influences important audiences, and they in turn change general opinion or even world views. The idea of a press comes from "pressure," so press theories look to things that have an impact on the creative person or environment. These may be social factors (e.g., expectations and mores), organizational factors, aspects of the physical environment, or cultural influence (e.g., values). Product theories define creativity by examining the results of the process, be they works of art, fiction or nonfiction, performances, inventions, patents, publications, speeches, and more. Product definitions may be easiest to apply because there is some tangible thing to count—the products themselves—but of course implications for creative persons are highly inferential. The focus is on products and thus not much can be said about anything but products. Of course, creative products are enormously important. Creative products in all domains move society forward. Creativity is all around us.

Mark A. Runco

See also Creative Personality; Creative Process; Creative Productivity; Creativity Theories; Originality

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Runco, M. A., & Albert, R. S. (Eds.). (1990). *Theories of creativity.* Newbury Park, CA: Sage.
Runco, M. A., & Pritzker, S. (Eds.). (1999). *Encyclopedia of creativity.* San Diego, CA: Academic Press.

Creativity and Mental Illness

The relationship between creativity and psychopathology has been the focus of considerable interest and research in psychiatry. Plato, Aristotle, Shakespeare, Proust, and Freud alleged a connection, as have the anecdotal accounts of many writers and visual artists. The lives of Sylvia Plath and Jackson Pollock, for instance, exemplify how thin the line can be between destruction and creation. Three questions are the focus of hundreds of studies: Do some kinds of psychopathologies enhance creative achievement? Are creatively gifted people more likely to be mentally ill? What is the nature of the connection between creative and pathological thought processes? The research has obvious implications for the development of talent, particularly in the arts.

Diagnostic analyses of the works or lives of well-known artists and writers are often used to explore the relationship between creativity and mental illness. All of this research has been done with adults. We know next to nothing about the mental health of creatively gifted adolescents. The psychoanalytic clinical literature in particular has put forth several theories explaining the connection between creativity and psychopathology. Findings, however, are equivocal and have been controversial since the first quarter of the 19th century.

Studies that examine what creativity and psychopathology have in common observe three shared characteristics: mood disturbance, tolerance for irrationality, and certain types of thinking processes. The incidence of mental illness among gifted visual artists, writers, and poets is higher than in the population at large. Significantly higher rates of depression and suicide are reported among eminent writers, poets, and visual artists, and some studies link creativity with bipolar disorders specifically, usually finding about 10 times as many diagnoses of bipolar disorders among creative individuals as in the general population. We know that psychotic thinking rarely turns into creative production without some abatement of the psychosis, but creative processes sometimes turn into psychotic ones.

Within the field of academic psychiatry, there has been serious acceptance of the association between creativity and hypomania. In recent years, however, it has been noted that these findings are often based on retrospective analyses of biographical material of eminent creative individuals, many of whom lived and worked during the Romantic Period when strong cultural assumptions alleged a divine "madness" associated with creative giftedness. There is now some question as to whether the self-reports of these individuals may have been, in fact, self-serving projections of cultural expectations. Were they really struggling with mental illness? Or did they relate emotional problems because that was the expected public persona of a great artist in their time? The self-report of some contemporary gifted artists and writers of elevated levels of creativity during periods of moderate mental illness does find support in the literature.

The work of several investigators, including Kay Jamison and Nancy Andreasen, suggests that creative production varies with mood states. Specifically, greater production seems to be generally preceded by an elevated mood, perhaps by opening up thought processes. Depression, however, may also enhance the creative process by slowing down rapid thought processes, putting thoughts and feelings into perspective, sharpening focus, and eliminate extraneous ideas.

There is growing consensus that the cognitive processes associated with certain moods may be the link between creativity and mental illness. Several authorities have noted cognitive similarities in samples of writers, artists, manic depressives, and psychotics. The conceptual styles of these groups appear to be similar, with the distinctions being the degree of control various subgroups have over their thinking. People with a mental illness have less control than those without a disturbance.

The thought processes of high creatives, psychotics, and manics share some similarities. There is a tendency to combine things that blur conceptual boundaries, sometimes referred to as overinclusiveness, for example, as well as fluency and

flexibility of thought. Restlessness, grandiosity, intensified sensory systems, and quickening of thought processes are also identified as shared characteristics.

Consistently, creativity is low in people with active, severe psychopathology. Manics, psychotics, and severe depressives are significantly less creative and productive than those with mild or no disturbance.

One of the implications of this research for educational and psychological practice is that there does appear to be a psychological vulnerability associated with high creative achievement in the visual arts and writing. Although most creatively gifted people do not suffer from mental illness, and although their rates of mood disorders and suicide are not high, the rates are significantly higher than in the general population. Creatively gifted individuals and their families and teachers should therefore be alert to the possible risks associated with the pursuit of creative achievement in the visual arts and in writing especially. They should be willing to tolerate a higher degree of irrationality or deviance because such behaviors are more common among these individuals. They should also guard against acceptance of the popular pairing of creative achievement with destructive behaviors. For every disturbed creative individual noted there are many more healthy creative individuals.

In summary, there is a link between mental illness and creative giftedness but it is observed primarily among writers, poets, and visual artists, not across disciplines. The link appears to be a cognitive one. Mood changes influence thought processes and these in turn seem to enhance creativity in some people. It is important to remember, however, that though significantly higher among this population than within the general population, the association between creativity and psychopathology is the exception rather than the rule. Mental illness is neither observed nor reported among the majority of high creatives. Emotional suffering or mental breakdown is not the sine qua non of creative genius.

Maureen Neihart

See also Creative Personality; Eminent and Everyday Creativity; Genius; Positive Disintegration; Psychoanalytic Theories of Creativity

Further Readings

Andreasen, N. (2006). *The creative brain: The science of genius.* New York: Plume.

Becker, G. (2000). The association of creativity and psychopathology: Its cultural-historical origins. *Creativity Research Journal, 13,* 45–53.

Chavez-Eakle, R. A., del Carmen Lara, M., & Cruz-Fuentes, C. (2006). Personality: A possible bridge between creativity and psychopathology? *Creativity Research Journal, 18, 27–38.*

Jamison, K. R. (1993). *Touched with fire: Manic depressive illness and the artistic temperament.* New York: Free Press.

Neihart, M. (1998). Creativity, the arts, and madness. *Roeper Review, 21,* 47–50.

Rothenberg, A. (1990). *Creativity and madness: New findings and old stereotypes.* Baltimore: Johns Hopkins University Press.

Creativity and the Economic System

Creativity and its counterpart, innovation, are the root of progress and thus fundamental to the dynamics of economic systems. This entry discusses different facets of the relationship between creativity and economic systems. It also discusses how creativity is thought about in economic thought, as well as how it is not thought about, for it continues to be the case that creativity is left out of the account of many economic models.

Creativity and the Liberal Tradition

The links between creativity, freedom, and economic thought run deep both historically and philosophically. Historically, individual liberties have grown and been extended to more and more people at the same time that modern economies have formed and grown. Intellectually, there is an important strand of thought in which creativity and individualism are seen as bedrocks of economic progress. This line of scholarship extends back to John Stuart Mill's famous essay *On Liberty,* through Alfred Marshall's *Industry and Trade,* to Friedrich Hayek's *The Constitution of Liberty.* Mill champions individualism and the

importance of giving individuals the opportunity to present and openly discuss ideas of all kinds. Marshall traces chains of innovations, made by many individuals, in the development of new industries. Hayek views the market as a zone of experimentation, in which individuals (under ideal conditions) freely form and pursue plans and ideas of their own devising, generating a plethora of alternatives. Then the market decides which are viable and which are not, and through this process outstanding innovations are uncovered and developed, producing economic and social progress.

In the liberal view, individual creativity is an important motivation for arranging society so as to provide individuals as much freedom as possible, including in matters of economics. Tied to this is a humility that recognizes that one cannot predict what another person will invent or create, nor can one necessarily correctly predict which innovations and ideas will bear fruit. It is better to allow individuals to pursue their own unique paths of development, providing society the broadest array of alternative ideas and possibilities.

With the formal development of neoclassical economics (and more recently, behavioral economics), the main focus in the study of economic systems has been on static efficiency—the efficiency of resource allocation—not the dynamic possibilities generated through freedom and creativity. Thus there is a difference in perspective between the classical liberal view and the research focus of most economists working in the field today. In the models that have been developed, under certain conditions the price established in a free market will be "efficient" in that it equates the social marginal cost of producing the good being sold with the social marginal value associated with consuming that good. Under other conditions, such as when there are externalities like pollution, informational asymmetries, or biases in judgment, the free market price may not be efficient. Either way, creativity and innovation take a back seat, and the importance of generating new ideas and products is underemphasized. This disconnect poses important issues for economic policy and debates about economic institutions: To what degree should these institutions focus on developing and championing individual freedom and creativity, versus regulating and correcting various market imperfections? Ultimately, most of the work done by economists addresses the second factor—correcting imperfections—and creativity is relegated to the side. Even when innovation is studied, it is done through very simple models. An important reason for the way the field has developed has been the drive in economics in the past 60 years to develop formal mathematical models, leaving the richness of individual paths of development to one side, hence making it difficult to incorporate creativity and individuality.

Economic Growth and Innovation

Innovation is widely recognized to be the source of much, if not most, economic growth. In modern times this insight goes back to Robert Solow's original empirical work on economic growth, published in 1957, in which he attributed the majority of growth to the "residual" in his regressions—meaning that increases of capital stock and labor explain only a minority share of growth of output, leaving him to conclude that the majority share was generated by improvements in techniques of production. Marshall recognized the enormous importance of innovation to economic development, as have economic historians since, such as Joel Mokyr and David Landes. In the "new" economic growth theory of the 1980s and 1990s, especially *endogenous growth theory,* innovation continues to be recognized as the basis for much economic growth.

A developing literature focuses on institutions that promote creativity and inventive activity, notably property rights for inventors (intellectual property) and institutions that support knowledge production and dissemination. Here the need for creativity and innovation is seen as an important driver of the design of economic institutions.

Models of Research and Development

Creativity is at the heart of the research enterprise and therefore of research and development activities leading to innovations. Understanding why some researchers and some research groups are more creative and productive than others is important as a basis for understanding competitive advantage and why innovations emerge in some places and organizations and not others. The role of creativity in this process can be studied at many levels

and in many ways: personality, creative interests and projects, collaborative creativity, organizational structure and processes, and reward systems.

Despite how rich the potential for linkages with the study of creativity is, however, there remains a large chasm between creativity, as it is studied in psychology and allied fields, and economic models of the research and development process. Economic models of innovation typically have a simple structure: The more resources are invested in the innovative activity (research and development), the higher is the probability of an innovation being produced. This basic structure lies behind macroeconomic models of growth such as Paul Romer's model, as well as microeconomic models of firm research and development. The actual conceptual steps involved in the process—the creative process—are omitted. Further, the nature of the framework, in which agents are simply described, leaves little room for modeling individual differences, including personality structure, or the role of emotions.

Economic models focus on the incentives firms have to engage in research and development, and the way the structure of rewards—for example, a tournament or the advantage of being first to market—influences investment in research and development. The focus is thus mainly on extrinsic motivators of creativity, leaving intrinsic motivations aside. There is also a developing literature on intellectual property protection and its impact on the research and development process. For example, both the breadth and time-length of patents can be expected to influence research and development activity in a field, and there are relatively subtle issues around how patents granted to first-generation inventors influence the incentives of next-generation inventors.

Enriching the economic models with insights from the psychological literature can help generate richer models with more predictive power. For example, personality structure may be related to ability to adapt to certain work environments, and the way individuals respond to different mixes of intrinsic and extrinsic motivators might be explored. Richer models might predict outcomes and inform discussion about a range of policy issues. For example, in the field of industrial organization, a question like this might be posed: When is it likely to be the case that highly creative individuals will work in small, independent boutiques, or as independent contractors, and when will they work in large integrated firms? The answer may depend on the structure of the industry, the kinds of individuals attracted to work in the field, the nature of the creative process used to create new products—for example, how long it takes and how large a team is involved, the nature of intellectual property protection, where the industry is located, and so forth.

The chasm, of course, extends in both directions. Psychological models of creativity could benefit from a deeper connection with and understanding of how economic incentives and conditions influence the creative process.

The growing organizational behavior literature on creativity, in which organizational structures and processes are related to the creativity of an organization, also has much to offer the study of economics as it relates to organizations. Whereas the economics of organization has tended to focus on incentives as the force driving creativity, the organizational behavior literature points to culture and values as equally important in sustaining creativity.

Entrepreneurship

Joseph Schumpeter stated famously that competition unleashes a "gale of creative destruction" in which innovations and new firms that create them are continuously emerging in markets, disrupting the existing order and overthrowing established firms. Creative destruction continues to be recognized as an important force in economic systems.

Much creative destruction, and the bringing of new ideas into the economic system, is driven by entrepreneurs, and the study of entrepreneurship has emerged as a major area of scholarly work in the past 20 years. Entrepreneurial activity begins with a creative idea or, in many cases, the recognition of opportunity—which is itself a creative insight. Thus creativity is inherent to entrepreneurship, and understanding the creative process and creative development of entrepreneurs is important. This link is recognized to some degree, for example, in the discussion and framework outlined by Scott Shane and S. Venkataraman, but ties to the creativity literature are not as strong as they could be. There is need for the development of conceptual frameworks to help understand how individuals

develop creative interests and through pursuing those interests put themselves in a position to have creative insights and recognize opportunities. More work is also needed studying the career paths and roots of creativity of entrepreneurs.

Creative Industries

Another place of intersection of creativity and economics is creative industries and markets for creative products. The most studied point of intersection of creative products and economics is the art market. Much art is sold at auction, and for some works of art, for example paintings, there are series of prices for the resale of the work over the years, making it possible to study the determinants of prices for art and movements in these prices over time. David Galenson, for example, has used these data to develop an interesting theory of two kinds of careers and forms of creativity generation.

In the past 10 years or so the field of economics of creative industries has grown beyond this initial area of interest. A new journal has been started, *Cultural Economics,* and there is a developing literature not only on the price of art, but also the careers of artists and others engaged in creative industries, such as movie producers and musicians, and there is an incipient literature on the determination of industry structure in these fields. The recently published *Handbook of the Economics of Art and Culture* reviews developments in this burgeoning field.

A related sociologic literature explores why some places and cultures flower creatively. Richard Florida has documented the importance of place for creative workers, arguing that certain urban centers attract highly creative people and industries. So far, however, there is surprisingly little research on why, historically, certain cities, states, and cultures have been extraordinarily creative. One example of a study of this kind is Allan Janik and Stephen Toulmin's study of turn-of-the-century Vienna.

Future Directions

Creativity is ultimately the basis for human cultural development and as such a deep root of the dynamism of economic systems. While many points of connection between creative processes and economics have been explored, many interconnections have scarcely begun to be addressed. This is an area of interdisciplinary scholarship where there is much open territory and much to be done.

Jonathan Feinstein

See also Competitions; Creativity in the Workplace; Entrepreneurial Ability; Innovation; Legal Issues for Gifted; Socioeconomic Status; Technology

Further Readings

Feinstein, J. S. (2006). *The nature of creative development*. Stanford, CA: Stanford University Press.

Ginsburgh, V. A., & Throsby, D. (2006). *Handbook of the economics of art and culture: Vol. 1*. Amsterdam: Elsevier North-Holland.

Hayek, F. A. (1960). *The constitution of liberty.* Chicago: University of Chicago Press.

Janik, A., & Toulmin, S. E. (1973). *Wittgenstein's Vienna*. New York: Simon & Schuster.

Menell, P. S., & Scotchmer, S. (2007). Intellectual property. In A. M. Polinsky & S. Shavell (Eds.), *Handbook of law and economics* (pp. 1477–1568). Amsterdam & London: Elsevier.

Mill, J. S. (1978). *On liberty.* Indianapolis, IN: Hackett. (Original work published 1859)

Mokyr, J. (2002). *The gifts of Athena: Historical origins of the knowledge economy.* Princeton, NJ: Princeton University Press.

Reinganum, J. (1989). The timing of innovation: Research, development, and diffusion. In R. Schmalensee & R. Willig (Eds.), *Handbook of industrial organization* (Vol. 1, pp. 849–908). Amsterdam: North-Holland.

Shane, S., & Venkataraman, S. (2000). The promise of enterpreneurship as a field of research. *Academy of Management Review, 25,* 217–226.

Creativity Assessment

The assessment of whether someone is creative or whether his or her product is creative is complex. Assessments have included tests, checklists for personality and cognitive characteristics, behavioral observations, and judgment of creative products.

Divergent Production Tests

In the 1950s, J. P. Guilford developed his divergent production tests to measure the divergent production content in his Structure of Intellect. In the 1960s, E. P. Torrance developed The Torrance Tests of Creative Thinking, with subtests with names such as Ask and Guess, Unusual Questions, Product Improvement, Unusual Uses, and Just Suppose. The tests were scored for Guilford's divergent production aspects, such as fluency, flexibility, elaboration, transformation, and originality. The results of these subtests were factored into something called a *Creativity Index,* similar to a quotient, or a composite score. Present-day users of the tests recommend using individual profiles and dimensions. The implication became that the higher the score, the more potentially creative the child was. Other researchers besides Guilford and Torrance included Jacob Getzels, Philip Jackson, Nathan Kogan, Mark Runco, and Michael Wallach. Journals such as the *Journal of Creative Behavior* and the *Creativity Research Journal* have published many international studies about the use of divergent production assessment instruments.

Evaluating Creativity Assessment Instruments

Validity is best described as the test's truthfulness. The three types of validity are (1) content/construct validity, (2) criterion validity, and (3) concurrent validity. *Construct validity* is limited by the lack of a universal definition for creativity and the complexity of what creativity is. Is there a separate creativity construct, creativity ability? *Criterion validity* refers to whether or not test scores predict performance later on in life or in other areas. Criterion validity is also called *predictive validity. Concurrent validity* shows that a certain test is highly correlated with previously validated measures.

Most creativity tests seem to be based on the original divergent production tests that were validated by Guilford back in the 1950s. What is called *creativity* is again the question, for many tests show strong concurrent validity when related to other tests that measure divergent production, which may have little relationship to real-life creativity. Another assumption in creativity assessment has been that creative people have above-average IQs. This is called the *threshold theory.* Do creative people have to be highly intelligent? Average IQs for people in various domains differ. Validity studies of creativity tests have shown that although concurrent validity is often adequate, criterion validity and construct validity are not.

Reliability is the consistency of the instrument. Adequate reliability does not imply that the test is valid. The scoring of creativity tests is difficult, because the scoring requires subjective judgment and scorers must be trained. The person using creativity testing must consider three interrelated types of reliability: (1) stability, (2) equivalence, and (3) internal consistency. The reliability of tests can be increased by administering the tests in a standardized way, by using objective scoring measures, by having item difficulties that are equal (is listing unusual uses for a ball easier than listing unusual uses for a bat?), by having the test measure only one aspect of creativity, and by increasing the number of items on the test. Administering the tests in a standardized way and scoring them objectively is particularly difficult for divergent production tests.

Scoring is also a challenge to reliability. The responses are as varied as the people taking the test, and they have been codified into classes so that a trained scorer can recognize certain patterns. For example, a response is called original if it occurs only once or twice in a group of 30 people. In creativity testing, the "amount" of creativity is at issue. What does it mean to "increase" one's creativity? The underlying assumption that there is a normal curve of creativity, or, to put it another way, the underlying assumption that some people have a fuller cup of creativity than other people, has not been proven. This assumption is an important issue when talking about creativity testing, because it assumes that a person who gets a higher score has "more" creativity and that a person with a lower score has "less" creativity. With doubt about what the construct of creativity actually is, and what the tests measure (validity), the question of "amount" is moot.

Checklists and Questionnaires

Other creativity assessors have made checklists. Reviewers have been critical of checklists, for again the problem becomes: What behaviors do creative

people show? Instruments such as the Adjective Checklist (ACL) and the Myers-Briggs Type Indicator (MBTI) have creativity scales based on personality attributes of creative adult producers who were invited to the Institute of Personality Assessment and Research (IPAR) project, in 1949. Instruments such as the High School Personality Questionnaire (HSPQ) have a creativity scale based on questionnaires given to the teachers of eighth graders, and so the use of such creativity scales should be monitored to determine how they were obtained. The Renzulli-Hartman Creativity Characteristics Scale in the Scales for Rating the Behavior of Superior Students (SRBSS) has items based on divergent production characteristics, as does the GIFT and GIFFI Scale. The NEO-Personality Inventory (NEO-PI-R) has an Openness scale that includes several subscales that seem to be related to the creative personality, including Fantasy and Aesthetics.

Other instruments are part of observational protocols. The storytelling protocol used by Beth Hennessey and Teresa Amabile looked at the characteristics of stories told by elementary school children. The ArtsConnection protocols look at divergent production characteristics shown by students dancing, making art, or doing theater. Still others rate students in conjunction with their performance in history days, or in academic or arts contests. These checklist items are based on divergent production as well, because they assess the amount (fluency), the classification (flexibility), the rarity (originality), and the transformational performance (transformations) of the students as they make their products. Interest inventories may also be revealing because they may show student interest in creative domains such as the arts, sciences, or technology. What is on present checklists may or may not be related to actual behaviors that creatively productive people exhibit, and even though a checklist may have concurrent validity, it may not have construct or criterion validity. Often the items are totaled, put onto a matrix, and added into a weighted total. *One* item checked may indicate creative potential just as well as several items checked. For example, one predictive behavior for visual artists is doodling in the margins of books and on papers turned in. This one behavior may be a criterion for future creativity.

Those who are in an ongoing relationship with the person being assessed may make the observations, but the Institute for Personality Assessment and Research (IPAR) observations were made by using the Q-sort technique by trained raters. Teachers of special subjects and coaches in competitions that involve creative thinking may make these observations. Assessors should include observations in home and extracurricular settings, on field trips, during private lessons, and in enrichment settings. Leisure time activities predict adult creativity, as well. Independent research based on interest, elaborate play activities such as theaters in the backyard, and imaginative fantasy play on the computer or with friends in the neighborhood should be included in the observational assessment.

The assessment of creative potential has many pitfalls, but careful, thorough, and informed people can sidestep these pitfalls with proper attention. One of the ways to sidestep is not to identify for creativity ability but to identify for talent—specific talent that is revealed through the person's products.

Product Assessment

The quality of the product matters in assessing creativity. Portfolios are used in various systems of what has come to be called *authentic assessment*. A portfolio is not just a folder containing a student's homework; rather, it is purposeful and includes an exhibition of achievement in a certain area of work, including writing, music, art, mechanics, oral presentations, videos, science projects, inventions, mathematical problems and solutions, and the like, with a view to the originality, the imagination, the uniqueness represented by the attempt. Assessors in these domains have already developed product assessment matrices, and experts in the various domains in which creativity is exhibited can recognize creativity, or innovation and newness, in their domains. Assessors need not reinvent the criteria. The cognitive characteristics of flexibility, fluency, elaboration, and originality may be ways of assessing portfolio data, but poets may write few words and not be "fluent," and musicians may compose in standard song form and not be flexible. These cognitive aspects should not be the main criteria for assessing creativity, but should be part of a comprehensive evaluation of a person's products, interests, personality, and the like.

Assessing creativity is complex, and it has engaged experts in psychometrics, experts and connoisseurs in domains, and some of the best thinkers in psychology and education. Yet there is always the surprise—the untutored or primitive visual artist; the small child born with a big voice and an innate sense of pitch; the builder, the fixer, the tinkerer who makes something new that the world has needed and wanted. The biographies of the Grandma Moseses, the Judy Garlands, the Frank Lloyd Wrights, and the Thomas Edisons edify, and complicate, any assessment.

Jane Piirto

See also Creativity, Definition; Creativity Theories; Meta-Analyses of Gifted Education; Torrance Tests of Creative Thinking

Further Readings

Barron, F. (1995). *No rootless flower: An ecology of creativity.* Cresskill, NJ: Hampton Press.

Getzels, J., & Jackson, P. (1962). *Creativity and intelligence: Explorations with gifted students.* New York: Wiley.

Guilford, J. P. (1967). *The nature of human intelligence.* New York: McGraw-Hill.

Hennessey, B. A., & Amabile, T. M. (1988). Storytelling as a means of assessing creativity. *Journal of Creative Behavior, 22,* 235–247.

Piirto, J. (2004). *Understanding creativity.* Scottsdale, AZ: Great Potential Press.

Piirto, J. (2007). *Talented children and adults: Their development and education.* Waco, TX: Prufrock Press.

Runco, M. (Ed.). (1990). *Divergent production.* Norwood, NJ: Ablex.

Simonton, D. K. (1995). *Greatness: Who makes history and why.* New York: Guilford Press.

Torrance, E. P. (1998). *Torrance Tests of Creative Thinking: Norms and technical manual.* Bensenville, IL: Scholastic Testing Service.

VanTassel-Baska, J., Johnson, D., & Avery, L. (2002). Using performance tasks in the assessment of disadvantaged and minority youngsters: Findings from Project STAR. *Gifted Child Quarterly, 46,* 110–123.

Wallach, M., & Kogan, N. (1965). *Modes of thinking in young children: A study of the creativity–intelligence distinction.* New York: Holt, Rinehart & Winston.

Creativity in Engineering

Ask any child what an engineer does and it is highly likely that his or her response will have something to do with driving trains, repairing machines, or construction. Although the term *engineer* has been part of the English vocabulary for thousands of years, the profession is still poorly understood by the general public. A search for the origin of the word *engineer* will generate several different theories, but they all lead back to the Latin words *ingenium* (innate character, talent, nature); *ingeniosus* (full of intellect, superior in mind, able, intellectual, clever, ingenious); and *ingeniator* (ingenious, to devise in the sense of construct, or craftsmanship). The early ingeniators (engineers) advanced their knowledge through trial and error or by tinkering with a device to make it better. Through their ingenuity they created or envisioned things we still marvel at today. A synonym for *ingenuity* is *creativity,* and thus the origin of the engineering disciplines addresses humankind's innate need to create. Where scientists seek to understand and explain the world around us, engineers seek to solve problems to create a better world.

Engineering Design and the Creative Process

The foundation of all engineering disciplines is the concept of design, a process by which engineers identify the problem and associated constraints, generate possible solutions, evaluate the solutions, develop and test a prototype, communicate the results, and redesign. Margaret Boden described three basic types of creative processes. The first she identifies as *exploratory creativity,* in which the individual investigates new ideas. From an engineering perspective this type of creativity would result in a new product. Straight pins were used to fasten papers together until the mid-1800s. Though effective in holding a group of papers together, pins damaged the paper, got caught on other objects, and occasionally pricked a finger. Advances in material design and technology along with the ability to see a problem and a creative solution resulted in a patent awarded for the first bent-wire paper clip in 1867.

A second type of creative process involves the combining of existing ideas to create a new product or process. Combining ideas using the Substitute, Combine, Adapt, Modify/Magnify/Minify, Put to other uses, Eliminate, Reverse/Rearrange (SCAMPER) technique or creating analogies when using synectics are examples of *combinatorial creativity.* Early engineers were multidisciplinary. As our knowledge base has expanded, so has the specialization within engineering. Most engineering design teams are interdisciplinary and provide opportunities to combine different ideas in the development of a solution to a problem. The ability of an engineer to work collaboratively is highly valued, and the Accreditation Board for Engineering and Technology (ABET) made collaborative activities a requirement in their accreditation criteria for university programs.

The third creative process described by Boden is *transformational creativity.* Although she described this process as making the impossible possible, engineers often use this process to improve on an existing design. There have been many patents issued for different paper clip designs, including one in 2005.

A comparison of the steps in engineering design with those in the *creative problem solving model* illustrates the similarity between efforts to understand the nature of both processes. Neither column in the table below is linear, but rather iterative and cyclic in nature.

Engineering Design Process	*Creative Problem-Solving Model*
• Indentify the need	• Objective finding
• Research the problem	• Fact finding
	• Problem finding
• Develop possible solution(s)	• Idea finding
• Select the best solution	• Solution finding
• Construct a prototype	
• Evaluate the prototype	
• Communicate solution	• Acceptance finding
• Redesign	

Role of Knowledge

The ingeniators of the Middle Ages relied on trial and error to advance their skill and knowledge and in doing so discovered many scientific and mathematical principles. As knowledge increased, designs improved and failures decreased. Today's engineers are expected to have strong backgrounds in math and science as well as a deep understanding of engineering codes and standards, ethics, economics, and social/cultural issues.

The emergence of creativity is dependent in part on the knowledge processed by the engineer. However, the method by which the knowledge is acquired affects the development of creativity. Creativity needs a facilitative environment, not an authoritative one. Future engineers need to wrestle with problems, challenge the questions posed, and learn to work collaboratively to analyze, criticize, and synthesize information.

Role of Judgment

Early in their careers, engineers are often placed on teams with experienced engineers for, despite all their education, these new engineers lack an experience base from which to analyze problems or evaluate solutions. To be eligible to sit for the licensed Professional Engineer (PE) exams in the United States, new graduates first have to spend 4 years working under the supervision of a PE. Time is needed to learn how to apply the knowledge gained in formal education, as is the opportunity to understand the social context in which the designs must be implemented. Professional judgment develops over time and is a valued

component of the design process. Knowledge, intuition, experience, and creativity are all invoked when making engineering design choices.

Creativity: The Essential Element of Engineering

In the writings of William Wulf, president of the National Academy of Engineering from 1996 to 2007, one often finds references to creativity as the essential element of engineering. Yet despite all the contributions engineering has made to the quality of our lives, the general public still views engineering as a field dominated by procedures and algorithms. Beginning in elementary school, it is essential that the creative side of engineering be acknowledged to develop the engineers of the next generation.

Eric L. Mann

See also Creative Problem Solving; Creativity in Science; Creativity Theories; Creativity Training; Synectics

Further Readings

Heywood, J. (2005). *Engineering education: Research and development in curriculum and instruction.* Hoboken, NJ: Wiley.

National Academy of Engineering. (2004). *The engineer of 2020: Visions of engineering in the new century.* Washington, DC: National Academies Press.

Santamarina, J. C. (2002). Creativity and engineering—Education strategies. In *Proceedings of the International Conference/Workshop on Engineering Education.* Honoring Professor James T. P. Yao, February 21–22, 2003, College Station, Texas, 91–108.

Wulf, W. A. (1998). Diversity in engineering. *The Bridge, 23,* 4. Retrieved February 8, 2008, from http://www.nae.edu/nae/bridgecom.nsf/weblinks/NAEW-4NHMBG?OpenDocument

Creativity in Science

It may be surprising to see science and creativity coupled because science is often considered a quantitative field, empirically based, where experiments are performed, data are collected, and conclusions drawn, whereas creativity conjures ideas of unbridled expression and artistic license. In fact, however, many great discoveries in science occurred because someone took a novel approach to solving a problem. The idea of thinking outside the box, actually playing with ideas rather than following a prescribed set of rules, has figured in the development of new cures, cutting-edge technology, and important scientific discoveries. In science, creativity can be a process, product, content, or personality condition that facilitates problem solving. For example, the story is often told that Albert Einstein finalized his theory of special relativity after having a dream about traveling in space sitting on top of an elevator. Another anecdote describes how August Kekule determined the structure of the benzene ring while dreaming of a snake biting its tail. Quite often too much time is spent being concerned with the end result and following a set of rules rather than letting one's mind wander to think in a different way. Consider what we might have lost or had to wait years for, if Einstein had not followed the direction of his dream.

Creativity in the Science Classroom

Although there is much evidence that creativity plays a vital role in scientific discoveries, creativity in the science classroom is often absent. Many science teachers were taught to do science using the scientific method, which consists of a number of sequential steps beginning with selecting a problem through coming to a conclusion. Most of the time, the problem is already given to the students, and all students work on the same problem using the same set of steps. Chances of arriving at different conclusions are slim and generally not encouraged. Science texts often describe an experiment to be carried out, complete with pictures of what the finished result should be. Many believe this fosters little creative or critical thinking but instead involves only duplication of what is illustrated. Posters showing these sequential steps continue to be displayed in many science classrooms across the nation despite the fact that actually doing science requires a more cyclic process.

Many gifted students exhibit characteristics such as productivity, persistence, concern for the future, imagination, curiosity, and independent

thought. These characteristics are often used to describe creative thinkers and scientists, making the infusion of creativity into science a way to address the needs of gifted learners, particularly those also gifted in science. It often becomes the responsibility of the science teacher to initiate this infusion of creativity.

There are a number of theories about creativity and its development, including whether or not creativity is an inherent characteristic or if it can be learned. Although these ideas are often debated, there are many who believe that creativity, at least "little c" creativity (as opposed to "Big C" creativity, meaning, genius), can be taught.

Teaching Students to Be Creative in Science

Based on the premise that creativity can be taught, there are a number of ways that teachers can infuse creativity into the science classroom. One model is Frank E. Williams's late-1960s *cognitive–affective interaction model* of implementing cognitive–affective behaviors in the classroom. It is three-dimensional: the content dimension, the teacher dimension, and the student dimension. If there is challenging content implemented by a teacher who uses multiple strategies, the students will increase their own cognitive aspects of fluency, flexibility, originality, and elaboration coupled with curiosity, risk taking, complexity, and imagination to develop new ideas. Fluency involves coming up with many ideas, such as listing all the ways that one could use a spring. Flexibility, while also focusing on many ideas, allows an individual to think along a number of different paths. Originality generally equates with finding novel solutions, and elaboration deals with expanding upon solutions or questions. Creative scientists must have curiosity, be risk takers, and have good imaginations. These cognitive and affective characteristics are particularly relevant to creativity in science.

SCAMPER

In addition, there are a number of strategies that science teachers can use to bring creativity to the classroom. One such strategy, SCAMPER, can be used to provide students with tools to assist them with being more creative by developing divergent thinking. In the 1980s Bob Eberle arranged some of the early works of A. F. Osborn into the acronym SCAMPER, so that students would have an easy way to remember a list of ideas they could use in their work to be more creative. This acronym represents the techniques of Substitute, Combine, Adapt, Modify/Magnify/Minify, Put to other uses, Eliminate, and Reverse/Rearrange. In science, these strategies can be accessed to provide new ways of looking at everyday problems and their possible solutions. For example, scientists, engineers, and physicians have worked to "minify" many instruments used in surgical procedures so that these instruments could be used to work in small spaces such as eyes and blood vessels. In the science classroom, students can use SCAMPER when working to invent a new product, a task that is often associated with units on simple machines, inventions, and/or the science fair.

Attribute Listing

In the late 1970s Robert Crawford explained the technique of attribute listing. This technique is useful for generating new ideas that can be used as either problems or solutions. Attribute listing may even be helpful during a brainstorming session. Attribute listing has two forms—attribute modifying and attribute transferring—both of which can be useful in the science classroom. In attribute modifying, the main characteristics of an object or problem, for example, are listed, and the student develops ideas for modifying or changing each one to solve the problem. Attribute transferring involves thinking in metaphors; thus an idea from one setting is transferred to and used in another.

Other Innovations

More recent innovations in creative science teaching involve problem-based approaches. These are reviewed by Jonathan Plucker and J. A. Nowak in "Creativity in Science for K–8 Practitioners."

Whether science is a vocation, avocation, or class in school, creativity must be an integral part of the process of doing science or engaging in scientific thinking. Otherwise, unique solutions to everyday problems, cures for specific diseases, and new technology may be lost.

Cheryll M. Adams and Rebecca L. Pierce

See also Brainstorming; Creative Problem Solving; Creative Process; Flow; Synectics

Further Readings

Kersting, K. (2003). What exactly is creativity? *Monitor on Psychology, 34*(10), 40–41.

Plucker, J. A., & Nowak, J. A. (2001). Creativity in science for K–8 practitioners: Problem-based approaches to discovery and invention. In M. D. Lynch & C. R. Harris (Eds.), *Fostering creativity in children, K–8* (pp. 145–158). Boston: Allyn & Bacon.

Williams, M. W., Markle, F., Brigocks, M., & Sternberg, R. J. (2002). *Creative intelligence for school.* Boston: Allyn & Bacon.

Creativity in the Workplace

Creativity provides incredible competitive advantages for individuals and organizations. Creativity enables the delivery of new products, services, and solutions and enhances decision making around ill-defined challenges. It also promotes personal resilience because it brings a sense of possibility and heightened self-esteem. Being creative is thus essential for personal and organizational prosperity.

Yet despite an increased focus on creativity, there is much confusion about its nature and ways to nurture it in the workplace. One explanation for this dilemma lies in several tensions, or seemingly contradictory choices, inherent in creativity. This entry addresses these tensions and provides steps that individuals, organizational leaders, and business schools can follow to take full advantage of the power of creativity.

Inherent Tensions

Promoting creativity first requires recognizing that everyone is born with the ability to produce creative results and make creative contributions. Creative abilities, of course, differ across individuals and there are certainly degrees of greatness. In the words of Harvard Professor Teresa Amabile, creativity exists along a continuum from the "garden variety" creativity observed in everyday life to that level involved in historically significant advances.

A corollary to the universality of creative ability is the fact that there is no one right way to be creative. Creative results come in the form of new products and manufacturing designs, novel inventions and unusual solutions to problems, or unique organizational strategies. Creativity also occurs in a variety of fields, certainly in the arts, but also in management, strategic planning, team-building, as well as marketing and research and development.

This perspective on creativity leads to the first tension: that creativity is not just about being artistic or generating wild and crazy ideas, stereotypes that prevail in the workplace. Creativity actually involves coming up with a new idea *and* doing something with it, whether it is writing a symphony or a novel, creating an organizational vision, solving problems, or resolving conflict on a team.

A second tension follows because of the need to balance internal and external worlds in the creative process. Creative ideas start in an individual, it is true, but they are further developed and shaped by interactions with the outside world, whether in the form of team sessions, conversations, or inspiration from nature, music, or art. If there is no balance between competing orientations, creative contributions developed in private might never see the light of day. Conversely, if no time is spent in reflection, creative results might merely be superficial responses to everyone else's ideas, with no special personal imprint.

A third tension is caused by the fact that creativity involves both a product and a process. Workplaces where innovation—or the ability of an organization to capitalize on the creativity of its employees—thrives leverage the creative talents of their employees through a healthy balance of product and process. Too much emphasis on products or results overlooks the emergent, trial-and-error nature of creativity. But not enough focus on them can cause a waste of resources and time. Discipline is required to allow for the necessary iteration between experimentation and execution.

Steps to Creativity

Given these tensions inherent in creativity, what are some recommended steps to grow more creativity at work?

Individuals can nourish their own creativity by the following:

1. Recognizing that the question is usually not how to *learn* to be creative, but rather how to uncover what is keeping them from being more creative. Too often, fears about being ridiculed or labeled different stifle creative ideas. Getting past deeply etched messages from the past and unproductive needs and fears can lead to a healthier flourishing of personal creativity.
2. Identifying and following personal processes to tap into their creativity—whether that involves walking by the river, sitting in a museum, or bouncing ideas around with friends or colleagues—and to balance the tensions inherent in creativity. Such processes, along with persistence and patience, can help overcome many obstacles to achieving one's creative potential.

Within organizations, leaders can nurture more creativity by doing the following:

1. Appreciating the wide diversity of creative styles, preferences, and results of individual team members. Some team members will shine at brainstorming; others might prefer to allow ideas to incubate in private. Some will be good at building on what's been done before; others may excel at crafting breakthrough solutions. All styles and contributions are equally valuable and need to be recognized and further developed.
2. Ensuring that there are decision-making, product-development, and conflict-resolution processes in place to achieve the synergy of this creative diversity. Different perspectives and styles will inevitably lead to conflict. Teams must learn to depersonalize conflict and manage it as a powerful tool to generate higher quality results.
3. Setting clear objectives, boundaries, and expected outcomes for teams. Flexible boundaries ensure that teams channel and capture creative energy without wasting time and resources.
4. Building a culture that supports creativity through rewards and recognition for information sharing and collaboration and through strong deterrents to wasteful political behavior.

Business schools can encourage more creativity in organizations by doing the following:

1. Providing courses that provide students not only with a variety of creative problem-solving tools and techniques, but also an appreciation for individual creative differences and opportunities that promote self-awareness and development of creative styles and preferences.
2. Addressing the challenges of managing the tensions of creativity in their leadership, strategy, product development, and organizational development courses.

Reaping the tremendous benefits of organizational and personal creativity requires an appreciation of several competing forces. Recognizing and surfacing the tensions between idea generation and execution, internal and external orientations, and process and product and figuring out how best to balance these forces will allow organizations and individuals to benefit from the awesome power of creativity.

Lynn C. Levesque

See also Best Practices; Leadership; Talent Development

Further Readings

Amabile, T. (1998, September–October). How to kill creativity. *Harvard Business Review,* pp. 77–87.
Cameron, J. (1992). *The artist's way.* Los Angeles: Jeremy P. Tarcher/Perigee.
Levesque, L. C. (2001). *Breakthrough creativity: Achieving top performance using the eight creative talents*. Palo Alto, CA: Davies-Black.

Creativity Research Journal

The *Creativity Research Journal* (*CRJ*) is one of the primary mechanisms disseminating scholarly research on creativity and its various expressions. Rankings of journal citation impact (one of the most useful indicators of research quality) places the *CRJ* in the top 50 of all of psychology journals and in the top 20 for educational psychology.

Several Nobel Laureates have articles in it. It is interdisciplinary and international. In fact, individuals and institutions in more than 60 countries contribute or subscribe to the *CRJ*. Articles on giftedness and related topics appear on a regular basis in it. This entry presents a short history and overview of the *CRJ*.

Background and History

The *CRJ* was founded in 1988. Only one issue was published that year, and it was published privately by the Creativity Research Center of Southern California, which is now defunct. Two years later Ablex Publishing (New Jersey) took over publishing the *CRJ,* and 10 years after that it was taken over by Lawrence Erlbaum Associates (also New Jersey). Erlbaum was sold to Taylor and Francis in 2006. The journal is truly international, with dozens of countries represented in its pages.

The *CRJ* was started to fill a gap in the scientific literature. This is implied by its title, and in particular "research." The gap was obvious to individuals working in the field in the 1980s, and most of these highly productive and influential scholars have served on the Editorial Board in the past 20 years. This includes Robert Albert, Teresa Amabile, Ravenna Helson, Howard Gruber, Howard Gardner, Robert Sternberg, David Henry Feldman, Mihaly Csikszentmihalyi, Ruth Richards, Albert Rothenberg, Robert Weisberg, and a number of other respected scholars. The quality of the Editorial Board ensures quality peer review and guarantees that the *CRJ* maintains its scientific standards.

The objectives of the *CRJ* can be explicitly stated. Quoting editor Mark Runco in the inaugural issue: "The primary objective is to publish high-quality, scholarly articles which will help researchers, educators, artists, organizational specialists, and other interested parties to better understand creativity. A related objective is to facilitate communication among those studying creativity" (p. 1). The criteria used to select articles to be published were also provided: "Originality is vital but must be balanced with fit and appropriateness" (p. 2). The unique stance of the journal is that the *CRJ* displays creativity but is also explicitly about creativity. The scientific grounding of the *CRJ* requires that much of the appropriateness in the definition above is a reflection of the fit with the existing literature on creativity. Speculation is not published.

The *CRJ* has always published diverse kinds of articles. This is necessary, if one wishes to understand creativity. After all, creativity is useful in many different disciplines and domains, including the arts, mathematics, invention, design, politics, sports, and more, and these vary in some ways in terms of the feasibility of empirical research and the operationalization of creativity.

There is also depth in the archives of the *CRJ*. That may be most obvious by looking specifically at the special issues that have been published. Special issues have been devoted to creativity and health, play, the arts, biomedical research, morality, schizophrenia, divergent thinking, qualitative research, and recently, malevolent creativity. There was a *Festschrift* for Howard Gruber, and an issue commemorating J. P. Guilford's 1950 seminal paper on creativity.

The *CRJ* has had an enormous impact on the field. Much of that comes from the communication facilitated by the journal and the option of having a particular place to look for research on the topic. Before the introduction of the *CRJ,* papers on creativity were published in various other journals, making them a bit difficult to locate. Also relevant to the impact of the *CRJ* is the economic research that has demonstrated that academic journals not only respond to scientific trends, but they also create new demand. This makes sense in that a journal gives scholars an opportunity and venue in which to publish their work. If their work is published, they are in fact benefiting from their research. In that light, new journals create new opportunities for scholarship. In the case of the *CRJ,* those are opportunities that encourage creativity.

Mark A. Runco

See also Creative Problem Solving; Creative Process; Creativity Theories

Further Readings

Feist, G., & Runco, M. A. (1993). Trends in the creativity literature (1967–1989). *Creativity Research Journal, 6,* 271–286.

Runco, M. A. (1988). Originality, utility. *Creativity Research Journal, 1,* 1–2.
Wallace, D., & Gruber, H. (Guest Eds.). (1993). Creativity in the moral domain. *Creativity Research Journal, 6*(1–2), 3–15.

Creativity Theories

Creativity is one of the most important assets of the human mind. It has played an essential role in cultural and technological evolution in every era. That is, one can find traces of creativity since the beginnings of human civilization. To survive on this planet, people have to find solutions for the problems they face every day. Nowadays, worldwide problems such as global warming, energy and economic crises, irreconcilable conflicts between people and environment, and related issues still bother scientists and politicians around the world. No matter what kind of creativity it requires or how trivial people might think a problem is (e.g., a new recipe), it still might have an impact on everyday life.

This entry focuses on theories used in understanding creativity. First, this entry discusses the history of creativity theories and theoretical frameworks. Next, the entry addresses the role of motivation in creativity as well as creative expression. Lastly, the entry considers approaches for researching creativity.

The Emerging of Creativity Theories

Although the concept of creativity can be traced to ancient time in all cultures, the systematic study of creativity emerged in the late 19th century. Graham Wallas proposed a four-stage model in 1926 to describe the process of creativity: a preparation stage, an incubation stage, an illumination stage, and a verification stage. At the same time, the psychodynamic approach proposed by Sigmund Freud also had profound influences on arts and literature. However, Joy Paul Guilford is recognized as the pioneer and major contributor in the field of creativity research. His description of creativity was based on the ability to manipulate ideas in fluent, flexible, elaborate, and original ways. Because his viewpoint was primarily embodied in the *structure of intellect model,* creativity is not an individually specific module, that is, creativity is not independent from intelligence. It is a manifestation of a basic mental function's manipulation. Guilford's position about creativity has great influence on this area even today. Empirical studies have shown a moderate relationship between creativity and intelligence, and many concepts of giftedness are based on this implication, such as Joseph Renzulli's *three-ring concept of giftedness*. Another great influence from Guilford's structure of intellect model is the development of an important measurement instrument of creativity. Following Guilford's work, Ellis Paul Torrance focused on the process of creativity and developed the famous Torrance Tests of Creative Thinking. Torrance's definition of creativity has been transformed into instructional guidelines for many creative-thinking training programs.

A Framework to Understanding Creativity

Four Ps

The ubiquitous four-Ps approach proposed by M. Rhodes in 1961 is a framework for understanding what to study regarding creativity. The four approaches are exploring (1) the person who is creative, (2) the process of creativity, (3) the product of creativity, and (4) the environmental press for developing creativity. The focus of a study can be categorized into these four domains. For example, based on the research literature, the creative personality traits are as follows: tolerance of ambiguity, openness to new experience, possessing unconventional values, independence of judgment, curiosity, preference for challenge and complexity, self-confidence and unconformity, propensity for risk taking, intrinsic motivation, and so on. However, because creativity is a complex phenomenon that is multidimensional and requires interactive examination, most of the creativity theories are multivariate or multidimensional theories. Another holistic approach to describe the producing experience of creativity was introduced by Mihaly Csikszentmihalyi, as the *flow* theory. Creativity is from this kind of optimal experience of discovery and invention.

Patricia A. Alexander, James L. Parsons, and William R. Nash proposed the *multidimensional,*

interactive process model of human creativity, which provides a broader view regarding how to understand creativity, how to study creativity, and the implications of related research methodologies. This model established a comprehensive framework to investigate the critical factors in a theory and explored how the creativity works by these factors.

Four Assumptions

It has four assumptions regarding the construct of creativity: (1) it is continuous, not dichotomous; (2) it is a dynamic, interactive, and multidimensional process; (3) it may encompass intentionality, but requires awareness; (4) it is higher-order intellectual processing. These assumptions have implications regarding how to study creativity and how to review a definition of creativity. First, these assumptions propose that people are not either creative or not creative; there are degrees and varieties of creativity, such as the construct of psychometric approaches in which creativity is viewed as a mental trait that can be quantified by an appropriate measurement instrument. Second, the manifestation of creativity involves a lot of interactions among many different factors between the individual and environment, which cannot be separated from time and space. Third, the relationship between affect and creativity is a major topic in understanding the process of creativity. Finally, it considers that creativity is not a mystical experience or phenomenon without etiology. It can be understood and studied from a person's cognitive abilities (e.g., divergent thinking, transformation abilities, sensitivity to problems and problem identification, tendency to practice with alternative solutions, insight and synthesizing abilities, evaluation abilities), especially from the brain function aspect. As brain imaging techniques improved—for example, functional magnetic resonance imaging (fMRI)—scientists could explore the human mind, including creative innovation.

Four Components

The four components in this model, which also can be considered as research domains, are (1) *biological* components, which include genetics, neurology, anatomy, and physiology; (2) *psychological* components, which include personality, motivation, and emotional well-being; (3) *sociology* components, which include society, culture, and economy; (4) *conceptual knowledge* components and *general strategic knowledge* components. The conceptual knowledge components are all the tacit and explicit knowledge that a person possesses about a specific concept or idea; and the strategic knowledge components are the reasoning, problem-solving, and self-regulatory process that have applicability across many tasks and many domains. The interactions of these components provide a basis for evaluating the testing and practice of a creativity theory, for example, investment theory of creativity proposed by Robert J. Sternberg and Todd I. Lubart, or geneplore model of creativity introduced by Ronald A. Finke, Thomas B. Ward, and Steven M. Smith.

Motivation and Creativity

The role of affect in the process of creativity has been noticed by researchers, such as Sandra W. Russ and Mihaly Csikszentmihalyi. Meanwhile, Teresa M. Amabile studied creativity from the viewpoint of social psychology and concentrated on the factor of motivation. In her model, creativity is a composite of three factors: (1) domain-relevant skills, (2) creativity-relevant skills, and (3) task motivation to contribute to a field of knowledge. Her original contribution in this area is from her prominent study in task motivation, concerning the effects of extrinsic and intrinsic motivation on creativity. In this model, creativity requires extensive knowledge preparation in a given field; that is, in the different domains, such as science and arts, a different knowledge base will be needed to execute the process of creativity. Besides, many implications for how to create a fertile environment for cultivating creativity were also derived from the empirical research results, such as teaching children to rely more on self-evaluation and self-reward systems; to focus less on external inducements and more on their own intrinsic enjoyment of work. Creativity theories provide teachers with ideas for helping children to find ways to really explore their most enjoyable and challenging activities. These suggestions are widely acknowledged by educators and implemented in the gifted and talented education program.

Along similar lines, John F. Feldhusen, basing his work on Amabile's model, includes a strong emphasis on metacognitive skills as an aspect of creativity-relevant skills, just like Sternberg's three-facet model. The three most relevant factors in Feldhusen's creativity model are (1) metacognitive processing, which is a set of strategies or metacognitive skills for processing new information; (2) a large and fluent knowledge base and mastery of skills in a particular domain; and (3) personality variables, which include attitudes, dispositions, motivations, and the like. As may be seen, each creativity model has its own unique contribution and focus; however, these capacities and factors can be conceptualized in the multidimensional, interactive process model of human creativity. Furthermore, these theories of creative behavior can be categorized as abilities, skills, and motivation.

The Expression of Creativity

The expression of creativity can be found in many different domains, including linguistic, logical-mathematical, spatial, bodily-kinesthetic, musical, interpersonal, intrapersonal, naturalist. Genius can be found in every professional field, and all people can express their creativity in their areas of greatest strength.

Sternberg also proposed the *WICS* (wisdom, intelligence, creativity, *and* synthesized) *model* for developing giftedness, and the *theory of successful intelligence* to improve achievement in school and life. The implications from this point of view are that creativity is working with other intelligences, and the traditional measurement of creativity might have the same problem as measuring intelligence, which captures only some aspects of the concept. As a matter of fact, how to measure and apply creativity to different fields is still a challenge for creativity research.

Research in Creativity

Researchers might find that besides the definition of creativity, including the different views from Western and Eastern culture, how to study creativity is still the most contentious issue for the future. Richard E. Mayer summarized the representative creativity research approaches as *psychometric, experimental, biographical, biological, computational,* and *contextual.* Each of these six approaches provides the research paradigms of *describing* the nature of creativity, *comparing* creativity and noncreativity, and *relating* factors of creativity. Each has its strengths and limitations; therefore, to have a comprehensive understanding about the phenomenon of creativity, a combination of research methodologies and interdisciplinary perspectives, such as psychology, cognitive science, neurobiology, and artificial intelligence, is required. Meyer also mentioned that although developing a clear definition of creativity and using combination of research methodologies are still challenges for creativity research, the assumptions about creativity and critical factors that might influence creativity performance are relatively much more consistent across researchers. How creativity develops in the human mind and how it relates to intelligence and cognition are still beyond our current understanding.

Tse-Yang Huang

See also Creative Classroom Techniques; Creative Communities; Creative Personality; Creative Problem Solving; Creative Process; Creative Productivity; Creativity, Definition; Creativity Assessment

Further Readings

Alexander, P. A., Parsons, J. L., & Nash, W. R. (1996). *Toward a theory of creativity.* Washington, DC: Association for Gifted Children.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: HarperCollins.

Dacey, J. S., & Lennon, K. H. (1998). *Understanding creativity: The interplay of biological, psychological, and social factors.* San Francisco: Jossey-Bass.

Mayer, R. E. (1999). Fifty years of creativity research. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 449–460). New York: Cambridge University Press.

Piirto, J. (2004). *Understanding creativity.* Scottsdale, AZ: Great Potential Press.

Runco, M. A. (2007). *Creativity: Theories and themes: Research, development, and practice.* Amsterdam, NY: Elsevier Academic.

Russ, S. W. (1993). *Affect and creativity: The role of affect and play in the creative process.* Hillsdale, NJ: Lawrence Erlbaum.

Sawyer, R. K. (2006). *Explaining creativity: The science of human innovation*. New York: Oxford University Press.

Weisberg, R. W. (2006). *Creativity: Understanding innovation in problem solving, science, invention, and arts*. Hoboken, NJ: Wiley.

Creativity Training

Issues and research about fostering creativity have been emerging in every field since Joy Paul Guilford presented his address on creativity at the American Psychological Association convention in 1950. The primary goal of these studies is to focus on what is optimal in an individual. In 1972, Ellis Paul Torrance reviewed 142 studies related to creativity training in children, and the results showed that overall 72 percent of the studies were successful; that is, creativity is teachable. He also found that the most successful approaches involved both cognitive and emotional functioning, and gave opportunities for involvement, practice, and interaction with others. Many questions about training effects still remain to be explored, such as how to choose related factors according to a creativity theory to be included in the training, and a more comprehensive understanding regarding the nature of creativity needs to be depicted.

Methodology

Nowadays researchers often use the method of meta-analysis to evaluate the effectiveness of creativity training programs instead of the vote-counting method used by Torrance. In the 1970s the concept of effect size was introduced as a more suitable and reasonable statistical method to synthesize the results of studies. Based on these empirical studies, meta-analysis has provided evidence that creativity can be enhanced by various kinds of training programs, and the average affect sizes of the training programs are $d = .50$ to $d = .80$; this is considered a moderate to large affect size. Because the effectiveness of creativity training programs is robust and the results could be generalized across types of creativity training programs and subjects' age level, people's performance on some specified measure of creativity definitely can be enhanced, as long as a realistic operational definition of creativity is represented in the instructional or training program.

Domains of Creativity

To understand the effectiveness of a creativity training program, a framework to explore the domains of creativity and investigating some related factors that might influence the performance of the creativity will provide direction. Ellis Torrance and H. T. Safter categorized the study of creative behavior into three major domains: *abilities, skills,* and *motivations*. This concise viewpoint gives a very useful and practical way to implement evaluations of creativity training programs. Reviewing the instructional materials, the content of training lessons, will reveal the focus and important factors of the training program. For example, William R. Nash developed *the 5 strategy guidelines,* which were transformed from Torrance's definition of creativity to challenge students to think creatively. The five steps are: (1) Becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so forth; (2) Identifying the difficulty; (3) Searching for solutions, making guesses, or formulating hypotheses about the deficiencies; (4) Testing and retesting and possibly modifying and retesting the hypotheses; and (5) Communicating the results. These guidelines focus on the process and skills of creativity. Besides, while developing a creativity training program and its evaluation, the domains of the *four-Ps* (person, process, product, and place) also need to be considered. Because the training program is a whole package, it includes creating a place for people to increase their creative skills and yield creative products. Therefore, the viewpoints of creativity behind these training programs are unavoidably associated with their instructional materials for fostering creativity and how to assess the progress after the training programs.

Challenges for Assessing Creativity

The most critical problem of the creativity training program are the criteria used for evaluating the effectiveness of a training program. Typically, the creative performance is measured by *divergent*

thinking. For instance, the Torrance Tests of Creative Thinking (TTCT), developed by Torrance, are the most frequently used criteria. Creativity training materials often involve divergent thinking activities, which also derive from Torrance's definition of creativity; therefore, evaluating training programs with such tests might become a case of "teaching to the test." Besides, scoring better on a posttest than a pretest may be the result of having learned what is wanted on the test (i.e., the *practice effect*) rather than truly increased creativity.

Nevertheless, there is another major concern about the impact of motivation on the TTCT or other creativity tests. Many studies have found that the scores of creativity tests could be improved by facilitating the motivation for taking the test or the testing conditions. Moreover, using divergent thinking as an introductory activity tended to increase students' interests or motives in a study topic. Therefore, the improving posttest scores might come from the influence of motivation, rather than the training materials. John F. Feldhusen and Ban E. Goh also mentioned that good instructional strategies probably only facilitate creative thinking processes, making it easier to access creativity but not guaranteeing successful, real-life creative production. This indicates that the effectiveness of a training program is usually limited to only the thinking process and implies that actual effects of creativity training programs might come from two sources: the learning experiences work as a stimulus to foster motivation and self-confidence with regard to creative thinking behaviors as well as the training providing practice in the creative thinking skills. However, gathering evidence of solid creative products in real life, the ultimate criterion, is still a challenge for evaluators of creativity training programs.

Important Factors for Enhancing Creativity

In addition to general intelligence, according to the literature the important factors for enhancing creativity are as follows: domain-specific knowledge, basic skills, self-management skills, specific creativity-aiding techniques, purpose and intention, curiosity and inquisitiveness, motivation, self-confidence and a willingness to take risks, mastery orientation and self-competition, beliefs, choice, and the opportunity to discover. Raymond S. Nickerson suggested that intrinsic motivation and commitment are the most basic determinants for enhancing creativity because, equipped with sufficient motivation, one is likely to obtain the necessary knowledge. Therefore, besides the cognitive aspects, cultivating motivation and other affective factors are also very important for long-term effectiveness of the creativity training programs.

Creativity Training Programs

Nowadays most researchers and educators agree that creativity training programs must be combined with other factors to produce long-term and transferable effects. John Feldhusen and Pamela R. Clinkenbeard suggest that these factors include (a) applying creative thinking skills in real-life situations, not merely exercises and activities (e.g., all areas of school curriculum); (b) creating a nonjudgmental environment that encourages creativity and risk taking; and (c) paying attention to the persistence necessary to develop a creative product. Such instructional models of creativity as the enrichment triad model created by Joseph S. Renzulli, the Purdue three-stage model proposed by John Feldhusen and Penny B. Kolloff, and the self-directed learning approaches introduced by Donald J. Treffinger, must be administered with appropriate instructional methods. Other famous creativity programs widely adopted by business, industry, and schools are the Osborn-Parnes model derived from Alex Osborn's brainstorming, Genrikh Altshuller's theory of inventive problem solving (TRIZ), Edward de Bono's lateral thinking, Calvin Taylor's Talents Unlimited, Martin V. Covington's Productive-Thinking Program, and the Khatena Training Method.

Treffinger warned that creativity training is not a process of homogenization. The purpose of training should not be focused on teaching everyone a fixed set of strategies, but to help individuals recognize, develop, and realize their unique strengths and talents. Creativity training should help to inspire their desire to learn and to be creatively productive in their own ways.

Scope of Creativity Training

Ideally, creativity training programs also may reveal innate abilities, improve higher-order thinking skills,

and build self-confidence, which should be fostered in an environment with a full-time climate of acceptance and encouragement. But, in practice, creativity training might not be able to develop all of these capacities at the same time and may provide only limited learning experiences that would enhance creative behavior in a given time frame. For example, a review by Ginamarie Scott, Lyle E. Leritz, and Michael D. Mumford found that four general main themes emerged in their creativity training studies: *idea production training, imagery training, cognitive training,* and *thinking skills training*. These training activities may be categorized into the *general strategic knowledge component* in the *multidimensional, interactive process model of human creativity* proposed by Patricia A. Alexander, James L. Parsons, and William R. Nash.

As may be seen from the components of the model, some components of creativity are hard or impossible to manipulate (e.g., biological and sociological components), some aspects are somewhat easier (e.g., conceptual and general strategic knowledge components), and some might be changed through learning experiences (i.e., psychological components such as motivation and emotional well-being). Creativity trainers should have the knowledge and wisdom to know what can be and what cannot be changed. The same idea applies in the issue of fostering creativity; that is, the aspects of creativity in an individual that can be cultivated most efficiently should be the primary concern of a creativity training program. That implies a good creativity training program has to be designed by assessing individual difference and needs in advance. Then these training and learning experiences could help to release or reveal the innate creative potential in a person.

Tse-Yang Huang

See also Creative Classroom Techniques; Creative Communities; Creative Leadership; Creative Personality; Creative Problem Solving; Creative Process; Creative Productivity; Creativity, Definition; Creativity Assessment; Creativity in the Workplace; Creativity Theories

Further Readings

Cramond, B. (2005). *Fostering creativity in gifted students*. Waco, TX: Prufrock Press.

Feldhusen, J. F., & Goh, B. E. (1995). Assessing and accessing creativity: An integrative review of theory, research, and development. *Creativity Research Journal, 8*(3), 231–247.

Langrehr, J. (2001). *Teaching our children to think*. Bloomington, IN: National Educational Service.

Nickerson, R. S. (1999). Enhancing creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 392–430). New York: Cambridge University Press.

Starko, A. J. (2004). *Creativity in the classroom: Schools of curious delight* (3rd ed.). Mahwah, NJ: Lawrence Erlbaum.

Sternberg, R. J., Grigorenko, E. L., & Singer, J. L. (Eds.). (2004). *Creativity: From potential to realization.* Washington, DC: American Psychological Association.

Sternberg, R. J., & Willams, W. M. (1996). *How to develop student creativity.* Alexandria, VA: Association for Supervision and Curriculum Development.

Tharp, T. (2003). *The creative habit: Learn it and use it for life*. New York: Simon & Schuster.

Criminal Gifted

Gifted people who commit acts of violence against themselves and others are relatively few in number. In the past decade, neuroscience has given us far greater awareness of the underlying biochemical correlates of our emotional states and the behaviors they arouse in us. People differ greatly not only in the expression of these states and behaviors, but also in the balance of a variety of neurotransmitters in the brain. When certain neurotransmitters are out of balance in an individual's central nervous system, he or she can become hypersensitive to life's tribulations and react in unpredictable and dramatic ways. In addition, it seems that true psychopaths (those with antisocial personality disorder) habituate so quickly to stimuli that they are forever bored and restless. Nothing can arouse them much, so they seek greater and greater stimulation to achieve some measure of arousal, some thrill that will make them feel alive. Recent discoveries of mirror neurons, the structure in the brain that permits empathy, have led to the hypothesis that psychopaths are deficient in or have defective mirror neurons.

Finally, there are conditions in which brain damage has destroyed those parts of the brain that inhibit aggression or allow for the development of empathy.

Biologically predisposed people usually also have psychological shaping for violence as well. It is also true that a gifted youth without much of a personality for aggression can be shaped in that direction. Violent behavior occurs as a response among smart young people for the same reasons it occurs among all people: hurt, frustration, and anger. Hurt can be physical or in the form of psychological injury, such as humiliation in front of a group. Violence in response to a threat of bodily injury is a long-identified expression of a fight-or-flight reaction to danger. Frustration can result in an explosive attempt to break down the real or perceived barriers to one's desired progress. And anger is one of our fundamental emotional states. Of course, hurt, frustration, and anger are part of everyone's daily lives. Some individuals differ in the spectrum of reactions they experience when they are hurt, frustrated, or angry.

Stoics, the strong and silent types, are usually able to keep a "poker face." They simply do not show their emotions, especially to their adversaries. They shove their feelings down inside of themselves and cut off their awareness of them. This coping mechanism can work for quite a while. When it fails, however, an explosion of mighty force can erupt. Feelings kept in a pressure cooker can burst out in an expression of violence. At the other end of the continuum is the person for whom hurt, frustration, and anger trigger immediate and catastrophic episodes of violent acting out.

Risk Factors

The intensity with which we experience our feelings and the nature and sensitivity of our emotional triggers to violence represents two fundamental variables in our understanding of violent behavior. A report released by the Federal Bureau of Investigation (FBI) in 2000 indicated four categories of risk factors found among youths who attempted to murder their classmates and teachers: (1) personality traits and behavior patterns, (2) patterns of family dynamics, (3) patterns of school dynamics, and (4) patterns of social dynamics.

Among the profile of personality traits (fairly stable and long-lasting characteristics of a person) and behavior patterns were included the following: alienation; poor coping skills; low tolerance for frustration; unusual interest in sensational violence in the news or entertainment media; identification with negative and/or criminal role models, such as Adolf Hitler or Hannibal Lecter; and the expression of clues suggesting intention to commit a violent act.

Patterns of family dynamics that the FBI suggests merit attention include allowing access to weapons and parents' refusal to recognize or acknowledge that their children are having problems.

The FBI cites the following patterns of school dynamics that may signal concern for possible acts of violence: unyielding and insensitive behavior of school personnel; commitment to a Code of Silence; and detachment from school, other students, and teachers.

All of the above conditions are magnified by participation in a peer group that is fascinated with violent or extremist beliefs and the use of drugs or alcohol.

Identification

When giftedness is combined with shaping for violence, a volatile condition is created. Gifted boys who are true psychopaths must be identified, and it must be recognized that situations in which such boys are humiliated or overwhelmed by others' superiority may lead to an outbreak of antisocial behavior. Gifted men who are true psychopaths usually need to be restrained or confined by society to prevent them from harming others. Many believe that there is little hope that these people can be changed. Those who are lucky, or so clever as to work themselves into corporations, organizations of education and religion, and government may damage or destroy our basic societal institutions, as Paul Babiak and Robert Hare point out in their book, *Snakes in Suits*.

Children who show a strange lack of feeling, who lie constantly to get what they want; who enjoy acts of cruelty toward animals and smaller children; who act out sexually; or who steal, set fires, and demonstrate no remorse for any of their actions may be true psychopaths. Personality tests and clinical interviews with trained psychologists can identify true psychopaths fairly accurately.

In his book *Savage Spawn,* Jonathan Kellerman argues that truly psychopathic young people who commit heinous crimes need to be locked up forever, because their disorder is a fundamental flaw in their nature that does not respond to treatment. The vast majority of gifted boys who are acting out with antisocial acts or aggressiveness are not true psychopaths, argue Barbara Kerr and Sanford Cohn. Kerr and Cohn believe that though dangerous and violent gifted boys do exist, there are many more gifted boys whose sociopathic behavior of rebelliousness, aggression, and self-destructiveness are learned behaviors that can be changed. In their book *Smart Boys,* Kerr and Cohn compare these two kinds of gifted boys to the poisonous butterfly and its mimic: the poisonous butterfly is biologically programmed to destroy the bird that preys upon it; the mimic butterfly has evolved merely to look like the poisonous one. Its markings are the same, but its essence is not lethal. Just as many butterflies assume the appearance of the most toxic exemplars of their species, so do gifted boys take on the characteristics of psychopathic behavior in order to defend themselves from those who might humiliate and hurt them.

Treatment and Guidance

Although a few books have been written about girl bullies, most of the information about guidance of antisocial gifted comes from the literature of boys' psychology. Kerr and Cohn give several recommendations for treatment and guidance of gifted boys with antisocial behavior. They found that gifted youths need honesty about their lives, their talents, and the prejudices of others toward them. They should be given specific information about their gifts so that they will understand why other children seem frustratingly slow. Another kind of honesty centers on the burden of being gifted and what Tracy Cross calls learning to live with the stigma of giftedness.

Gifted children searching the Web can find wonderful sources of knowledge—but they may also come in contact with tainted sources such as racist Web sites and Web sites that demean women. Gifted children need guidance in choosing not only what they want to know, but how to go about knowing it. That means critical evaluation of the sources of knowledge, and friendly assistance with technology.

Kerr and Cohn also suggest that gifted boys also need honest information about their role and responsibilities in the family. If a boy is the superstar, he needs honesty regarding the likelihood of getting more resources in the family than his siblings. Even in healthy families such sibling resentment occurs, but tends to fade after about a year if it is treated as no big deal. It becomes a big deal if, in response to taunts and teasing, boys may remind others of their princely status. If the gifted boy is the brother of a superstar, the second most talented in a family, he needs loving help in finding his own arenas of excellence as well as steadfast refusals to compare the two.

Gifted children need instruction and guidance in emotional, moral, and spiritual intelligence. Books on guiding boys, such as *Raising Cain* and *Real Boys,* give excellent suggestions for shaping these kinds of intelligence. In addition, books such as *Smart Girls* and *Reviving Ophelia* give good advice about the emotional guidance of gifted girls. This kind of guidance may be the best protection against the lethal shaping of our society.

Sanford Cohn

See also Boys, Gifted; Bullying; Emotional Intelligence; Girls, Gifted; Moral Development; Spiritual Intelligence

Further Readings

Babiak, P., & Hare, R. D. (2007). *Snakes in suits: When psychopaths go to work*. San Francisco: HarperCollins.

Coleman, L. J., & Cross, T. L. (2005). *Being gifted in school: An introduction to development and guidance of gifted children*. Waco. TX: Prufrock Press.

Kellerman, J. (1999). *Savage spawn*. New York: Ballantine Books.

Kerr, B. A. (1997). *Smart girls*. Scottsdale, AZ: Great Potential Press.

Kerr, B. A., & Cohn, S. J. (2001). *Smart boys: Talent, manhood, and the search for meaning*. Scottsdale, AZ: Great Potential Press.

Kindlon, D., & Thompson, M. (1999). *Raising Cain: Protecting the emotional lives of boys*. New York: Ballantine Books.

Pipher, M. (1994). *Reviving Ophelia: Saving the selves of adolescent girls.* New York: Ballantine Books.
Pollack, W. (1999). *Real boys: Rescuing our sons from the myths of boyhood.* New York: Macmillan.

Critical Thinking

A construct with many definitions, critical thinking is important for the education of gifted students regardless of the content area. Because these students are able to process information at advanced levels at an early age, they need the intellectual stimulation that comes with curriculum that is heavily embedded in critical thinking. Teachers who understand this necessity readily embrace the opportunity to build a rigorous curriculum of thinking skills through challenging and meaningful content. Even in Advanced Placement (AP) classes, the opportunity to examine the breadth of the content that comes through critical examination and questioning must be provided within and in addition to the accelerated pace of the class.

This entry discusses the various definitions of critical thinking, the combination of skills involved in critical thinking, curriculum that encourages critical thinking, and the implications of critical thinking. It also presents two scenarios illustrating critical thinking in the classroom.

Definitions

The issue of a definition of critical thinking sometimes prevents teachers from using the strategies necessary to build on the skills of gifted adolescents. Definitions abound. For example, John Dewey, the pioneering American educator, coined the term in the 1930s but preferred to call it *reflective thinking,* defining it as active, persistent, and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends. He saw critical thinking as a disposition that included living with uncertainty, that is, risk taking. In addition, he saw this reflective thinking as a series of connections, or relationships, that had to be considered carefully in order to keep the pattern of thinking more than a series of disconnected bits of information.

Similarly, Robert Ennis defined critical thinking as reasonable and reflective thinking focused on deciding what to believe or do. This very compact definition provides direction for those wishing to incorporate activities based on critical thinking in content, if they examine the key words in this definition. Discussion or activities based on content must require reasoning, reflection, and decision making, which are all focused on beliefs (thoughts or cognition) or doing (actions). Specific strategies to foster critical thinking according to this definition include clarifying issues and terms, identifying components of arguments, judging the credibility of evidence, using inductive and deductive reasoning, handling argument fallacies, and making value judgments.

Other scholars define critical thinking in terms of investigation whose purpose is to explore a situation, phenomenon, question, or problem to arrive at a hypothesis or conclusion about it that integrates all available information and therefore can be convincingly justified. Divergent views are aggressively sought because all assumptions are open to question. Discovery is also evident because inquiry is not biased in favor of any one outcome.

Still others state that critical thinking is the use of those cognitive skills or strategies that increase the probability of a desirable outcome. It is described as thinking that is purposeful, reasoned, and goal directed. Further, this kind of thinking involves solving problems, formulating inferences, calculating likelihoods, and making decisions when the thinker is using skills that are thoughtful and effective for the context and task. Dividing the thinking process, which is fluid and continuous, into discrete skills is somewhat artificial, but it is necessary to break the massive topic of critical thinking into manageable pieces. All of the previous definitions convey the idea of using mental activities to work on specific cognitive tasks.

Finally in terms of definitions offered here (although many other definitions of critical thinking are available), Richard Paul defines critical thinking as a process by which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking and imposing intellectual standards on them. The following dispositions are present in the process used by a well-cultivated critical thinker:

- Raises vital questions and problems, formulating them clearly and precisely
- Gathers and assesses relevant information, using abstract ideas to interpret it effectively
- Comes to well-reasoned conclusions and solutions, testing them against relevant criteria and standards
- Thinks open-mindedly within alternative systems of thought, recognizing and assessing, as necessary, their assumptions, implications, and practical consequences
- Communicates effectively with others in figuring out solutions to complex problems

Common to all of these definitions is the idea that critical thinking involves using mental activities to work on specific cognitive tasks. The constant use of the mind as an active agent in solving problems, evaluating issues and ideas, breaking down bias, and communicating effectively is the focus of all of these definitions. Moreover, understanding the importance of the use of the mind provides a clear rationale for the type of activities that must be employed in learning situations in order to stimulate the intellectual thought that is necessary to engage critical thinkers. Critical thinking is not an educational fad that will pass with time and go out of style. Rather, it has a very long history in psychology and education. In 1933, John Dewey identified learning to think as the primary purpose of education. In terms of gifted behaviors, perhaps a definition written 45 years ago provides the idea that intelligence can be described in terms of learnable skills. Critical thinking is the process of evaluation or categorization in terms of some previously accepted standards; this seems to involve attitude plus knowledge of facts plus some thinking skills. Hence, the critical thinking equation is as follows:

Attitude + Knowledge + Thinking Skills = Critical Thinking

Skills and Curriculum

Thus, critical thinking involves a combination of skills used simultaneously. Though these skills can be taught, it is also necessary for educators and others who work with gifted students to understand that these individuals often have learned critical thinking skills by the time they arrive in school. They often pick up by these skills themselves in thinking and reading about the individual events they experience. In that case, it is important to stimulate this thinking in school by consistently providing choices and opportunities for students to use these skills in whatever content area and at whatever their level in school. Waiting for a student to arrive in an AP class in high school for critical thinking to occur is losing sight of the many previous years that were not attending to thinking needs. Teachers must address the need for a continual critical thinking curriculum throughout all of school. The lack of a consistent curriculum can be prevented if teachers provide challenging and worthwhile tasks that foster maximum engagement and provide cognitive rigor. When observing students' out-of-school behavior, it is obvious that they engage in numerous activities ranging from passively watching television, to actively participating in sports, to choosing challenging volunteer or work situations. They may engage in a variety of extracurricular activities from early in their educational careers. Their lives are not characterized by a "one size fits all" paradigm. Gifted students are interested in different ideas, in different books, and in different ways of exploring ideas. Schools must foster this individual uniqueness as well as attend to individual differences and provide differentiation in curriculum. Critical thinking is one of those unique characteristics of gifted students that must be understood and used both in the design of activities and in the choice of appropriate content for all courses.

Examples

Critical thinking in the classroom invites students to be active agents in their own learning process. An example of a classroom that invites critical thinking can be seen in the following scenario:

Christine teaches English in a suburban high school in a major midwestern city. She has taught for 15 years and has tried many methods to engage her students. Her mantra is always to assign "rigorous works of literature," and she prefers classics. Although she does not see herself as overly critical, she does not tolerate incorrect information when it

can be factually disproved in the assigned reading. She discusses with students every day, posing an open-ended question and asking students to think alone, share with two others, and then arrive at conclusions to share with the entire class. She teaches thinking skills in each of these open-ended questions. For instance, she asked the question "Who is Hamlet" in a recent class discussion, asking students to reason, from what they had read, how they would define this complex character. Further, several times during the class period, she came back to the question, "Who, then, is Hamlet?" Sometimes, this occurred after discussion had apparently gone to different aspects of the play. In the same class discussion, she asked students whether Hamlet's judgments of Gertrude's (his mother's) actions were "any of his business." Students had to judge both Hamlet's actions and the events that preceded his statements in order to arrive at their conclusions. Christine always insists on textual evidence for hypotheses or conclusions voiced in class. She asks, "Where did you find your support for that conclusion?" or "What made you hypothesize that?" There is a tacit understanding in class that one needs to support a statement in order to voice it.

Contrast this scenario with the following example of a high school social studies class: Joe has taught social studies for 15 years. He feels that social studies is the single most important subject for his students in order to survive in a global economy. In fact, he frequently quotes newspapers, statements made by television news anchors, and items from NPR in his lectures to his classes. He does not feel that adolescents have enough life experience to judge, predict, or analyze situations meaningfully. So, he does these skills for his students. He carefully chooses films, Internet activities, and readings for his students, but he admits that his teaching of critical thinking occurs from what students gain from him as they observe how he reasons through ideas. He expects his students to ultimately have their own ideas and views in order to do well on his assigned tasks and assessments, although he does try to look for well-reasoned responses.

Examining these two scenarios would seem like a right answer/wrong answer task. However, if one examines both classes and both teachers, one can see that critical thinking possibilities occur in both. Christine is open to discussion and ideas as she moves through the daily class experiences. Joe models critical thinking and processes information for students that perhaps challenges the way they see the same events. One might wish that Joe would tolerate different responses because not everyone makes the same conclusions from the same scenario. Both instructors infuse rigorous content and process into their classroom activities. A gifted student may actively learn from both of these classes. From Christine, a gifted student would test ideas, and may be put in the "hot seat" to support viewpoints with text. In Joe's class, a gifted student would be challenged to listen to a well-developed collection of facts and ideas, synthesized in a way to challenge and to explain the issue at hand.

Implications

Critical thinking instruction relies on two major assumptions: (1) that there are clearly identifiable and definable thinking skills that students can be taught to recognize and to apply accurately, and (2) that if students recognize and apply these thinking skills, they will be better, more effective thinkers. Critical thinking is essential in classes for all students. For those who process information more efficiently and move more quickly through it, typically attributes of gifted students, critical thinking explains the way they work with information whether in the classroom, their own home, or in the career they choose. School can be an impediment to thinking if classes focus on simple solutions through simple content. If teaching to the test—whether the standardized yearly assessment or the AP test—is what the instructor chooses to do, then little cognitive growth will occur for gifted students. On the other hand, if the experience is challenging, open to examination, and tolerates more than one right answer if the answer is justified with well-developed support, then school is a laboratory for growth and perfection (or acquisition) of skills. Intellectual skills, like physical skills, require instruction, practice, and feedback in order for learners to reach higher levels of competence. Critical thinking skills, well developed and employed, open doors for students that rote memorization of someone else's thinking does not.

Felicia A. Dixon

See also Advanced Placement; Cognition; Curriculum Models; Secondary Schools

Further Readings

Dewey, J. (1933). *How we think* (Rev. ed.). New York: Heath.

Dixon, F. A. (2006). Critical thinking: A foundation for challenging content. In F. A. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education* (pp. 323–341). Waco, TX: Prufrock Press.

Ennis, R. H. (1985). Goals for a critical thinking curriculum. In A. Costa (Ed.), *Developing minds: A resource book for teaching thinking* (pp. 54–57). Alexandria, VA: Association for Supervision and Curriculum Development.

Halpern, D. (1997). *Critical thinking across the curriculum: A brief edition of thought and knowledge.* Mahwah, NJ: Lawrence Erlbaum.

Kurfiss, J. G. (1988). *Critical thinking: Theory, research, practice, and possibilities* (ASHE-ERIC Higher Education Report No. 2). Washington, DC: Association for the Study of Higher Education.

Paul, R., & Elder, L. (2001). *Critical thinking: Tools for taking charge of your learning and your life.* Upper Saddle River, NJ: Prentice Hall.

Cultural Conceptions of Giftedness

Gifts and talents can exist only in a cultural context—a frame of reference made up of patterns of expectations, behavior, values, and meanings shared by members of a community. Those historical and social forces shape both the dynamics of individual psychology and the way individuals may be perceived as gifted. Cultural outlook also influences the researcher in the design of investigations, the questions asked, and the way findings are interpreted.

Western Versus Non-Western Views of Giftedness

In the United States, the definition of giftedness still most widely used was set out in the 1972 Marland Report in a checklist that includes "valued by society," "rarity," and "yield a product," thus requiring demonstrated competence. This Western view stresses individual and competitive achievement rather than collaboration with others.

There is a further dichotomy between the Western acceptance of an ability spectrum (the bell curve) with a lower and an upper end, so that only a few children can be gifted, and the Eastern view that all children have that potential. Indian, Chinese, or Japanese parents and teachers believe that children can succeed at a high level within a culture of hard work, clear focus, and support. Whether all or just a few children have access to learning opportunities brings extreme differences of approach, practice, and outcomes.

In many cases, Western cultural conceptions of giftedness lead to the construction of assessments that fail to identify disadvantaged students with capacities for rapid learning of complex material and advanced problem-solving abilities. For example, the underlying assumption of talent searches, a popular approach to gifted education, is that out-of-level testing will reveal a small group of children with precocious achievement in mathematical or verbal areas, and that these children are the gifted who can benefit from special programming, particularly accelerated programming. U.S. findings of talent searches are not unusual in reporting that poor and minority students are far less likely to participate in these programs compared with children from advantaged backgrounds. As yet, there is no scientific comparison, either cross-nationally or even within one country, between aspects of any program for the gifted and another, so it is hard to say what type of provision would be the most appropriate in any cultural situation.

In addition, conceptions of giftedness within a particular culture may be so divergent from dominant, Western points of view that it is difficult for educators to bridge the gap in values in order to provide appropriate gifted education. For example, indigenous people may place greater value upon the survival skills of tool-making, hunting, and prediction of weather patterns than on school-related skills. Cultures such as the Navajo, whose world view is profoundly spiritual, may value ceremonial skills and the capacity for attaining harmony above all other abilities. Collectivist cultures may value those aspects of intelligence that promote community welfare rather than individual achievement. These complexities are discussed in Shane Phillipson

and Maria McCann's book, *Conceptions of Giftedness: Sociocultural Perspectives,* and in Robert Sternberg and Janet Davidson's *Conceptions of Giftedness.*

Provisions for the Gifted

Excellence can come from a wide variety of special provisions—and even from none. For example, although there are no educational programs for the gifted in Scandinavia and Japan, the children's achievements there on international surveys are often superior to those of countries that do have them. China provides widespread enrichment for volunteer children via its Children's Palaces, and the outstanding results show on the world stage, whether in sport or in economic progress. In both New Zealand and Israel, the governments provide generously, again employing some self-selection to higher-level learning. The United Kingdom is taking provision for the gifted into all schools. Germany and much of Eastern Europe self-select via competitions, funded both federally and privately. Brazilian help goes to finding seriously deprived children who are potentially talented.

Fundamental Issues

Yet, some fundamental issues in ideas of giftedness confront researchers and policymakers everywhere. The following are four prominent issues.

Issue 1: Upsetting the Conventional Profile

Conventional ways of identifying and providing activities for the gifted have been designed by people whose values and ideas tend to replicate the dominant culture, yet might alienate others. Where the outlook of the child's cultural group does not match that of the school, there may be deliberate noncompliance. In many cultures, gifts are associated with social handicap (e.g., lack of friends), though this view is diminishing with increasing evidence to the contrary. Disaffection and social exclusion are problems worldwide, and affect the potentially gifted.

It is only in cultures that have a long history of concern for the gifted that the idea that disability and impairment can disguise and block exceptional talents is becoming active. It is becoming recognized that without targeted support, complications such as learning difficulties, autistic spectrum disorders, and hyperactivity are liable to handicap gifted students' success rates in formal schooling.

Issue 2: Early Childhood

In education, the very youngest participants are often the last priority. Kindergarten and nursery workers usually have less voice in educational discussions. There are some rare exceptions to this, such as Reggio Emilia in Italy or in cultures where the community shares responsibility for bringing up its youngest members. It is not easy to test the abilities of very little children, but those who are obviously very advanced pose problems from the start of school life.

Issue 3: Access to High-Quality Education

Cultural controls, often unrecognized, mean that around the world there is limited access to enrichment and challenge in education for some potentially gifted. Selection can be via tests or expert judgment, or self-selection where individuals can decide for themselves to experiment and learn in a challenging educational environment. Although there are practical reasons for rationing high-quality education, there are often ways to be found that could enable a wider range of learners to progress.

Issue 4: Educating Teachers

Culture affects all educational concerns, such as mixed ability teaching, skipping grades, vocational guidance, gender issues, and parents' influence. In addition, because the most able learn at a swifter pace and greater depth than other children, this causes problems of educational management and selection for their curriculum. This suggests the need for changes to the style of teaching, discipline, organization, communication, and the overall approach to the highly able.

Practitioners need access to sound empirical evidence as well as the fruits of others' experiences, transferable between cultures. They need to know what has worked where, what cannot be said to work anywhere, and how to adapt this knowledge

to local conditions. Currently, there is little evidence of cross-cultural work for practitioners to draw on. Such information should cover a great variety of educational approaches and recognize the wider outcomes of such provision.

Joan Freeman

See also Cultural Values; Global Issues

Further Readings

Freeman, J. (1998). *Educating the very able: Current international research*. London: H.M. Stationery Office. (Translated into Thai) (Available online: http://www.joanfreeman.com)

Freeman, J. (2002). *Out of school educational provision for the gifted and talented around the world*. Report for the Department for Education (UK Government). (Available online: http://www.joanfreeman.com)

Freeman, J. (2005). Permission to be gifted: How conceptions of giftedness can change lives. In R. Sternberg & J. Davidson (Eds.), *Conceptions of giftedness* (pp. 80–97). Cambridge, UK: Cambridge University Press.

Phillipson, S., & McCann, M. (2007). *Conceptions of giftedness: Sociocultural perspectives*. London: Routledge.

Stevenson, H. W. (2002). Cultural interpretations of giftedness: The case of East Asia. In R. Friedman & K. B. Rogers (Eds.), *Talent in context: Historical and social perspectives on giftedness*. Washington, DC: American Psychological Association.

Cultural Values

Issues associated with cultural and socioeconomic diversity continue to be discussed at meetings and in literature focused on education for gifted students: identification for special programs, components of programs, and broad societal implications of the underrepresentation in programs of students from minority cultures and with low socioeconomic status. More inclusive program philosophies, the use of multiple criteria during selection, and matching selection with school demographics have not rectified nationwide disparities, although these strategies have helped some programs move toward proportionate presence of commonly underrepresented populations in programs. Rarely acknowledged in this regard are cultural value orientations.

Philosophers in education and social sciences have questioned whether U.S. schools simply reproduce society, not reform it. That question is related to the underrepresentation of nonmainstream groups in programs for gifted students. Scholars have found that educators' expectations for children are based largely on parents' economic status, whether parents advocate for their children, and whether children's appearance and behaviors resonate with teachers' own cultural background. Idealistic, well-meaning dominant-culture teachers may unwittingly and consistently respond more favorably to students who are similar to themselves. Schools may therefore help to perpetuate social hierarchies if teachers give unequal attention and support when nominating students for special educational opportunities.

Other factors may also contribute to the cultural disparities related to participation. Students' achievement may be affected by teacher responses, according to scholars who have found that teachers favor attractive, middle-class, high-achieving, conforming students, responding less favorably to those who are unattractive, low-achieving, from nonmainstream cultures, or from low-income families. In addition, dominant-culture teachers may respond negatively to nonmainstream styles of conversation and argumentation. Minority-culture students may actually view education as "dangerous," potentially separating them from their families and communities. Perhaps these students anticipate that to be gifted means separating themselves even farther from support. Teachers may forget that acculturation into the mainstream culture should be viewed on a continuum, rather than as either present or absent. Educators, believing that being inclusive means that "differences don't matter," may miss a chance to affirm the unique individual and cultural strengths of nonmainstream students.

The perception among some educators that participation in gifted programs must be earned or "deserved" may also be problematic. Pleasant, cooperative, helpful, responsive, competitive, conscientious, and contributing students may be seen as especially deserving of participation if

they meet test-score criteria during initial screening. In contrast, discouraged and neglected gifted children, irritating, isolated, or "too-different" gifted children, or immigrant gifted children without proficiency in English may all be unable to demonstrate their abilities in ways that catch the attention of teachers. For a multitude of reasons, high-ability students may also be unable to demonstrate their giftedness at a particular time in their development or in particular circumstances.

Scholars, examining the language of dominant-culture teachers as they nominated students for participation in a gifted program, found that the teachers confidently used ad hoc criteria reflected in major themes: behavior, verbal assertiveness and verbal skills, family status, work ethic, and social skills. In reality, some minority cultures do not value "standing out" and "showing what you know," two common informal criteria for selection. Those criteria have implications for students from nonmainstream cultures, who, arguably, may need the services more than do students who have economic and educational-enrichment advantages. Even "work ethic" may not be demonstrated in ways teachers are accustomed to seeing it, and verbal ability may not be in English.

Cultural value orientations, then, including teachers', may be related to the underrepresentation of some cultural groups in gifted programs. Individual, conspicuous, competitive achievement, which has been deemed a basic dominant-culture value orientation, is reflected in checklists commonly used to nominate students or support nominations. If participation in a program must be earned, perhaps children whose cultures value deference to authority, humility, wisdom, the expressive arts, collaboration, and listening, for example, may not be viewed as "deserving." One study found these themes in the language of minority-culture participants nominating acquaintances for a hypothetical gifted program. In short, in order to be nominated for a gifted program, students not from the dominant culture apparently need to be assertive, be "known," and demonstrate their gifts conspicuously. Teachers may be unaware that some minority cultures are not encouraged to be assertive. Minority students may not realize that teachers are looking for certain behaviors.

If children and teens from minority and/or low-socioeconomic cultures are to be identified, including those from contexts lacking the kind of enrichment that mainstream middle-class students take for granted, then programs for gifted students may need to be different from the solely more-and-faster programs that are typical. Programs should address individual needs. Needs of culturally different students include affirmation of and support for familiar and unfamiliar gifts, besides having educational experiences appropriate to ability level—all potential rationales for selection and programming.

Ethnocentric, monolingual teachers may not recognize the linguistic sophistication of a bilingual immigrant student, not be sympathetic to challenges related to oral-language acquisition and writing and reading, not understand the loneliness of lack of language facility, not be sensitive to the cognitive overload associated with new-language immersion, and not understand why families speak their native language at home at the end of a tiring day. If dominant-culture teachers do not consider that they themselves are also from a culture, they might assume that their own values are at the top of a hierarchy of cultural values. They may avoid nominating cultural-minority children for a gifted program because they "don't fit." They may miss the unique strengths, talents, and creative and other abilities of those children, also denying a chance to enhance self-concept; classroom involvement; connection to school; and social, emotional, and cognitive development through making participation in a gifted program possible.

Jean Sunde Peterson

See also Bilingualism and Creativity; Cultural Conceptions of Giftedness; Identification; Socioeconomic Status

Further Readings

Peterson, J. S. (1999). Gifted—Through whose cultural lens? An application of the postpositivistic mode of inquiry. *Journal for the Education of the Gifted, 22,* 354–383.

Peterson, J. S., & Margolin, L. (1997). Naming gifted children: An example of unintended "reproduction." *Journal for the Education of the Gifted, 21,* 82–100.

Curriculum Models

Curriculum is a design plan for learning that requires the purposeful and proactive organization, sequencing, and management of the interactions among the teacher, the students, and the content deemed desirable for students. A model is a format for curriculum design developed to meet unique needs, contexts, and/or purposes in the classroom. In order to address these goals, curriculum developers design, reconfigure, or rearrange one or more key curriculum components. Curriculum for advanced learners is qualitatively different from curriculum in the regular classroom; some of the components of curriculum models for advanced learners include content, assessment, introduction/closure, teaching strategies, learning activities, grouping and pacing, products, resources, extension activities, and differentiation.

Providing appropriate curriculum for high-ability learners has been a continual focus of the field of gifted education. Depth and complexity are overarching goals of curriculum for all gifted learners, and should be focal points when educators are developing or identifying curriculum for high-potential students. Quality curriculum is essential for all students; curriculum for talented students differs in the level of depth, complexity, challenge, and incorporation of enriched material. High-ability learners need additional challenge, faster-paced instruction, and more opportunity for deep exploration of content. Strong curriculum models will address all the needs of gifted learners and will facilitate teacher's efforts to create, organize, and implement advanced learning.

Evolution of Curriculum Models for Talented Students

Virgil S. Ward was one of the first educational theorists to propose the need for differentiated curriculum for gifted students. His research began in the 1950s and focused on Differential Education for the Gifted (DEG). Ward's work laid initial theoretical and conceptual frameworks for educators of the gifted. He emphasized the teacher's role in supporting talented students, stressing the importance of unique curricula developed specifically for talented students. Ward pointed out that the adaptation of existing curricula often resulted in talented students being given "more of the same," resulting in a lack of challenge and engagement. Methodologies and interconnections of content areas should be the focus of curriculum development for talented students rather than the didactic transmission of existing facts and basic understandings.

In more recent years, theories involving curriculum for the gifted have come to focus on operationalized program models affecting entire schools. For example, Joseph Renzulli's *schoolwide enrichment model* (SEM) introduced us to an identification system and programming options in the form of a continuum of services that not only identified the traditionally serviced gifted children in the top 5 to 10 percent, but also captured the creative-productive potential in students from the top 20 percent who may or may not perform well on traditional measures of intelligence. Along with Renzulli, Sally Reis introduced the *revolving door identification model,* which allows students to enter the program via a variety of alternative and traditional pathways (IQ measurements, performance test scores, products, along with parent nominations, portfolio assessments, peer nominations, etc.).

A curriculum model for gifted learners that is focused on extraordinary talent in specific domains is the *talent search model of talent identification and development,* developed by Julian Stanley and his colleagues at Johns Hopkins University. This model utilizes the SAT-Math and SAT-Verbal as identification measures, and is largely based on accelerative practices within schools. A plethora of research about the model suggests it has substantial benefits for mathematically and verbally talented youth. The Study of Mathematically Precocious Youth (SMPY), led by Camilla Benbow and David Lubinsky, has been a major source of information about the learning needs of mathematically gifted students. More than 300 articles have been published about SMPY, supporting the model's contention of the benefits of acceleration. The model's focus on content does not require altering curriculum greatly, allowing the model to align nicely with state and national standards.

The sustainability of the Stanley model has been well documented; parents and students have proven

to be the strongest proponents of SMPY, with schools resisting due to the negative beliefs about accelerative practices largely held by public schools across the United States. Longitudinal research is currently being conducted at Vanderbilt University; the 50-year follow-up study will include 6,000 students and is expected to rival Lewis Terman's study in terms of longevity and surpass it in terms of talent development research.

Both Renzulli's SEM and Lubinski and Benbow's SMPY are considered comprehensive programming and curriculum models, the first to be implemented in school settings, and the second in university-based settings (although it is possible for schools to use out-of-level testing and acceleration by domain to implement the talent search model in schools). The next section explores curriculum development models designed to help teachers with the complicated process of writing curriculum for talented students.

Curriculum Development Models

Three models have emerged in recent decades that have proven beneficial for educators to utilize when writing curriculum for gifted learners. These models offer step-by-step instructions for educators to use as guidelines when developing curriculum for advanced learners. The process of creating curricular experiences for high-potential students is complex and difficult; these three models offer varying approaches and specific examples to assist in the process.

Integrated Curriculum Model

The *integrated curriculum model* (ICM) developed by Joyce VanTassel-Baska establishes a framework for developing appropriate curriculum for talented students. The three dimensions—advanced content; higher-level processes and product development; and interdisciplinary concepts, issues, and themes—provide a solid foundation for developing challenging and engaging units for talented students.

The dimension of Advanced Content should include in-depth investigations, advanced reading, primary sources, and the use of advanced skills. Overarching Concepts can include change, systems, patterns, and cause and effect. The Process–Product dimension focuses curriculum on elements of reasoning, research, problem-based learning, and inquiry skills.

VanTassel-Baska proposes a three-circle visual that communicates the interconnectedness and interdependence of the three dimensions (see Figure 1).

Using ICM, curriculum developers have access to practical steps and strategies that support and encourage creativity, growth, and increased success with practice while writing curriculum. VanTassel-Baska and her staff at the Center for Gifted Education at the College of William & Mary have developed several curricular units that research has proven to be effective for talented students. All of VanTassel-Baska's units are aligned with national standards, making their implementation in classrooms across the country appropriate and relevant.

Multiple Menu Model

The developers of the *multiple menu model* (MMM) at the National Research Center for the Gifted and Talented at the University of Connecticut sought to create a model that focused on the methodologies of varying disciplines and creating firsthand inquirers out of students (see Figure 2). The overarching belief of MMM is that curriculum is a combination of knowledge and instructional techniques; good curriculum comes when we identify the core knowledge we want our students to know, with appropriate instructional techniques for each learning opportunity. Striving for a balance between content and process was a constant goal while writing this model; the opportunities for deep learning in curriculum developed using MMM cemented this focus on not only content, but process as well. Joseph Renzulli, Jann Leppien, and Thomas Hays incorporated the idea of drop-down menus into MMM to provide teachers with a variety of rich options when developing advanced curriculum for talented students. They provide prerequisite assumptions about the curriculum writing process, including the belief that teachers who themselves possess a passion for a discipline will create quality curricular experiences and that providing authentic methodological inquiry experiences for students is the most effective way to ensure deep learning.

The six components include the Knowledge Menu, the Instructional Objectives and Student

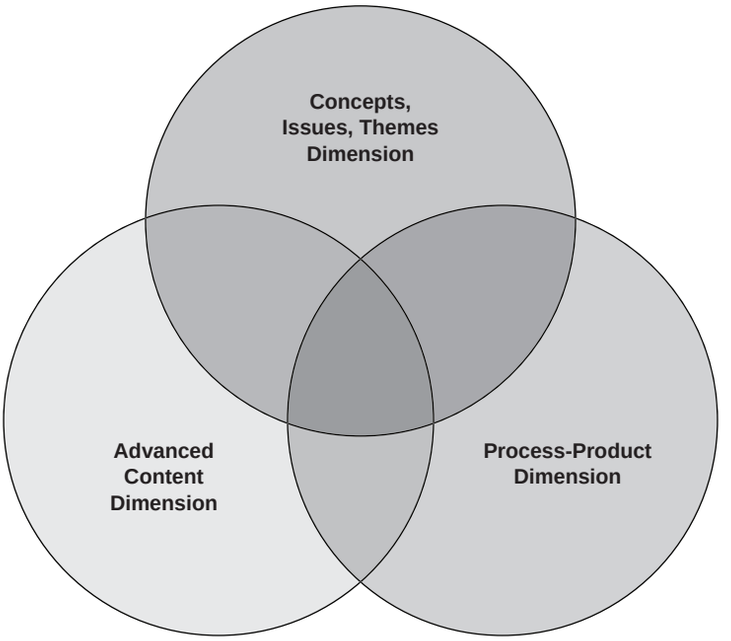


Figure 1 The Integrated Curriculum Model for Gifted Learners

Source: J. Van Tassel-Baska.

Activities Menu, the Instructional Strategies Menu, the Instructional Sequences Menu, the Artistic Modification Menu, and the Instructional Products Menu, which is composed of two submenus: Concrete Products Menu and Abstract Products Menu.

The development of a Knowledge Tree is an essential step in the curriculum development process using MMM; each curricular unit should begin with a Knowledge Tree outlining related concepts, themes, content, and methodologies that could be incorporated in the lessons. This method of thinking about curriculum forces educators to realize and incorporate the inter-/intradisciplinary components of a unit.

MMM has been successfully implemented in classrooms across the country by practicing professionals and content specialists. The focus on student inquiry, rather than on inclusion of all relevant information in a unit, makes this model an excellent starting point for educators of bright children seeking to write quality curriculum.

Parallel Curriculum Model

The *parallel curriculum model* (PCM) is a set of four interrelated aspects of advanced curriculum that can be used individually or in combination to create or revise existing curriculum units, lessons, or tasks. Each of the four parallels offers a unique approach for organizing content, teaching, and learning that is closely aligned to the special purpose of each parallel. The main focus of PCM is on developing essential understandings and questions for each curricular unit.

The four parallels of PCM include the Core Curriculum, Curriculum of Connections, Curriculum of Practice, and Curriculum of Identity. According to the model, the Core Curriculum addresses the core concepts, principles, and skills of a discipline; the Core Parallel is always present because it represents the foundational knowledge students must acquire. The Curriculum of Connections helps curriculum developers establish a set of overarching concepts, principles, and skills

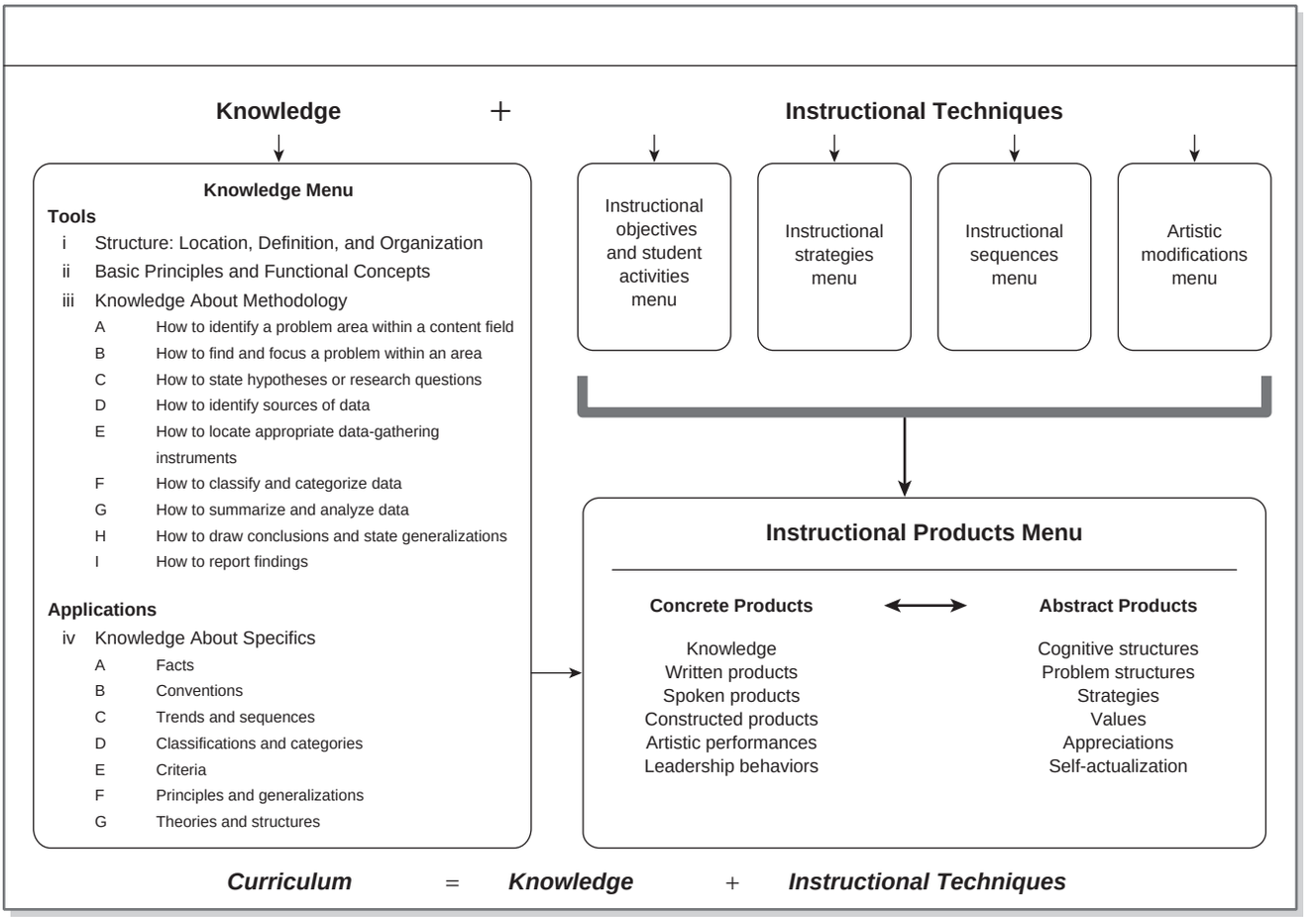


Figure 2 Multiple Menu Model

Source: J. S. Renzulli.

across multiple disciplines. The Curriculum of Practice is a plan that includes a set of guidelines and procedures to help students understand, use, generalize, and transfer essential knowledge, understandings, and skills in a field to authentic questions, practices, and problems. Lastly, the Curriculum of Identity is a plan that includes a set of guidelines and procedures to assist students in reflecting upon the relationship between the skills and ideas in a discipline and their own lives, personal growth, and development. Emphasizing a particular parallel within a curricular unit should largely be based on the student learner profile, subject area, content goals, and related units.

The authors of PCM stress the importance of catering to a variety of learning needs in the classroom; their proposed *ascending levels of intellectual demand* (ALID) is a process that advances one or more facets of the curriculum in order to match a learner's profile and provide appropriate challenge and pacing. Prior knowledge and opportunities, existing scheme, and cognitive abilities are major attributes of a learner's profile. Teachers reconfigure one or more curriculum components to ensure that students are working to their maximum potential while at the same time catering to their individual learning needs.

Future Implications

Curriculum models for talented learners have evolved over time to focus on essential understandings, interconnections, discipline methodologies, and opportunities for depth and complexity in

every lesson. It is a widely accepted belief that each child is unique and therefore possesses unique learning needs; the challenge for educators of bright children is to identify and incorporate best practices in curriculum development into their best practices as gifted educators. Curricular programming models such as the SEM and curriculum development models such as the PCM are tools that have been developed and researched for educators to better serve their high-ability and high-potential students.

Jenna Bachinski

See also Academic Talent; Inquiry; Language Arts, Curriculum; Mathematics, Curriculum; No Child Left Behind; Social Studies, Curriculum

Further Readings

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting: The complete guide to modifying the regular curriculum for high ability students*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Leppien, J. L., & Hays, T. S. (2000). *The multiple menu model: A practical guide for developing differentiated curriculum*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1985). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A., Kaplan, S. N., Renzulli, J. S., Purcell, J. H., Leppien, J. H., & Burns, D. E. (2001). *The parallel curriculum*. Thousand Oaks, CA: Corwin Press.

VanTassel-Baska, J. (1985). The talent search model: Implications for secondary school reform. *NASSP Bulletin, 69*(482), 39–47.

VanTassel-Baska, J. (2003). Content-based curriculum for high-ability learners: An introduction. In J. VanTassel-Baska & C. A. Little (Eds.), *Content-based curriculum for high-ability learners* (pp. 1–23). Waco, TX: Prufrock Press.

D

Dance

Talent in dance encompasses a complex and multifaceted set of abilities and traits combining physical, emotional, and cognitive domains. What makes the charismatic performer stand out? What do we see in a captivating soloist—Mikhail Baryshnikov, Judith Jamison, Anna Pavlova, or Fred Astaire—that we don't perceive among the corps de ballet? What is the relationship between the creativity of an outstanding dancer and the creative skills involved in inventing movement and choreography? These questions highlight the difficulty in defining dance talent. It is certainly more than physical prowess, but can common characteristics be identified and measured?

Different dance styles and techniques value different characteristics, but all involve interplay of kinesthetic and aesthetic abilities that distinguish dance talent as a communicative art form from pure athletic talent. The role dance plays in different cultures and its connections to body image, sexuality, gender, and spirituality make a universal definition of talent particularly difficult to agree upon. The internal emotional processes and communicative power of dance to touch an audience have received little study; much of the focus of talent identification is on physical characteristics and motivation.

Most processes for identifying talent have been developed to select potential students or performers for advanced instruction, conservatories, or professional opportunities. As such, the definitions of talent are directly connected to factors such as the ideal body type and prior experience related to the dance style being taught. In ballet, for example, a slender body type, flexibility, and the ability to quickly imitate movement by sight are important criteria. African-inspired forms tend to value rhythmic acuity, the ability to perform intricate locomotor patterns, and spatial awareness in complex directional and axial dimensions. Many Asian dance forms highlight subtle and structured movements of hands, torso, head, and eyes. Exceptional foot speed along with rhythmic acuity is required for tap, clogging, flamenco, and other rhythmic, musically inspired forms.

A few general—that is, neither style- nor culture-specific—definitions have been proposed. The 10 criteria in Barry Oreck, Susan Baum, and Steven Owen's Dance Talent Assessment Process (DTAP) correspond to Joseph Renzulli's *three-ring conception of giftedness:* These include Above Average Ability (Rhythm, Coordination and Agility, Physical Control, Memory and Recall, Spatial Awareness), Task Commitment (Ability to Focus, Perseverance), and Creativity (Expressiveness, Improvisation, Movement Qualities). This definition, tested with diverse populations of students, including those with no prior dance experience, has shown a high degree of predictive validity and relevance for a range of dance styles and techniques.

Edward Warburton's Multidimensional Assessment Instrument in Dance (MAiD) assesses content-related understanding in dance—evaluating students' abilities to recognize, produce, and

express the meaning of actions, efforts, and use of space and movement. Awareness of these characteristics is undoubtedly related to talent, particularly as a choreographer or improviser, but is often neglected in identification processes that focus solely on physical attributes.

Creativity in dance—whether in choreography, improvisation, performance, or teaching—is usually connected to a new or unique style or approach. Choreographers known for inventing or reconceiving dance styles or techniques—such as Martha Graham, Isadora Duncan, George Balanchine, Twyla Tharp, Gene Kelly, and Harold Nicholas—are commonly identified as the paragon of creativity in their dance forms. Creative dance as an educational approach encourages students to create movement to express their own feelings and ideas. A common component in creative dance programs is gaining an understanding of movement and the body, such as the concepts of time, space, and force presented by Rudolph Laban, who called dance the basic art of humankind, and who emphasized developing self-awareness in movement as well as deeper symbolic, nonrational forms of self-expression.

Little research has been done on the typical developmental stages for dancers. Jacque Rossum's 2001 study supported the relevance to dance of Benjamin Bloom's three stages of development. Bloom's first stage roughly encompasses the elementary school years (ages 5–12), which are characterized by exploration and consistent but limited (3–8 hours per week) training. The second stage (ages 12–16) is characterized by a marked increase in training time and a transition to a second, more demanding teacher. The third stage involves the personal choice of the young artist to dedicate her- or himself to the art form either as a career or a serious avocation. Given the difficulty in finding paying work as a performing artist, this decision is one made out of personal passion and commitment. The artist's absolute level of talent at this stage may be less critical than the drive and perseverance to engage in daily work in the studio. Chance elements, injuries, and financial constraints are clearly as important as talent in defining an artist's ultimate career path.

People with outstanding talent in dance are often perceived as rarities in modern Western cultures but not so in other cultures where dance is more a part of daily life and ritual. Even in the West, popular dances such as salsa, the Macarena, the electric slide, country-and-western line dancing, and other social dance forms demonstrate the widespread appeal and universal human characteristics that are seen in dance. Freed from limiting ideas about ideal body type or critical acceptance, social and ritual dance forms offer evidence of the universality of dance and dance talent in human beings and the need to develop better means of identifying and developing it.

Barry Oreck

See also Athletic Giftedness; Creativity, Definition; Talent Development

Further Readings

Bloom, B. S. (Ed.). (1985). *Developing talent in young people.* New York: Ballantine Books.

Laban, R. (1975). *Modern educational dance.* Boston: Plays, Inc.

Oreck, B., Owen, S., & Baum, S. (2003). Validity, reliability and equity issues in an observational talent assessment process in the performing arts. *Journal for the Education of the Gifted, 27*(1), 62–94.

Van Rosssum, J. A. (2001). Talented in dance: The Bloom stage model revisited in the personal histories of dance students. *High Ability Studies, 12*(2), 181–197.

Warburton, E. C. (2002). From talent identification to multidimensional assessment: Toward new models of evaluation in dance education. *Research in Dance Education, 3*(2), 103–121.

Davidson Institute for Talent Development

Bob and Jan Davidson started the Davidson Institute for Talent Development in 1999 after selling their successful educational software company that developed and marketed such products as *MathBlaster* and *ReadingBlaster.* The Davidsons decided to establish a nonprofit dedicated to supporting profoundly gifted students. The Davidson Institute is based on the premise that talent in the United States is underidentified and underserved. The Institute strives to recognize, nurture, and

support highly intelligent young people and to provide opportunities for them to develop their talents to make a positive difference.

The Davidsons believe that gifted students are at risk for not developing their potential in today's academic and political climate because traditional curriculum teaches to the middle of the student population academically, with little or no differentiation for students' abilities, learning styles, or interests. This one-size-fits-all approach leaves many students sitting, bored, for hours in regular schools while listening to whole-class lectures on content material and skills they mastered long ago.

The Davidson Institute emphasizes an IQ-based concept of giftedness, defining the highly gifted child as typically scoring 3 or more standard deviations above the norm on the bell curve, which would place the score at approximately 145 or more on most accepted aptitude tests. The Davidson Institute, located in Reno, Nevada, offers a variety of services and programs to fulfill its mission of talent development in these students.

The Davidson Academy of Nevada was founded in 2006 as a tuition-free public school for profoundly gifted middle and high school students in Nevada. Students who attend take classes at least 3 years above their grade level, and curricula are highly individualized and separated into three tracks: core, college prep, and college prep with research. The Davidson Academy utilizes resources from the University of Nevada, Reno, where students have access to libraries, professors, and classes. To be admitted, students must score at or above the 99.9th percentile on an IQ or college entrance examination (e.g., SAT or ACT) and must demonstrate the motivation, social and emotional maturity, and overall readiness for the environment of an accelerated educational program.

Another program offered by the Institute is Davidson Young Scholars, a group of young, highly gifted students ages 5 to 18, who are provided full-time consultants to assist families with their specialized needs. Currently, there are more than 1,200 Davidson Young Scholars who receive assistance ranging from educational advocacy and talent and interest development, to making peer connections, to financial assistance. The Institute currently enrolls an average of 15 Young Scholars each month.

Still another program offered is the Davidson Fellow Scholarships, awarded to students under the age of 18 for outstanding accomplishments in science, mathematics, technology, literature, music, philosophy, or "thinking outside the box." Up to 20 scholarships are awarded each year, and Davidson Fellows are honored for their achievement at an awards ceremony in Washington, D.C. As of 2008, more than $2.6 million had been awarded to 107 Davidson Fellows. Previous recipients have demonstrated high creative productivity, evidenced through projects such as the development of a new method for detecting early cancer and the development of a method for recycling plastic that is cost-effective and environmentally friendly.

Talented students ages 13 to 16 who seek additional academic challenges in the summer may apply to the Davidson Institute's THINK Summer Institute where admitted students take two college courses taught by University of Nevada, Reno, professors in the areas of mathematics, science, the humanities, and/or languages. Currently, students are admitted based on SAT or ACT scores, an essay, and letters of recommendation. Students earn up to seven transferrable college credits upon completion.

The Davidson Institute's Educators Guild provides free informational and advocacy services for educators at all levels, as well as for other professionals who work with or are concerned about the needs of highly gifted students. Educators of gifted students have access to consultants, and may join discussion forums and receive informative newsletters on giftedness and talent development.

The Davidson Institute's GT-Cybersource calls itself the "gateway to gifted resources" on the Web. With the availability of over 450 articles and more than 4,000 resources for and about gifted and talented students, the searchable database is available to researchers, parents, students, and teachers for accessing information, as well as learning about events on a master calendar, and summaries of state and federal gifted education policies. The Gifted Education Policies map provides a state-by-state breakdown of the legal status of gifted education, whether funding is available, how much funding has been allocated, and more.

A summary of the Davidson's educational philosophies is presented in the nationally circulated book *Genius Denied: How to Stop Wasting Our Brightest Young Minds*. Coauthored by Bob and Jan Davidson, with Laura VanderKam, and

published in 2004 by Simon & Schuster, *Genius Denied* chronicles the story of gifted children who sit in classrooms year after year with little or no intellectual stimulation. Peppered with interesting anecdotes, the book offers educators and parents information as well as practical advice about how to become advocates for talent, and how to become resources for gifted children.

Nancy Heilbronner

See also Genius; Intelligence Testing; Summer Programs

Further Readings

Davidson, J., Davidson, B., & VanderKam, L. (2004). *Genius denied: How to stop wasting our brightest young minds*. New York: Simon & Schuster.
Davidson Academy of Nevada: http://www.DavidsonAcademy.UNR.edu
Davidson Fellow Scholarships: http://www.DavidsonFellows.org
Davidson Institute: http://www.Davidson-Institure.org
Davidson Institute Educator's Guild: http://www.EducatorsGuild.org
Davidson Institute GT-CyberSource: http://www.GT-CyberSource.org
Davidson THINK Summer Institute: http://www.THINKSummerInstiture.org
Davidson Young Scholars: http://www.DavidsonYoungScholars.org

Declarative and Procedural Memory

Human memory is often divided into two basic subdivisions: *declarative memory,* or knowledge of facts, and *procedural memory,* or recall of how to perform a task. Questions that can be answered by who, what, where, or when are examples of declarative memory. ("What is the capital of Delaware?" "What is a quadratic equation?") The declarative memory can be thought of as a "what" system in contrast to the procedural "how" system. Knowing how to ride a bicycle, whistle for a taxi, or flip an omelet are examples of procedural memory.

Procedural memories are the collections of skills that we think of as automatic once we have learned them. They require little conscious thought in a neurologically intact individual. One of the hallmarks of procedural memories is that they are learned through modeling and repetition and are often difficult to describe. Explaining how to perform the act often results in an impoverished response: "You know how to whistle don't you? Just put your lips together and blow."

Declarative memory is usually broken down into further subcategories: *semantic memory,* or memory for abstract facts, versus *episodic memory,* or memory that is context dependent. Episodic memories are memories of events linked to a specific time and place. For example, semantic memory would help you to recognize that both a Chihuahua and a Great Dane are part of the larger category "dog," but episodic memory is the recollection of the time you dressed your dog up as a bumblebee for Halloween. An episodic memory has a what, a where, and a when component to it. Semantic memory is abstract knowledge; episodic memory is a personal and specific recollection of lived events. Those unique lived events may shape one's semantic memories over time, updating and refining conceptual categories and collections of facts that form semantic memory.

There are also other subdivisions of memory. Some researchers further divide episodic into *aware* or *unaware*. Episodic aware memory is generally termed *working memory.* There is some evidence that the emotional component of memory is stored semi-independently of the recall of the events that provoked the initial emotional state. For example, individuals with injury-induced amnesia from an automobile accident may still have flashbacks and psychological distress when hearing recorded sounds of collisions. There is also strong evidence of memory systems that detect potential danger; these systems are faster.

The Utility of Multiple Memory Systems

Declarative and procedural memory serve two different and complementary purposes. Procedural memory includes stimulus-based processing, such as learned reflexes, habits, skills, and processes. It is a dedicated system devoted to performing the tasks that one performs over and over again. It is highly efficient and requires progressively less conscious thought as the task is mastered.

Procedural memory can exist in the absence of declarative memory. One of the landmark cases in psychology is the story of Henry M, or HM. HM suffered intractable seizures requiring the bilateral removal of his medial temporal lobe, but one of his hippocampi was left in hopes that it would suffice. Unfortunately for HM, the remaining hippocampus was nonfunctional. HM became a man without the ability to form new declarative memories. His procedural memory remained intact; researchers were able to teach him skills such as mirror writing (writing upside down and backward). Each time he was surprised to find that he had this skill, having no recall of his earlier lessons.

Declarative memory requires conscious thought; it is often referred to as explicit or higher-order processing because it requires cortical control. Declarative memory is often an initial step in the initial learning of a procedure. Most of us have had the awkward experience of learning to drive a stick-shift car. As you lurch across the parking lot trying to remember which foot to depress in which order, the process is awkward, deliberate, and effortful. With practice it becomes an automatic behavior (the process of shifting).

The automatic processing of procedural memory has distinct advantages. It is biologically cost effective, simple, allows a high speed of reaction, and exploits the predictable features in the environment. Procedural memory functions at its best in known, predictable settings. Higher-order cognitive processing becomes a necessity when the task is novel or the choices ambiguous. Much of higher thought, such as cognition and behavior, is a process of selecting from learned movement sequences, ideas, strategies, and goals that are stored in the cortex. Without memory, intellect is crippled.

The memory systems have an evolutionary underpinning. We survived through interaction with the environment, through object recognition and object location. Like much of the animal kingdom, we recognized and recalled the place where predators travel and where plants can be harvested. We learned and recalled motor or action patterns (what to do and how to do it).

Localization of Memory

The different subtypes of memory tend to localize in different neuroanatomical regions. Declarative memory is generally found in the temporal lobe in hippocampus, entorhinal and perirhinal cortex, and the forebrain. Procedural memory is noted in the brainstem, cerebellum, and frontal cortex (in the supplementary and premotor cortex).

Procedural memory is often associated with the circuits mediated by the basal ganglia, which are an evolutionarily older, subcortical structure. Disorders such as Tourette's syndrome or Huntington's disease often include the expression of fragments of purposeful movement such as gestures or of noises that involve sequences of muscle movements (coughs, throat clearing, or humming).

Formation of memories involves several neurotransmitter systems: acetylcholine, dopamine, norepinephrine. Drugs that affect these neurotransmitters can compromise or enhance this process. For example, anticholinesterases can enhance memory formation and are often used to treat symptoms of Alzheimer's disease and other dementias. Therapeutic doses of dopamine-enhancing drugs, such as Ritalin (methylphenidate), often enhance working memory.

Intelligence and Memory

Intelligence is often conflated with expertise. Experts outperform novices in both *speed* and *accuracy*. This appears to be part of a process of inducting more components into procedural memory. For example, master chess players demonstrated superior recall for chess pieces on a board as long as the pieces were organized as they would be during play. Mastery requires learning and memorization accumulated through approximately 10,000 hours of experience. Intelligence and mastery may or may not overlap.

Intelligence is also conflated with divergent thinking. We recognize genius in an economist's ability to reconceptualize market forces or in the paintings of Mark Rothko. Yet the ability to express one's knowledge often depends on one's ability to hold concepts in mind in order to compare them in novel ways or to use a paintbrush as if it were a mental and physical extension of the artist's body. These are tasks that require the integrity of declarative and procedural memory.

Nadia E. Webb

See also Intelligence; Neuroscience of Creativity

Further Readings

Heilman, K., & Valenstein, E. (1993). *Clinical neuropsychology* (3rd ed.). New York: Oxford University Press.

Koziol, L. (2007, November). *Basal ganglia.* Speech presented at the conference of the National Academy of Neuropsychology, Scottsdale, AZ.

Schmolck, H., Kensinger, E. A., Corkin, S., & Squire, L. (2002). Semantic knowledge in Patient H.M. and other patients with bilateral medial and lateral temporal lobe lesions. *Hippocampus, 12,* 520–533.

Depression

Depression is a common mental disorder that affects millions of Americans each year. Gifted, talented, and creative adults and children are no exception. Highly gifted people including Isaac Newton, Ernest Hemingway, Mark Twain, and Vincent van Gogh suffered from various forms of depression. Depression is characterized by feelings of sadness or worthlessness, change in appetite or weight, decreased energy level, inability to concentrate, or recurrent suicidal thoughts or attempts. Over the decades, research has shown two contrasting views of the psychological well-being of gifted individuals. Some studies have found similar levels of depression in gifted individuals compared with their non-gifted peers, while others have found gifted individuals to have a greater than average risk for depression, especially writers and artists. Nevertheless, research on the link between depression and the gifted has been sustained and extensive.

In the following paragraphs, depression is categorized and discussed in three groups: unipolar depression, existential depression, and bipolar disorder. How each type of depression is related to the gifted and creative population and treatment recommendations are also discussed.

Unipolar Depression

Unipolar depression is marked by depressed mood, feelings of sadness or emptiness, loss of interest in activities, insomnia, loss of energy, or recurrent suicidal ideation. Depression may be the result of interactions among social, biological, and environmental factors. There is a growing body of evidence that suggests a link between creativity and depression. Many creative and gifted individuals who experience unipolar depression tend to be emotionally sensitive and perfectionistic. They may be overly upset by life's problems or overly self-critical of their work or performance, and thereby at risk for depression. In addition, low self-esteem and poor self-concept can aggravate the symptoms. Depression may be obvious in some gifted persons and well hidden in others. Creative children as young as age 7 can show signs of depression, especially those who enroll in undifferentiated school programs where their learning experiences are different from others and they cannot find like-minded peers for social support.

Treatment for unipolar depression usually involves psychotherapy and antidepressant medication. Many people find psychotherapy more effective with the help of medication. Psychotherapy for depression can be in the format of individual, group, couples, or family treatment. Various forms of cognitive behavioral therapy, interpersonal therapy, or psychodynamic therapy are often used to treat depression. The focus of psychotherapy treatment usually involves verbal and nonverbal communication about thoughts, feelings, and behaviors of depressed state, how better to cope with the disorder, and how to gain a healthier outlook on life.

Existential Depression

Existential depression is a type of depression that gifted individuals are more likely to experience than their non-gifted peers. This type of depression results from a person's questioning of his or her own existence, the meaning of life, freedom of choice, and responsibility for self-creation. Although existential depression can be triggered by a major life event, such as loss of a loved one or loss of a job, gifted individuals are more likely to suffer from it spontaneously. From young ages, children who are gifted and talented may start to think about questions that peers of similar age may not otherwise ask, including questions such as "What's the meaning and purpose of life?" Although no specific type of psychotherapy is identified for existential depression, it is often treated similarly to unipolar depression. However, some suggested treating existential depression

from an existential approach, which examines one's inner self, values, and meanings.

Bipolar Disorder

Bipolar disorder, also known as manic-depressive disorder, is characterized by episodes of mood in two directions: depression and mania. During a depressive episode, symptoms are like those of unipolar depression. During a manic episode, an individual is irritable, easily distracted, has inflated self-esteem, feels pressure of speech, increases involvement in goal-directed activities, or engages excessively in pleasurable events that potentially lead to excruciating consequences. Although the cause of bipolar disorder is unknown, it clearly has a strong biological component and significant heritability. It is known that bipolar disorder can both promote and hinder creative work. Gifted people tend to begin creative work in the depressive phase of bipolar and follow through the latter stage of their work during the manic phase.

Optimal management of bipolar disorder for gifted people involves a combination of medication and psychotherapy. Mood stabilizers, antidepressants, and antipsychotics are the three main categories of medication to help relieve bipolar symptoms. Psychotherapies such as cognitive behavioral therapy or interpersonal therapy are commonly used to help resolve problems, especially in work and relationship areas where creative individuals with bipolar disorder often face difficulties.

Despite the various forms of depression gifted and creative individuals may encounter, it is a treatable disorder. Besides treatment with psychotherapy and medication, care and help from family and friends is essential. It is possible for the gifted to enjoy a life with creativity, free from depression.

Ya-Ting Tina Yang

See also Creativity and Mental Illness; Existential Depression; Meaning of Life; Perfectionism; Suicide; Twice Exceptional

Further Readings

Jackson, P. S., & Peterson, J. (2003). Depressive disorder in highly gifted adolescents. *Journal of Secondary Gifted Education, 14,* 175–186.

Maisel, E. (2002). *The Van Gogh blues: The creative person's path through depression.* Emmaus, PA: Rodale.

Neihart, M. (2002). Gifted children and depression. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Webb, J. (2005). *Misdiagnosis and dual diagnoses of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders.* Scottsdale, AZ: Great Potential Press.

Differentiated Model of Giftedness and Talent

The field of gifted education defines its special population around two key concepts: giftedness and talent. Most professionals in gifted education commonly use these two terms conjointly, in expressions like "the gifted and talented are…" Yet in almost every discussion of the giftedness construct, scholars mention one particular idea; namely a distinction between early emerging forms of giftedness, genetically rooted and usually manifested in childhood, and fully developed, adult forms of giftedness. The *differentiated model of giftedness and talent* (DMGT) was conceived to exploit that distinction as the basis for clearly differentiated definitions of the terms *giftedness* and *talent:*

Giftedness designates the possession and use of outstanding natural abilities (called high aptitudes or gifts), in at least one ability domain, to a degree that places an individual at least among the top 10 percent of age peers.

Talent designates the outstanding mastery of systematically developed competencies (knowledge and skills) in at least one field of human activity to a degree that places an individual at least among the top 10 percent of age peers who are or have been active in that field or fields.

As these definitions reveal, the two concepts share three characteristics: (1) both refer to human abilities; (2) both are normative, in the sense that they target individuals who differ from the norm or average; (3) both refer to individuals who are non-normal because of outstanding behaviors. These

three commonalities help understand why professionals and laypersons alike so often confound the concepts. From these two definitions a simple definition for the process of talent development can be extracted: It is the progressive transformation, through learning and practice, of gifts into talents. Giftedness (G), talent (T), and developmental process (D) constitute the basic trio of components within the DMGT (see Figure 1). Three additional components complete the structure of this talent development theory: intrapersonal catalysts (I), environmental catalysts (E), and chance (C).

Components

The Basic Trio

The basic trio consists of giftedness (G) being transformed through development (D) into talents (T). Within the DMGT, natural gifts are grouped into four aptitude domains (see Figure 1): intellectual (Gi), creative (Gc), social (Gs), and physical (Gp). These natural abilities, whose development and level of expression are partially controlled by the individual's genetic endowment, can be observed in every task children are confronted with in the course of their schooling: for instance, the intellectual abilities needed to learn to read, speak a foreign language, or understand new mathematical concepts; the creative abilities needed to solve many different kinds of problems and produce original work in science, literature, and art; the physical abilities involved in sports, music, or woodwork; or the social abilities that children use daily in interactions with classmates, teachers, and parents.

High aptitudes or gifts can be observed more easily and directly in young children because environmental influences and systematic learning have exerted their moderating influence in only a limited way. However, they still show themselves in older children, and even in adults, through the facility and speed with which individuals acquire new skills in any given field of human activity. The easier or faster the learning process, the greater the underlying natural abilities will be.

Talents (T) represent the outcome of the talent development process. They progressively emerge from the transformation of high aptitudes into the well-trained and systematically developed skills characteristic of a particular field of human activity. Figure 1 shows some of the many talent fields relevant to school-aged youth. But fields of talent cover a much larger spectrum. One can find talented individuals in almost any field of human activity: professions, business, administration, trades, technologies, sales and services, social or health occupations, factory work, and sports.

The third component, talent development (D), includes all the talent-oriented activities undertaken by young gifted individuals from initial (self-) identification until either dropping out or retiring. This process begins as soon as a child or adult starts systematically learning and practicing the skills of a given field of activity. Three major developmental processes can be identified: (1) biological maturation (reserved for the development of natural abilities), (2) informal learning, and (3) formal learning and practicing. Formal learning may in turn take two forms: noninstitutional or autodidactic, as opposed to the more common institutional talent development found in academic institutions, music schools, or sports centers. Informal development characterizes the growth of natural abilities, whereas talents result essentially from formal learning activities.

The Catalysts and Chance

Intrapersonal catalysts (I) are subdivided into physical and psychological factors, all of them under the partial influence of the genetic endowment. Hereditary predispositions to behave in certain ways (temperament), as well as acquired styles of behavior (e.g., traits and disorders), contribute significantly to support or to slow down talent development. Self-management gives structure and efficiency to the talent development process, and to other daily activities. Among self-management activities, motivation and volition (will, perseverance) play a crucial role in initiating the process of talent development, guiding it and sustaining it through obstacles, boredom, and occasional failure.

The environment (E) manifests its significant impact in many different ways. The *milieu* exerts its influence both at a macroscopic level (geographic, demographic) and a more proximal level (size of family, socioeconomic status). Many significant *persons,* not only parents and teachers but also siblings and peers, may exert positive or negative influences on the process of talent development. Gifted

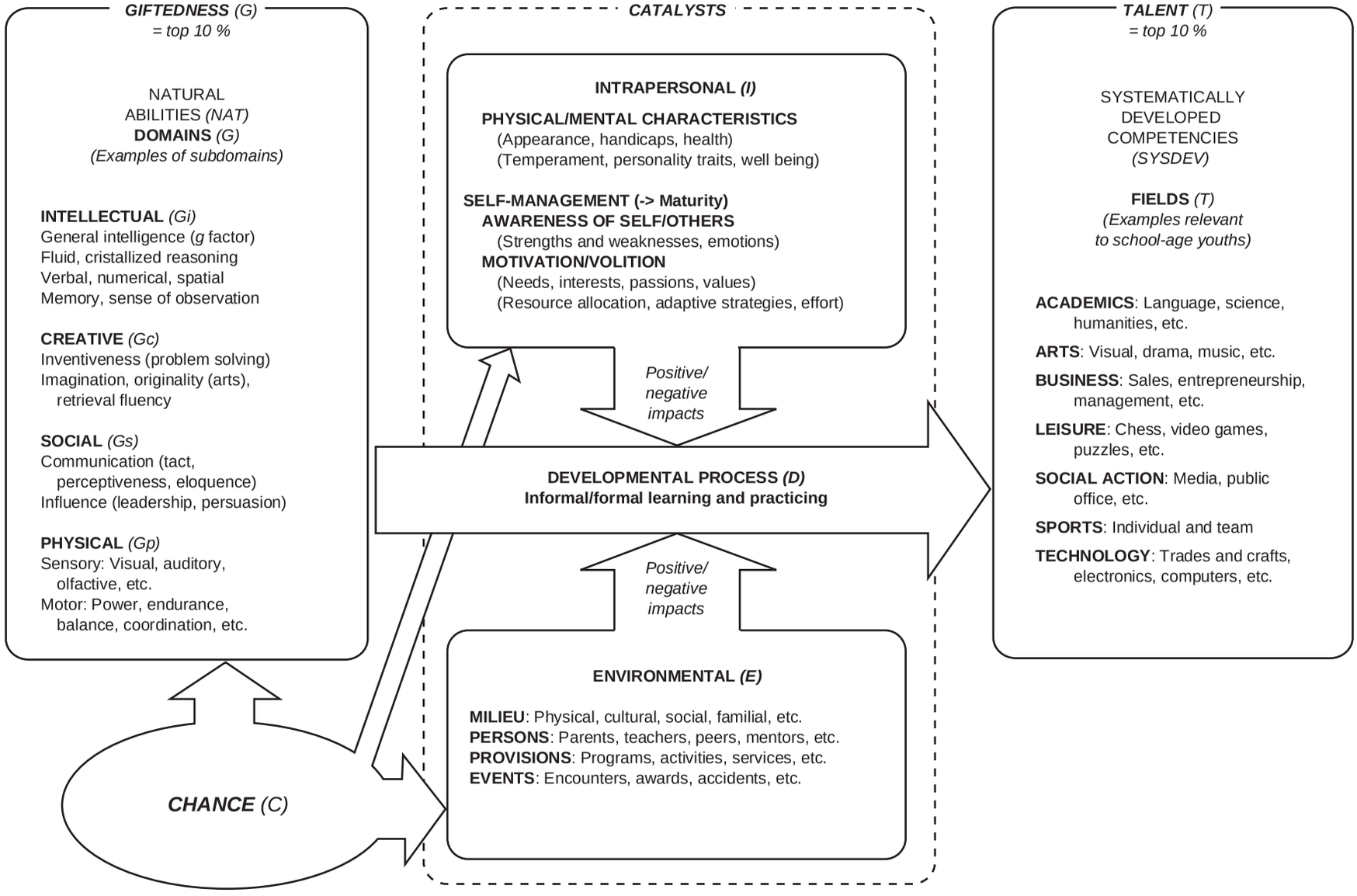


Figure 1 Gagné's Differentiated Model of Giftedness and Talent

education programs within or outside the school belong to the *provisions* category; they are a more systematic form of intervention to foster or hinder the process of talent development. It is customary to subdivide them into three groups: enrichment (in the regular classroom), part-time or full-time homogeneous grouping, and accelerative measures. Finally, significant *events* (winning a prize or award, suffering a major accident or illness) can influence markedly the course of talent development.

Strictly speaking, chance (C) is a characteristic of some of the elements placed in the other categories (the "chance" of being born in a particular family; the "chance" of a gifted child's school offering an enrichment program). Chance also plays a major role in determining a person's genetic endowment.

Prevalence and Levels

An adequate definition of any normative concept must specify how subjects differ from the norm and what it means in terms of the prevalence of the population subsumed under the label. In the DMGT, the minimum threshold for both giftedness and talent is placed at the 90th percentile: Those belonging to the top 10 percent of the relevant reference group in terms of natural ability or achievement deserve the relevant label. This generous choice of threshold is counterbalanced by a subdivision of gifted and talented populations into five vertically structured subgroups according to a metric-based system. Within that system, gifts or talents are respectively labeled "mildly" (top 10%), "moderately" (top 1%), "highly" (top 1:1,000), "exceptionally" (top 1:10,000), and "extremely" or "profoundly" (top 1:100,000). As in other fields of special education, the level of the student's giftedness or talent, as well as the domains or fields in which these abilities manifest themselves, should guide the choice of an appropriate intervention program.

A Few Dynamic Considerations

In the DMGT, high natural abilities (gifts) act as the constituent elements of talents. Accordingly, there is much more diversity among systematically developed skills than among their "natural" precursors. For example, manual dexterity (Gp) can be modeled into the particular skills of a pianist, a painter, or a video-game player. Similarly, analytical reasoning (Gi) can be modeled into the scientific reasoning of a chemist, the game analysis of a chess player, or the strategic planning of an athlete. The causal relationship between gifts and talents implies that talent rarely emerges from average aptitudes; talented achievements require at least above-average aptitudes. However, the reverse is not true. Some outstanding natural abilities may not be translated into talents, as witnessed by the well-known phenomenon of academic underachievement among intellectually gifted children. The important role of gifts as builders of talents leaves much room for other significant causal influences from both types of catalysts (I, E), as well as the intensity of the talent development process (D). The complexity of these interactions among causal factors confirms the uniqueness of each talented individual's developmental path from early identification to peak achievements.

Françoys Gagné

See also Domains of Talent; Giftedness, Definition; Levels of Gifted; Talent; Talent Development

Further Readings

Gagné, F. (2003). Transforming gifts into talents: The DMGT as a developmental theory. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 60–74). Boston: Allyn & Bacon.

Gagné, F. (2005). From gifts to talents: The DMGT as a developmental model. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 98–119). New York: Cambridge University Press.

Gagné, F. (in press). Debating giftedness: Pronat vs. antinat. In L. Shavinina (Ed.), *International handbook of giftedness*. Amsterdam: Springer.

Rogers, K. (2002). *Re-forming gifted education: How parents and teachers can match the program to the child*. Scottsdale, AZ: Great Potential Press.

Differentiation

Despite the belief held by many in the field of education, *differentiation* is not a new term. Differentiation, used in education for decades,

refers to the practice of deliberately changing or modifying with forethought the content, practice activities, projects, tests, assessments, and/or learning environment for a student or group of students, based on their academic, affective, and/or learning needs. Differentiation is a whole approach to teaching children as individuals—it is a proactive response, not a reactive one, to specific learner needs. In a differentiated classroom, all students are engaged in learning that is designed to challenge them, to maximize their academic and affective progress, and to enable them to be successful beyond the constraints of time and conformity. Differentiation is a mind-set, not a strategy. When implemented appropriately, differentiation is an empowering and liberating mind-set for the teacher and promotes powerful learning for all involved in the adventure. The work of Carol Tomlinson and others has pushed the topic of differentiation in gifted education to center stage.

A Controversial Issue

The topic of differentiation is somewhat controversial in gifted education, in part because it is often misunderstood. The movement toward inclusion, that is, placing all students in a heterogeneous classroom regardless of their learning needs (special education, English language learners, gifted students, etc.), has made differentiation of instruction a hot topic. It may be inappropriately represented as the latest cure-all for the inclusion classroom, and administrators may naively think that having a professional day presentation on the topic is all that is needed for teachers to gain a good understanding of the idea. Teachers are then expected to become instant experts on differentiation and meeting the needs of all students in their classrooms. Consequently, many school districts have chosen to disband formal services for gifted students in favor of placing them in a classroom where the teacher is "differentiating." In reality, becoming expert at differentiation is a long process involving hard work and the ability to be a reflective teacher, constantly learning about one's students in order to modify learning to meet their needs.

Another issue that makes differentiation somewhat controversial is the fact that students are often grouped for instruction. Grouping assists with meeting individual needs based on students' readiness for a particular skill, topic, or concept; their learning profile (learning style, gender, learning preferences and such); and/or their interest in a particular topic or form of expression. Educators, researchers, administrators, and parents often hold differing opinions about grouping. Some see advantages, such as being able to put students with similar learning needs together for a particular lesson, but others see this as inequality of access. Grouping in a differentiated classroom is intended to be flexible grouping; the groups are constantly changing as the teacher studies each student's strengths, areas that need improvement, and developmental stage. Differentiation is a student-centered approach, not a teacher-centered one. This idea is often controversial in itself. Because most teacher education programs promote a "teacher at the center" approach, learning to put students at the center is often a new concept for teachers, and redirecting the focus takes time and effort.

Once students are grouped for a learning experience, the reality is that the teacher cannot work with all students at the same time. Normal classroom management may need to be modified to address this fact. When the teacher is working with one group of children, the rest need to be actively engaged in learning also. This can be accomplished through the use of anchoring activities. Anchoring activities are designed for independent learning so that students have something to work on while the teacher is busy with another group of students. These activities take a variety of forms, such as review work, brain teasers, puzzles, silent reading, journal writing, independent investigations, and center activities. Often the activities are self-checking and selected specifically for individual students based on their particular learning needs. Therefore, classroom rules in a differentiated classroom must address behaviors necessary for working independently as well as in groups.

Implementation

In general, the way differentiation is implemented differs along a continuum from one teacher's classroom to another. Some teachers assign different spelling words to students based on their readiness. Although that is certainly one small way to differentiate, many teachers view that as

differentiating and take the process no farther. In fact, on the continuum, that would simply be *micro-differentiation*. It is one step toward differentiation, not the end of the journey, even if in many instances it is considered to be. *Macro-differentiation* occurs once the teacher embraces differentiation as a mind-set and continually makes choices for student learning based on this belief.

In a differentiated classroom, a visitor would expect to see students working individually or in small groups on different activities based on learner needs. The classroom would lend itself to various physical arrangements to facilitate whole group, small group, and individual learning. Rather than a traditional, fixed time period schedule, time would also be flexible so that learning was not programmed into a set number of minutes according to a schedule, but instead could be rearranged to accommodate the needs of the students, teacher, and activities. There is more physical movement in a differentiated classroom because students work to complete the tasks assigned. Consequently, the noise level is often very different from the quiet traditional classroom where students sit in rows, all working on the same assignment. Rather than sitting at a desk in the front, the teacher in the differentiated classroom is constantly moving from group to group and to individual students, frequently gathering data about the students and their responses. This formative assessment is then used to determine the most appropriate next entry point for the different students.

Differentiation is not, however, a remedy for poor curriculum. One must begin with clearly articulated, well-formulated, challenging curriculum. Otherwise, the end result is differentiated poor curriculum that is meaningless and not worthy of the time students must spend working through it.

Strategies

In a differentiated classroom, teachers must use a variety of instructional strategies to meet the needs of their students. In general, these strategies allow the teacher to address different learner characteristics in the same lesson. The next paragraphs describe several of the many strategies that may be used to differentiate instruction.

Tiering a Lesson

Tiering a lesson or an activity is one such strategy and is often referred to as the most complex strategy in differentiation because it entails considerable planning and preparation. For example, in a tiered lesson, the students may all be working on activities that address the same standard, but the activities are modified to match the learner's readiness better for a particular skill, concept, or topic. Consequently, students are often placed in groups according to the particular activity they have been assigned. There may be a group of students who still need direct instruction from the teacher about the process of adding fractions, whereas another group has a good understanding of the process and works on a more complex set of problems.

Choice Boards

A choice board is another way teachers provide opportunities to work on material that is differentiated. In this case, the work is differentiated by student interest; students are given an opportunity to choose what activities they will complete or what content they will study. The choice board is set up like a tic-tac-toe grid—three rows and three columns. In each block formed by the intersection of the rows and columns, the teacher places the directions for a particular piece of work. As in tic-tac-toe, each student must choose activities from the blocks to form a combination that would give them a "win." For example, a student might choose three activities in a row, column, or along a diagonal. Teachers can be very creative in designing choice boards, including developing tiered boards.

Compacting

Another strategy often used in the differentiated classroom is compacting. This is a less complicated strategy than tiering. It involves determining what a student knows already, how the teacher knows that information, and how the teacher will change the lesson to accommodate the student's prior knowledge or skills. For example, a teacher may give the class a pretest on classification. Some students may already have mastered or are close to mastering this concept. For those students, the teacher determines, often with student input, the

alternate activities or course of study they will pursue while the rest of the class learns the material these students already know.

Grading and Assessment

Because students are working on different activities, it follows that grading and assessment will also be different. Grading means the day-to-day assigning of scores to student work, such as a 93 on a test or an A on a writing assignment. Assessment means determining where a student is on the journey toward mastery of a particular concept or skill; for example, by using multiple means to gather data about a student's progress. These are also controversial topics. Although many educators see the need for differentiation and the benefits it has for the students in their classroom, they are often very uncomfortable with differentiating their grading to reflect the differentiated activities and learning that occur in the classroom. There is no one way to resolve the issue of differentiated grading. Some teachers indicate in a grade book which assignments are differentiated; others may choose to weight the grades, depending on the difficulty of the activity. Due to the high-stakes nature of grading and the emotions surrounding it, this issue will be debated for quite some time.

Assessment does not appear to be as controversial because it is more a matter of gathering data about a student's progress than about assigning one score to a report card. Assessment takes into consideration the amount of time it takes for a student to show mastery, whereas grading does not. For example, a teacher gathers data on two students who are learning about fractions. One student catches on quickly and scores very high on all homework and practice activities. The other student takes longer to master the topic, scoring low on beginning activities and gradually obtaining higher scores throughout the unit. On the unit test, both students receive a score of 100. Traditionally, each student's grades would be averaged and the one who took longer to master fractions would receive a lower grade because that student had several low grades while learning the material. The teacher's assessment of the students is that both showed mastery at the end of the unit; however, the individual grades reflect the length of time it took each to reach mastery. In a differentiated classroom, assessment and grading should be better aligned because the teacher is meeting individual needs, not viewing all students as similar individuals with similar learning needs who arrive at mastery in the same timeframe.

Cheryll M. Adams and Rebecca L. Pierce

See also Cluster Grouping; Controversies in Gifted Education; Inclusion; Schoolwide Enrichment Model

Further Readings

Adams, C. M., & Pierce, R. L. (2006). *Differentiating instruction: A practical guide to tiering lessons in the elementary grades*. Waco, TX: Prufrock Press.

Coil, C. (2004). *Standards-based activities and assessments for differentiated classroom*. Marion, IL: Pieces of Learning.

Kingore, B. (2004). *Differentiation: Simplified, realistic, and effective*. Austin, TX: Professional Associates Publishing.

Kingore, B. (2007). *Reaching all learners: Making differentiation work*. Austin, TX: Professional Associates Publishing.

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting*. Mansfield Center, CT: Creative Learning Press.

Tomlinson, C. A. (2003). *Fulfilling the promise of the differentiated classroom*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A. (2004). *Differentiation for gifted and talented students*. Washington, DC: National Association for Gifted Children.

Winebrenner, S. (1992). *Teaching gifted kids in the regular classroom*. Minneapolis, MN: Free Spirit Press.

Disabilities, Gifted

Gifted pupils with disabilities face seemingly contradictory social expectations and definitions, have varied prevalence rates, and encounter diverse and sometimes inadequate identification procedures. Nevertheless, these youth can clearly benefit from gifted and special needs instruction, and from teacher and parent advocacy.

Gifted youth are generally expected to be high achievers and to be generally well behaved, whereas

students with disabilities tend to face lower academic and behavioral expectations. Gifted youth with disabilities, with their combination of strengths and weaknesses, tend to confound many observers with their contradictory expectations.

Officially labeled "gifted youth with disabilities," these children actually fit formal definitions for both gifts and disabilities. According to the U.S. federal and many state educational definitions, students with gifts excel in intellectual, academic, creative, artistic, and leadership pursuits. By contrast, students with disabilities are defined as fitting one or more of various federal and state categories: mild disabilities (learning disabilities, emotional/behavior disorders, and speech/language impairments), sensory handicaps (hearing and visual impairments), physical disabilities (orthopedic and health impairments), and mental retardation (or mental disabilities).

Gifted-disabled, also called twice-exceptional, students can be defined more broadly than in state and federal guidelines—and with greater prevalence—by some theorists and exceptional-child educators who see these youth as having substantial educational strengths and challenges, whether in or out of school. Yet even with more restrictive educational definitions, students with gifts, disabilities, and dual exceptionalities are fairly prevalent. In recent years—with a fairly consistent 5 to 6 percent of U.S. public school K–12 students in gifted programs, with 10 to 12 percent in special education programs, and (in many gifted-disabled experts' opinions) with as much giftedness in the disabled as in the general student population—there are perhaps between about 0.5 and 0.7 percent of the nation's students who are both gifted and disabled, or about 300,000 students in all.

Identification

There are several issues of breadth and accuracy involved in the adequate identification of the relatively large gifted-disabled population, however. These issues are present whether these students' assessments begin with the known "gift" or the "disability." Private practitioners with the disabled, such as psychologists or physicians, may diagnose twice-exceptional pupils with more sweeping definitions of "disability" than those guidelines utilized by school system personnel. For instance, some private psychologists who view the term *disability* broadly may adhere to a learning disability (LD) definition that includes a student's mere letter reversals as evidence of LD, rather than a more school-based LD definition that requires many additional, acute, intrinsic, memory or organizational problems in reading. Students with very visible disabilities, such as those who use a wheelchair, hearing aids, or Seeing Eye dog, may be so stigmatized or stereotyped by their disability status that their giftedness goes unrecognized. Gifted students with cerebral palsy or other forms of neurological disorders may have such a difficult time with communication that extraordinary talents are hidden and ignored; nevertheless, the world's greatest physicist, Stephen Hawking, and many extraordinary writers, artists, and musicians transcended serious, visible physical disabilities.

School-based assessors, such as school psychologists, may need to meet more stringent, institutionally based criteria than private psychologists do in identifying these twice-exceptional children as disabled. By U.S. federal and many state education definitions, a true LD student, for example, is supposed to display a significant difference between average-range-or-above potential and actual achievement in one or more school subjects due to the aforementioned innate perceptual, memory, or organization challenges. In practice, however, gifted students may not be labeled "LD" in some school districts because these students' wide gaps are not between simply average-range intellect and subaverage achievement—the gaps expected by many school systems—but between high intellect and average achievement (a far less pressing problem in the eyes of many school systems).

Just as the disabilities of gifted youth may not be professionally identified often enough, disabled youth—particularly those with mild disabilities in health, learning, behavior, and speech—may not be seen as gifted frequently enough, and many may even have their strengths diagnosed as weaknesses. Private or school psychologists, like gifted educators, may too often bypass high overall IQ outcomes in the assessment process of these twice-exceptional youth. These assessors may also overlook very high scores in verbal or nonverbal IQ sections, or extremely high subscores in critical subsections, such as outcomes in verbal comprehension and general information.

Instruction

Whatever their assessed strengths and weaknesses, youth who simultaneously fit both "high-potential" and "special education" criteria should have instruction that takes into account both their gifts and special needs. Across gifts and exceptionalities, these twice-exceptional students have often benefited from: (1) a personally meaningful curriculum, (2) use and development of their strong learning modalities in their curriculum (e.g., their visual, auditory, or tactile-kinesthetic senses), (3) instruction on how to compensate for weak learning modalities in that curriculum, (4) step-by-step teaching in weak skills, and (5) practice of improved skills with classmates and mentors. Gifted students with mild hearing impairments, for example, may benefit from readings on the lives of eminent achievers with similar disabilities, from activities that utilize their visual or tactile-kinesthetic modalities, and from instructional approaches that get them to focus their listening on the most important themes and subthemes of a teacher's oral presentation. High-potential youth with mild visual impairments might be provided tips on how to deal with overly dense print, and might receive step-by-step instruction on how to focus on the main points of a long reading selection.

Twice-exceptional youth have also benefited from specialized teaching and counseling, depending on their particular mild sensory, physical, or intellectual challenges. Gifted LD students, for example, can benefit from personally meaningful curricular references in history, literature, and health to prominent and everyday LD persons. Gifted emotionally or behaviorally disordered (or EBD) youth, if they are withdrawn, can be kept out of classroom settings (or special-needs sites) that have numerous aggressive students. Also, gifted EBD students may be provided counseling that implements more cognitively oriented therapeutic approaches than are typically used with EBD youth.

Advocacy

In advocating for gifted youth with disabilities, teachers can inquire into available services and curricula for these youth, as well as inservice training for themselves. Educators can read about special education laws on disabled students' rights to individualized counseling and related services. Further, teachers can ask their schools for appropriately complex and fast-moving student curricula, as well as for inservice instruction and professional readings on how to engage in particularly important professional tasks, such as the writing of students' Individual Education Plan (IEP) objectives. A biology teacher for a gifted health-impaired youth, for instance, can ask his or her school for materials on how smoking might affect not just the whole body, but different body parts and functions, such as those that are strong or weak for that particular student. Similarly, biology educators of high-potential orthopedically impaired youth can seek advice from IEP experts, in or out of their districts, on how to tie health studies—if they are an area of particular concern for a student—into the adolescent's "Transitional" IEP section dealing with mobility. (This IEP segment outlines the learning steps needed for special education students to develop helpful exercise and transportation skills for adult life.)

Parents of gifted students with disabilities, and with other significant challenges not covered by the federal disability definition (like attention deficit disorder), can advocate to educators in several ways to bring about better school-based results. Parents can lay out clearly for educators their children's daily challenges and joys at home and in the community. Parents also can describe for teachers those past teaching approaches that have—and have not—produced the best results. Parental input on challenges, joys, and useful approaches is likely to be most essential for low-incidence gifted-disabled populations, such as artistic youth with mental disabilities, about whom educators may be especially limited in knowledge. Proactive educators can take the initiative, seeking input from parents on effective educational strategies, and can keep parents updated on techniques being used at school to effectively support gifted students with disabilities.

Terence Paul Friedrichs

See also Guidance; Individual Education Plan; Learning Disabilities; Twice Exceptional

Further Readings

Besnoy, K. (2006). *Teaching twice-exceptional students*. Waco, TX: Prufrock Press.

Coleman, M. R. (2005). Meeting the needs of students who are twice-exceptional. *Teaching Exceptional Children, 38*(1), 5–6.

Friedrichs, T. P. (2001). *Distinguishing characteristics of gifted students with disabilities*. Waco, TX: Prufrock Press.

Hallahan, D. P., & Kauffman, J. M. (2005). *Exceptional children: Introduction to special education* (10th ed.). Needham Heights, MA: Allyn & Bacon.

National Center for Education Statistics. (2002). *Digest of education statistics*. Washington, DC: U.S. Department of Education.

National Education Association. (2006). *The twice-exceptional dilemma*. Washington, DC: Author.

Nielsen, M. E., & Higgins, L. D. (2005). The eye of the storm: Services and programs for twice-exceptional youth. *Teaching Exceptional Children, 38*(1), 8–15.

Skinner, W. (2007). *Infinity and zebra stripes: Life with gifted children*. Scottsdale, AZ: Great Potential Press.

Skrtic, T. M. (1995). *Disability and democracy: Reconstructing (special) education for postmodernity*. New York: Teachers College Press.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, J., & Olenchak, F. R. (2005). *Misdiagnosis and dual diagnoses of gifted children and adults*. Scottsdale, AZ: Great Potential Press.

Yewchuk, C. R., & Bibby, M. (1989). The handicapped gifted child: Problems of identification and programming. *Canadian Journal of Education/Revue canadienne de l'éducation, 14*(1), 102–108.

Divergent Thinking

Divergent thinking represents the potential for creative thinking and problem solving. It is not synonymous with actual creative behavior but has proven to be a good estimate of it. It is also useful as a construct for empirical research on creativity and in various applied settings. This entry defines divergent thinking and discusses how it is used in education and other applied settings. The theoretical basis is also reviewed.

Definition

Divergent thinking is best defined by contrasting it with convergent thinking. Simply put, the former is thinking that moves in different directions and the latter is thinking that moves toward one or a very few correct or conventional answers. "How are automobiles and bicycles alike?" allows divergent thinking; "What is the capital of California?" requires convergent thinking.

Convergent thinking can be judged by correctness. Responses to divergent thinking exercises and tests, in contrast, may be quite varied, numerous, and original. In fact, that is the attraction of divergent thinking. Originality is particularly important because it is vital for creative thinking. Originality is apparent in divergent thinking that leads to unusual or unique ideas. There are other important features of divergent thinking, including ideational fluency (the number of ideas given to a particular question) and flexibility (the number of categories or themes in the ideational set). The different aspects of ideation are highly intercorrelated, but not entirely redundant. It is best to use all of them to get a real understanding of an individual's thinking.

Uses

Divergent thinking exercises can be used in education, with preschool-aged children through college, in order to exercise the ideational basis of creative thinking. There are numerous divergent thinking exercises available, and many others can be found by simply altering questions such that they are open-ended to allow ideation and to avoid a focus on one correct or conventional answer.

More formally, divergent thinking allows the objective assessment of creative potential. Thus it can be used as either a means for exercising the ideational skills that are associated with creative thinking or used as a psychometric measure to estimate the potential for creative problem solving. Sometimes these two things go hand in hand, with tests of divergent thinking used as criteria to assess the impact of programs that are designed to enhance creative potentials. This is a logical approach to take, though in precise terms divergent thinking should be used more as a predictor of the potential for creative problem solving and not a criterion of actual creative performance. Too often, when it is used as a criterion, the assumption is that divergent thinking is synonymous with actual creativity. This view is inaccurate. It is, again, a useful estimate of the potential for creative thought.

It is only an estimate of potential because other things in addition to divergent thinking are involved in actual creative performances. These include motivation (usually intrinsic), tolerance, risk taking, openness, and a few other attitudes, capacities, and abilities that operate in various combinations in different domains of creative performance (e.g., art, mathematics, science, interpersonal relationships, to name just a few). Creative talent usually is defined as a complex, the idea being that no one predictor or trait is sufficient and that various things are involved.

Theoretical Basis

The notion of a creativity complex is entirely consistent with the original conception of divergent thinking, and in particular with the *structure of intellect model* developed by J. P. Guilford. Although several others had foreseen the value of ideation and open-ended tasks (including Alfred Binet, who developed the first test of mental ability, the precursor of the Stanford-Binet IQ test), it was Guilford who operationalized divergent thinking and then demonstrated its distinctiveness and separation from convergent thinking. At about the same time, E. Paul Torrance developed a variety of tests of divergent thinking and published norms for scoring and interpretation. The Torrance Tests of Creative Thinking remain the most commonly used measure of divergent thinking.

Influences

Divergent thinking is influenced by several things, including the particular stimuli or question format, the directions given when the exercise or test is presented, and the more general environmental conditions. A permissive environment, for example, seems to support more originality than does a testlike environment. It may also be better to describe divergent thinking exercises in a way that contrasts them with academic tests. If students view divergent thinking exercises as just another academic test, they tend to focus on "what the teacher is looking for" and correct or conventional (rather than original) ideas.

Even more profound is the influence of the medium or particular stimulus. Verbal tests often elicit the most ideas, and figural and visuals tests tend to elicit more original ideas. This may be because the latter are less familiar to students and examinees and, as a result, they are more likely to use their own thinking and imagination. Realistic tests have also been developed. These pose questions that are similar to the student's actual experience. Such realistic tests also elicit high fluency scores, perhaps because they engage students, but there is sometimes an experiential bias, much like that which characterizes many tests of the IQ. Simply put, students draw from their experience rather than generating new ideas, and as a result are not as original as they might otherwise be.

These influences on divergent thinking are of interest in that they contribute to our understanding of the creative process. They also have practical application. It is quite possible to facilitate divergent thinking by providing the best stimuli, directions, and environment. This, in turn, implies that divergent thinking tests and exercises can be used to aid in the fulfillment of the potential for creative thinking and problem solving.

Mark A. Runco

See also Creativity, Definition; Creativity Theories

Further Readings

Guilford, J. P. (1968). *Creativity, intelligence, and their educational implications*. San Diego, CA: EDITS/Knapp.

Runco, M. A. (Ed.). (1991). *Divergent thinking*. Norwood, NJ: Ablex.

Runco, M. A. (Ed.). (2008). *Divergent ideation and creative thinking*. Cresskill, NJ: Hampton Press.

Torrance, E. P. (1995). *Why fly?* Cresskill, NJ: Hampton Press.

Diversity in Gifted Education

Diversity or, more specifically, the lack of success in achieving it, in gifted and talented education programs has been and continues to be one of the major issues facing administrators, academics, and policymakers at all levels. Defining what is meant by *diversity* is also frequently a topic of debate. The range of definitions provides a good

baseline for this brief discussion of the topic. Diversity can be defined using ethnic, subject matter, cultural, level of intellectual precociousness, gender, multiply challenged, and many other domains. Each of these is an equally appropriate area of concern for educators in the field.

Individual Differences

Most gifted education programs are designed to identify and provide alternate educational opportunities for those who demonstrate academic excellence. They are designed to identify those who are different from the mainstream school population. What is often missed in most of these programs is that there is also diversity within the gifted population itself, which further complicates the processes. The oft-used square peg in a round hole analogy is not quite sufficient.

Variability within the gifted population often is forgotten when educational decisions are being made about specific students. To carry the square-peg analogy a bit farther, gifted kids are not all "squares" either; some are diamonds, some are stars, and some might even be described most accurately as free-form or asymmetrical. Schools, however, often try to shape gifted students educationally, as if they were all alike. One way to think about the ways that gifted individuals differ from each other is by looking at four general categories: degree of giftedness; racial, cultural, and socioeconomic differences; type of giftedness; and other confounding variables. Any of these, singly or in combination with the others, can affect the probability of a particular gifted student having difficulties in school, even in an otherwise well-designed gifted program. The potential impact of individual differences within each of these categories is as follows:

Degree of giftedness: The more highly gifted that students are, the more likely that they will be at risk in the typical school environment.

Racial, cultural, and socioeconomic differences: The more that gifted students differ from either the dominant racial, ethnic, or socioeconomic group or from the expectations of their own group, the more likely it is that they will be at risk in the typical school environment.

Type of giftedness: Gifted students who are creative, divergent thinkers; those who are gifted in the psychosocial domain; and those who are gifted in visual and performing arts are likely to be more at risk in a typical school environment that focuses on convergent thinking and academic achievement.

Other confounding variables: Students who have been identified as having learning disabilities or behavior disorders; those who are considered to be emotionally disturbed; and those who are physically challenged, hearing impaired, or visually impaired are likely to be more at risk in the typical school environment because their other-identified exceptional educational needs tend to be addressed rather than their giftedness.

Broadening the definition of giftedness to encompass multiple talents and diversity among the gifted may have come out of a desire to create educational environments more suitable to the development of creative potential. So far, efforts to modify the learning environment have not kept pace with an understanding of giftedness that includes the entire range of individual differences within the gifted population.

Identification

If one were to step back in time to the earliest gifted education classrooms, one would find that they were almost without exception dominated by youth of Western European background from predominantly middle- and upper-class families. To put it more bluntly, they were well-off White kids who had come from homes where books, art, and music were valued. If there was any diversity at all, it was perceived along religious grounds, where children from lower-middle-class Jewish families, many second-generation immigrants, could also be found. Their placement in gifted education was on the basis of performance on standardized IQ tests. These children would be academically gifted only. Artists, musicians, future leaders, and others, would have been left out. African Americans, Asian Americans, Hispanics, Native Americans were absent from most gifted education classes. It would take the civil rights movement, federal legislation, extensive and contentious research on bias in testing instruments, and the concerted

efforts of at least two generations of gifted educators to begin to change the picture.

Today's gifted classroom is still dominated by European American students, with impressive gains having been made by Asian Americans, and diversity is measured on racial grounds, not religion. General economic conditions and cultural constraints remain the apparent underlying causal factors behind continuing underrepresentation by people of color in contemporary gifted programs. Studies as early as 1993 pointed to up to 50-percent underrepresentation by African Americans, Hispanics, and Native Americans in gifted classrooms. Some recent research points to giftedness assessment methods as a contributing factor, but there are not sufficient data for a firm conclusion in this regard at this time.

Where giftedness manifests itself has a significant impact on identification for inclusion in programs. Academic and athletic excellence have received the most attention and reward in American education settings. Research on multiple intelligences by Howard Gardner and others has increased the interest of educators in music, art, verbal and nonverbal communication, psychological, economic, leadership, and even cross-cultural empathy. Academic excellence and athletic prowess, however, are still the only areas consistently identified in most U.S. schools.

Although adding subject matter areas to the list of potential types of giftedness would seem to be desirable for students' sakes, it has compounded the problems for administrators, policymakers, and classroom educators alike. Acknowledgment of the possibility that giftedness may exist in a subject matter domain raises parental expectation for identification and response processes, which seldom exist. Likewise, tools to measure the potential for giftedness in nonbiased ways simply do not exist in many of the areas mentioned. In some, like music and art, only beginning steps have been made, because the in-classroom programs that might encourage such giftedness have often been cut in financially strapped school districts. Also, in many states, giftedness is legislatively defined as performance beyond certain specified levels on scholastic aptitude tests. Thus only the academically gifted are legally recognized and entitled to funding from public sources. Recognition of the existence of multiple areas of giftedness remains a subject of much discussion among educators, but at this time is receiving very little attention outside education circles. It is likely that it will take another generation of educators to address this.

Underrepresentation and Underachievement

Most diversity activities today are focused on the underrepresentation of people of color in gifted programs. The apparent successes of Asian Americans may be attributed to the lack of ethnic specificity in demographics. Some Asian American groups, notably Chinese, Indian, and Japanese, have made significant entry into gifted programs. But it must be noted that the term *Asian* covers more than 30 language groups, many more ethnic and cultural groupings, and the majority of three of the world's five major religions. The diversity within the term itself is sufficient to mask major underrepresentation among subgroups within. Frequently the giftedness of persons of color is masked by cultural or socioeconomic barriers that make them nearly invisible; the disproportionate numbers of Hispanic, African American, and Native American children among those below the poverty level confounds attempts to distinguish the effects of racism or poverty on children's achievement. As a result, the giftedness is buried, with the resulting frustration leading to underachievement in standard educational settings.

Students whose talents are rooted in domains other than those that society has chosen to serve or to reward—the nontraditionally gifted—are at significant risk of underachievement. Although academic underachievement is one issue that confronts this population, it seems more critical to recognize the potential for underachievement in the nontraditionally gifted student's talent domain. Though academic underachievement is of concern to teachers and parents of any child, there must be growing consciousness that academic success alone is unlikely to nurture in nontraditionally gifted students the zest, commitment to task, ability, and creativity upon which extraordinary adult accomplishment is founded. If anything, an entrenched school system and social climate, often supporting appropriate programs only for academic and/or athletic gifts while ignoring others, runs the risk of so alienating these young people that they may never fully realize their potential.

The causes of this underrepresentation and underachievement have been the subject of study for more than 20 years. There are remarkably consistent findings among the research results. The impacts of socioeconomic status, cultural constraints, and self-induced suppression of ability explain a major part of this underrepresentation. Neither poor academic achievement nor limited English language ability indicates a lack of giftedness, for a variety of factors can prevent children from fully demonstrating their intellect. For example, a lack of access to stimulating educational materials and experiences can impede children's early intellectual development; nutritional deficiencies can compromise their ability to concentrate; social isolation can delay their development of interpersonal skills; and trauma from a disadvantaged and dysfunctional home life can depress their overall functioning.

Gifted underachieving minority students perform poorly in school for many of the reasons that any student might. Yet, as described earlier, minority students may face additional barriers. In short, underachievement is not only a problem, but a symptom of problems. To address this, educators must explore factors contributing to underachievement; these factors can be categorized as sociopsychological, family related, peer related, and school related. One or all of these factors can hinder student achievement.

Some researchers have noted how minority students' learning styles may contribute to underachievement. Specifically, research indicates that African American students tend to be field-dependent, visual, and concrete learners, whereas schools teach more often in verbal, abstract, and decontextualized ways. Thus, mismatch between learning styles and teaching styles can result in confusion, frustration, and underachievement for gifted minority students.

Excessive use of competition can also hinder students' achievement, damaging academic motivation and educational engagement. Given the more social and less competitive cultural heritage of some minority students, particularly Hispanics and Native Americans, competition may heighten these students' anxieties, lower achievement motivation, and lower academic and social self-concepts. Sensitivity to cultural factors is critical to proper identification of gifted children from these groups.

Programs and Outreach

Identifying the special talents of students from diverse backgrounds is just the first step toward helping them achieve their full potential. Educators need to develop programs for gifted students that reflect and respect their cultures and learning styles. Doing so will demonstrate to the students that they truly belong in such programs, and will help ensure their retention and success. Teachers, along with community members (including local colleges) and the students' families, need to work together to empower and encourage all students, and to provide them with enriching educational materials and experiences and role models and mentors.

Educators have a responsibility to do whatever they can to create a school setting where all gifted students can feel that they belong; where their unique traits and talents are recognized, stimulated, and celebrated; and where their natural passions for learning will continue to blossom and flourish. To reduce the possibility that children who do not fit stereotypical profiles of gifted children will be passed over, identifying students from diverse backgrounds for talent needs to be a multipronged effort by many of the adults close to them. Involving adults from children's home, religious, and community lives in the identification process helps ensure that the availability of gifted programs is widely known. Outreach is especially important in areas where parents may be totally absorbed by meeting their family's basic and immediate needs, and unable to focus on the possibility that their children may be gifted or to provide educational enrichment.

Clifton Wickstrom and Diane Boothe

See also History of Gifted Education in the United States; Intelligence; Underachievement; Underrepresentation

Further Readings

Fiedler, E. D. (1993). Square pegs in round holes: Gifted kids who don't fit in. *Understanding Our Gifted, 5*(5A), 1, 11–14.

Ford, D. Y. (1995). *Correlates of underachievement among gifted Black students: Promising practices and programs*. Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Gardner, H. (1983). *Multiple intelligences: The theory into practice*. New York: Basic Books.

Klug, B. J. (2004). Children of the starry cape: Gifted and talented Native American students. In D. Boothe & J. Stanley (Eds.), *In the eyes of the beholder: Critical issues for diversity in gifted education* (pp. 49–71). Waco, TX: Prufrock Press.

U.S. Department of Education, Office of Educational Research and Improvement. (1993). *National excellence: A case for developing America's talent*. Washington, DC: Government Printing Office.

Wickstrom, C. D. (2004). Give us your best and brightest, but…: A historical review of U.S. national policy on education for the highly capable. In D. Boothe & J. Stanley (Eds.), *In the eyes of the beholder: Critical issues for diversity in gifted education* (pp. 263–274). Waco, TX: Prufrock Press.

Domains of Talent

Domains of talent refers to the specific areas in which a person may excel. Benjamin Bloom described talent as "an unusually high level of demonstrated ability, achievement or skill in some special field of study or interest" (p. 5). In Bloom's early work at the University of Chicago, researchers attempted to investigate distinct domains of talent in order to identify critical factors in the development of talent. The research team selected only four of literally hundreds of domains to study: athletic/psychomotor; aesthetic/musical/artistic; cognitive/intellectual; and interpersonal. Bloom's team selected these four domains because of the interrelationship between and among them as well as the spectrum of domains, and attempted to identify the ways in which talent develops in a domain. Early in the study the team dropped the interpersonal domain because no clearly identifiable criteria could be established in the field to identify persons who were considered extraordinarily talented in the interpersonal domain. Bloom and his colleagues focused primarily on the middle of the population, hypothesizing that those in that group, under favorable learning conditions, could develop unusually high levels of demonstrated ability achievement or skill in some special field of study or interest.

Lauren Sosniak, a researcher in the Chicago group, identified three phases of learning that influence the development of the talent domain. The earliest phase of development described is when young children demonstrate an interest or curiosity for a particular talent that is encouraged by parents and others through informal play and exploration of the talent. Sosniak describes the second phase of development as a more formal disciplined approach to the talent domain that is facilitated by parents and expert others to focus on the details of the talent domain: the techniques, structures, vocabulary, and connections. This phase is also characterized by respect and reciprocity between the student and teacher as well as recognition of the student's talent in more formal ways (e.g., recitals, competitions). In the final phase of talent development, students begin the process of personalizing their talent. In this period of development they begin to work with other professionals in their talent domain to gain increasing levels of expertise. A hallmark of this period for those who become recognized at the highest levels of their field is the personalization of their talent, working from mastery of technique to giving personal meaning to their talent. It is also at this point that researchers noted that students who could not make the shift to personal meaning began to realize that although they would always be proficient in their area of talent, it was unlikely to manifest itself at the highest levels in their field. Among the conclusions of this work was that exceptional levels of talent development require certain types of environmental support, special experiences, excellent teachers, and appropriate motivational encouragement at each phase of development.

Another major researcher in the field, Françoys Gagné, described domains of talent as the advanced mastery of systematically developed abilities and knowledge in at least one field of human endeavor to a degree that places a child's achievement within at least the upper 15 percent of age peers who are active in that field. Gagné's *differentiated model of giftedness and talent* proposes five aptitude domains: intellectual, creative, socioaffective, sensorimotor, and "others" (e.g., extrasensory perception). Further, Gagné contends that talents progressively emerge from the transformation of these aptitudes into the well-trained and systematically developed skills of a particular field.

Howard Gardner also contributed to the discussion on domains of talent with his *theory of multiple intelligences* by trying to broaden the

concept of talent. He stressed the importance of role models, contact with the domain in which an individual's talent may lie, and contact with other equally talented individuals in the domain to foster and mentor talent.

Richard Snow further distinguished talent development as different from aptitude by describing talent as recognized achievement in the field (e.g., real world), assessed as a performance accomplishment such as a process or product in the real world. Aptitude is distinguished from talent because aptitude is derived from constructed assessments and not from a real-world performance. Further describing the development of domains of talent, authors Teresa Amabile, E. Phillips, and Mary Ann Collins characterized talent as an innate ability consisting of domain and creativity relevant skills. Domain relevant skills were described as having a special attraction as well as education in the domain, and creativity relevant skills were described as a combination of personality and cognitive style.

Domains of talent are found in every area of human endeavor and are valued differently based on cultural norms. Given constructive learning conditions, the majority of the population can develop talent in a domain, though not all talent will manifest itself at the highest levels. There are literally hundreds of domains of talent, some of which (e.g., giftedness, musical talent, athletic prowess, storytelling) are seemingly more valuable in society than others, but all of which are instrumental to the development of human potential.

Beverly D. Shaklee

See also Eminence; Giftedness, Definition; Multiple Intelligences; Talent; Talent Development

Further Readings

Amabile, T., Phillips, E., & Collins, M. A. (1994). Person and environment in talent development: The case of creativity. In N. Colangelo, S. Assouline, & D. Ambronson (Eds.), *Talent development* (pp. 265–280). Dayton: Ohio Psychology Press.

Bloom, B. (1985). *Developing talent in young people.* New York: Ballantine Books.

Bloom, B. (1985). Generalizations about talent development. In B. Bloom (Ed.), *Developing talent in young people* (pp. 507–549). New York: Ballantine Books.

Colangelo, N., Assouline, S., & Ambronson, D. (Eds.). (1994). *Talent development.* Dayton: Ohio Psychology Press.

Gagné, F. (1993). Constructs and models pertaining to exceptional human abilities. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 63–85). Oxford, UK: Pergamon.

Gardner, H. (1997). *Extraordinary minds: Portraits of exceptional individuals and an examination of our extraordinariness.* New York: Basic Books.

Piirto, J. (1994). *Talented children and adults: Their development and education.* New York: Macmillan.

Snow, R. (1994). Aptitude development and talent achievement. In N. Colangelo, S. Assouline, & D. Ambronson (Eds.), *Talent development* (pp. 101–122). Dayton: Ohio Psychology Press.

Sosniak, L. (1985). Phases of learning. In B. Bloom (Ed.), *Developing talent in young people* (pp. 409–438). New York: Ballantine Books.

Drama

Drama has been a major vehicle for creative expression since the dawn of human development through early religious rituals, reenactment of natural phenomena, and the inclination of humans for storytelling. Dramatic representation is characterized by communicating a universal truth about common human experiences such as love, death, loyalty, jealousy, lust, change, or moral conflict. Drama can be used as an educational tool, as entertainment from party games to cabarets, for commercial purposes, as well as formal productions in professional venues. Drama lies at the core of all performing arts including dance, music, puppetry, mime, opera, and storytelling, each requiring specific abilities and training. When adults can recognize behaviors that indicate dramatic talent in a young person, they will be better equipped to offer opportunities for development and career guidance. Moreover, best practices in education include exposure to drama experiences for all students, nurturing creative expression and ensuring future patrons of the arts as well as recognizing and developing future performing artists.

Dramatically Creative Person

Traits

Certain characteristics are often found in children with dramatic talent; however, these traits may not always be valued in school settings. If an environment for dramatic development is not provided for the talented child, behaviors indicating dramatic predisposition can be misinterpreted or considered inappropriate. Recognizing and channeling talents into positive outlets such as acting, music, and/or dance lessons with performance opportunities can help elementary-aged children demonstrating dramatic talent to develop a positive self-image. A special mentor or teacher often takes the lead in developing the potential of the young artist. Secondary schools typically provide more opportunities for development of dramatic talent than elementary schools. The following behaviors indicate potential dramatic talent in children, and are listed with their possible negative interpretations in italics:

- Verbalizes easily, that is, recounts events in storytelling style—*may fantasize and elaborate in ways seen as lying*
- Uses expressive body language, facial expressions, and verbal communication—*seen as attention seeking*
- Improvises naturally and spontaneously—*acts as class clown*
- Holds attention of a group when speaking—*considered self-centered*
- Enjoys evoking emotional response from listeners, such as laughter, frown, tension—*called drama queen or manipulative*
- Organizes plays and skits with peers, often taking a leadership role—*becomes bossy or impatient when peers don't see it his or her way*
- Mimics others in speech, walk, gesture—s*een as disrespectful*
- Observant and sensitive to details of environment— *hypersensitive and internalizes criticism*
- Nonconforming—*judgmental of peers, opinionated*
- Taking risks—*can make unwise decisions*
- Perseveres when pursuing area of passion—*considered stubborn*

When adults recognize these behaviors as indicators of talent, and then become advocates for positive performing arts experiences in schools, young people have a greater chance of fulfilling their potential. Many children, especially those at risk, do not have such opportunities outside of school. Drama in the classroom as an instructional method, as well as in more formal settings, offers positive experiences to channel energy toward successful outcomes and nurtures self-efficacy that can fuel motivation for effort in areas that are more difficult.

Career Development

Building a career in the dramatic arts in contemporary America poses many challenges and often requires personal sacrifice. Young dramatic artists frequently face postponing both financial security and family life, and many who ultimately achieve in the field have received both moral and financial support from their families. Because drama lies at the core of every performing art, young people must begin technical training at an early age. Music and dance require early training to capture sensitive periods of physical development to build technique, and young actors must study movement and diction. Creative expression is nurtured in an environment that encourages spontaneity, experimentation, humor, and play rather than strict authoritarian rules. Directors and teachers who encourage dialogue, improvisation, and experimentation empower actors of all ages to become creative collaborators in the dramatic process.

The Creative Process in Drama

Participation in the process of dramatic production has many benefits. When used in the classroom, dramatized material is better retained than the same material delivered in a book or lecture. Memory is exercised in learning lines, interpretation of characters requires analytical thinking, and collaborative interaction improves. The creative process in drama embodies many stages from script to performance, involving both individual efforts and group collaboration:

Stage One: The solitary conception of the piece by playwright

Stage Two: Collaboration with producers and director

Stage Three: Solitary work of interpretation and vision by director

Stage Four: Director in collaboration with designers (sets, costumes, etc.)

Stage Five: Rehearsal—collaboration, experimentation, and discovery with actors

Stage Six: Performance—actors communicate final product of the collaboration, the performance, with the audience

Whether one works at the solitary level or the group level throughout this process, the collective efforts of many talents bring to life the conception of the original creation.

The Dramatic Product

The successful performance allows all who share the communal event to transcend the immediate world and experience a collective moment of intimate, mutual understanding that triggers the imagination to live a momentary fantasy—the unbelievable becomes real. The drama is here and then gone, but it lives in the hearts of those who present it and those who witness it, and it provides new glimpses into life.

Kristin B. Berman

See also Creative Personality; Dance; Musical Creativity; Performing Arts; Playwrights; Talent Development

Further Readings

Cole, S. L. (1992). *Directors in rehearsal: A hidden world*. New York: Routledge.

Feist, G. J. (1999). The influence of personality on artistic and scientific creativity. In R. J. Sternberg (Ed.), *Handbook of creativity* (pp. 273–296). New York: Cambridge University Press.

Fiske, E. B. (Ed.). (2000). *Champions of change: The impact of the arts on learning*. Washington, DC: Arts Education Partnership, President's Committee on the Arts and the Humanities, The John D. and Catherine T. MacArthur Foundation.

Strasberg, J. (1996). *Accidentally on purpose: Reflections on life, acting, and the nine natural laws of creativity*. New York: Applause Books.

Dropouts, Gifted

Gifted dropouts refers to gifted students who drop out of high school despite their potential to succeed academically in school in comparison to the general student population. There are no good estimates of the number of gifted dropouts because of the differing definitions of giftedness and limited comprehensive longitudinal studies done with this population. Though no reliable estimates of the number of gifted dropouts exist, the often-cited Marland Report suggests that nearly 18 percent of gifted students are gifted dropouts. Variables that predict dropping out, reasons for leaving school, characteristics of gifted dropouts, and recommendations for alleviating this problem are highlighted in this entry.

Gifted dropouts are a heterogeneous group; however, there are some similar variables that help to identify this group. Some of the variables that predict dropouts as identified by Joseph Renzulli and Sunghee Park are (a) instability in the home environment; (b) drug and alcohol abuse by students; (c) lack of interest and motivation in school; (d) negative and rebellious attitudes toward school and authorities; (e) incomplete or inappropriate gifted curriculum in the school; (f) poor peer relationships and social adjustment to school environment; and (g) inadequate counseling services in school and communication breakdown between the school and the home. Emotional adjustment issues are another problem that affects some, but not all, gifted students.

Reasons for leaving school differ for male and female dropouts. For males, the reasons for leaving school are mainly school- and job-related and include failing school, getting a job, and inability to keep up with schoolwork with or without a job. For females, the reasons for leaving school are mainly personal- and school-related and include getting pregnant, becoming a parent, failing school, and inability to keep up with schoolwork. School-related reasons such as not liking school and failing school are the main reasons for leaving school for both males and females. Social problems such as not getting along with other students at school and family problems such as having to take care of sick family members are other reasons for leaving school.

Boredom with the academic regimen in school is an important factor to consider in working with gifted students. Lannie Kanevsky and Tacey Keighley pointed out that gifted students seek control, choice, challenge, complexity, and caring educators to flourish academically. The ability to control one's own learning experiences, having a choice to do work that reflects one's abilities, being provided with adequate challenge in the learning materials, dealing with complex materials that utilize creativity and critical thinking instead of rote memorization, and having caring teachers who are respectful of the gifted student's abilities and provide appropriate stimuli are essential for potential dropouts to succeed in school.

About half of gifted dropouts are in the lowest quartile of the socioeconomic status level in comparison to gifted nondropouts. Hispanic and Native American gifted are also more likely than European American and Asian American gifted to drop out of school. It is also more likely that the parents of many of these students did not finish high school and in turn their parents did not proceed on to college. Many gifted dropouts are also found to be lacking experience with computers and to spend little time with computers compared to gifted nondropouts. A large number of gifted dropouts also spent little time volunteering, suggesting a lack of connection to potential mentors outside of school. Though gifted dropouts' family members were concerned about their children dropping out of school, many parents did not take extra steps to ensure their children stay in school, such as taking them to the counselor or talking to the schoolteacher; getting extra academic support in school for their children; or finding other schools that may be receptive to their children's high abilities.

Existing research with gifted dropouts has some suggestions to help these students succeed in school and also to highlight the actions that teachers, parents, and advocates for gifted students can take to help these students better succeed in school. Teachers need to be aware that sensitivity is part of giftedness and to help these students accept and express their sensitivity in an appropriate and respectful manner. Because giftedness occurs in a variety of forms, teaching professionals should be knowledgeable about the different forms of giftedness and try to accommodate students' differing giftedness instead of academic giftedness only. The provision of challenging academic environment is essential to keep these students engaged in the learning process from an early age through high school. Students with problems need to have an active collaborator and advocate to deal proactively with the problems they may face in school or personal life; this is where professionals involved in schools, such as counselors and psychologists, are needed to intervene actively. Challenge of authority and authority figures is common with gifted students and needs to be handled constructively to help students form a positive resolution. The provision of active interventions for students with suspected or real problems with drugs and/or alcohol is important to help students deal with underlying issues that might be hampering their success in school. Drawing family and community support is also essential to help gifted students form connections outside of school and help ensure a comprehensive support system to help gifted students remain accountable to themselves and others.

Some students who leave school eventually finish their General Equivalency Diploma (GED) or pursue their college degree through a community college or university. Nonetheless, educators and advocates for gifted students need to help those who leave school and are left behind academically.

Kai Kok "Zeb" Lim and Ban Hong Lim

See also Attitudes Toward Gifted; Boys, Gifted; Early Ripe, Early Rot; Girls, Gifted; Practical Intelligence; Talent Development; Underachievement

Further Readings

Hansen, J. B., & Toso, S. J. (2007). Gifted dropouts: Personality, family, social and school factors. *Gifted Child Today, 30,* 30–41.

Kanevsky, L., & Keighley, T. (2003). To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Review, 26,* 20–28.

Renzulli, J. S., & Park, S. (2000). Gifted dropouts: The who and the why. *Gifted Child Quarterly, 44,* 261–271.

Dual Processing Model

The *dual processing model* is a theory of how people learn that assumes that people have separate channels for processing verbal and visual material. Verbal material includes printed and spoken words, whereas visual material includes illustrations, photos, animation, and video. The dual processing model is based on the idea that the way people mentally represent verbal material is qualitatively different from the way they represent visual material. The dual processing model has its roots in Allan Paivio's *dual coding theory,* has been applied to multimedia learning by Richard Mayer, and has implications for creativity and talent.

Dual Coding Theory

Paivio proposed dual coding theory in his classic books *Imagery and Verbal Processes* in 1971 and *Mental Representations: A Dual Coding Approach* in 1986. The central tenet in dual coding theory is that people possess separate information processing systems for verbal and nonverbal material. According to dual coding theory, learners can engage in three important cognitive processes during learning: (1) Learners can mentally form *representational connections* by converting presented verbal material (such as the word *dog*) into internal verbal representations. (2) Learners can mentally form *representational connections* by converting presented nonverbal material (such as a line drawing of a dog) into internal nonverbal representations. (3) Learners can mentally form *referential connections* between verbal representations and nonverbal representations (such as between the word and the drawing of a dog).

Dual coding theory can explain why pictures are easier to remember than their printed names. When a picture of a dog is presented, learners build both a nonverbal representation (e.g., a mental image the dog) and a verbal representation (e.g., the word *dog*), and form a referential connection between them. When they try to remember what they learned they have two ways of retrieving the material—through the verbal system or through the nonverbal system. In contrast, when the word *dog* is presented, learners are more likely to build only a verbal representation, so they have only one way to retrieve what they have learned when they are tested.

Cognitive Theory of Multimedia Learning

Dual processing is a central feature in current explanations of *multimedia learning*—learning from words (e.g., printed or spoken text) and pictures (e.g., illustrations, photos, animation, or video). Thus, a multimedia message could consist of a narrated animation of how a tire pump works, or an illustration with printed text. For example, separate visual and verbal channels are fundamental to Richard Mayer's *cognitive theory of multimedia learning* as described in his book *Multimedia Learning* in 2001.

As shown in Figure 1, spoken words enter the learner's cognitive system through the ears whereas printed words and pictures (such as illustrations or animation) enter the learner's cognitive system through the eyes. If the learner attends to some of the incoming words, they enter the verbal channel in working memory (as indicated by the *selecting words* arrow). If the learner attends to portions of the incoming pictures, they enter the pictorial channel in working memory (as indicated by the *selecting images* arrow). If the learner attends to portions of the printed words, they briefly enter the pictorial channel where they can be transferred to the verbal channel for deeper processing (as indicated by the arrow from images to sounds). Next, the learner can mentally organize the verbal material into an organized verbal representation (as indicated by the *organizing words* arrow) and can mentally organize the pictorial material into an organized pictorial representation (as indicated by the *organizing images* arrow). Finally, the learner can mentally integrate the verbal and pictorial representations with each other and with appropriate prior knowledge from long-term memory (as indicated by the *integrating* arrows).

Consistent with the dual processing model, research on multimedia learning supports the *multimedia principle*—people learn better from words and pictures than from words alone. For example, people perform better on solving transfer problems about how to troubleshoot or redesign pumps after they receive a narrated animation showing how a bicycle tire pump works than after they receive the narration alone.

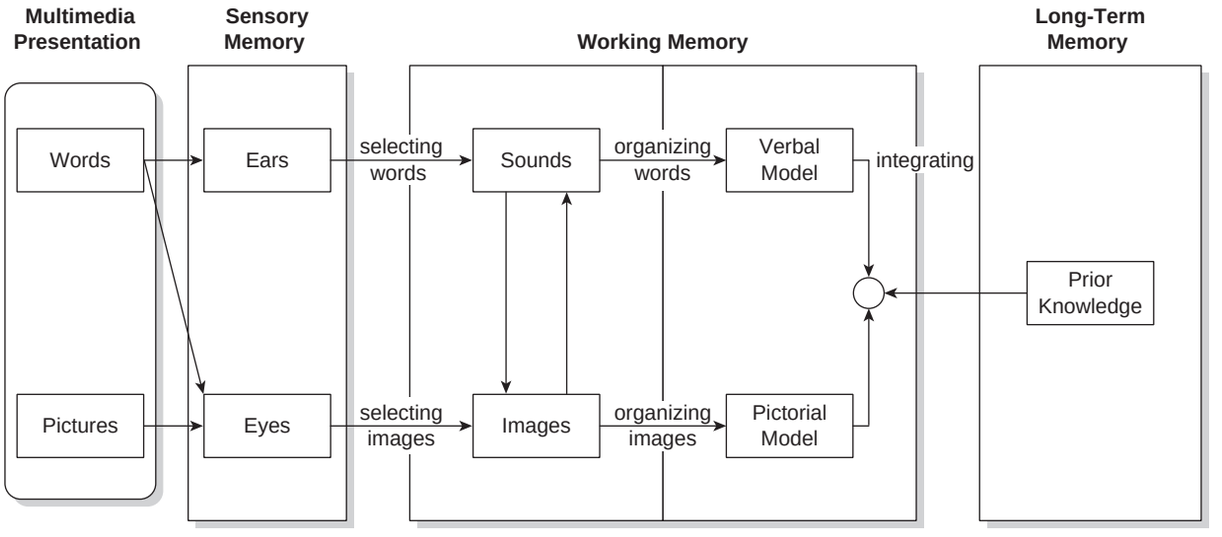


Figure 1 Dual Processing Model for Multimedia Learning

Source: Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press. Reprinted with Permission.

Note: The verbal channel runs across the top; the pictorial channel is across the bottom.

Implications for Creativity and Talent

Although formal schooling tends to favor the verbal channel—such as through the use of lectures and printed text—deeper learning can be achieved when learners also use their pictorial channel. Understanding can be achieved when learners are able to build connections between verbal and pictorial representations, such as between diagrams depicting how a pump works and a verbal explanation describing the steps in how a pump works. Creative problem solving can be improved when learners are able to use both their verbal and pictorial channels for learning.

Verbal ability is related to the verbal channel, and spatial ability is related to the pictorial channel. Verbal ability is the ability to build and manipulate verbal representations (e.g., being able to summarize a paragraph); spatial ability is the ability to build and manipulate visual representations (e.g., being able to mentally rotate a printed figure). Although verbal ability (e.g., facility in using the verbal channel) is considered a central component in academic success, talent and giftedness may also involve spatial ability (e.g., facility in using the pictorial channel).

Richard E. Mayer

See also Creative Problem Solving; Learning; Visual-Spatial Learners

Further Readings

Mayer, R. E. (2001). *Multimedia learning*. New York: Cambridge University Press.

Mayer, R. E. (2005). Cognitive theory of multimedia learning. In R. E. Mayer (Ed.), *Cambridge handbook of multimedia learning* (pp. 31–48). New York: Cambridge University Press.

Paivio, A. (1986). *Mental representations: A dual coding approach*. New York: Oxford University Press.

Paivio, A. (2007). *Mind and its evolution: A dual coding theoretical approach*. Mahwah, NJ: Lawrence Erlbaum.

Dyslexia

Gifted youth with dyslexia are a varied population, as can be seen in the definitions, estimated prevalence, noted characteristics, and recommended identification, programming, and advocacy approaches for this group. Each of these aspects of dyslexia in relation to gifted youth is discussed in this entry.

Definitions

Dyslexia, like giftedness, can be defined in various ways. Some definitions are specific to dyslexia, whereas others describe the condition as one of a broader set of challenges called *learning disabilities*. Medical definitions, like those of many optometrists and the International Dyslexia Association, define dyslexia specifically as a set of severe, intrinsic, lifelong, perceptual, memory, and organizational problems that often underlie significant reading, writing, and other language-based challenges. By contrast, definitions by advocacy groups, psychologists, and educators tend to focus, with varying degrees of breadth, on *language-learning disabilities*. Most broadly, the Learning Disability Association's (LDA's) advocacy-based definition refers to extensive learning "differences," rather than deficits, shown by dyslexics and other persons with learning disabilities (LD). This definition emphasizes the many ways in which people with learning challenges can—rather than can't—do community, home, and school tasks over the entire life span. Psychological definitions, such as that of the American Psychiatric Association's fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*), generally are used more narrowly to show how information-processing challenges affect dyslexic and other learning disabled persons at home, in school, and around the community. Perhaps most narrowly, educational definitions, such as those of the U.S. Department of Education and many state education departments, focus on processing difficulties that cause LD youth to underachieve academically in one or more school subjects during the K–12 years.

These diverse definitions—with their implicit, varied challenges for gifted dyslexics—may present different opportunities for these youths' widely varied strengths to arise. For example, LDA's definition, with its "can do" philosophy about LD persons' alternative ways of getting things done, has long been open to excellent performance from high-potential dyslexics throughout their life spans. Further, federal and many state educational definitions, which connect "LD" to "average-to-above" intellectual potential during the K–12 years, suggest that many LD students can profit substantially from appropriate, school-based, remedial instruction. When appropriately individualized, the instruction often accompanying the "LD" label can significantly close the gap between gifted dyslexics' very high academic potential and their actual achievement levels.

Prevalence

Given the varied definitions of giftedness and dyslexia, it is difficult to determine the precise prevalence of gifted dyslexic students. Even within a given definition, the theory and the practice surrounding that definition portend different numbers of gifted dyslexic children. For instance, according to the federal gifted and LD definitions—both of which are open, theoretically, to having the "other" exceptionality present—there should be about 100,000 gifted K–12 students with dyslexia and other learning disabilities. In practice, however, few dyslexic children may actually be identified for gifted programs, perhaps due to dyslexic youths' difficulties in achieving the results needed for gifted-program admissions, on test scores, or on teacher, parent, or self-nominations.

Characteristics

In professional gifted and learning-disability journals (from 1997–2007), the characteristics of these seemingly elusive gifted dyslexic youth can actually be described in familiar gifted-education terms, through these journals' descriptions of these youths' *learning*, *intellectual*, *creativity,* and *leadership* strengths and needs. The literature on these characteristics has traditionally put a "human face" on these pupils' processing difficulties and on the effects of these challenges on the children's lives. In recent years, however, the literature—particularly that of gifted education—has increasingly described these youths' strengths, as well.

In both the traditional and recent literatures on *learning* traits, gifted youth with dyslexia can exhibit sometimes stubborn reversals in reading or writing, as well as inadequate eye–hand coordination. However, they may also be aware, in at least a general way, of their strengths. Among these youths' learning capabilities are reading comprehension and analytical thinking strengths, as well as above-average academic work and scholastic consistency, at least relative to other dyslexics.

These pupils often may be frustrated by the realization that they do not perform up to academic expectations.

In their *motivation* for scholastic performance, gifted youth with dyslexia may display poor attention. Nonetheless, they may be focused, at least in spirit, on positive academic achievement.

Although even spirited, gifted dyslexics may sometimes choose to withdraw from school-based tasks, they also may demonstrate various prosocial skills—even leadership—among other school youth. Some high-potential dyslexics may particularly exhibit mechanical and sports proficiencies.

Identification

Rarely do professionals simultaneously identify high-potential dyslexic students' gifted and dyslexic characteristics, due to either–or views of giftedness and dyslexia. Gifted educators often search for assets in high-potential assessment, while special-need teachers, medical personnel, psychologists, and general educators look for debits in special-education identification. Some of the few professionals who regularly identify both exceptionalities in gifted dyslexic students happen to be cross-trained (i.e., schooled or experienced in both challenged *and* gifted persons' characteristics and needs).

In most cases, even when the gifted dyslexic is dually identified (either formally by professionals, or informally by parents), either the gift or the dyslexia tends to be noticed first. Parents of a substantially gifted pupil may first notice the child's advanced development in size, verbal skills, and breadth and depth of information. Similarly, parents of a moderately or severely dyslexic student—a youth who possesses less-obvious talents—may seek out a diagnosis for the child's dyslexia earlier than for his or her gifts.

Once parents refer high-potential dyslexic children for dyslexia assessments, these children's characteristics are viewed differently through the lenses of different professionals, including optometrists, learning disability advocates, psychologists, and special educators. Optometrists may examine gifted dyslexics with visual exams, searching for these students' ingrained, physically evident reversals, processing slowness, and memory challenges. Learning disability advocates may also closely consider the extent of these students' perceptual problems, though they may look harder than optometrists at the effect of these problems on academic underachievement, tests, grades, and daily homework. These advocates may also consider, more than optometrists, dyslexia's influences on broader life functions that continue through these youths' lifetimes. By contrast, psychologists may use specific (generally standardized) diagnostic measures, including information-processing tests and student, parent, and teacher interviews and questionnaires to assess dyslexia's impact on important scholastic and other key life skills during the school years. Special educators, possibly the country's most frequent source for identifying language-based learning disabilities, may search even more specifically, with curriculum-based and standardized measures, for significant gaps between gifted dyslexics' high potential and actual academic achievement. (Significance of gaps may be judged differently by special educators in different school districts.) For many school systems, LD gaps should primarily be due to the same processing difficulties cited in different ways in different LD definitions. In the federal definition, LD-labeled "underachievement" must explicitly be due mostly to these processing factors rather than the social and other variables that may produce similar results.

Just as special needs professionals may differ in their assessments of high-potential dyslexics' needs, gifted educators—perhaps the country's most frequent assessors of high potential—may also vary in their assessments of these children's gifts. Some gifted assessors, more than others, need to be persuaded that processing challenges may indeed depress a legitimately gifted dyslexic's strengths. Gifted educators need to remember that auditory and visual memory problems, reversals, and other challenges in lower-level intellectual functions can reduce overall IQ scores. On the other hand, these youths' other higher-level IQ subtest scores, such as in Comprehension and Information, can be as high as those of other gifted children. Further, gifted education assessors should remember that, on these children's daily academic work, grades may be depressed by these lower-level functions, as well as by frustration over school failures. High-potential dyslexics may, however, be as strong as other gifted youth on their strong subjects. Finally, outside of school hours, these youth—even if they

fail to meet strict criteria for intellectual and achievement giftedness—may provide ample evidence of excellence in creativity or leadership.

Programming

Dually assessed gifted youth with dyslexia may be given varied programming, depending on those professions providing that programming. For their challenges, dually labeled individuals who are medically diagnosed may often receive visual–motor treatment to correct their "misperceptions." When gifted dyslexics' challenges are diagnosed by LD advocacy agencies, particularly when they are adults, they may be pointed toward community resources to build skills and combat stressors. By contrast, when diagnosed as youth by psychologists, these students tend to receive more school-based than community-based recommendations, suggestions centered on remedial tutoring and/or on academic modifications that allow them to compensate for very weak skills and study habits. Somewhat similarly, if assessed by K–12 special educators, gifted dyslexic youth may receive direct remedial instruction in deficient skills, mostly in reading, writing, math, and personal coping techniques for dealing with deficiencies.

In addressing gifted dyslexics' strengths, high-potential educators most frequently enhance these youths' creative, leadership, intelligence, or academic abilities. Idealistic gifted educators may look beyond the classroom, to nurture these youths' sports and mechanical strengths, areas long unspecified in the general federal "gifted" definition.

Advocacy

In advocating for appropriate identification and programming for gifted dyslexic youth, parents, teachers, and other professionals usually follow one or more of five pathways: (1) educating themselves through books, articles, and novels about these youth; (2) learning, through dialogue with each other and with these children, about difficult situations confronting these youth; (3) deciding on activities to develop these youths' strengths and to remediate their weaknesses, based on "best practices" research and "group think" dialogue; (4) advocating for more appropriate education for these youth; and (5) monitoring implementation of all these steps.

Terence Paul Friedrichs

See also Learning Disabilities; Twice Exceptional

Further Readings

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Davis, G. A., & Rimm, S. B. (2004). *Education of the gifted and talented* (4th ed.). Needham Heights, MA: Allyn & Bacon.

Friedrichs, T. P. (2001). *Distinguishing characteristics of gifted students with disabilities*. Waco, TX: Author.

Hallahan, D. P., & Kauffman, J. M. (2005). *Exceptional children: Introduction to special education* (10th ed.). Needham Heights, MA: Allyn & Bacon.

International Dyslexia Association: http://www.interdys.org/index.htm

Learning Disability Association. (2007). *About learning disabilities*. Retrieved October 30, 2007, from http://www.ldaamerica.org

Olenchak, F. R., & Reis, S. M. (2002). Gifted students with learning disabilities. In M. Neihart (Ed.), *Social and emotional development of gifted children: What do we know?* Washington, DC: National Association for Gifted Children.

Rawson, M. (1968). *Adult accomplishments of dyslexic boys*. Baltimore: Johns Hopkins University Press.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, P., & Olenchak, F. R. (2005). *Misdiagnosis and dual diagnosis of gifted children and adults*. Scottsdale, AZ: Great Potential Press.

E

Early Admission, College

Early admissions to college or university (also known as early entrance) is a rare but highly effective educational strategy for many gifted students. Rooted theoretically in the areas of learning and achievement motivation, the practice assumes that gifted students will develop their intellectual capabilities more fully when they are presented with tasks that match or slightly exceed their capabilities. Early entrance allows students to enroll in an institution of higher education from 1 to 4 years earlier than their age-mates and to proceed through curricula at a pace consistent with their intellectual abilities rather than their chronological age. This practice can minimize the boredom many gifted students experience in the secondary environment and thereby increase self-confidence, promote self-efficacy, and encourage the expression of talent and ability at high levels. Early entrance also fosters social and emotional development by giving gifted students an opportunity to belong to a community of intellectual peers among whom they need not downplay their intellectual abilities to be accepted or make friends. This entry describes early admissions programs, the research covering early admission, and program requirements.

The forerunner to present-day early entrance programs in the United States was the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University (JHU), established by Julian Stanley in 1971. Stanley worked individually with a number of gifted students who had advanced academic abilities, some as young as 13, thereby enabling them to enter JHU without having completed high school. In 1977, Halbert Robinson, drawing on Stanley's pioneering work, created the first structured early entrance program at the University of Washington (UW) for students entering before age 15. Robinson believed that an optimal match could and should exist between a student and his or her learning situation. The UW's Early Entrance Program, which admitted its first two students in 1977, was initially conceived and implemented along academic lines with less emphasis placed on transitional, support, and socioemotional elements. These latter have assumed increasing importance as the practice of early entrance has evolved.

Currently, there are 17 early entrance programs in the United States. Residential programs include the following: the Advanced Academy of Georgia at the State University of West Georgia; the Georgia Academy of Mathematics, Engineering and Science at Middle Georgia College; the Missouri Academy of Science, Mathematics, and Computing at Northwest Missouri State University; the National Academy of Arts, Sciences, and Engineering at the University of Iowa; the Program for the Exceptionally Gifted at Mary Baldwin College; the Texas Academy of Leadership in the Humanities at Lamar University; the Texas Academy of Mathematics and Science at the University of North Texas; the Resident Honors Program at the University of Southern California; and Simon's Rock College of Bard.

Commuter-based programs include the Academy for Young Scholars and the Early Entrance Program at the University of Washington; Bard High School Early College; Boston University Academy; the Early College at Guilford College; the Early Entrance Program at California State University Los Angeles; and the Early Honors Program at Alaska Pacific University.

These programs differ in significant ways. Ten are residential; seven are commuter-based, although some allow students to live in on- or off-campus housing. Some programs expect students to transfer to another college or university after the first 2 years, but others expect students to graduate from their home institutions. Several admit students only in 12th grade, and one accepts only students younger than age 15. One admits only women (Grades 9–12), and two are accelerated high schools. Three programs admit students directly into their college or university's honors program. Some programs arrange for high school diplomas to be granted by students' home high schools; others dispense with this altogether. Some admit only students from their home state while others accept students from a national and international pool of applicants. Some programs offer preparatory coursework for students before admission to college or university, but others allow students to take university courses from the outset. One university offers two early entrance options for gifted adolescents: one for students after Grade 7 or 8, and one for students after Grade 10. Programmatic components vary widely, as does the degree of freedom that early entrants have in choosing their curricula. Some programs emphasize humanities or science, whereas others encourage students to sample widely from university course offerings and put together double- or even triple majors in disparate areas.

Research About Early Entrance

The most extensive research about early university entrance has been conducted at SMPY or at the UW. The evidence from these studies demonstrates that early entrance has substantial, positive effects on students' academic and intellectual development. Compared with traditional-aged peers, most early entrants as undergraduates earned higher grades and more academic honors, took more credits per quarter or semester, and held higher career aspirations; they also earned more graduate and professional degrees.

The social and emotional effects of early entrance have also been the focus of several investigations conducted at the UW. Since the inception of the UW's first early entrance program, researchers have used cross-sectional and longitudinal studies to explore students' social and emotional development and their assessment of various aspects of their early entrance experiences. Early entrance students who participated in these studies were found to be as socially well adjusted and psychologically mature as nonaccelerants and to have viable social lives with intimates and friends. No association between early entrance and psychological or social impairment has been identified. Early entrants also ascribed a number of benefits to early entrance, including increased confidence in themselves and in their intellectual and social skills; the acceptance of individual differences; the encouragement of intellectual depth, academic excellence, and personal responsibility; the solidarity and sense of belonging they felt within their particular program; friendships with peers, faculty, and staff; and the support of caring adults.

How parents experience their children's early entrance to college or university is not yet well understood. One recent study conducted at UW investigated parents' perspectives about the impact of early entrance on their children. These data suggest that early entrance is an attractive option for parents who are willing to follow the lead of their talented and ambitious adolescents. Parents who participated in this study said that their children's educational needs were well met at the university level, and most reported that any worries they might have had about their children's younger age on a university campus proved to be unfounded. Parents also reported differing levels of comfort with their children's increased freedom as undergraduates and their decreasing involvement in their children's educational decision-making. Most, however, were satisfied with the many facets of their children's early entrance experience and found the university to be a place where their children were both celebrated and understood.

Early admission to college or university is not an optimal match for all gifted students—even if they are qualified academically or intellectually.

Most students who enter these programs are used to receiving the highest possible grades in the primary and secondary environment, often with little or no effort, and they have to adjust their expectations, study habits, time management, and organizational skills as university or college undergraduates. Some are not willing or ready to make these adjustments, and their academic performance reflects this. Although research about early entrants who drop out or earn poor grades is scarce, the data suggest that lack of success is usually the result of adjustment or behavioral difficulties, perceived conflict or lack of cohesion within the family-of-origin, or problems in interpersonal relationships.

Programmatic Requirements

To be most effective, early entrance programs require more than a pairing of student ability and academic challenge. Specifically, three constituents must be well prepared: students, parents, and the institution.

Students

All early entrants need a period of intellectual preparation in a supportive and rigorous environment; a peer group that is large enough for them to find same-age friends; a home base in which to congregate, study, or socialize; communication with parents; a faculty and staff who enjoy teaching, advising, and mentoring gifted young scholars; and a welcoming university or college environment. However, programs for younger students need to provide more intensive academic transitioning during the first year, and programs for older students must balance students' competing needs for independence and guidance.

Advising and counseling that are tailored to this population are critical support services. Research indicates that early entrants show strong evidence of multipotentiality, a dynamic that can pose a significant challenge to students' decision-making and advising needs. Early entrants rise to the challenge of multipotentiality in different ways and at different times. Some feel paralyzed by having to choose between equally prized interests; some become stalled and confused. Some get off to a flying start only to change their minds part way through their undergraduate careers. Others stay focused on their original interest and may or may not take the risk to explore other options. At the same time that students are making decisions that are critical to their future careers, they are transitioning from same-age to traditional-aged peer groups and primary relationships are taking on increasing importance. Further, early entrants are not immune from events that can traumatize all adolescents, such as changes in family lives and parental configurations, the emergence of psychological disorders, and increasing exposure to a complex world. The availability of academic advising and psychological counseling, both formal and informal, from individuals who understand these gifted students well is thus of great importance.

Parents

The early entrance experience presents parents with a number of issues and challenges. Although research suggests that students are far more likely to choose early entrance because of their intellectual needs rather than because of parental pressure, adolescents' educational decisions are rarely devoid of parental influence or input. Parents of gifted students, who are used to being actively involved in overseeing their children's educational trajectories, must learn to disengage from their children's lives at the university level. For parents of early entrants, this disengagement comes several years earlier than it does for parents of traditional-aged students. The former can benefit greatly from information and advice about the social, emotional, and academic challenges that they and their children may encounter during the first year. Comprehensive parent orientation activities at the start of the initial academic year give parents a better idea about what to expect from an early entrance program, and about the complexities of the university environment that their children are entering. Opportunities for them to speak with parents of earlier cohorts of early entrants and to support each other during their own transition are also invaluable. Finally, channels of communication with program staff must remain open, especially during students' first undergraduate year. The younger the student, the more intense and regular that communication will be.

Institution

Institutional support will vary depending on the size and location of the college or university that early entrants attend. Active collaboration with officers and services that are important to students' lives assists early entrants to access these services when they need them. Students who are minors may also need institutional and parental permission to engage in some research opportunities, internships, service learning projects, or foreign study programs until they reach the age of majority, authorization which program staff may be called upon to facilitate. Regular interaction with faculty and central administrators also helps sustain a welcoming climate in which early entrants can thrive.

Kathleen D. Noble

See also Halbert Robinson Center; National Academy of Arts, Sciences, and Engineering; Study of Mathematically Precocious Youth

Further Readings

Brody, L. E., Muratori, M. C., & Stanley, J. C. (2004). Early entrance to college: Academic, social, and emotional considerations. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students* (pp. 97–107). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Noble, K. D., & Childers, S. A. (2009). Swimming in deep waters: Twenty years of research about early university entrance at the University of Washington. In L. Shavinina (Ed.), *The handbook on giftedness*. New York: Springer Science.

Noble, K. D., Vaughan, R., Chan, C., Childers, S., Chow, B., Hughes, et al. (2007). Love and work: The legacy of early university entrance. *Gifted Child Quarterly, 51*(2), 152–166.

Olszewski-Kubilius, P. (2002). A summary of research regarding early entrance to college. *Roeper Review, 24*(3), 152–157.

Early Entrance, Kindergarten

Early entrance to kindergarten is a strategy used to make educational accommodations for young children with advanced cognitive abilities. It allows children to begin kindergarten at a chronologically earlier age than their peers and to be placed at a level that is academically aligned with their abilities. The early entrance strategy also provides students the opportunity to spend a number of years in the company of their academic peers while continuing to develop socially and emotionally. Although this accommodation strategy is primarily designed to meet the academic needs of children with exceptional abilities, it often serves their social and emotional needs also. This entry describes issues relating to early entrance for kindergarten.

Early Entrance Strategy as Part of Acceleration

Early entrance to kindergarten is part of a larger category of accommodations known as acceleration. Though early entrance to kindergarten is a small portion of the spectrum of acceleration strategies, it is often the beginning of them. Students who begin kindergarten early are given the opportunity to move more quickly through school and graduate at a younger age than their peers. Research studies as early as the 1930s and 1940s showed the positive effects of acceleration. In the 1990s, the research team of James Kulik and Chen-Lin Kulik conducted a meta-analysis of acceleration studies that found acceleration to contribute in a positive way to academic achievement. The key factor was believed to be the degree to which the content was adjusted to the ability of the group. More recently, the John Templeton Foundation sponsored a major project analyzing the effects of acceleration on gifted students. The culmination of this research is in a two-volume report, *A Nation Deceived: How Schools Hold Back America's Brightest Students*. This report highlights various benefits of acceleration as a strategy to meet the needs of gifted students. For more than half a century, research has shown that acceleration is a highly useful strategy for meeting the needs of gifted students.

Intellectual Needs of Gifted Students

For some children, early entrance to kindergarten is a good choice, but for others, it is not. Intellectual, social, and emotional maturity are critical factors to be considered when making the early entrance decision. With that said, some students experience

enhanced social and emotional progress when their academic needs are being acknowledged and appreciated. Even very young gifted children sometimes have difficulty finding friends with similar intellectual interests. For example, it may be confusing when a gifted 3-year-old asks a young neighborhood child to play archeology. When the playmate is unable to respond positively and enthusiastically, the gifted child may not understand the seemingly unenthusiastic response, and both children may wind up perplexed. Continued experiences such as this contribute to feelings of frustration and alienation for gifted children. These same gifted students sometimes describe themselves as having been dropped on Earth from some other planet because their interests and ideas are so different from their same-age peers.

For many gifted children, the intellectual interest is so strong that it is a large part of how they view themselves. Placing a ceiling on their academic pursuits is disheartening, and when such constraints are placed on them, gifted students may feel as if they are being denied. Educational systems in the United States try to provide appropriate educational opportunities for students with special needs. Often when one speaks of *special needs students,* the term refers to some sort of limitation of abilities; however, some school systems are beginning to see the importance of meeting the special needs of students with advanced intellectual abilities.

Some students who are not appropriately placed may develop underachievement problems. Sylvia Rimm and Katherine Lovance found that the use of acceleration, including early entrance to kindergarten, helped reverse some underachievement problems. The accommodations seemed to provide gifted students with some validation of their intellectual abilities.

Recognition of Advanced Abilities

Occasionally a teacher of preschool students will recognize exceptionally advanced abilities in a young child and talk with the parents about the possibility of having the child enter kindergarten at an early age. Subsequently, the parents may readily find a school willing to make this accommodation and the child may enter kindergarten at an early age. Though this does happen, it is usually a more complicated process; most schools continue to be strongly opposed to early admission.

Gifted children are often highly verbal with large vocabularies. Some learn to read spontaneously. Others are practically obsessed with numbers, ancient civilizations, dinosaurs, or a wide variety of other topics. Their thirst for knowledge is great, and they seek as much information as they can find. Some parents readily recognize the advanced abilities and the maturity of their young children. However, sometimes parents will take these interests and abilities for granted, not realizing how unique these characteristics are. Parents only become aware of the significance of these traits when other people begin to comment on the advanced interests of their children.

Factors to Consider

Once parents are aware of the advanced abilities and interests of their children, they often begin to look for information about available accommodation options. There are several factors to consider when looking at early entrance as a possible strategy.

Youngest in the Class

The decision to use acceleration should be given careful consideration. One of the factors for parents to consider is that by choosing early entrance to kindergarten, they are choosing to have their child be one of the youngest in the class during all of that child's schooling. This means that the child may be the youngest in the class during middle school, high school, and college.

Expectations of Kindergarten

Most kindergarten classes have a combination of teacher-directed activities and student-directed activities. There are times when students will be expected to sit quietly, take turns, and raise their hands before speaking. Students will be expected to get along fairly well with their peers and be able to keep track of their own belongings.

Various Regulations

A good place to begin the search for early kindergarten admission information is the local school or

local school service center. The logical second phase of the research is to inquire about policies at local private or parochial schools. The regulations regarding early entrance vary widely. Minimum age for students to begin kindergarten is set by each state. However, even with these guidelines, schools in the same locale may have widely differing criteria for early entrance. Some schools allow a specific number of days to early entrance consideration. For example, one school system will accept applications for students who miss the cut-off date by no more than 45 days, whereas another school system uses a 90-day extension policy. Parents may find that some schools are more flexible about their cut-off decision if there is a large amount of verifiable evidence of advanced abilities.

Indications of Need

Many gifted young children like taking an IQ test. Highly verbal gifted students often enjoy the undivided one-on-one attention of the adult clinical examiner. Scores in the superior or very superior range are good indicators of intellectual ability far beyond average.

Acceptance into kindergarten at an early age is certainly one reason for testing, but testing also provides parents with quantitative data about how their child's development compares with that of others. Testing also gives parents a baseline of test scores to help monitor their child's intellectual progress. Often local school psychologists will provide testing for students in their school districts. Not all psychologists have expertise in the area of gifted children. Options of additional persons to do testing may be obtained through state gifted and talented education departments or the National Association for Gifted Children.

Types of Requirements

Every school system devises its own procedures for applying for early entrance to kindergarten. Following are some examples of school systems' requirements for early entrance to kindergarten:

- The child's individual intelligence test scores must be in the superior to gifted range (or it might be stated that the scores must be at least two standard deviations above the norm).
- The early entry candidate must score in the superior to gifted range on an achievement test (or it might be stated as a certain percentile must be reached, for example, the 97th).
- The child's demonstrated social and emotional maturity is comparable with other kindergarten students.
- The child's scores on a measure of visual-motor maturity are comparable with those of other kindergarten children.
- There may be other requirements such as taking the school's own readiness for academic skills assessment or test.
- A developmental evaluation may be required.
- Because of recent research on the importance of handwriting, applicants may be asked to show evidence of good fine-motor skills. Students with good handwriting skills are more likely to perform well, not only in kindergarten, but also as they move through elementary school.

After reviewing an application, some school systems will make a conditional acceptance of early entrance to kindergarten. The trial period provides an opportunity for parents, teachers, and administrators to determine the appropriateness of the placement. Teachers will expect students to do some teacher-assigned work, be able to sit quietly for group time, and be able to focus on assigned work. All stakeholders want to make sure that the placement is a good match between the school's expectations and the child's abilities.

If after gathering information, however, the child does not score well, or some of the evaluations show social or emotional immaturity, the recommendation to wait another year for kindergarten admission will be made. This is not a failure on anyone's part. Early entrance is just a strategy to increase the odds of finding a good academic match for the child. No one wants a child to be placed in a class that causes undue stress. The potential stress factor is a reason that parents, teachers, or schools take great pains to identify students who would be a good match for the school's program.

Identifying Potential Problems

Once a child has been selected for early entrance, it is important for teachers and parents to be in close communication regarding any area that may not be

comparable with other students. Development of handwriting skills is a common area that may need attention. Both handwriting and drawing are skills that most students can learn. Many resources, such as books and workbooks, are available to assist parents in developing these skills. Addressing this area early can prevent many later difficulties.

Growing Acceptance

In the United States, the goal of schooling is to educate all children to their fullest potential and to educate all students to be good and cooperative citizens. Sometimes these goals seem at cross-purposes. Some people consider acceleration elitist. This is a difficult position to support considering the emphasis that American schools place on providing appropriate educational opportunities for children with other types of special needs. Generally, teachers, parents, and administrators want what will best serve the individual child.

Patricia Lance Hollingsworth

See also Acceleration Options; Early Admission, College; Intelligence Testing

Further Readings

Colangelo, N., Assouline, S. G., Gross, M. U. M. (Eds.). (2004). *A nation deceived: How schools hold back America's brightest students* (Vol. 2). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Davis, G. A., & Rimm, S. B. (1989). *Education of the gifted and talented* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Kulik, J. A., & Kulik, C. C. (1992). Meta-analytic findings on grouping programs. *Gifted Child Quarterly, 36*(2), 72–76.

Piirto, J. (2007). *Talented children and adults, their development and education* (3rd ed). Waco, TX: Prufrock Press.

Rimm, S. B., & Lovance, K. J. (1992). The use of subject and grade skipping for the prevention and reversal of underachievement. *Gifted Child Quarterly, 36*(2), 100–105.

Robinson, N. M., & Weimer, L. J. (1991). Selection of candidates for early admission to kindergarten and first grade. In W. T. Southern & E. Jones (Eds.), *The academic acceleration of gifted children* (pp. 29–73). New York: Teachers College Press.

Early Identification

Young gifted children usually show their special abilities before entering elementary school. At preschool, they may have advanced understanding or performance in one or a variety of areas. The earlier these preschoolers are identified, the more favorable their development. To promote optimal talent development, gifted preschoolers require a rich and stimulating environment, challenging curriculum, and appropriate educational interventions. This entry describes the characteristics of giftedness, parents and teachers and the identification process, and the provision of special activities.

Characteristics of Giftedness

There are many signs of giftedness. To Linda Silverman of the Gifted Development Center, parents and preschool teachers need to take note of some of these earliest signs of giftedness, although not all need to be present for a young child to be gifted:

- Unusual alertness in infancy
- Less need for sleep in infancy
- Long attention span
- High activity level
- Smiling or recognizing caretakers early
- Intense reactions to noise, pain, frustration
- Advanced progression through the developmental milestones
- Extraordinary memory
- Enjoyment and speed of learning
- Early and extensive language development
- Fascination with books
- Curiosity
- Excellent sense of humor
- Abstract reasoning and problem-solving skills
- Vivid imagination (e.g., imaginary companions)
- Sensitivity and compassion

If a child exhibits a majority of the characteristics in the behavioral scale, parents and preschool teachers may nominate the child for gifted assessment.

Parents and Teachers

Parents are generally good identifiers of giftedness. Studies indicate that parents described their

young gifted as divergent thinkers, highly focused on their interests, curious, and persistent. Parents have also found their young possessing high verbal ability (including large vocabularies for their age), an unusual sense of humor, an unusual ability to make abstract connections in learning, and a keen perceptiveness in a wide range of interests, yet a demonstrated ability in a single area.

Preschool teachers can observe the child's performance in a number of domains (i.e., cognitive, language, motor, social-emotional, self-help, and aesthetic) and then relate the observations to the expected behaviors for a child of that age. They can consult checklists of characteristics of potential giftedness or gifted rating scales.

Research has shown similarities in parents' and teachers' characterizations of early abilities in young gifted children. In addition, teachers reported other traits such as discordant development, emotional immaturity, socialization difficulties, and a tendency of being pushed by parents.

Identification Process

A systematic and comprehensive identification process contains three essential components: a parent's questionnaire, an on-site observation at the preschool, and a formal assessment.

Parents complete an extensive questionnaire asking for wide-ranging information on the child's development, giving specific examples of emerging or mastered behaviors. Assessors have observed that the ability of the parents to communicate the desired information varies. Although some parents are articulate, others may provide only the most minimal details, with the need for follow-up interviews.

The on-site observation is on the preschooler's processing skills, problem-solving ability, and task commitment. The child participates in a short task, a teacher-directed concept attainment task, and then engages in self-selected activities. Assessors have found that on-site observation can present special challenges. Though some children are gregarious and participate easily, others, even with a parent present, are quite reluctant to participate in new situations.

Children may be assessed formally at a young age using traditional formal assessment (such as the Stanford-Binet Form L-M or the Stanford-Binet—Fourth Edition depending on the age of the child; the Wechsler Preschool and Primary Scale of Intelligence; the Kaufman ABC). Assessors have to pay special attention to the children's short attention spans and their tendency to be easily distracted. The formal assessment indicates precocity if the subtest and composite score of a child are high. However, one can get uneven performances among subtests resulting in low test scores. Such scores may not be an accurate assessment of the child's ability.

It is important that extensive investigation accompany the identification process. Once the information is gathered, the data from the three sources is then reviewed and analyzed by a study team. This team will use a case study approach to make a decision about the child on an individual basis.

Provision of Special Activities

Many intellectually gifted children master the cognitive content of most preschool and kindergarten programs quite early. They come to the preschool ready and eager to learn concepts not usually taught until an older age. Parents will find that the most learning occurs when an optimal match between the learner's current understanding and the challenge of new learning material has been carefully engineered. Thus, selecting a program or school for a gifted preschooler who masters ideas and concepts quickly but who behaves like a typical 4- or 5-year-old is indeed a challenge. Parents need to look for open-endedness, flexible grouping, and opportunities for advanced activities in a program that allows their child to learn in the company of intellectual peers. Early environmental enrichment can make a real difference to learning ability throughout life.

Another challenge for preschool providers is that young gifted children may develop in an uneven manner, significantly out of developmental step with their age peers. Some gifted preschoolers show peaks of superior performance in one cognitive skill rather than in all cognitive areas. A child who reads at age 3 and demonstrates advanced spatial reasoning ability, for example, may not have the highest IQ. Understanding the unique developmental patterns often present in gifted children can help parents and teachers adjust their expectations of academic performance in young children to a more reasonable level. Evidence also indicates that the gifted preschooler may not be

advanced in areas of physical and social skills, except when the physical tasks involve cognitive organization. In addition, advanced cognition often makes the young gifted aware of information that they are not yet emotionally ready to handle.

Tock Keng Lim

See also Early Entrance, Kindergarten; Gifted Rating Scales; Identification; Parent Nominations; Preschool; Teacher Nominations; Very Young Gifted

Further Readings

Coleman, L. J., & Cross, T. L. (2005). *Being gifted in school: An introduction to development, guidance and teaching*. Waco, TX: Prufrock Press.

Roedell, W. C. (1990). *Nurturing giftedness in young children*. Reston, VA: ERIC Clearinghouse on Handicapped and Gifted Children. ERIC EC Digest #E487. ERIC Identifier: ED321492.

Silverman, L. K. (1992). *How parents can support gifted children*. Reston, VA: ERIC Clearinghouse on Handicapped and Gifted Children. ERIC Digest #E515. ERIC Identifier: ED352776.

Early Ripe, Early Rot

"Early ripe, early rot" is a piece of folklore and educational jargon that suggests too early an intervention for the gifted will not help them and may actually cause them long-term harm. This proverbial saying is often dismissed as anti-intellectualism, yet there is some truth to this claim. Contrarily, ample evidence shows that early intervention, when done appropriately, is beneficial to the long-term intellectual, psychological, and emotional development of the gifted person. The notion of early ripe, early rot is occasionally substantiated in the life of a gifted individual. Longitudinal research with many gifted proves that early rot is not the norm and most early ripeners do well across the life span. This entry describes the background and empirical evidence for early ripe, early rot theories.

Background

The truism is not new; it is common in ancient occidental and oriental proverbs and in print at least as early as the 14th century. It is alluded to in the Hebrew bible. Fig trees produce two or more crops of fruit if weather conditions are right. In ancient Israel and Palestine, the first fruit was the *bikkurah,* or early-ripe fig. This early ripening and early rotting fruit is mentioned in Micah 7:1, Isaiah 28:4, Hosea 9:10, and Nahum 3:12. An ancient Thai proverb อย่าชิงสุกก่อนห่าม is translated as, "Don't hasten to ripen before being nearly ripe first." Various authors note Chinese, Japanese, or Zen versions of the same idea, but do not give specific sources.

In literature from the late 1300s, several mentions are made of the pere-ionettes, the early-ripe pear. Chaucer wrote about them in the Reeves Tale from his *Canterbury Tales*. William Langland's Piers Plowman says that the pere-ionettes were very sweet and very early ripe, and therefore very soon rotten. The Latin phrase, *Praecocia non diuturna,* "The fruicte that soonest ripes, doth soonest fade awaie," appears as a warning in Geoffry Whitney's 1586 catalog of emblematic sayings.

In Shakespeare's *Richard III* (circa 1590), Richard says about his nephew, whom he will soon murder, "So wise so young, they say do never live long" (III, i, 79). A similar saying appears in print in Scotland by 1882 as "ripe fruit is soonest rotten." Other European versions include the following: "soon old, soon with God" (England), "bald reif hält nicht steif" (German), "vroeg rijp, vroeg rot" (Dutch), "ce qui croît soudain, périt le lendemain" (French), "sol que mucho madruga, poco dura" (Spanish), and "presto matura, presto marcio" (Italian).

In 1875, a British tract on good health noted, "It is a recognized fact in physiology that the longer a child is in getting its full growth the longer it will live. 'Early ripe, early rot' is almost a proverb. Children who grow rapidly are always weakly." The 19th-century American journalist, critic, and women's rights activist Margaret Fuller said, "For precocity some great price is always demanded sooner or later in life."

William Sidis, perhaps the smartest child ever with an estimated IQ of 200 to 300, became the rallying cry for those who believed the truth of early ripe, early rot in the 20th century. He could read and spell by age 2, type English and French by 4, and entered Harvard at 11 where he gave a lecture on his intuitive understanding of "four-dimensional

bodies." Soon after he had a breakdown, and although he graduated with honors at 20, he spent the rest of his life avoiding intellectual activities. A 1924 *New York Times* editorial about how gifted children, and especially Sidis, fizzled out as adults was entitled, "Precocity Doesn't Wear Well." In the 1930s and 1940s, early ripe, early rot was a common educator mantra and early readers were generally thought of in the negative.

In part, this idea of early burnout comes from a lack of understanding of what high levels of natural ability are and from where they come. Historically and in some modern cultures, precocious ability is thought to come from the intervention of a spirit, genii, muse, or demon. In these cases, there may appear an associated worry that the person was used by a manipulative or even evil entity. The belief is that the fall will assuredly come when the person is abandoned, burned out, and left worse for the association. In some cultural groups, early speaking is associated with witchcraft.

Empirical Evidence

Contrary to the proverbs, almost 80 years of longitudinal studies of the gifted find those children who make considerable advances from a young age do better than equally bright individuals who have not made early advances and better than individuals of lesser aptitude. Gifted children generally excel academically, professionally, in their personal relationships, and in their physical and emotional health. The appropriate match between a child's educational, personal, and developmental needs and the child's training and experiences facilitate strong and healthy progress.

There seem to be several causal agents for those fewer cases where an unusually gifted individual is noticed in early life, receives a lot of attention, but later does not have a happy or healthy adulthood. In an effort to avoid early rot, some gifted are kept away from educational interventions that would better match their needs, and consequently, the person underachieves. Other times, overambitious adults, often a parent, try to show the world the efficiency of a rigorous intervention they espouse without paying enough attention to the child's need for loving and supportive parents. Sometimes a parent's or child's unhealthy desire for fame and notoriety drives the later problems. Developmental changes especially at puberty can cause some prodigious children to appear to lose their previously high performance and have to struggle to reestablish it. This phenomenon is noted among prodigious musical performers. Even here, the prodigies who make it are not noticed as much as those who do not.

When the education and training of a gifted individual is correctly matched with that individual's current developmental levels in thoughtful and appropriate ways, the child excels in talents during his or her childhood and across the ages of adulthood. Academic success, happiness in career choice, healthy adult relationships, and strength of spiritual beliefs are associated with appropriate support and education of the gifted child. Early ripe and early rot is a possible, but not inevitable, path. With appropriate education, good parenting, healthy friendships, and active spirituality, early ripe can be the beginning of lifelong flourishing.

Michael F. Sayler

See also Adolescent, Gifted; Adult, Gifted; Anti-Intellectualism; Attitudes Toward Gifted; Controversies in Gifted Education; History of Gifted Education in the United States; Images of Gifted in Film; Precocity; Prodigies

Further Readings

Anbar, A. (2004). *The secret of natural readers: How preschool children learn to read.* Westport, CT: Praeger.

Bamberger, J. (1986). Growing up prodigies: The mid-life crisis. In D. H. Feldman (Ed.), *Developmental approaches to giftedness* (pp. 265–279). San Francisco: Jossey-Bass.

Blount, B. G. (1972). Parental speech and language acquisition: Some Luo and Samoan examples. *Anthropological Linguistics, 14,* 119–130.

Colangelo, N., Assouline, S. G., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Gross, M. U. M. (2003). *Exceptionally gifted children* (2nd ed.). London: RoutledgeFalmer.

Hall, W. W. (1875). *How to live long: Health maxims, physical, mental, and moral.* London: Sampson Low, Marston, Low, and Searle.

Higginson, T. W. (1898). *Margaret Fuller Ossoli.* Boston: Houghton Mifflin.
Muratori, M. C., Stanley, J. C., Ng, L., Ng, J., Tao, B., & Tao, T. (2006). Insights from SMPY's greatest former child prodigies: Drs. Terence ("Terry") Tao and Lenard ("Lenny") Ng reflect on their talent development. *Gifted Child Quarterly, 50,* 307–324.
Sayler, M. F. (2008). Gifted and thriving: A deeper understanding of the meaning of GT. In L. Shavinina (Ed.), *The handbook on giftedness.* New York: Springer Science.
Stainthorp, R., & Hughes, D. (2004). An illustrative case study of precious reading ability. *Gifted Child Quarterly, 48,* 107–120.
Whitney, G. (1973). *A choice of emblemes, 1586.* Menston, Yorkshire, UK: Scolar Press.

Eating Disorders, Gifted

Attention to anorexia nervosa and bulimia, two major eating disorders, in gifted individuals has been rare in the literature, with no studies comparing gifted individuals with counterparts in the general population regarding prevalence. Therefore, it is not known how gifted youth compare with those not identified as gifted concerning eating disorders. A few studies have found high IQ scores or high achievement among anorexic females, but the relationship of eating disorders to giftedness was not a focus of those investigations. This entry explains how eating disorders are diagnosed, and what kinds of stressors can lead to eating disorders among the gifted.

According to diagnostic guidelines, persons with anorexia nervosa refuse to stay within a normal weight range, have a distorted perception of their shape or size, and weigh less than 85 percent of what is considered normal for their age and height. Persons with bulimia repeatedly follow binge eating with self-induced vomiting, laxatives, or diuretics; fasting; or excessive exercise. Extreme dieting can actually foster bingeing, a natural response to food deprivation. The medical consequences of these pathologies vary with the type of disorder, but can lead to problems with kidneys, blood pressure, cardiac rhythm, electrolytes, intestines, salivary glands, and dental enamel and to seizures, stroke, heart failure, depression, and suicide. Individual and family therapy is usually warranted and required.

Some gifted youth develop healthy and effective ways to cope with stress. They may talk about it, step back and gain perspective, and problem-solve. They release tension through diversions or by altering routines. Others practice less healthy coping, including eating too much or too little. They may have internalized messages about others' expectations, and control may be an issue when much in life feels uncontrollable. Personality, temperament, and environment may also contribute to vulnerability.

In the United States, physical appearance is deemed important in the dominant culture, including being thin. Models, gymnasts, dancers, and media idols are often significantly underweight, fashion trends may demand thinness, and diets are hawked. The preoccupation with appearance does indeed contribute to public awareness of the importance of fitness and good nutrition. However, it may also contribute to both genders developing eating disorders, lacking nutrition, and jeopardizing health. Gifted youth are not immune to the impact of cultural messages related to appearance.

Other messages come from fathers, boyfriends, brothers, mothers, sisters, and other significant persons, perhaps related to high expectations for academic and talent performance, but also for appearance. To gifted children or teens, who are able to control their world to a significant extent with verbal ability and intellectual nimbleness, an impressive physical appearance may seem as important as stellar performances—and as controllable. The foundation for an eating disorder may be established at the time girls, particularly, are growing and developing—especially when families overvalue appearance. In addition, coaches and directors of gifted and talented youth may tacitly approve of bulimia in the interest of being competitive.

Eating disorders that develop in vulnerable individuals may reflect issues related to difficulty expressing uncomfortable feelings; fear of maturity; difficulty with problem solving; or sexual or other trauma, for example. Stellar achievement and social poise may mask internal emotional struggles. Yet scholars have not studied the phenomenon of eating disorders among pretty, high-achieving, perfectionistic, nice, compliant gifted females, who fit common stereotypes related to the

disorders. Low self-esteem may contribute to vulnerability, and shame associated with an eating disorder can then exacerbate the negative view of self. Addicted, neglectful, violent, overprotective, perfectionistic, and dieting families; early dieting; high tolerance for physical discomfort; and impulse disorders can predispose someone to an eating disorder, which can then go on indefinitely. Internet information and electronic communication may "teach" how to binge and purge or how to hide emaciation. Friends may inform, and model for, each other.

Gifted males need to become aware of eating disorders, not just because their remarks affect the females close to them, but because males are also increasingly presenting clinically with eating disorders themselves. Probably no less than for females, media images tell young males that perfect thinness is ideal. As with females, dancers and athletes in certain sports are especially vulnerable. They are likely to suppress anger, have high expectations, and tolerate pain. Harmful eating habits may become well established during years in school athletics and persist into adulthood. For themselves and for the sake of others around them, males need to understand that eating disorders are potentially life-threatening.

Another kind of eating disorder, obesity, has received considerable attention as a national health concern. However, unless there is evidence, obesity is not automatically pathologized as a psychiatric disorder because psychological or behavioral factors are not a given. Instead, it is seen as a medical condition.

Obesity is complex and difficult to explain, even though easier to recognize than anorexia nervosa and bulimia. Genetics, body type, metabolism, culture, lifestyle, and family milieu may be factors. Even as a voyeuristic media culture focuses negatively on obesity, it is important not to make assumptions about the psychological health or eating behaviors of individuals who are obese. It is also important not to assume that awareness of risks is enough to provoke major personal changes. Change often requires long-term, lifelong effort.

Gifted youth can benefit from prevention-oriented small-group discussion related to normal development and to eating disorders. Such focused discussion is rare in gifted-education curricula, and the disorders have indeed been associated with developmental challenges. Obesity may actually be more difficult than the disorders to discuss in a group in the abstract, depending on group membership. Small- or large-group informational presentations by community mental health or school counselors can also be helpful and may be crucial to the well-being of gifted teens.

Jean Sunde Peterson

See also Parental Attitudes; Popular Culture

Further Readings

Hornbacher, M. (2006). *Wasted: A memoir of anorexia and bulimia*. New York: Harper Perennial.

National Eating Disorders Association. *Eating disorders information index*. Retrieved December 1, 2007, from http://www.nationaleatingdisorders.org/p.asp?WebPage_ID=294

National Eating Disorders Association. *Eating disorders survival guide*. Retrieved December 1, 2007, from http://www.nationaleatingdisorders.org/p.asp?WebPage_ID=758

Normandi, C. E., & Roark, L. (2001). *Over it: A teen's guide to getting beyond obsession with food and weight*. Novato, CA: New World Library.

Eccentricity and Temperament

From the clichéd absent-minded genius who misplaces his glasses to the obsessive, reclusive artist, giftedness and eccentricity have been linked in common perception. The more talented the individual, the more unconventional and idiosyncratic his or her temperament is thought to be. This entry explores the complex relationship between temperament, eccentricity, and giftedness reviews current research.

Temperament

Temperament refers to basic dimensions of personality rooted in biology, rather than culture or upbringing. Though shaped by experience and maturation, temperament is considered relatively stable throughout an individual's development and across situational contexts.

Temperament has been extensively studied for more than 50 years. The best-known and most

influential study was the New York Longitudinal Study of Child Temperament conducted by psychologists Stella Chess and Alexander Thomas. Chess and Thomas collected data from 138 children, following them from infancy to middle childhood. Chess and Thomas identified 11 aspects of behavioral style: activity level, self-control, concentration, intensity, regularity, persistence, sensory threshold, adaptability, regularity, initial response, and predominant mood. Cluster analysis indicated three fundamental types, evident in about two-thirds of the sample: easy children, difficult children, and slow-to-warm-up children. No correlation was made with intelligence or creativity, nor were temperamental extremes connected to mental health diagnoses.

Using Chess and Thomas's model, William Carey, director of behavioral pediatrics at Children's Hospital in Philadelphia, developed a series of questionnaires (later renamed TemperaMetrics) designed to assess children as young as one month. Mary Rothbart, a developmental psychologist at the University of Oregon, defining temperament as "constitutionally based individual differences in reactivity and regulation," also developed a series of age-based questionnaires to assess activity level, soothability, impulsivity, intensity of pleasure, inhibitory control, perceptual sensitivity, anger and frustration, fear, and sadness.

Other researchers focused on the hereditary aspect of temperament. Robert Plomin and David Rowe studied 91 pairs of twins, identifying five dimensions of temperament—sociability, emotionality, activity, attention span-persistence, and soothability—which they believed were determined by genetics. Plomin and Arnold Buss then developed the *EAS theory of temperament,* EAS standing for core traits of emotionality, activity, and sociability. Others have posited heritable features of novelty seeking/risk taking, harm avoidance/timidity, and reward dependence.

There have also been attempts to understand the neurobiology of temperament using EEG probes, PET scans, and fMRIs. A National Institute of Mental Health study, The Psychobiology of Childhood Temperament, is using fMRI technology to see if differences in temperament, related to differences in brain functioning, put some children at risk of psychiatric disorders.

Temperament is currently an active area of research with applicability to a number of issues including behavior problems, school achievement, psychopathology, stress, and resilience. Although the importance of temperament is well established, important questions remain about its exact components, how they interact, how to measure them, and how they are affected by context, maturation, and experience.

Temperament and Giftedness

Kazimierz Dabrowski, a Polish psychologist, developed a theory he believed could explain the intensity, sensitivity, and unusual behavior (i.e., eccentricity) of gifted individuals. He posited five *overexcitabilities* or heightened responsiveness to specific stimuli: psychomotor, sensual, emotional, imaginational, and intellectual. Although Dabrowski did not use the word *temperament,* these overexcitabilities resemble "high end" versions of temperamental traits of activity/arousal, response threshold, intensity, and emotionality.

Thomas Oakland of the University of Florida sought to test the hypothesis that gifted children are temperamentally different from non-gifted children. Oakland tested 1,554 students, examining preferences in four dimensions:

1. practical–imaginative
2. thinking–feeling
3. organization–flexibility
4. extraversion–introversion.

Although findings indicate that gifted students are significantly more likely to be imaginative than are non-gifted students, numerous students in gifted programs did not fit the profile, suggesting that temperament is not necessarily linked to giftedness.

In a comprehensive analysis of temperament and giftedness, Ugur Sak synthesized results of 14 studies using 19 independent samples of 5,723 gifted adolescents. Using a Jungian model of personality types, Sak found that gifted youngsters were significantly more likely to be intuitive and introverted than were their non-gifted peers. Gifted youngsters preferred novelty and complexity, and used holistic, abstract, and speculative processes.

Eccentricity

Although there have been many attempts to catalog temperament, eccentricity has remained

a vague, general term for any kind of odd or idiosyncratic behavior. In contrast to schizotypal behavior (representing a distortion of reality and characterized by peculiarities of thinking, belief, and interaction), eccentric behavior has a more benign connotation as the expression of unique personality, intelligence, or creativity.

The concept of temperament may help to clarify types of eccentricity because traits of temperament at the far ends of the continuum—extreme introversion, perfectionism, inflexibility, restlessness, and so forth—may indicate behavior deviating from the norm but not pathological. Mental health professionals do not always agree about how to distinguish eccentricity from disorder, however, especially in gifted persons whose giftedness may be inexorably bound to patterns of divergent or unconventional thinking and response.

James Webb, Dierdre Lovecky, and others have written about misdiagnosis of gifted children with disorders such as attention deficit/hyperactivity disorder, Asperger's syndrome, anxiety, bipolar disorder, and obsessive-compulsive disorder. Such misdiagnoses may be the result of a gifted individual's eccentric temperament, especially traits such as introversion, which may be misinterpreted as narcissism, anxiety, or social backwardness; intensity of response, which may be mistaken for a mood disorder or hyperactivity; narrow concentration, seeming to indicate Asperger's syndrome or, on the contrary, broad and divergent attention indicating distractibility or attention-deficit; inflexibility, interpreted as an obsessive need to control; and perfectionism, leading to perseveration to meet an internal ideal.

In combination and through interaction with elements of the environment, eccentric traits can lead to psychosocial problems including difficulty with peer relations, difficulty making decisions, self-criticism, intolerance, and avoidance of risk. Eccentricity in gifted or creative individuals is thus a complex subject, based on temperament but shaped by context and experience.

Barbara Probst

See also Creative Personality; Creativity and Mental Illness; Originality; Personality and Intelligence

Further Readings

Healy, J. M. (2006). The dance of nature and nurture: How environment impacts brain development and genetic expression. In S. Olfman (Ed.), *No child left different*. Westport, CT: Praeger.

Oakland, T., Joyce, D., Horton, C., & Glutting, J. (2000). Temperament-based learning styles of identified gifted and nongifted students. *Gifted Child Quarterly, 44*(3), 183–189.

Sak, U. (2004). A synthesis of research on psychological types of gifted adolescents. *Journal of Secondary Gifted Education, 15*(2), 70–79.

Thomas, A., & Chess, S. (1977). *Temperament and development*. New York: Brunner/Mazel.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, P., & Olenchak, F. R. (2005). *Misdiagnosis and dual diagnoses of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders*. Scottsdale, AZ: Great Potential Press.

Effective Programs

In recent years, the field of gifted, creative, and talented (GCT) education has focused on research-based best practices as the scaffold to describe program service provision. In general, this has led to a change in program paradigm—from schools and school districts supporting a "program" for GCT learners to the provision of multiple services addressing complex and diverse needs of these learners. Just as no two GCT children will possess the same academic, social, and emotional needs, so also will there be little possibility that a single program provision will serve GCT needs.

In 2007, Karen B. Rogers synthesized research on the multiple components that constitute program services and concluded that program components include the research on (a) instructional management systems for organizing the learners for the services to which they are ultimately matched; (b) instructional delivery systems through which their instruction is differentiated to address specific learning needs; and (c) curricular modifications and adaptations of the general school curricula to address specific curricular and content needs. This entry describes the research findings for these three elements of the program and the research that supports these program components.

Research Findings

Program Element One

Program policy requires the school (or each district school) to identify a minimum of two grouping, two acceleration, and two individualization service options by which GCT learners can be organized for the instructional and curricular differentiation required.

Component One: Grouping by Ability or Performance for Learning and Socialization

There are seven research-supported grouping options for GCT learners, four of which are *ability-based*, and six of which can be *performance-based*. Grouping by ability entails the identification of students grouped together by assessment of potential or ability, not necessarily by their current levels of performance. Conversely, grouping by performance accommodates the identification of students grouped together by assessments of performance levels and readiness for increasing levels of challenge in learning. Table 1 summarizes the forms of grouping, the effect sizes, and the specific grade levels and subject areas on which the grouping research was conducted.

Effect size. Effect size (ES) is an estimate of the effect of a specified strategy upon a target population. It is, in simplistic form, a proportion of an additional year's growth to the group to whom the strategy has been applied. The comparison group is assumed to have made the expected year's growth in one year's time, while the treatment group has made the one year plus this additional proportion of a year. ES is calculated for each study of a specified strategy using the following basic formula:

$$\frac{\text{Achievement Gain}_{\text{treatment group}} - \text{Achievement gain}_{\text{comparison group}}}{\text{Standard Deviation}_{\text{pooled treatment + comparison groups}}}$$

Table 1 Grouping Option Effect Sizes

Grouping Option	*Definition/Type of Grouping Option*	*Effect Size*	*Specifics of Effect Size*
Full-time ability grouping (Ability-based only)	Special school, self-contained classroom, magnet school, full-time GCT program	.49 .33 1.06 .53	Elementary (K–6) Secondary (7–12) Residential high school (9–12) Self-efficacy
Cluster grouping (Ability-based OR Performance-based)	Top 5–8 learners at grade level are placed in single heterogeneous classroom by: • Ability OR • Performance in either math or language arts	.59 .44	Elementary ability clusters (1–8) Elementary performance clusters (3–8)
Like ability/ performance cooperative groups (Ability-based OR Performance-based)	Pairs, teams of 3–4 learners of like ability or performance in specific subject work on differentiated cooperative task	.28	Elementary (3–5) in science and social studies

(Continued)

Table 1 (Continued)

Grouping Option	*Definition/Type of Grouping Option*	*Effect Size*	*Specifics of Effect Size*
Pull-out or send-out program (Ability-based OR Performance-based)	GCT learners attend yearlong resource room program outside of regular classroom for specified time each week	.45	Extension of general class curriculum (1–8)
		.44	Yearlong critical thinking skills training (4–8)
		.32	Yearlong creative thinking skills training (3–7)
Regrouping for specific instruction (Performance-based only)	GCT learners are placed in level of curriculum at which they are currently functioning—usually advanced, general, or basic at grade level	.34	Elementary average across all ability levels, when regrouping is done across whole grade level (reading, math)
		.79	High-ability regrouped effects in math and reading (3–8)
		.22	Regular student regrouping effects in math, reading (3–8)
		.15	Low-achieving student groups in math, reading (3–8)
		.37	Attitude toward regrouped subject
		.18	Self-efficacy in regrouped area
Within class grouping/flexible grouping (Performance-based only)	Teacher subdivides heterogeneous class into how ready learners are for each instructional unit to be taught	.34	GCT effect in math, science (2–8)
Cross-graded classes (Performance-based only)	Across school, all students are sorted to the grade-level curriculum at which they are currently functioning	.45	Across all ability levels, effect for language arts
		.46	Across all ability levels, effect for mathematics

These ES results are then averaged across all the studies of a strategy, as reported in Tables 1 through 3 of this entry. An ES of .30 is considered to make a distinct difference in academic learning. If GCT students are able to make one and one-third years' growth in one year's time, that is a considerable effect.

Component Two: Accelerating GCT Learners to Shorten the Time in K–12 Schooling or to Provide Access to Curriculum Beyond Current Age or Grade Level

Eleven acceleration options are shown to have beneficial academic, social, and psychological effects on GCT learners, of which three are *grade-based* (shortening school time) and eight are *subject-based* (advanced content access). Table 2 summarizes each option and the specifics of its effects.

Component Three: Individualizing GCT Learners' Study by Developing a Unique Plan of Study or by Allowing Student to Progress Flexibly Through the K–12 School Curriculum

Of the nine options researched, four provide a *unique plan of study*, and six allow for *flexible progression*. Table 3 summarizes each option, provides a definition for it, the effect sizes, and the specifics for the effect sizes reported.

Table 2 Grade-Based and Subject-Based Acceleration Options

Acceleration Option	*Definition/Type of Acceleration*	*Effect Size*	*Specifics of Effect Size*
Grade skipping (Grade-based only)	Learner bypasses a grade level	.37 .34 .42	Academic effect (1–12) Socialization effect (1–12) Self-esteem effect (3–12)
Grade telescoping (Grade-based only)	GCT learners as a cohort move through several years' curriculum more rapidly—finishing 3 years in 2 years' time, etc.	.40	Academic effect (3–8)
Early admission to college (Grade-based only)	GCT learner begins full-time university 1–2 years early without prerequisite high school diploma	.25 .29	Academic effect Self-esteem effect
Early entrance to school (Subject-based only)	GCT learner begins kindergarten or 1st grade a year early	.30 –.24 .10	Academic effect Socialization effect Self-efficacy effect
Concurrent/ dual enrollment (Subject-based only)	GCT learner takes class at higher building level during regular day	.22 .46	Academic effect (7–12) Self-esteem effect (7–12)
Advanced Placement courses (Subject-based only)	Learner takes AP course for college credit on high school campus, using AP-trained teachers, curriculum	.62 .10	Academic effect (9–12) Self-efficacy (9–12)
International Baccalaureate programs (Subject-based only)	Learner participates in total IB program, leading to college credit when external exams are passed; uses IB-trained teachers, curriculum	.54 .03	Academic effect (10–12) Self-efficacy (10–12)
Credit by examination (Subject-based only)	Based on test performance, learner is allowed to take coursework beyond grade level instead of repeating	.59	Academic effect (by subject area in which test is taken)
Summer college programs (Subject-based only)	GCT learner takes college campus accelerated program for 3–6 weeks—half or whole day spent on one subject area	.45 .36	Academic effect (in subject area selected for course) Self-efficacy
Saturday college programs (Subject-based only)	GCT learner takes college campus, yearlong accelerated course, half or whole day each week is spent in course	1.56	Academic effect (in subject area selected for course)
Talent search participation (Subject-based only)	GCT learner takes national exam, such as SAT, and partakes of options offered by college campuses based on test score	.34	General academic effect

Program Element Two

The GCT program must ensure that these learners are differentiated in pace, content organization, and complexity based on research about the nature of their ability to acquire new knowledge and skills.

Table 4 summarizes the major points about the distinct differences in the nature of learning for GCT students and focuses on the subject areas with research to support the implementation of the differentiated instructional strategy involved.

Program Element Three

The content, processes, and products of the GCT curriculum must be modified or adapted according to research-based modification strategies.

In Table 5, the keywords that identify the research-supported modification/adaptation strategies used by the 29 curriculum differentiation models, which compose curriculum differentiation in the field are listed, defined, and the strength of the research itself by subject area are delineated.

Table 3 Unique Plan and Flexible Progression Individualization Options

Individualization Option	*Definition/Type of Individualization*	*Effect Size*	*Specifics of Effect Size*
Compacted curriculum (Unique plan OR Flexible progress)	Learner is preassessed on prior mastery and bypasses mastered materials	.83 .20 .17	Academic math, science effect Language arts, social studies Self-efficacy
Independent study (Unique plan)	Learner studies self-selected topic on own timeline without direct teacher supervision	0	Academic effect * * Specific topic is not assessed in yearly achievement tests
Self-instructional materials (Flexible progress)	Learner studies given topic on own timeline via computerized delivery of course	2.35	Academic effect (1 study only)
Credit for prior learning (Flexible progress)	GCT learner provides evidence of previous learning experiences with unit or course and is allowed to bypass it for more advanced work	.56	Academic (in specific area for which credit is given)
Mentorship (Unique plan)	GCT learner works one-to-one with content expert over yearlong study of specific study area	.22 .71 .16 2.00	Small group, elementary, middle school academic effect High school yearlong academic effect (specific subject area only) Self-efficacy Daily tutoring of high talent child (from Bloom's work on Talent Development)
Online computer coursework (Flexible progress)	GCT learner takes a computerized course on own timeline, supervised by a computer tutor who provides feedback	.74 .40	Academic effect (specific to course) Self-efficacy

Individualization Option	*Definition/Type of Individualization*	*Effect Size*	*Specifics of Effect Size*
Distance learning (Flexible progress)	Student takes course offered by satellite or television off-site	Not calculable	No quantitative studies reported. Literature is primarily program descriptions
Individual Education Plan (Unique plan)	GCT learner has written individual learning plan that school personnel monitor and implement	Not calculable	No quantitative studies reported. Literature is primarily descriptions of IEP contents and state guidelines
Nongraded classes (Flexible progress)	GCT learners placed in multi-age classroom and allowed to work at own levels of readiness and pace	.38	Academic effect (1–8)

Table 4 Content Area–Related Instructional Differentiation Strategies

Instructional Strategy	*Definition*	*Strongest Research Base*	*Some Initial Explorations in Research/Literature*
Fast pacing	New content is introduced at 2–3 times the "normal" class presentation pace	Mathematics Science Foreign language learning	Target teaching of gaps in knowledge/skill in any subject area Computer science Problem-solving training
In-depth learning	Learner is allowed to learn a concept in its entirety	Science History	Literature Social studies
Concept-based learning	Topic/unit is organized by its central concept, issues, principle, generalization	Science History Social studies	Humanities Language arts
Whole-to-part	Concept to be taught is provided up front in its entirety followed by work on the parts	Mathematics Science	Literature Social studies History
Elimination of excess drill and repetition	Once concept is mastered, it is reviewed at space intervals only 2–3 additional times	Mathematics Science Spelling Geography	Literature Social studies Foreign language learning

(Continued)

Table 4 (Continued)

Instructional Strategy	*Definition*	*Strongest Research Base*	*Some Initial Explorations in Research/Literature*
Self-instructional learning	Learner is provided materials to work through on own	Mathematics Spelling Geography	Social studies Science Foreign language learning
Reflection and analysis of own learning	Learner is given time to take a whole concept and take its parts apart and reassemble	Science	Humanities Language arts Social studies

Table 5 Research-Supported Content, Process, and Product Differentiation

Curricular Strategy	*Definition*	*Strongest Research Base*	*Some Initial Explorations in Research/Literature*
Abstract content	The big ideas, underlying meaning, and principles of the content area are emphasized rather than facts and details	Literature History Humanities	Science Social studies
Complexity in content	The intricacies and more difficult aspects of content are incorporated	Mathematics Science	Literature Social studies
Multi/transdisciplinarity	The content is linked with other disciplines by common themes or concepts	Social studies Science	Literature Humanities History
Organization and sequence of content	Content is reordered for better acquisition: whole-to-part, conceptually, etc.	Science	History Literature Humanities Social studies
Study of people content	Content is related to people of a field, human issues, and social problems of that field	Social studies Science	Literature Humanities
Methods of inquiry content	Content is related to the methods and procedures professionals in the field use	Science Mathematics	Humanities Social studies Literature
Higher-order processing	Learners must analyze, synthesize, and evaluate what is being learned	Literature Social studies Humanities	Science Mathematics
Open-ended processing	Learners produce multiple answers, perspectives	Literature Humanities	Social studies Science

Curricular Strategy	*Definition*	*Strongest Research Base*	*Some Initial Explorations in Research/Literature*
Proof and reasoning processes	Learners must support arguments, ideas with evidence	Science Mathematics	Literature Social studies
Memory work	Learners are exposed to multiple strategies for encoding and retrieving information	Science	History Geography Literature
Discovery/problem-based tasks and projects in learning process	Learners must initiate their own learning by working with primary resources to solve a problem or induce a concept	Science	Social studies Humanities
Freedom of choice process	Learners select small tangent from main course of study to pursue on their own	Social studies Science	Literature Humanities
Social issues, ethics group discussion process	In small group or whole group, focus is placed on the social or ethical implications of content area	Social studies Humanities	Literature Science
Service learning	Small group projects focused on the improvement of conditions in some field	Social studies Humanities Science	Literature
Planning, research, organization, test-taking skill training	Training in these areas	Science Mathematics	Social studies Humanities
Communication skills training	Training in this area	Literature	Social studies Science
Arts integrated processing	Incorporation of arts principles within core academic content	Criticism in language arts Science	History Aesthetics Social studies
Real world problems/ products	Focus of study on real world issues rather than academic ideas	Science Mathematics	Literature Social studies Humanities
Real audiences feedback for products	Products are submitted to content experts for evaluation	Science Social studies Literature	Mathematics History
Transformational products/performances	Nontraditional media are way of "using" what is learned rather than summarizing it	Science	Social studies
Processing of the "classics"	Incorporating the big ideas, the essentials of a field of study	Literature Humanities	Science Art Music Theater Mathematics

Table 6 Characteristics, Traits, and Behaviors of "Effective" GCT Teachers

Cognitive, Intellectual Traits	*Professional Behaviors and Characteristics*	*Personal Characteristics and Traits*
• Expertise in specific academic talent area • Self-directed in own learning, love for new advanced learning • Strong belief in individual differences and individualization • Highly developed teaching skill and knowledge • Highly intelligent	• Facilitator of learning • Variable pacing of learning experiences • Consistent, accurate feedback • Recognition of the importance of intellectual development in GCT learners	• Genuine interest in and liking of GCT learners • Equanimity, level-headedness, emotional stability • Possess high degree of curiosity and intellectual honesty • Sense of humor "in line" with subject area

Program Elements Four and Five

Although there is no strong research base to support the direct effects of these elements, the development of a policy to set the rules and guidelines of a program is strongly recommended (Element Four) and every effort to place "effective teachers" with GCT learners to implement the research-based best practices is necessary.

Jean Purcell and Rebecca Eckert, in previous work on program provision, recommended the following elements of a gifted program policy: (1) identification; (2) program services; (3) curriculum and instruction/assessment of learning; (4) program design and management; (5) teacher preparation; and (6) program evaluation.

Previous syntheses of research on teacher effectiveness have isolated the following intellectual, professional, and personality traits. Table 6 displays these traits.

Elements for Effective Programs

A strong research base delineates program elements that will most likely predict a strong and effective gifted program of service. These elements include instructional management strategies, techniques for differentiating instructional delivery, strategies for differentiating the general curriculum, a program policy that is fully implemented and monitored, and the placement of "effective teachers" with these learners. Some programs may be able to survive and thrive without all of the aforementioned elements in place, but the longevity of those programs may be threatened in the long run. Best practice suggests to educators and administrators to try their best to include all of the program elements described in this entry.

Karen B. Rogers

See also Administrative Decision Making; Best Practices; Differentiation; Meta-Analyses of Gifted Education; Research, Quantitative

Further Readings

Colangelo, N., Assouline, S., & Gross, M. U. M. (Eds.). (2005). *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Delcourt, M. A., Loyd, B. H., Cornell, D. G., & Goldberg, M. D. (1994). *Evaluation of the effects of programming arrangements on student learning outcomes*. Charlottesville, VA: National Research Center on the Gifted and Talented.

Hoekman, K., McCormick, J., & Gross, M. U. M. (1999). The optimal context for gifted students: A preliminary exploration of motivational and affective considerations. *Gifted Chil d Quarterly, 43,* 170–193.

Kenny, D. A., Archambault, F. X., & Hallmark, B. W. (1995). *The effects of group composition on gifted and non-gifted elementary students in cooperative learning groups*. Research monograph No. 95116. Storrs, CT: National Research Center on the Gifted and Talented (ERIC Document Reproduction Service No. ED 402 702).

Kulik, J. A., & Kulik, C-L. C. (1992). Meta-analytic findings on grouping programs. *Gifted Child Quarterly, 36,* 73–77.

Purcell, J. H., & Eckert, R. D. (Eds.). (2005). *Designing services and programs for high-ability learners: A guidebook for gifted education*. Thousand Oaks, CA: Corwin Press.

Ravaglia, R., Suppes, P., Stillinger, C., & Alper, T. (1995). Computer-based mathematics and physics for gifted students. *Gifted Child Quarterly, 39,* 7–13.

Rogers, K. B. (2002). *Re-forming gifted education: Helping parents and teachers to match the program to the child*. Scottsdale, AZ: Great Potential Press.

Rogers, K. B. (2007). Lessons learned about educating the gifted and talented: A synthesis of the research on educational possibilities. *Gifted Child Quarterly, 51,* 382–396.

Sheffield, L. J. (Ed.). (1999). *Developing mathematically promising students*. Reston, VA: National Council for Teachers of Mathematics.

Slavin, R. E. (1987). Ability grouping: A best-evidence synthesis. *Review of Educational Research, 57,* 293–336.

Elderly, Gifted

The productivity and ingenuity of those who remain engaged in or discover new talents in the later years of life directly challenge negative perceptions of aging. Contemporary cultural messages overwhelmingly place value upon newness and youth and deride that which is old or aged. Negative stereotypes of the elderly frequently include images of unavoidable decline including poor physical health, loneliness, loss of independence, expectations of age-related memory impairment, and an increase in the prevalence of depression or irritability. These beliefs about the elderly are being challenged as life expectancy continues to increase and the maturing momentum of the world's population adds strength to the pursuit of successful aging and optimization of well-being in the later years. As such, talent development and giftedness in later life are likely to gain importance in the literature. This entry describes theories of development in the gifted elderly as well as clinical implications.

Erik Erikson's *stage theory of development* identifies the main crisis of the older adult to be conflict between themes of integrity versus despair, with the successful resolution of this stage being the emergence of "wisdom." Wisdom may be defined as truly superior knowledge or knowledge with extraordinary scope and depth. According to Erikson, age-related tasks of the older adult include review of life accomplishments, the management of multiple loss experiences and preparation for death. Although these tasks are appropriate existential end-of-life issues, the dilemma of generativity versus stagnation that Erikson identifies with middle-age also applies to the older adults who also seek to remain productive in their advanced years. Erikson himself continued to contemplate and write about psychosocial development across the life span, publishing a book on aging in 1986 when he was 84 years old.

There is much to learn from eminent elderly gifted role models who historically and currently produce groundbreaking works across talent domains, and whose achievements are uniquely shaped by their long-view perspective gained from a wealth of life experiences. When seeking elder role models, those who remain productive until their death in their eighties or nineties deserve attention. Ben Franklin (84 years old), Thomas Edison (84 years old), Pablo Picasso (92 years old), and Georgia O'Keeffe (98 years old) are all examples of individuals who remained productive throughout their lives and for whom advancing years proved to be an opportunity rather than a barrier to talent development. Each of these individuals was able to build on earlier career successes while remaining viable sources of innovation and creativity. It is important to consider that an individual may produce his or her greatest life's work at any age.

In the 1920s, Lewis Terman began a longitudinal research project designed to learn about the lives of gifted children and continued to monitor them as they aged. At an average age of 70 years, the gifted participants indicated that leisure activities and avocational pursuits offered a structure for daily activity while providing a sense of meaning or purposefulness, a sense of belonging, an opportunity to demonstrate previously acquired competencies, and the challenge of continued accomplishment. Once work and family responsibilities had diminished, time allowed for the pursuit of interests that had previously been identified by the participants as being desirable but for which time had not allowed attention.

A growing body of research indicates that creative endeavors are sought out by older adults, many of whom may for the first time in their lives have time to pursue hobbies and talents that were not previously prioritized. Positive health benefits are routinely found in adults who maintain

or increase their involvement in creative activities. Indices of improved health include greater self-reported perceptions of well-being and life satisfaction, decreased need for medication, lower numbers of doctor visits, and improved resiliency and problem-solving skills when faced by life challenges.

When one works with older gifted populations, it is important to encourage the activation of latent talents. Many older adults have skills that were nurtured during their youth, which became dormant during the adult years, yet continue to be stored in long-term memory as crystallized knowledge and hold the potential for actualization in the later years. Some older adults may face obstacles for talent expression such as lower initiative, changed physical or mental functioning, reduced economic resources, isolation, decreased networking skills, and impaired planning abilities. Social and environmental interventions can promote the pursuit of curiosity, wonderment, and puzzlement and result in new achievement experiences as well as an increased sense of well-being for the elderly gifted person.

For many older adults, life review or reminiscence serves as a mechanism for reconciling, synthesizing and resolving issues within personal narratives of current identity while reinforcing memories of significant life events and important relationships from the past. Furthermore, the traditional role of an elder as storyteller, historian, wisdom keeper, or sage is fulfilled when an audience values the knowledge and talents of the older generation. Dementia or physical decline in elderly populations does not preclude the possibility of expression of gifted ability. Changes in cognitive and physical functioning may reduce barriers to talent expression such as lower inhibitions, decreased perfectionist filtering, or disregarding expectations of what is polite or age appropriate for one's age.

Amy Katherine Harkins

See also Eminence; Fluid and Crystallized Intelligence; Giftedness, Definition; Grandparenting; Meaning of Life; Role Models; Self-Actualization; Terman's Studies of Genius

Further Readings

Erikson, E. H., Erikson, J. M., & Kivnick, H. Q. (1986). *Vital involvement in old age.* New York: W. W. Norton.

Holahan, C. K., & Sears, R. R. (1995). *The gifted group in later maturity.* Stanford, CA: Stanford University Press.

Moody, H. R. (2006). *Aging: Concepts and controversies.* Thousand Oaks, CA: Pine Forge Press.

Elementary Enrichment

Elementary enrichment opportunities enable children to move beyond grade-level lessons and extend the regular curriculum with individualized opportunities. Examples of enrichment include exposure to new topics and ideas, training in creative and critical thinking skills, problem solving, firsthand investigative opportunities, the development of an independent study in areas of choice with individual research, and the use of advanced research methods.

There are a variety of factors to consider when planning elementary enrichment for gifted and talented children. For example, what types of enrichment opportunities can and will be made available? Will the regular curriculum be extended with enrichment or will it be compacted and replaced with teacher-selected advanced content? Will students have the opportunity to pursue their personal interests using independent study? Enrichment can take many forms, as described in this entry, and these questions about content and how curriculum can be enriched are at the core of the decisions that guide enrichment selections. The central question is this: What constitutes appropriate levels and types of enrichment for gifted, creative, and talented students?

Curriculum and Instructional Enrichment

Virgil Ward was the first theorist to develop ideas of differential education for the gifted. His work established the basic principles for adapting curriculum for use with gifted and talented students. Joseph Renzulli extended Ward's work, suggesting the development of enrichment activities and programming models. Renzulli created the first *enrichment programming model,* which advocates exposing bright students to new topics and areas of interest, training thinking and research skills, and

providing opportunities for self-selected investigative activities of problems in students' interest areas. Following the creation of the *enrichment triad model,* Renzulli developed the *multiple menu model of curriculum,* including enrichment approaches in which six practical planning guides enable teachers to use menus to design in-depth curriculum units for classroom use. This model differs from traditional approaches to curriculum design in its emphasis on balancing authentic content and process, involving students as firsthand inquirers, and exploring the structure and interconnectedness of knowledge.

James Gallagher suggested the use of both content modification and enrichment in the core subject areas of language arts, social studies, mathematics, and science. Sandra Kaplan's approach to curriculum for the gifted included both acceleration and enrichment strategies. Working with a Leadership Training Institute task force, Harry Passow led a group of scholars in formulating seminal curriculum principles across content, process, and product, as well as including enrichment opportunities.

Emerging from these and other earlier theories, Carol Tomlinson, Kaplan, Renzulli, and their colleagues subsequently developed the *parallel curriculum model,* which integrated a series of parallel approaches with an emphasis on core knowledge and skills, generative learning, identity development, and interdisciplinary opportunities. This model provides several opportunities for enrichment. Joyce VanTassel-Baska and her colleagues have written gifted curriculum across various content areas, using curriculum design and alignment to standards as well as enrichment ideas. In her most recent work, she developed an *integrated curriculum model* (ICM) for the gifted with a content mastery dimension, the process/product research dimension, and an epistemological concept dimension.

Of these approaches, the most influential and widely used elementary enrichment and program delivery approach is Renzulli's enrichment triad model and the subsequent, *schoolwide enrichment model.* This model, coauthored with Sally Reis, suggests the need for a comprehensive approach to elementary enrichment for gifted and other students in the school. The enrichment triad model, an organizational and service delivery model, has three components: Type I enrichment (general exploratory experiences), Type II enrichment (group training activities), and Type III individual and small-group investigations of real problems. Renzulli and Reis's work includes elements such as enrichment planning teams, needs assessments, staff development, materials selection, and program evaluation. Some of the service delivery components are lessons to promote development of thinking processes, and procedures to modify the regular curriculum, such as curriculum compacting.

Curriculum compacting, a service also described by Renzulli and Reis, is another process that can be used within elementary enrichment programs to meet the needs of the advanced student. It advocates eliminating or modifying work that may already be mastered, and thus avoiding busywork or repetition. Compacting enables gifted learners to prove their proficiency in the base curriculum while finding time for appropriately challenging and enriched curriculum. This strategy is one of the most widely used approaches to encourage curriculum differentiation in conjunction with enrichment models for gifted learners.

In summary, classroom teachers and gifted education and enrichment specialists often provide different levels of elementary enrichment to many gifted and talented students across many different types of models. Enrichment usually includes some or all of the following components: exposure to new topics and areas of interest, training in thinking and research skills, opportunities for self-selected investigative activities of problems that students select or are assigned by their teachers. Enrichment usually includes emphasis on authentic content and process, enabling students to serve as firsthand inquirers, and exploring the structure and interconnectedness of knowledge.

Organization and Delivery

The second consideration about elementary enrichment is organizational, relating to where and when students will be provided with enrichment to meet their learning needs. For example, gifted and talented students can be grouped by instructional level in and across classrooms in

their elementary school. They can be cluster grouped across one or more content areas in classrooms and assigned to classes with teachers who have had professional development and use strategies to meet their learning needs. Separate classes can be provided for gifted students at the elementary level, and students can be provided with opportunities for advanced project work after school or during a time that their curriculum has been compacted.

Establishing opportunities for enrichment across the elementary grade levels and differentiation in all classrooms are good ways to begin the development of what Renzulli and Reis recommend in a continuum of services that range from some level of service in regular classroom settings to separate schools or centers for gifted and talented learners. School-based enrichment programs offer a diverse set of learning opportunities. For example, some students receive enrichment opportunities in pull-out or resource rooms that enable teachers to send students from their regular classrooms to spend time with other high-potential students. In these resource rooms or pull-out programs, students can work on in-depth, advanced independent study projects and group projects in their interest areas. In this type of pull-out model, students leave their regular classroom for a specified period for specialized enriched instruction and then return to spend the remaining time in the regular classroom. An advantage is that students are able to work on advanced and enriched learning opportunities in areas of interest commensurate with their ability level. Other types of delivery for enrichment can be seminars, field trips, after-school programs, or even special enrichment clusters advocated by Renzulli and Reis. In enrichment clusters, a special time is scheduled for all students in an elementary school to select the enrichment experience in which they would like to participate. Enrichment clusters are nongraded groups of students who share common interests and who come together to pursue these interests during specially designated time blocks—usually from 1.5 hours to one-half day per week. The major purpose of a cluster is to produce a product or a service, and everything students do in the cluster is directed toward completing a product or delivering a service for a real-world audience. Thus, students learn only relevant content and use only authentic processes within this context.

In some districts, enrichment experiences are combined to create the greatest number of opportunities for students. For example, a pull-out model can be combined with enrichment clusters across several grade levels. In other elementary schools, enrichment is delivered by a combination of a pull-out program and cluster grouping. This grouping occurs within the regular classroom, where identified students are assigned to a teacher who is expected to modify the curriculum and instruction to meet their needs as well as the needs of other students in the classroom. Cluster grouping enables students to work in a regular classroom while still grouping them with other students who achieve at similar level. It also allows them the benefit of working with a teacher who has been trained in differentiation of curriculum and the needs of gifted learners.

Organizational approaches vary widely across the country for delivering enrichment. In some districts, students have opportunities to travel to a center one day each week to work with other identified gifted and talented students on advanced curriculum, or to pursue individual interests. Some centers enrich the regular curriculum at a school by providing differentiated enriched opportunities for academically gifted students in kindergarten through Grade 5. Students may, for example, spend 1 day each week at a center studying advanced content and exploring enrichment by pursuing personal interests through independent study. Self-contained classrooms can be used for all or part of a day and are appropriate for providing enrichment as well as accelerated learning opportunities for gifted and talented learners.

All children deserve the opportunity to learn in an enriched and nurturing environment where potential for developing giftedness and talent can be addressed. Programs use a variety of different types of elementary enrichment services for gifted students, across different self-contained classrooms, pull-out classrooms, individual classroom modifications, resource rooms, schoolwide enrichment models, consulting teacher services for students in individual classrooms, adjunct service models, and special schools.

Organized enrichment models can positively influence the education of all students in the schools. All students can benefit from enrichment in specific curriculum areas, in both schoolwide activities and individual classrooms. Resource teachers who provide enrichment for gifted and talented students can have a positive effect on the entire classroom through schoolwide enrichment opportunities, as well as curriculum modification and the introduction of advanced or alternative materials and programs to all students. In other words, an effective enrichment program can influence other students as well as teachers through professional development of colleagues. Gifted education specialists can serve as role models to enable more enrichment to occur schoolwide for more students.

Enrichment teams, as advocated by Renzulli and Reis in the schoolwide enrichment model, can help plan enrichment experiences for the entire school. Enrichment programs should evolve into an integral part of the district's educational delivery system and should be regularly reviewed to determine both content effectiveness and appropriateness of delivery. Gifted students need a planned, articulated, and coordinated enrichment program that will provide challenge as well as engagement and enjoyment of learning.

Sally M. Reis

See also Enrichment Theories; Enrichment Triad Model; Middle School Enrichment; Purdue Model; Schoolwide Enrichment Model

Further Readings

Purcell, J. H., & Eckert, R. D. (Eds.). (2006). *Designing services and programs for high-ability learners*. Thousand Oaks, CA: Corwin Press.

Renzulli, J. S. (1977). *The enrichment triad model*. Wethersfield, CT: Creative Learning Press.

Renzulli, J. S. (Ed.). (2007). *Systems and models for developing programs for the gifted and talented*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Elementary School, Literature Curriculum

The elementary school literature curriculum reflects the expectations at district, school, and classroom levels. Literature is a tool for teaching communication and for transporting its readers to times and places otherwise beyond reach. Three approaches evident when children interact with children's literature include top-down/reader-based, bottom-up/text-based, and an integrated/balanced perspective. It is important for elementary children to be surrounded by text and given the opportunities to engage with those words both independently and with guided practice. In addition, balance should be sought among genres, reader stance, and formats. This topic has special considerations when working with gifted, creative, and talented elementary students, which is discussed later in this entry.

Using Literature for Teaching Communications

Communication in the elementary school includes the areas of reading, writing, speaking, and listening. Through these modes and via texts, learners can use these same texts and modes of communication to mentally travel to places, times, and locations that would otherwise be inaccessible. Current practices and trends demonstrate that literature is used as models for reading and writing.

There are three basic approaches to using literature to teach reading: (1) top-down/reader-based, (2) bottom-up/text-based, and (3) integrated/balanced. The top-down/reader-based approach sees teachers and learners beginning with the whole of a text, the big meaning or major concept, and then moving down to sentences, words, syllables, letters, and sounds. In the bottom-up approach, learning begins with the smallest part of language, sounds, and letters, and then moves to sentences, and finally paragraphs and the whole text. The third approach, integrated/balanced, does not go simply up or down but rather integrates and recursively balances the strengths from the other approaches. This balance is the current goal, and therefore the purpose for using literature. Many schools that use a balanced approach for reading

also incorporate a writer's workshop that then uses the same texts that the learners read from as models for their writing, both for content and mechanics.

Basal Readers and Trade Books

In some classrooms, the combination of text selections is literally handed to the teachers and learners through the use of a basal reader or trade books. Basals are specifically published graduated books created, and used for, teaching. Within each basal, portions of novels, poems, and other genres are shortened or modified to meet a particular grade-level vocabulary. These books align with bottom-up/text-based approaches. Alternately, trade books are those picture books or novels that are published as stand-alone texts. These are the books available in the children's section of stores and libraries. These trade books are not constructed with the sole purpose of monitoring the vocabulary level or to teach readers at a particular stage. Trade books are matched with the top-down/reader-based approach. Classroom teachers are rarely the policy or purchasing decision makers and are often left to respond to the texts they are given, doing their best to integrate materials with personal teaching philosophies and expectations of the district or school. For example, a teacher who believes in the bottom-up/reader-based approach may be in a setting full of basal readers. In this case, the teacher selects a nonfiction or expository text to read along with a science unit. Or later that month, the teacher may initiate an author study and use some selections from the basal while supplementing them with trade books from the school or public library. Flexibility, creativity, and attention to the needs and interests of the students can help modify any of these approaches to provide a comprehensive, engaging literature curriculum for students.

Genres, Reader Stance, and Formats

The role of literature in the lives of elementary learners must include a consideration of genres, reader stance, and formats. Children's literature is divided first into either fiction or nonfiction and further by eight genres: poetry, folklore, fantasy, science fiction, contemporary realistic fiction, historical fiction, biography, and nonfiction/expository. Each genre has specific characteristics and evaluation criteria. For example, the folklore genre includes tall tales, legends, and other stories originated in oral storytelling traditions. For children just beginning to read and write, whether English is their first or an additional language, these are engaging and familiar selections. In practice, children investigate versions of *The Three Little Pigs* or other tales from around the world to compare the story grammar and the language selection. This is an extension of oral language, so it allows emerging readers and writers to understand the relationship between the spoken and written word.

Every child is an individual and brings a life history that is uniquely his or hers. Every author writes from a perspective that reflects his or her own experiences. When a reader interacts with an author's text, he or she is knowingly or unknowingly taking a stance. These interactions and stances are historically considered either aesthetic or efferent. In the efferent stance, the reader/listener takes away something, often knowledge or information. You see this stance in classrooms when someone initiates comprehension questions or searches for a fact about a particular topic. The other stance, aesthetic, expects the reader to share an experience or encounter the book for the sake of sheer enjoyment. Watching elementary children as they are speechless with anticipation during a teacher reading aloud is an example of this stance. When children self-select texts and can be heard giggling, that is another indicator of their aesthetic stance. In today's classrooms, the role of efferent stance has taken center stage and aesthetic stance is more often reserved for time when other tasks have been completed. Before children can become lifelong readers, they must see a purpose and have a passion for reading; this requires frequent, consistent opportunities to be a reader taking the aesthetic stance.

There are two basic formats for children's literature in the elementary school: picture books and novels. Notably, these are not genres of literature but, rather, the physical publication format that holds the text between its covers. Learners of all ages and reading abilities should realize that reading, and enjoying, a picture book is not reserved for younger grades. Nor is it true that novels should only be used with older children. Plenty of picture books, especially those about the Holocaust, demonstrate content wholly intended for an older audience. Conversely, novels can be used in smaller pieces for the enjoyment of many ages. The person

matching children with books should have a broad, and deep, understanding of children's literature. That means knowing books inside and out… literally. In the past decade, graphic picture books and graphic novels have added to the blurred lines between format and genre. These graphic picture books and novels are finely crafted books that use graphics, known also as comics, to carry the reader through the text.

Using Literature With Gifted, Creative, and Talented Youth

Today's gifted, creative, and talented elementary students are fortunate to live in a time of equally ambitious literature options. These learners are well-poised to be presented with increasingly challenging genres and complex story lines. For example, having students investigate the similarities and differences between science fiction and fantasy provide opportunities for vocabulary development, analytical consideration, discussions, and the reading of many high-quality books. With every benefit, there comes a caution. One of the challenges to meeting the desires and needs of these students often places them reading books years above their grade level. This is a juncture where a book must be matched to the reader's maturity. As readers' proficiencies increase, so do the complexity and controversy levels. For example, although parents may celebrate that their 7-year-old child is reading at the "10th-grade" level, the content of those books presented both explicitly and through innuendo may be a mismatch with the age and life experience of the child. Stakeholders must consider the individual as books and texts are selected.

Several excellent curricula for elementary literature for gifted students have been developed. One is the Junior Great Books curriculum. This is a research-based K–12 reading program that provides an excellent framework for teaching reading comprehension, critical thinking, and writing, with structured discussions for students sharing their ideas about great literature.

Junior Great Books helps students develop essential literacy skills—reading carefully, thinking critically, listening intently, and speaking and writing persuasively. By participating in shared inquiry discussion, Great Books students learn to read for meaning and to support their own interpretation of the text. The William & Mary curriculum units are specific teaching models that are used to strengthen students' critical thinking skills. Each model is used within the context of a particular unit of study. Each of the models is flexible and may be adapted to use in many classroom lessons. Some of the best-known units are the Literature Web, the Hamburger Model of Persuasive Writing, and the Vocabulary Web.

Karen A. Jorgensen

See also Classics/Great Books

Further Readings

Center for Gifted Education: http://cfge.wm.edu

Fox, M. (2001). *Reading magic: Why reading aloud to our children will change their lives forever.* New York: Harcourt.

Fox, D. L., & Short, K. G. (Eds.). (2003). *Stories matter: The complexity of cultural authenticity in children's literature.* Urbana, IL: National Council of Teachers of English.

Galda, L., & Cullinan, B. (2006). *Literature and the child* (6th ed.). Belmont, CA: Wadsworth/Thomson Learning.

Great Books Foundation: http://www.greatbooks.org/programs-for-all-ages/junior.html

Hearne, B., & Kaye, M. (Eds.). (1981). *Celebrating children's books.* New York: Lothrop, Lee, & Shepard Books.

Leu, D. J., & Kinzer, C. K. (Eds.). (2003). *Effective literacy instruction: Implementing best practice* (5th ed.). Upper Saddle River, NJ: Merrill Prentice Hall.

Rosenblatt, L. M. (1978). *The readers, the text, the poem: The transactional theory of the literary work.* Carbondale: Southern Illinois University Press.

Scieszka, J. (Ed.). (2005). *Guys write for guys read.* New York: Penguin Group.

Silvey, A. (2004). *100 best books for children.* Boston: Houghton Mifflin.

VanTassel-Baska, J. (2008). William & Mary language arts curriculum units. Retrieved from http://cfge.wm.edu/curriculum.htm

Elementary School, Mathematics Curriculum

The elementary school mathematics curriculum is a crucial component in the general education

of students, provides opportunities for giftedness and creativity to manifest, and serves as a foundation for initiating a deeper interest in mathematically oriented fields. Elementary mathematics also plays a key role in identification procedures used in gifted education. In this entry, the recommendations of the National Council of Teachers of Mathematics (NCTM) for the elementary curriculum are summarized, with a short exposition of the major theorists that have affected the elementary school mathematics curriculum, followed by findings from the Study of Mathematically Precocious Youth applicable to the elementary curriculum. This entry concludes with a discussion on identification and a brief synopsis of programming options available at the elementary level.

National Council of Teachers of Mathematics Standards

The *Principles and Standards for School Mathematics,* a publication of the NCTM provides an idealistic vision of the mathematical content and processes that are relevant in the 21st century. The strand for elementary students revolves around five overarching basic goals, which are to help students cultivate number sense, to teach methods of estimation and measurement, to enhance pattern recognition, teach geometric concepts, and introduce statistical methods. These overall goals remain the same as a student progresses from the early elementary level to the late high school level while the depth of investigation within a particular content domain increases. The intention is to introduce concepts early in an intuitive manner, and to build on these as students' reasoning abilities. The agenda set for the elementary level (Kindergarten–Grade 8) is challenging, especially in the realm of geometry where students are expected to construct convincing arguments and proofs to solve problems or draw conclusions about geometric figures and patterns. In essence, by placing primary responsibility for establishing the validity of mathematical ideas with the students, the standards are viewing each student as a mathematician. Having students justify the validity of their ideas promotes the importance of being able to communicate with others by organizing arguments in a coherent way.

Despite the laudable goals of the NCTM Standards, the reality of the matter is different. One of the jokes among mathematics educators in the United States is that if Benjamin Franklin were to miraculously appear in the world today, he would be unable to cope with all the changes that have occurred. However, he would surely recognize a mathematics classroom because of the consistent way in which this particular school subject is taught! Research in mathematics education has shown that the mode of instruction has been consistent even in the face of reform. The routine followed in most traditional mathematics classrooms are as follows: solutions to the previous day's homework, short presentation of the next topic, followed by seat work, during which the teacher moves about the classroom answering questions. Emphasis on procedures and the classroom routine just mentioned are the defining characteristics of most mathematics classrooms, in which many gifted students' potential is left unnurtured.

Major Theorists

The elementary school mathematics curriculum is rooted in the three traditional R's, namely reading, (w)riting, and (a)rithmetic. However, unlike other subject areas, it has been the center of continued political debate about what constitutes the most appropriate mathematics curricula in the elementary school years. The elementary school mathematics curricula in the United States and numerous other parts of the world bear the influence of the theories of learning proposed by Jean Piaget, Jerome Bruner, and Zoltan Dienes. Piaget proposed a developmental stage theory that was aligned with age, in which children progressed through sensory-motor, preoperational, concrete-operational, and formal-operational stages during the first 15 years of life. Unlike Piaget's theory, Bruner's theory of learning is not age-dependent but does consist of three stages, the enactive, iconic, and symbolic, in which concept development moves from the physical to the representational to the abstract. There is some correspondence between the stages proposed by Piaget and Bruner. This prescriptive curriculum at the elementary school level has been influenced by Piaget's developmental stage theory as well as by Bruner's work. In stark contrast, Dienes proposed a radically

different elementary mathematics curriculum, one that aligns itself more with the call of the NCTM standards. Dienes is a Hungarian-born mathematician and mathematics educator and the inventor of the multibase arithmetic blocks and numerous other manipulatives for elementary education; he is considered one of the founding figures of mathematics education. According to Dienes, children do not need to reach a certain developmental stage to experience the joy, or the thrill, of thinking mathematically and experiencing the process of doing mathematics. The curriculum unfortunately does not give children the opportunities to engage in this type of thinking. Like Piaget, Dienes emphasized that mathematics is the study of structure—and that many of its most important concepts and processes have meanings that depend on thinking based on conceptual systems-as-a-whole. For instance, using a wide range of creative tasks, Piaget demonstrated the inherent systemic nature of (a) unit concepts whose meanings depend on invariance properties (with respect to a system), (b) relation concepts whose meanings depend on properties such as transitivity (with respect to a system), and (c) other properties such as those that depend on patterns or regularities (of a system)—or on the maximization, minimization, or stabilization of properties within a system. Piaget demonstrated that statements of belief often are emergent properties of systems of belief, that statements or principles often depend on systems of principles, and that these systems need to function as system-as-a-whole before the relevant concepts, principles, and beliefs attain their intended meanings. Finally, he demonstrated what children's thinking is like before relevant conceptual systems-as-a-whole have begun to function as systemic wholes; and, he demonstrated some of the most important processes that influence development. But one of the things that Piaget did not do, and that Dienes has done, is to recognize that mathematics is not just about structure, but, even more importantly, it is about isomorphism, homomorphism, and more generally structural mappings among structures. Furthermore, relevant conceptual systems are molded and shaped by the external systems they are used to interpret, and that beyond entry-level mathematical systems usually need to be expressed using some external media—or embodiment—if they are to function properly. Therefore, Dienes studied a phenomenon that later cognitive scientists have come to call *embodied knowledge and situated cognition,* and he emphasized the *multiple embodiment principle* whereby students need to make predictions from one structured situation to another. His notion of embodied knowledge presaged other cognitive scientists who eventually came to recognize the importance of *embodied knowledge* and *situated cognition*—where knowledge and abilities are organized around experience as much as they are organized around abstractions (as Piaget, for example, would have led us to believe), and where knowledge is distributed across a variety of tools and communities of practice. Dienes was an early pioneer in what is now coming to be called *sociocultural perspectives* on learning and problem solving.

Identification and Study of Mathematically Precocious Youth

The identification of mathematically gifted elementary school children has largely been through the use of standardized batteries such as the Stanford-Binet IQ Test, the SAT-M, or the Iowa Tests of Basic Skills. Researchers within the community of gifted education have criticized the use of strictly quantitative measures because they often overlook qualitative aspects of mathematical thinking. For instance, the Russian psychologist V. A. Krutetskii differentiated the talents of schoolchildren on the basis of longitudinal observational studies centered on specifically tailored mathematical tasks and labeled students as "not capable," "capable," and "very capable." The mathematically gifted students in his studies showed four characteristics, namely flexibility, curtailment, logical thought, and formalization.

Julian Stanley's landmark Study of Mathematically Precocious Youth (SMPY), started at Johns Hopkins University in 1971, introduced the idea of above-level testing for the identification of highly gifted youth. From 1980 to 1983, in SMPY, 292 mathematically precocious youth were identified on the basis of the SAT. These students scored at least 700 on SAT Mathematics before the age of 13. Other tests that have good validity and reliability are the Stanford-Binet Intelligence Scale (Form L-M) and the Raven's Advanced Progressive

Matrices, which is useful with students from culturally diverse and English as a second language backgrounds. The researchers Ann Lupkowski and Susan Assouline have suggested that the methods used in SMPY are applicable to the elementary school curriculum. In particular, these researchers recommend early identification of mathematical talent, a fast-paced curricula that does not contain overt repetition of concepts but moves gifted students onto higher, more complex mathematical ideas, pairing with a mentor, and using repeated diagnostic testing to keep such students moving at an accelerated pace through the elementary school curriculum. The caveat with this approach is to ensure that these students are also exposed to other subjects and have adequate social opportunities to interact with their peer group.

The effectiveness of such radical acceleration coupled with exclusive-ability grouping, as extensively reported by Miraca Gross in her longitudinal study of exceptionally and profoundly gifted students in Australia, indicates that the benefits far outweigh the risks of such an approach. Most of the students in Gross's studies reported high levels of academic success in addition to normal social lives. These findings are further validated by David Lubinski and Camilla Benbow, who compiled a comprehensive account of 35 years of longitudinal data obtained from the SMPY. They reported the findings from 20-year follow-ups on various cohort groups that participated in SMPY. These researchers found that the success of SMPY in uncovering antecedents such as spatial ability, tendency to independently investigate, and research-oriented values were indicative as potential for pursuing lifelong careers related to mathematics and science. The special programming opportunities provided to the cohort groups played a major role in shaping their interest and potential in mathematics and ultimately resulted in "happy" choices and satisfaction with the career paths chosen.

Programming Options

Myriad programming options that have been validated by gifted education research are available in the elementary school curricula such as schoolwide enrichment, curriculum compacting, curriculum differentiation, heterogeneous or homogeneous grouping, radical acceleration, and summer math camps. In addition, the use of local and statewide mathematical contests leading to qualification for the prestigious Math Olympiads provide gifted elementary school students the motivation and opportunities to learn advanced mathematical concepts early. Typically, the exceptionally talented students benefit the most from such opportunities to interact and excel in competitions consisting of mathematically gifted students from their peer group.

In many countries (such as Hungary, Romania, Russia, and the United States), the objective of such contests is to typically select the best students to eventually move on to the national and international rounds of such competitions. At the local and regional levels, problems typically require mastery of concepts covered by a traditional high school curriculum with the ability to employ or connect methods and concepts flexibly. At the Olympiad levels, however, students in many countries are trained in the use of undergraduate-level algebraic, analytic, combinatorial, graph theoretic, number theoretic, and geometric principles.

Bharath Sriraman

See also Cognition; Early Identification; Identification; Mathematics, Curriculum

Further Readings

Gavin, K., & Adelson, J. (2007). Elementary mathematics. In J. Plucker & C. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says* (pp. 367–394). Waco, TX: Prufrock Press.

Gross, M. U. M. (1993). Nurturing the talents of exceptionally gifted children. In K. A. Heller, F. J. Monks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 473–490). Oxford, UK: Pergamon.

Krutetskii, V. A.(1976). *The psychology of mathematical abilities in school children* (J. Teller, Trans., & J. Kilpatrick & I. Wirszup, Eds.). Chicago: University of Chicago Press.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years: Uncovering antecedents for the development of math-science expertise. *Perspectives on Psychological Science, 1,* 316–345.

Lupkowski, A. E., & Assouline, S. C. (1992). *Jane and Johnny love math: Recognizing and encouraging mathematical talent in elementary students. A guidebook for educators and parents.* Unionville, NY: Trillium.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics:* Reston, VA: Author.

Sriraman, B. (2008). *Creativity, giftedness and talent development in mathematics.* Charlotte, NC: Information Age Publishing.

Sriraman, B., & Lesh, R. (2007). A conversation with Zoltan P. Dienes. *Mathematical Thinking and Learning: An International Journal, 9*(1), 59–75.

Elementary School, Science Curriculum

Although the field of elementary science curriculum with respect to general education has been fairly well researched, particularly since the late 1960s when several projects funded by the National Science Foundation were developed and implemented, elementary science curriculum developed specifically for gifted students is a rare commodity. *Science curriculum* means the concepts, resources, objectives, essential understandings, strategies, and products that teachers use to provide students with an understanding of a science topic. These elements are carefully planned and organized to provide a clear map of what the students should know, understand, and be able to do as a result of interacting with the teacher and the materials.

At the elementary level, usually kindergarten through Grade 5, formal science instruction is sporadic. Most attention in the classroom is focused on reading, writing skills, and mathematics, with science and social studies taking minor roles as time permits. Consequently, many programs and services for gifted students address talent or high ability in mathematics or language arts, leaving students who are talented in science at a loss for opportunities within the school day to further develop their interests and abilities. It is unclear whether this lack of attention to elementary science curriculum for gifted students is due to the lack of science curriculum written for this population or if the lack of science curriculum is due to the paucity of services offered to elementary students who are gifted in science. In addition, few research studies focus specifically on either the design and development or the effectiveness of elementary science curriculum for gifted and high-ability learners. This entry describes science talent, curriculum issues, and science units available for students.

Science Talent

Currently, there is no specific assessment for finding science talent. Programs and services designed to address the needs of students gifted in science generally use a standardized test of achievement for identification of students with high ability in this area. Unfortunately, using only a standardized paper-and-pencil test overlooks those who may not be good test takers, understand the language of the test, or have abilities not uncovered by such a measure. Checklists and rating scales are also occasionally used to identify students talented in science. These instruments contain statements or words that commonly describe students with high ability in science such as daring, persistent, curious, and autonomous. However, watching a child actually performing a science experiment may provide as much or even more information than a standardized achievement score would about that child's talent or ability in science. Other factors such as attitude and creativity may also assist with the identification of science talent.

Curriculum Issues

Numerous journal articles address an interesting science activity developed and implemented in the classroom for gifted students. Most of these, though interesting ideas, have little data to support their usefulness in developing science talent other than that the students enjoyed the activity. There is generally not enough description of the activity to allow another teacher to duplicate the activity, nor is it easy to identify the areas of the regular science curriculum that were modified in depth, complexity, or abstraction to meet the needs of students gifted in science. Similarly, commercially prepared materials, although providing more detail for ease of implementation, suffer from similar shortcomings, that is, lack of effectiveness

data and failure to identify modifications for gifted learners. Although many commercially prepared materials provide a suggested grade level or grade band, most must be used at a lower grade level if they are being used with students gifted in science. For example, if a science unit is designated as appropriate for Grades 4 and 5, then it may be too easy for fourth- and fifth-grade students who have high ability in science and may be more appropriate for third-grade students gifted in science.

Good science curriculum must include opportunities for students to do science as a scientist would do science. This means that students need opportunities to focus on questions and problems that have meaning to them and find solutions to real-world issues and problems, while engaging in hands-on, inquiry-based learning. Students should work individually and in groups, share findings, and reach meaningful conclusions. This means the students do not know the answer to the question before they begin investigating, unlike the cookbook science investigations that are found in many science texts. For students gifted in science, the curriculum must allow students to explore ideas in greater depth, must be more complex in nature, and require students to think more abstractly.

Science Units for Gifted Students

As mentioned previously, there is little in the way of science curriculum written specifically for gifted students. Two sets of materials, however, have been developed specifically for this population: The William & Mary Units and the resources from Project SPRING and Project SPRING II.

William & Mary Units

Joyce VanTassel-Baska and her colleagues at the College of William & Mary developed a set of seven science units spanning Grades 1 through 8. These units focus on broad concepts such as "systems" and are problem-based. In all units, the emphasis is on finding resolution as well as on studying a problem. In general, the units cover the areas of chemistry, physical science, biology, archeology, and environmental science. The units span several grade bands, and the user is encouraged to tailor them to the needs of specific classrooms. There are two units for early elementary, two units for elementary, and three units for middle school. The units are used widely both nationally and internationally. Several units have undergone extensive effectiveness studies. The units include an introductory framework, lesson plans, scoring protocol for the final assessment, and references. Worksheets for students are included and may be reproduced directly from the book for classroom use. These units were developed through funds from the Jacob K. Javits Program of the U.S. Department of Education. This program provides federal monies through grants to develop programs and services for gifted students. The units are currently published by Kendall/Hunt Publishing Company in Dubuque, Iowa.

Dust Bowl

This unit was developed for gifted science students in Grades 1 through 3. Students must try to figure out why a small town is becoming a dry, dusty, area fraught with foreclosures and stores going out of business. They develop a plan to assist the town with overcoming these issues. Some topics studied are plant growth, meteorology, geology, earth science, and ecology.

What a Find!

In this unit, also designed for Grades 1 through 3, gifted science students become archeologists who must conduct a dig to determine the value of historical artifacts. Both history and culture play important roles in this unit. This is a good example of integrating science and social studies. This unit is unique in the series in that it provides suggested unit extensions.

Acid, Acid, Everywhere

Perhaps the unit with the most data and research associated with it is Acid, Acid, Everywhere. This unit is based on a hazardous waste spill that must be identified and safely removed. Students work through the unit, finding solutions to an ill-structured problem, learning important aspects of chemistry relating to acids, bases, and neutralization and the effect of the spill on the surrounding ecosystems. According to VanTassel-Baska in the *Guide to Teaching a Problem-Based Science Curriculum,* the unit has been used with 45 experimental

classrooms. The pretesting and posttesting for this unit showed significant growth in science process skills for the students who used the unit. This unit is recommended for use with gifted students in Grades 4 through 6.

Electricity City

This unit is also designed for Grades 4 through 6. Students have to determine the power requirements for a large recreational facility in their town. A variety of stakeholders' needs must be met as well as planning for any backup needed because of outside factors such as weather. In this unit, students study electricity, circuitry, model construction, scale, and meteorology.

Hot Rods

Despite the title, this unit for Grades 6 through 8 is not about cars, but about nuclear power. Students are given the scenario of having a nuclear power plant in their town. Their problem is to determine whether they should close the plant or expand, based on their research. Topics in this unit include studying the incident at Chernobyl, the impact of nuclear energy, and nuclear waste.

The Chesapeake Bay

Pollution is the basis of this unit, also for Grades 6 through 8. Students need to determine why certain aquatic life is disappearing from the bay. Economics, ecosystems, pollution, politics, and reading topological maps are covered in trying to solve the problem.

No Quick Fix

In this unit, students learn about cells, immunity, and disease. Tuberculosis is the basis of the ill-structured problem. Topics such as communicable diseases, cell biology, infection, community health, and disease prevention are central to this unit designed for gifted science students in Grades 6 through 8.

Project SPRING and Project SPRING II

Both Project SPRING and Project SPRING II were also funded by the Jacob K. Javits Program. Directed by Howard Spicker and Shirley Aamidor, these programs were designed to address the needs of gifted students in rural midwestern areas. Although these materials have not been published through one of the publishing houses, the materials are available through ERIC document reproduction service. The curriculum manuals are not detailed, but enough information is given for a teacher to replicate at least two of the units—Water and Forestry. Both units are interdisciplinary and address the National Science Standards. Differentiation was provided using Bloom's Taxonomy, a taxonomy of behavioral objectives at six levels: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. Gardner's *theory of multiple intelligences* was also used in creating the units. A unique feature of these units is that they were differentiated for use with various cultures (Appalachian, African American, Mexican American, and Mescalero Apache) by including features of that culture in the lessons. Data gathered about the effectiveness of these units indicated that the science problem-solving skills of students in the study improved, although their achievement did not.

Commercial Science Units

Although not designed specifically for gifted students, there are some excellent examples of good science curriculum from various publishers. These may be used as sets or as stand-alone units. The Full Options Science System (FOSS) uses science principles, processes, and concepts to teach a variety of science topics in the areas of life, earth, and physical science. The units appropriate for K–8 regular classrooms were developed at the Lawrence Hall of Science, University of California at Berkeley, with support from the National Science Foundation.

Another set of materials that have a good foundation are the Science Curriculum Improvement Study (SCIS) materials. The K–6 SCIS materials are research-based and were developed with an inquiry-based foundation, addressing state and national science standards. In the early grades, math and science topics are integrated. SCIS materials address life-environment and physical-earth science topics.

The Delta Science Modules are centered on hands-on investigations to develop conceptual and critical thinking skills. These K–8 materials focus

on life, earth, and physical science. Teachers using any of these grade-level commercially prepared units with gifted science students will need to determine the appropriate level rather than depending on the suggested grade level of the materials.

Good elementary science curriculum, especially science curriculum specifically for gifted students, is not plentiful. However, as science becomes a tested subject across the nation, the development of more science materials for the elementary classroom may be forthcoming. Paul Brandwein and A. Harry Passow authored a conceptual resource that describes purposes, principles, and programs for developing science talent and teaching science to gifted students that could be used to guide the development of materials.

Cheryll M. Adams and Rebecca L. Pierce

See also Creativity in Science; Critical Thinking; Curriculum Models; Multiple Intelligences

Further Readings

Brandwein, P. F., & Passow, A. H. (Eds.). (1988). *Gifted young in science: Potential through performance*. Washington, DC: National Science Teachers Association.

National Science Foundation (2008). Student learning in math and science. In NSF (Eds.), *Science and engineering indicators*. Arlington, VA: Author. Retrieved from http://www.nsf.gov/statistics/seind08/c1/c1s1.htm

Neber, H., & Schommer-Atkins, M. (2002). Self-regulated science learning with highly gifted students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies, 13,* 59–74.

VanTassel-Baska, J. (1999). Science education for gifted and talented children. *ERIC Review, 6(2),* 50–51.

Elementary School, Social Studies Curriculum

Social studies curriculum for the gifted at the elementary level must contain the elements of good curriculum, exemplary curriculum in the subject area as delineated in the national standards reports for civics, history, economics, and geography, and differentiation features found effective with gifted learners.

Sound curriculum features for all curricula must be designed in such a way as to state goals, outcomes, activities, and strategies and materials to be employed to address outcomes and assessment approaches to assess learning outcomes. Based on how students learn in any given curriculum, the curriculum is revised to reflect a stronger emphasis in areas that students need more help. Thus, the design work of a social studies curriculum is essential by individual discipline first and then in a more interdisciplinary fashion.

Social studies curriculum for the gifted must also adhere to what is exemplary for each of the underlying disciplines. In teaching history, for example, it is crucial for students to explore important primary source documents such as the Gettysburg Address, the Declaration of Independence, and the Magna Carta. Students also need to develop critical reasoning about history, understanding its logic, and be able to compare across events, cultures, and periods. Moreover, it is useful if students also understand the importance of change in studying history—what remains constant and what changes within cycles of history. Finally, students need to learn the importance of multiple perspectives in history, the voices in different cultures and periods that have been vocal about what is happening in their world. This means that students must understand history from the perspective of both the victors and the vanquished. Moreover, in a postmodern world, they must recognize that different interpretations of the same event must be discussed in order to understand it effectively.

This entry discusses several aspects and features that are often associated with and are important to consider when designing social studies curriculum for gifted elementary students, including differentiation, working strategies, assessment, multiculturalism, and interdisciplinarity.

Differentiation for the Gifted

In respect to differentiation of social studies curriculum for the gifted, several features should be addressed. The first is providing an advanced learning base for gifted students through compacting or

reorganizing the core curriculum to make it more challenging for gifted learners at each stage of development. One way to do this is to accelerate the standards associated with each of the social studies strands of learning to ensure that gifted students can advance to the levels of learning for which they are ready when they are ready.

A second consideration is ensuring that the curriculum base is sufficiently complex for the gifted, that they are using higher level thinking and problem-solving skills in the pursuit of understanding historical issues and problems from the perspective of the past and the present. A focus on macro concepts such as change and cause and effect will also elevate the level of discourse about history and make the curriculum more challenging as a result.

A third issue in differentiation of the social studies curriculum is in providing depth, not just breadth, of knowledge. One way of ensuring depth is to have students work on one issue or problem of history in a problem-based learning mode that asks them to research, discuss, come up with a resolution, draft a bill, present to a real-world audience, and ultimately, experience history in the making. This postholing approach deepens student understanding even as it heightens motivation for learning.

Curriculum for the gifted also must allow for creative opportunities for gifted learners through the deliberate use of projects that provide choice, questions that are open-ended, and a focus on having students create original products according to clear specifications suggested by careers in the real world of the professions. For example, "Design a program of foreign aid that would guarantee those in need receive it." Or, "Create a utopian society, based on your understanding of what would make the world a better place. Provide insight on governance, economics, social mores, families, education, and leisure."

Finally, curriculum for the gifted must focus at a more abstract level on real-world issues, themes, and ideas that matter to the gifted student of today. Educators can no longer expect that these students who live online will tolerate never getting to events of the 21st century or to countries like South Africa or Bosnia. Rather, educators must organize their content to ensure that current events, as well as those in the history books, can be nested there.

Strategies for Working With the Gifted

Strategies for working with gifted learners in the social studies clearly favors more inquiry-based approaches, including problem-based learning, scenarios, role playing, use of question trees for discussion, and project-based learning both individually and in small groups. Smaller group projects are recommended, especially having students work in dyads.

Assessment Approaches for Use With the Gifted

Assessment approaches in the social studies found effective with the gifted would favor the use of authentic tools such as performance-based assessment, clearly favored by the College Board Advanced Placement Exams, and the International baccalaureate exams at secondary level. These approaches can be used quite effectively at elementary and middle school levels. Students can perform document analysis by third grade—what needs to be altered is the complexity of the document. Students can interpret an historical event through the eyes of a given stakeholder group—what needs to be altered is the level and range of analysis expected.

Multiculturalism

Multiculturalism is also an aspect of social studies curriculum that is essential for gifted learners to experience. The best products of all minority cultures in this country—African American, Hispanic American, Asian American, and Native American—all deserve rich treatment within a curriculum for these learners. As James Banks, the eminent social studies and multicultural educator, has suggested, students need exposure to their multiple selves, which is only found by studying the groups to which they belong and affiliate, with cultural group membership being a vital part of that understanding.

Interdisciplinarity in the Social Studies

Social studies curriculum for the gifted can also benefit from being integrated successfully with language arts and other fine arts areas. Helping students appreciate the relationship of the visual

arts, the music, and the theater of a culture and period as a window into understanding the people and the issues of the time cannot be overstated. Students derive some of their best insights about a culture and its people through the art those people have produced. Thus, social studies education for gifted learners needs to be enriched by these multicultural perspectives found in the art forms of each relevant culture to be studied.

In other areas of social studies teaching such as political science and economics, these twin subjects are often best joined to promote the understanding of gifted students who can explore the various systems of government and economic theories at a deeper level than textbooks typically allow. By focusing on the abstract concept of systems, students can scaffold an understanding of multiple perspectives on different conceptual systems that govern societies in the world today and in the past.

In teaching geography, the interconnections with the geology of an area are irresistible. As Charles Darwin came to appreciate in the Galapagos Islands, geography and geology came to dominate the presence of certain species and our understanding of evolution. Without the features of these islands, sculpted over time by wind and water, and their location, our understanding of the major idea of the last century may not have been possible.

Thus, there is a real benefit to helping gifted students in the social studies understand their world better by connecting it to other curriculum areas in which they are learning. The skills of the language arts are all exploited in the teaching and learning of social studies. Writing, reading, listening, and orally communicating all find their way into a social studies curriculum, making these skills a truly fundamental part of advanced learning practice. The teaching of all great literature is enhanced by discussing the historical backdrop against which it is occurring, the geographical location of its setting, and the cultural history of its characters. Communication too is affected by understanding culture because language is the mediator for understanding, and translation is a uniquely human skill that can aid or impede cultural understanding. Therefore, learning the language of a culture can promote deeper appreciation and understanding of that culture—its philosophy, history, and way of life. For gifted students, this cross-fertilization with learning at least two languages during the K–12 years is fodder for advanced study of selective cultures, an additional enrichment benefit in social studies learning.

Joyce Lenore VanTassel-Baska

See also Curriculum Models; Differentiation; Social Studies, Curriculum

Further Readings

College of William & Mary, Center for Gifted Education. (2003). *Ancient China: The Middle Kingdom*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *Building a new system: Colonial America 1607–1763*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *A house divided?: The Civil War, its causes and effects*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *The 1920s in America: A decade of tensions*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *The 1930s in America: Facing depression*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *The world turned upside down: The American Revolution*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2003). *The road to the White House: Electing the American president*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (2005). *The Renaissance and Reformation in Europe*. Dubuque, IA: Kendall/Hunt.

Little, C. A., Feng, A. X., VanTassel-Baska, J., Rogers, K. B., & Avery, L. D. (2007). Study of curriculum effectiveness in social studies. *Gifted Child Quarterly, 51,* 272–284.

VanTassel-Baska, J., & Little, C. (Eds.). (2003). *Content-based curriculum for gifted learners*. Waco, TX: Prufrock Press.

Elementary School, Writing Curriculum

One of the challenges in teaching writing is that the writing process is a personalized endeavor,

involving students in applying their cognitive and affective energies to expression on the page. For elementary gifted learners, this is a challenging task because it requires psychomotor coordination in addition to coherent thought and feeling.

This entry discusses several aspects of teaching writing to elementary students, including the common approaches and processes, the interdisciplinary connection between reading and language arts, strategies for teaching writing, and integrating technology. In addition, this entry addresses writing curriculum for gifted students, including learning disabled gifted students. Finally, this entry briefly enumerates the essential elements for an effective writing curriculum for elementary students.

Approaches and Processes

Research on teaching writing offers insight into how improvement is best accomplished, even for young children. Four approaches to teaching writing may be considered and are frequently employed in schools: (1) Presentation—the teacher explains what good writing is and gives examples. (2) Natural process—the teacher has students engage in a great deal of free writing, individually and in groups. (3) Focused practice—the teacher structures writing tasks to emphasize specific aspects of writing. (4) Skills—the teacher breaks down writing into its component parts and then provides practice, sometimes in isolation, on each part. Focused practice has been found to produce the strongest learning, and the presentation approach produced the lowest.

A second emphasis that enhances writing is the use of metacognitive strategies such as planning, monitoring, and assessing one's own writing as a part of the process of developing written work and revising it. Students need to self-monitor their performance when using the strategies, and teachers need to encourage generalization of the strategies by having students use them with different types of materials in a variety of content areas. Moreover, all students need teachers to explain writing task expectations clearly and fully. The three processes consistently identified as being critical to effective writing instruction are planning, writing, and revision.

Interdisciplinary Connections in Reading and Language Arts

Writing fosters learning in all disciplines. It is a tool for thinking, which makes it integral to every subject at every scholastic level. Skill in writing is developed and refined through practice, which means students should have frequent opportunities to write across the curriculum. The integration of reading and writing tasks has also produced learning benefits for students. Specifically, the combination of incorporating inquiry through advanced questioning, analyzing, and responding in writing to literature, prewriting, and communicating specific criteria as expectations for learners have been found to be effective strategies that produce higher achievement gains in learners. Feedback based on writing also produces higher achievement gains if specific instructional objectives are manifest.

Interdisciplinary connections in reading and writing can span other content disciplines as well. Students need to develop literary habits of mind that encourage them to use resources appropriately and effectively. Researching relevant issues of significance can be one avenue to develop such skills. By exploring an issue of real-world relevance and interest to the learner, students can learn how to organize data to support an argument, how to develop an argument, how to evaluate various perspectives on an issue, and how to present their findings in oral and written forms. Many students may be engaged in conducting researching during their school years, so it is important that they have the appropriate tools to frame a written research report based on important issues and questions they have defined.

Strategies for Teaching Writing

The direct teaching of focused and intensive writing techniques appears to be more successful than does relying on general process techniques. When the organizational skills necessary for successful writing are emphasized throughout a unit, there is a significant increase in students' scores on the organizational quality of their essay writing from the pretest to the posttest, especially for students who received low scores on the pretest. Writing journals have been found to be worthwhile, with

students believing journals helped them in various other aspects of the English curriculum.

Integrated units of study in all subject areas to teach writing are readily available for schools to use and have yielded impressive gains for consistent use. Research-based teaching units in language arts, science, and social studies, produced by the College of William & Mary Center for Gifted Education, have been found to show significant achievement gains in both gifted and non-gifted students at the elementary level in the area of persuasive writing, using performance-based assessments modeled after the National Assessment of Educational Progress (NAEP) assessment measures. Assessment results suggested that continued emphasis on the elaboration of ideas was an implication for continued instruction in writing.

Integrating Technology With Writing Instruction

As technology options have increased and developed, the integration and use of technology in instructional practices for teaching writing must be expanded in developing young writers. The use of laptops has made possible easier access to writing as a skill to be practiced every day and to be incorporated into routine learning tasks.

Other promising areas in which technology can help support student writing include the following:

- Software may assist with the basic processes of transcription and sentence generation (e.g., spelling checker, speech synthesis, word prediction, and grammar and style checkers).
- Application can support the cognitive processes of planning (e.g., prompting programs, outlining and semantic mapping software, and multimedia applications).
- Computer networks can support collaboration and communication, which are important elements of the writing process.

Helping elementary students with goal setting and providing feedback on progress in their writing can enhance their sense of competence in this difficult skill.

Teaching Writing to Elementary Gifted Learners

Writing is a thinking process, so the gifted child can develop excellence in the capacity to think as well as to write through varied writing experiences. The fundamental skills associated with a process writing approach need to be used with gifted learners at all stages of development, but they must begin in the early elementary years. Specifically, these skills are (a) prewriting, (b) paragraph development, (c) theme development (literary generalizations), (d) development of introductions and endings, (e) work on supporting details, (f) effective use of figures of speech, (g) editing, (h) teacher and peer conferencing, (i) revising, and (j) rewriting.

Consideration also needs to be given to the type of writing that gifted students are encouraged to master. Balance between creative writing forms and analytic expository writing forms, including persuasive writing is needed. Writing with gifted students should include exposure to good writing through extensive reading, critique of others' writing, and many opportunities to practice their own writing skills. One form of such practice comes through writing competitions, which are readily available online and in reference materials. Writing programs for elementary students should include the writing conventions of various disciplines—writing for the general public, writing across the curriculum, technical writing, expressive writing, and persuasive writing.

Distance learning opportunities have dramatically increased options for meeting the needs of gifted students in writing. Programs such as the Johns Hopkins Writing Tutorials as well as other online courses are challenging curriculum opportunities for students who demonstrate proficiency with grade-level material. Working with local writers or college students as tutors or mentors can also heighten student interest and involvement in writing.

Various studies have shed light on what teaching techniques specifically work well with teaching writing to gifted elementary students. When a graphic organizer was used to teach persuasive writing, explicitly using a rubric, and teacher feedback was consistently provided, gifted learners showed significant improvement in persuasive writing at the elementary grade levels from

3 through 5. Use of explicit models for writing have also been found helpful in enhancing writing in students at these age levels. Working with teachers on the techniques of teaching writing has also yielded positive results in their using more writing assignments in class and providing feedback to students on their writing.

Learning Disabled Gifted Writers

Distinguishing instructional techniques to use with twice-exceptional learners, teachers can address both the gift and the disability through the use of appropriate interventions. Journal writing and word processing were found to be powerful tools in improving student writing while increasing students' self-confidence. Students with learning disabilities can produce better written work when dictating or using speech recognition systems than when handwriting.

Essential Elements

Elementary students can learn how to write well if they receive direct instruction coupled with feedback on their work. There is little substitute for having students write every day, even if it is only for 10 minutes, and having them share what they have written with others. Using a proverb or meaning-laden quotation as a stimulus to get students to think and then write is a powerful technique for developing thinking skills at the same time they are developing fluency. Such work does not have to be assessed but, rather, discussed with the teacher and class in a whole group. Such a technique puts a premium on ideas or content over the mechanics of writing, which frees elementary gifted students to focus on thinking.

Overall emphases in a writing program for elementary students then should include the following: (1) adherence to a basic framework of planning, writing, and revision; (2) explicit instruction of critical steps in the writing process, as well as the features and conventions of the writing genre or text structure; and (3) provision of feedback guided by the information explicitly taught.

Joyce Lenore VanTassel-Baska

See also Curriculum Models; Language Arts, Curriculum

Further Readings

College of William & Mary, Center for Gifted Education. *Autobiographies*. Dubuque, IA: Kendall/Hunt.

College of William & Mary, Center for Gifted Education. (1999). *Guide to teaching a language arts curriculum for high-ability learners*. Dubuque, IA: Kendall/Hunt.

VanTassel-Baska, J. (2002). Assessment of gifted students' learning in the language arts. *Journal for Secondary Gifted Education, 13*(2), 67–72.

VanTassel-Baska, J. (2002). Language arts for the gifted. *CEC ERIC Digest,* Reston, VA.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted learners* (3rd ed.). Boston: Pearson, Allyn, & Bacon.

VanTassel-Baska, J., Zuo, L., Avery, L. D., & Little, C. A. (2002). A curriculum study of gifted-student learning in the language arts. *Gifted Child Quarterly, 46*(1), 30–44.

Elementary Schools

See Elementary Enrichment; Elementary School, Literature Curriculum; Elementary School, Mathematics Curriculum; Elementary School, Science Curriculum; Elementary School, Social Studies Curriculum; Elementary School, Writing Curriculum

Elitism

Elitism is the belief that a select few are superior to others. Charges of elitism have been made against gifted education since the field's inception, and the history of attitudes, assumptions, policies, and practices suggests that too often the charges have been justified. During the past 25 years, however, there has been a shift in definition, identification, and programming policies, such that the charge of elitism is considerably less valid than it once was. This entry describes traditional views that gifted education is elitist and how those views have changed.

Early work that focused on exceptionally advanced ability assumed that giftedness, creativity, and talent were innate and permanent. It focused on attempts to measure and quantify these attributes in order to identify certain people as gifted, creative,

and/or talented relative to others, and advocated that labeled children be provided with enriched learning opportunities, often in segregated classrooms or special schools. Not surprisingly, many educators, as well as parents of children excluded from the special categories, considered the enterprise elitist, and found it untenable. That children from certain minorities, and from rural and less privileged backgrounds, were less likely to be assigned to the preferred categories added to the weight of the claims of elitism. Somewhat predictably, all of this led to political pressures to reduce or eliminate funding and support for gifted programs.

During the past quarter century or so, many factors have come together to challenge the perspective that some children are born more intelligent, creative, or talented than others. One factor was the popularity of Howard Gardner's *theory of multiple intelligences,* the idea that people can be intelligent in a number of different domains. Another challenge came from the neurosciences, with discoveries that the human brain is built by a complex and dynamic interaction between constitutional and environmental factors. Research findings in cognitive psychology and brain development show that although individual differences do appear to exist at birth, they are more malleable than once thought. Intelligence is not as unidimensional or as fixed at birth as was earlier assumed, but is considerably more domain-specific, plastic, and environmentally responsive.

Similarly, researchers studying expertise have discovered that ability is incrementally developed, built on effort, practice, and persistence, along with attitudes of problem finding and problem solving. Allied with this, studies of motivation are demonstrating that attitudes toward intelligence make an enormous difference in achievement outcomes. There is now a robust body of evidence demonstrating that people with a growth mind-set—believing that intelligence develops, that ability is constructed one step at a time, with appropriate opportunities to learn and hard work over time—do better academically, as well as in many other areas of their lives, than do those with a fixed mind-set, who believe that intelligence is fixed at birth, and differentially apportioned.

Another difference between the historic approach and the developmental approach concerns perceptions of the origins of giftedness, creativity, and talent. Although the historic emphasis was on genetic superiority, most psychology and education professionals today agree that both nature and nurture are critically important, and are increasingly focused on the developmental nature of intelligence, its dependence on opportunities to learn, and the importance of the goodness of fit with the environment. As we move from a notion of innate genetic causality toward understanding the importance of environmental dimensions interacting over time, giftedness, creativity, and talent become less mysterious and exclusive, and more widely available.

For many years, critics argued that gifted education exacerbated social, economic, and racial disparities. What observers have been noting recently, however, is that when educators provide a curriculum match for advanced learners, students' academic needs are better met, and there are fewer concerns about elitism. That is, when educators employ a special education approach, and address individual students' domain-specific gifted learning needs, the resulting programs are more consistent with emerging knowledge of human development and foster giftedness more broadly across the population. During the past 25 years, we have learned that the gifts, creativity, and talent that were previously seen as mysteriously bestowed on a select few are actually not so mysterious at all but, rather, a function of appropriate opportunities to learn, in combination with psychosocial factors such as motivation, drive, confidence, and persistence.

The models differ significantly in implications for educational placement. Under the historic mystery model, the first choice was a full-time segregated classroom, where a gifted, creative, or talented child was educated with categorically similar children. Increasingly, however, experts are advocating a broad range of learning options that support learning mastery, including many kinds of acceleration, extracurricular and enrichment opportunities, and online learning, in addition to full-time special classes for those who are highly gifted or talented in one or more domains, as appropriate to the child's learning needs at a given point in time.

Because of the mastery model's flexible responsiveness to individual differences, and more fluid connections with general education, it encompasses racial, economic, gender, and cultural diversity. When gifted learning options are flexibly targeted to special learning needs, giftedness can

be found in every school in every district, regardless of socioeconomic status, race, language, or culture. This approach better addresses the learning needs of students who demonstrate exceptionally advanced ability and encourages high-level learning in those whose exceptionality might not otherwise be identified.

Increasingly, then, accepted practice in education and psychology is moving away from a categorization of some children as "gifted," "creative," or "talented" (with all others implicitly assigned then to the "not gifted," "not creative," or "not talented" categories), and toward a focus on individual differences in developmental trajectories, recognizing that pathways to high-level achievement are diverse, domain-specific, and incremental. It appears that exceptional abilities are not bestowed on a select elite after all, and that parents, educators, and individuals have considerably more influence on their development than previously realized.

Dona Matthews

See also Diversity in Gifted Education; Domains of Talent; Expertise; Multiple Intelligences; Optimal Development; Talent Development; Underrepresentation

Further Readings

Balchin, T., Hymer, B., & Matthews, D. J. (Eds.). (2008). *The Routledge international companion to gifted education: Toward a conceptualisation fit for the 21st century.* London: RoutledgeFalmer.

Dweck, C. S. (2006). *Mindset: The new psychology of success.* New York: Random House.

Ericsson, K. A., Charness, N., Feltovich, P. J., & Hoffman, R. J. (Eds.). (2006). *The Cambridge handbook of expertise and expert performance.* Cambridge, UK: Cambridge University Press.

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators.* Scottsdale, AZ: Great Potential Press.

Eminence

The word *eminence* is often used interchangeably with *fame, greatness,* or *genius,* but each term has different connotations. *Fame* does not imply merit or praiseworthiness; individuals such as Adolph Hitler and Osama bin Laden are unquestionably famous. Fame can be assessed with content analyses of biographies, newspapers, reference works, or electronic media or with public opinion surveys. *Greatness* or *genius* imply merit and are often assessed by panels of historians or specialists in specific fields of accomplishment. Research on eminence includes the villainous and iniquitous along with the geniuses and the meritorious, partly because these judgments are subjective. This entry describes studies of eminent people, characteristics of eminent people, identified eminent people, and predictors of eminence.

Studies

Historiometric studies of eminent people use large quantitative data sets to measure trends over time. Psychometric research uses psychological tests to probe the abilities and traits of eminent people. Psychobiographical studies examine the lives of single individuals with a focus on childhood experiences and emotional dynamics. Comparative biographical studies examine the lives of eminent individuals looking for traits or experiences they have in common.

Although the methods are different, the same individuals are often identified as eminent. In *The Price of Greatness,* Arnold Ludwig compared the samples in *Cradles of Eminence* by Victor Goertzel and colleagues to Ludwig's own samples drawn from reviews in *The New York Times Book Review* and those listed in standard reference works. Ludwig found that the overlap between his samples and those of the other works ranged from 67 to 85 percent. Samples based on published biographies tend to include larger numbers of political and literary figures. Scientists and business leaders are better represented in samples that use expert judgments as a measure of eminence.

In the Goertzels' 1962 comparative biographical study of eminent people, the most eminent were Franklin Delano Roosevelt, Mahatma Gandhi, Winston Churchill, Albert Schweitzer, and Theodore Roosevelt. These five men stood out from the rest of the sample in the number of biographies published about them. The Goertzels' 1968 sample was more diverse with Robert F. Kennedy,

Lyndon Johnson, Simone de Beauvoir, Anaïs Nin, Sidonie Colette, T. S. Eliot, Ché Guevara, and Carl Jung the most eminent. In the 2003 sample, Hillary Rodham Clinton, Tiger Woods, Michael Jeffrey, Oprah Winfrey, and George W. Bush led the sample, in that order.

The more recent samples have more women and minorities and people from more diverse fields of accomplishment. The recent samples include people who became eminent through marriage to an eminent person. There continues to be a large number of eminent people who had difficult childhoods because of accidents, illnesses, or family conflicts. Although difficult childhoods leave some people wounded and disadvantaged, eminence is sometimes achieved by those who gain strength from dealing with adversity. This is particularly true of writers and artists who are able to use their experiences as inspiration for their work. Major factors in achieving eminence are a drive for achievement and an internal locus of control.

Characteristics of Eminent People

Eminence is usually attained by outstanding performance in a single area of achievement, and eminent people often have exceptional ability in one specific domain. Howard Gardner has applied his *theory of multiple intelligences* to the lives of eminent people, finding that they were creative individuals who solved problems, fashioned products, or posed new questions in a way that was initially thought to be unusual but that was eventually accepted by others working in the domain.

Many eminent people were unhappy in school, especially when schools emphasized discipline and memorization over more creative activities. These people often excelled in one area and had little motivation to perform in other ways. They were happier with schools or tutors that gave them the freedom to work on their own or with others who shared their interests.

Many eminent artists, writers, and creative people came from unconventional homes that used storytelling as a means of communicating feelings. The parents of these creative people read to them frequently and shared intellectual interests and a love of learning with them. Sometimes they treated their children much like adult companions, sharing mature interests and concerns. Many had fathers who had dreams but failed to achieve them and mothers who devoted themselves to their offsprings' aspirations. These smothering mothers may be less common in the future because more mothers have their own careers.

Historiometric research by Dean Keith Simonton found that college education has a positive effect until the junior year, probably because of the acquisition of general knowledge and skills. After that, the increased specialization required for advanced and graduate study may tend to inhibit creativity. Scientists, however, generally require considerable graduate education to master the knowledge base of their fields.

Identified Eminent Persons

Experts consulted by *Time* magazine identified eminent persons in five categories: leaders and revolutionaries, artists and entertainers, builders and titans, scientists and thinkers, and heroes and icons. Albert Einstein was cited as the "person of the century" and as the preeminent scientist in a century dominated by science. Other scientists and thinkers identified by the experts were Leo Baekeland; Tim Berners-Lee; Rachel Carson; Francis Crick and James Watson; Philo Farnsworth; Enrico Fermi; Alexander Fleming; Sigmund Freud; Robert Goddard; Kurt Gödel; Edwin Hubble; John Maynard Keynes; Louis; Mary and Richard Leakey; Jean Piaget; Jonas Salk; William Shockley; Alan Turing; Ludwig Wittgenstein; and Wilbur and Orville Wright.

The most eminent political leader of the 20th century, in the *Time* sample, was Winston Churchill. Others were David Ben-Gurion, Ho Chi Minh, Mohandas Gandhi, Mikhail Gorbachev, Adolf Hitler, Martin Luther King, Ayatullah Ruhollah Khomeini, V. I. Lenin, Nelson Mandela, Pope John Paul II, Ronald Reagan, Eleanor Roosevelt, and Franklin D. Roosevelt, Teddy Roosevelt, Margaret Thatcher, Margaret Sanger, Lech Walesa, and Mao Zedong.

The most eminent in the "builders and titans" category was Willis Carrier, the air conditioning entrepreneur. Others in that category are less well known than the corporations they founded, including Bill Gates of Microsoft, Amadeo Giannini of the Bank of America, Thomas Watson, Jr. of IBM, Akio Morita of Sony, Sam Walton of

Wal-Mart, and David Sarnoff of RCA. Henry Ford and Walt Disney, whose companies bear their names, were also cited, as were Walter Reuther of the United Auto Workers and crime boss Lucky Luciano.

Most eminent among the artists and entertainers were The Beatles, the only ones included as a group. Others included Louis Armstrong, Lucille Ball, Marlon Brando, Coco Chanel, Charlie Chaplin, Le Corbusier, Bob Dylan, T. S. Eliot, Aretha Franklin, Martha Graham, Jim Henson, James Joyce, Pablo Picasso, Richard Rodgers and Oscar Hammerstein, Frank Sinatra, Steven Spielberg, Igor Stravinsky, and Oprah Winfrey.

Anne Frank was most eminent in the "heroes and icons" category. Others included Muhammad Ali, Princess Diana, Billy Graham, Ché Guevara, Edmund Hillary and Tenzing Norgay, Helen Keller, The Kennedys, Bruce Lee, Charles Lindbergh, Harvey Milk, Marilyn Monroe, Mother Teresa, Emmeline Pankhurst, Rosa Parks, Pelé, Jackie Robinson, Andrei Sakharov, and Bill Wilson.

Although individuals are eminent, eminence is socially defined. People are eminent because society recognizes them for achievement in fields that are of great public interest. There are many actors and writers and politicians and athletes in lists of eminent people, but few, if any, dentists. Although each field of achievement has many worthy and creative practitioners who make important contributions to society, only a few individuals can be recognized as eminent in each generation.

Predictors

Simonton found that a powerful predictor of eminence in many creative fields is simply the quantity of output. By the end of his career, Charles Darwin had 119 scientific publications, Albert Einstein 248, Francis Galton 227, Alfred Binet 277, William James 307, and Sigmund Freud 330. Simonton concluded that the creative person generates a large number of ideas or products, and then submits them to aesthetic or scientific or social judgment. Only a few of these products receive sufficient recognition to make their producers eminent. Recognition is awarded partly for the quality of the products, but also depends on their being produced in the right place and at the right time. Being driven to produce, and being willing to fail and keep trying, greatly increase an individual's chance of becoming eminent.

Ted Goertzel

See also Eminent and Everyday Creativity; Eminent Women; Genius

Further Readings

Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Eliot, Graham, and Gandhi*. New York: Basic Books.

Goertzel, V., Goertzel, M. G., Goertzel, T. G., & Hansen, A. (2004). *Cradles of eminence*. Scottsdale, AZ: Great Potential Press.

James, C. (1993). *Fame in the twentieth century*. New York: Random House.

Ludwig, A. (1995). *The price of greatness*. New York: Guilford Press.

Piirto, J. (2004). *Understanding creativity*. Scottsdale, AZ: Great Potential Press.

Simonton, D. K. (1984). *Genius, creativity and leadership*. Cambridge, MA: Harvard University Press.

Simonton, D. K. (1999). *Origins of genius: Darwinian perspectives on creativity*. New York: Oxford University Press.

Time.com (2000). The most important people of the century. Retrieved from http://www.time.com/time/time100/index_2000_time100.html

Eminent and Everyday Creativity

Creativity can be expressed in many different ways. There are differences among domains, for example, with artistic creativity differing from mathematical creativity, and differences within domains (e.g., dance vs. painting or writing) as well. It is also quite useful to distinguish between eminent creativity and everyday creativity. This entry explains eminent and everyday creativity, explores the differences between them, and relates them to the key issues in creativity research.

Eminent Creativity

Eminently creative individuals have been studied for many years. This is not surprising given their contributions to society and progress. They are especially good targets for investigation because their creative talents are unambiguous and without question. The research suggests that many famous creators have shared certain tendencies. They seem to have each been concerned with originality, for example, and most have devoted virtually their entire lives to their work.

One critical part of eminent creativity is expertise. Expertise is usually defined in terms of a knowledge base. More concretely, eminent individuals develop a rich and detailed knowledge base. This allows them to understand what is important within the domain or field in which they work. It allows them to do routine things effortlessly and to consider a large number of ideas and options simultaneously. There is a potential drawback in that sometimes expertise leads to assumptions that should not be made. This is the so-called price of expertise.

Expertise is domain specific. Different domains have different amounts of available and required information. Interestingly, fields that do not have large knowledge bases allow mastery at earlier ages. Prodigies occasionally appear in these fields partly for this reason. Other fields require huge amounts of knowledge, and because this requires years to master, prodigies are not found in them. Music allows prodigies, just to name one example, but physics does not.

Expertise does not tell the whole story. A second important aspect of eminent creativity is sociological. Typically, experts within a field are the ones to recognize high-level performance and eminence. Their opinions may eventually be shared by the general public, but the initial attribution of eminence is given by the gatekeepers and experts within a field. One implication of this is that eminent creativity, unlike everyday creativity, must be understood as a social phenomenon. Audiences and social contexts must be considered, for example, as should social judgmental and attributional tendencies. Here again, there is a drawback, of sorts, for theories of eminent creativity sometimes define it primarily in social and attributional terms, and someone hoping to change a field may misunderstand this and invest more in social skills and impression management than in the knowledge that is required by the field itself. Another curious implication of eminence as a social attribution is that the designation may change. Indeed, there were people in Rembrandt's time who were much more famous, yet today only art historians recognize their names.

Eminent creativity is partly a result of hard work. Expertise is developed, and this can take years of concentrated effort. For this reason, intrinsic motivation is often included in profiles of highly creative persons. They must be motivated if they are to devote years to their chosen topic or field. Yet eminent creativity is also sometimes influenced by chance and luck. Sometimes the actual insight is fortuitous or serendipitous (e.g., X-rays) and sometimes creative persons just happen to have interests that fit with current Zeitgeist and are therefore appreciated. The Wright brothers were lucky that they had a bicycle shop and could support themselves in that fashion, just to name one example. They were able to use their tools and shop when working on the airplane. What if they had been born 50 years earlier and the bicycle was not so fashionable?

The research on eminent individuals relies on archival, biographical, or autobiographical information, which can cause problems. It also is not at all clear how the tendencies uncovered in that research generalize to other individuals. Thus, another line of study focuses on everyday creativity.

Everyday Creativity

Everyday creativity is not a domain of performance in the sense that music and mathematics are domains. Everyday creativity is not formalized and does not have some of the features of widely recognized domains (e.g., unique symbol systems). Perhaps most important is that, unlike eminent creativity, everyday creativity may be personal rather than social. An audience is not necessary. Everyday creativity may be used when an individual copes with an unforeseen problem while driving or scheduling one's time. Parents, teachers, and managers may use their creative capacities to deal with schedules or minor interpersonal issues. Everyday creativity may be used when getting dressed or writing a kind note on a birthday card. It is original and effective, and thus creative, but

with local rather than expert standards. Everyday creativity is extremely important because it is used so frequently in our day-to-day lives.

Distinctions Between Eminent and Everyday Creativity

The distinction between eminent and everyday creativity can be clarified by looking to the creativity literature. There is a framework that is frequently used to categorize theories and research on creativity; it can be used to pinpoint exactly how eminent creativity differs from everyday creativity. This framework separates actual creative performances from the creative potentials that may not yet be expressed. Figure 1 summarizes this framework and shows how the actual performances that are required for eminent creativity fit with the product approach to creativity and to persuasion. The product approach is called that because there is always some tangible objective result, such as a work of art, an invention, a scientific publication, a technological patent, or the like. Eminently creative persons are productive. They are also, in a manner of speaking, persuasive: they change the way that other people think. Creative potential, on the other hand, can be quite personal. There may be no manifest product, though the individual may have a good idea or insight. It may be original and effective only for the one individual, which is why it is everyday creativity.

Creative potential might be apparent in personality traits (e.g., open-mindedness) or in a thinking process. Educators will probably have the greatest impact if they target the creative process. Products can be misleading. Creative products, be they inventions, works of art, or the like, may say little about the process that was actually used. In addition, the people who are productive and persuasive by definition differ from others who have mere potential but have yet to make the transition to actual performances.

This is not to say that eminent creativity does not rely on any process. The processes used for everyday creativity may also be used by eminent creators, though these eminent individuals must also make their work public. Not surprisingly, then, two somewhat different theories have been used to describe the creative process. One is essentially cognitive and personal and the other social and historical (see Figure 1). Cognitive processes are usually described in terms of stages, with creative thinking resulting from preparation, incubation, illumination, and verification, just to name one well-known stage theory. Yet there is a process at work in systems theories of creativity as well. Here, a creative individual may have an insight and share it with some audience. If it impresses the gatekeepers of that particular field (i.e., the experts, judges, and authorities), it will be used from that point forward and eventually may even change the entire domain (e.g., art, mathematics, literature). This kind of social and historical process does assume that creative work is actually performed and shared; it is not personal potential. For this reason, systems theories assume that persuasion is a part of creativity. For systems theories like this, all creativity is eminent creativity. If there is no audience, no persuasion, there is no objective reason or consensus about creativity. There is, in this view, no everyday creativity.

Alternative perspectives on theories of creativity distinguish between psychological and historical creativity, between Big C creativity and little C creativity, or between objective and subjective creativity. Each of these parallels the distinction between eminent and everyday creativity.

Table 1 Perspectives on Creativity

	Potential	*Products*
Internal	Process	Ideas
(personal/subjective)	Personality	Insights
External	Presses	Performances
(social-environmental objective)	Places	Persuasion

All such distinctions, including those in Figure 1, should be considered with care. They should not be interpreted as suggesting that there are two different kinds of creativity. Recall here the idea that creative potential can eventually be fulfilled and could then be manifested in actual creative behaviors or "performances." This view therefore posits a connection between personal, psychological, and subjective creativity, on the one hand, and social, historical, objective creativity on the other. This perspective is highly practical, especially for educators. After all, that is one thing that education can target: the fulfillment of potential.

Mark A. Runco

See also Creativity, Definition; Eminence; Originality

Further Readings

Richards, R. (Ed.). (2007). *Everyday creativity and new views of human nature: Psychological, social and spiritual perspectives*. Washington, DC: American Psychological Association.

Runco, M. A., & Albert, R. S. (Eds.). (1990). *Theories of creativity.* Newbury Park, CA: Sage.

Runco, M. A., & Pritzker, S. (Eds.). (1999). *Encyclopedia of creativity.* San Diego, CA: Academic Press.

Eminent Women

The very title of this entry demands selection and judgment: Who is eminent? How does one qualify to be eminent? In what does eminence consist? Eminence can be defined as a position of superiority, distinction, or excellence. Dean Keith Simonton defines eminence as having "made a name" for oneself. Some speak of true eminence as being defined as the person having made an original contribution to the domain, rather than high achievement. Eminent people have biographies written about their lives; they are in the journals, magazines, newspapers, and other media.

Simonton noted that predicting eminence from mere prominence depends on certain criteria. Regarding individual differences, the productivity, intelligence level, personality attributes, and degree of psychopathology are somewhat distinctive in eminent people. In terms of development, the family pedigree, childhood precocity, birth order, presence of early trauma, the presence of role models and mentors, and formal education and training are important. In the sociocultural context, the political, economic, cultural, and ideological are vital. Simonton proposed a methodology that he said is problematic because of the reliability and validity of current instruments and methods used to define eminence. His work on eminent women stated that fewer than 3 percent of eminent people throughout history were women, Marie Curie notwithstanding. The U.S. Inventors Hall of Fame includes few women, as do most other Halls of Fame. This has led researchers and feminists to propose their own lists.

This entry describes how eminence is determined, barriers to eminence, and profiles, themes, and implications of eminence.

Determining Eminence

One could speak of eminent women in their absence. For example, Samuel Johnson's *Lives of the Most Eminent English Poets* in the 18th century contained no women among the 50 who were profiled. This example is not unusual. The problems arise from a historical disregard for women's lives, except for those of royal lineage. History knows Catherine the Great, Elizabeth I, and Marie Antoinette, and their eminence is not disputed. This has led to special studies of eminent women, separate from eminence in general. Mary Queen of Scots, Jeanne d'Arc, Victoria, Elizabeth I, George Sand, Madame de Staehl, Catherine the Great, Maria Theresa, Marie Antoinette, Mary I, Anne of England, Madame de Sevigné, Christina of Sweden, Elizabeth Barrett Browning, Mme. De Maintenon, Josephine of France, Catherine de Medici, Cleopatra, Charlotte Brontë, and Harriet Beecher Stowe were the 20 most eminent women found by statistical study in 1913 by Cora Castle, who distilled the list from a master list of 868 women.

Catherine Cox also conducted a study of eminence, using items from the Stanford-Binet test in 1916, extrapolating the IQs of eminent people through a technique called *historiometry.* This study demonstrated that a certain intelligence level is necessarily present in eminence in the domains

Table 1 Women in *Cradles of Eminence* and in the U.S. National Women's Hall of Fame

Field of Achievement	*Name*
Arts and Humanities	Maude Adams, Louisa May Alcott, Marian Anderson, Maya Angelou, Lucille Ball, Ann Bancroft, Ethel Barrymore, Simone de Beauvoir, Phyllis Bentley, Ingrid Bergman, Sarah Bernhardt, Nellie Bly, Margaret Bourke-White, the Brontë sisters, Gwendolyn Brooks, Pearl Buck, Maria Callas, Mary Cassatt, Willa Cather, Ilka Chase, Jennie Jerome Churchill, Colette, Catherine Cookson, Nancy Cunard, Marian DeForest, Marlene Dietrich, Mary Louise De La Ramee (Ouida), Agnes De Mille, Emily Dickinson, Isak Dinesen, Marjorie Douglas, Isadora Duncan, Kathrine Dunham, Eleonora Duse, George Eliot, Edna Ferber, Kathleen Ferrier, Ella Fitzgerald, Kirsten Flagstad, Jane Fonda, Margot Fonteyn, Anne Frank, Margaret Fuller, Wanda Gag, Greta Garbo, Judy Garland, Charlotte Perkins Gilman, Ellen Glasgow, Martha Graham, Helen Hayes, Lillian Hellman, Katharine Hepburn, Wilhelmina Holliday, Julia Ward Howe, Zora Neale Hurston, Janis Joplin, Frida Kahlo, Kathe Kollwitz, Sheila Kaye-Smith, Helen Keller, Dorothea Lange, Lillie Langtry, Gertrude Lawrence, Lotte Lehmann, Doris Lessing, Beatrice Lillie, Maya Lin, Amy Lowell, Shirley Maclaine, Katherine Mansfield, Carson McCullers, Edna St. Vincent Millay, Nancy Mitford, Marilyn Monroe, Anna Moses, Flannery O'Connor, Georgia O'Keeffe, Edith Piaf, Sylvia Plath, Ayn Rand, Vita Sackville-West, Olive Schreiner, Beverly Sills, Edith Sitwell, Bessie Smith, Gertrude Stein, Gloria Steinem, Harriet Beecher Stowe, Barbara Streisand, Maria Tallchief, Ida Tarbell, Elizabeth Taylor, Dorothy Thompson, Sigrid Undset, Ethel Waters, Jessamyn West, Eudora Welty, Edith Wharton, Laura Ingalls Wilder, Oprah Winfrey, Virginia Woolf
Athletics	Donna De Varona, Babe Didrikson, Gertrude Ederle, Althea Gibson, Billie Jean King, Wilma Rudolph, Helen Stephens
Aviation	Amerlia Earhart, Bessie Coleman, Blanche Scott, Emily Warner
Business	Linda Alvarado, Elizabeth Arden, Coco Chanel, Katharine Graham, Martha Harper, Barbara Holdridge, Estée Lauder, Helena Rubenstein, Muriel Siebert, Madame Walker
Civil Rights—race, poverty, age, gender, labor, etc.	Bella Abzug, Susan B. Anthony, Ella Baker, Daisy Bates, Antoinette Blackwell, Amelia Bloomer, Charlotte Bunch, Lydia Child, Angela Davis, Paulina Davis, Dorothy Day, Bernadette Devlin, Emma De Voe, Catherine East, Marian Wright Edelman, Betty Friedan, Matilda Gage, Emma Goldman, Germaine Greer, Angelina Grimke, Sarah Grimke, Fannie Hamer, Dorothy Height, Dolores Huerta, Mother Jones, Maggie Kuhn, Susette LaFlesche, Kate Millett, Lucretia Mott, Kate Mullany, Rosa Parks, Alice Paul, Esther Peterson, Phyllis Schlafly, Elizabeth Cady Stanton, Gloria Steinem, Lucy Stone, Mary Talbert, Sojourner Truth, Harriet Tubman, Mercy Warren, Ida Wells-Barnett, Sarah Winnemucca, Fanny Wright
Education	Ethel Andrus, Mary McLeod Bethune, Lydia Bradley, Rachel Carson, Rosalynn Carter, Mary Cary, Cary Catt, Ruth Colvin, Joan Cooney, Nannerl Keotane, Patricia Locke, Mary Lyon, Louise McManus, Maria Montessori, Katherine Saubel, Sophia Smith, Anne Sullivan, Frances Willard

(Continued)

Table I (Continued)

Field of Achievement	*Name*
Government	Abigail Adams, Madeleine Albright, Gertrude Bell, Shirley Chisholm, Hillary Clinton, Elizabeth Dole, Anne Dudley, Geraldine Ferraro, Indira Gandhi, Ella Grasso, Martha Griffiths, Oveta Culp Hobby, Barbara Jordan, Ruth Bader Ginsberg, Wilma Mankiller, Golda Meier, Patsy Takemoto Mink, Constance Motley, Antonia Novella, Sandra Day O'Connor, Frances Perkins, Eva Peron, Jeanette Rankin, Janet Reno, Rozanne Ridgeway, Edith Rogers, Patricia Schroeder, Margaret Chase Smith, Margaret Thatcher
Invention	Harriet Strong
Law	Florence Allen, Myra Bradwell, Crystal Eastman, Patricia Harris, Belva Lockwood, Josephine Ruffin
Mathematics	Grace Hopper
Medicine	Faye Abdullah
Military	Mary Hallaren, Jeanne Holm, Wilma Vaught
Other	Betty Bumpers (children's immunization), Jane Croli (women's clubs), Eileen Garrett (parapsychology), Mata Hari (spy), Beatrice Hicks (engineer), Julia Gordon Lowe (Girl Scouts), Annie Oakley (marksman), Eleanor Roosevelt (humanitarian), Sacagawea (interpreter), Victoria Woodhull (orator, spiritualist)
Science	Dorothy Andersen, Virginia Apgar, Ruth Benedict, Annie Cannon, Jacqueline Cochran, Eileen Collins, Rita Colwell, Gerty Corey, Helene Deutsch, Sylvia Earle, Gertrude Elion, Alice Evans, Lillian Gilbreth, Jane Goodall, Alice Hamilton, Shirley Jackson, May Jemison, Elizabeth Kenny, Stephanie Kwolek, Anne Morrow Lindbergh, Shannon Lucid, Maria Mayer, Barbara McClintock, Katherine McCormick, Margaret Mead, Maria Mitchell, Mary Pennington, Ellen Swallow Richards, Sally Ride, Florence Sabin, Felice Schwartz, Florence Siebert, Nettie Stevens, Harriet Tassig, Florence Wald, Annie Wauneka, Sheila Widnall, Chien-Shiung Wu, Rosalyn Yalow
Religion	Annie Besant, Evangeline Booth, Mother Cabrini, Mary Dyer, Mary Baker Eddy, Anne Hutchinson, Leontine Kelly, Mother Marianne, Betty Schiess, Anna Shaw, Mother Theresa
Social Work	Jane Addams, Dorothea Dix, Bertha Holt, Margaret Sanger, Hannah Solomon, Faye Wattleton

of the arts, government leadership, literature, philosophy, and science. Military leaders did not have the high intelligence scores that the others did. As stated, most of the people studied were men.

Another useful way of determining eminence might be the number of scholarly biographies undertaken and published about a certain woman. This way has its merits, but may be disproportionately skewed toward the literary and the artistic, as writing a biography is an accepted scholarly venue for these fields, whereas it is not so in science, mathematics, business, or invention. The Goertzels listed people who had at least two biographies written about them, reasoning that one biography may represent a special scholarly interest, but two represented possible eminence. Scrutinizing the list, however, reveals that they also listed women who had written autobiographically. When one writes about oneself in a memoir, one thus increases one's chances of being regarded as worthy of study

by the Goertzels. Table 1 has omitted women who did not have at least two scholarly biographies written about them.

History has forgotten many women visual artists, who were often miniaturists in families of men artists, and who were stymied in art schools because the highest level of training was the painting of the nude and women were forbidden from taking these classes. Women writers, who were relegated to read in the library rather than attend classes for credit at the major universities, as described by Virginia Woolf in *A Room of One's Own,* have also been forgotten. Likewise, history has often overlooked women scientists, who, as daughters of famous scientists were forbidden from studying the skies as was the daughter of Galileo, and women musicians, who, as prodigy sisters of prodigy brothers, were sent on concert tours to less prestigious venues, as Fannie Mendelssohn was.

Barriers

Yet the problematic situation remains. Why so few creatively eminent women? Studies have revealed some clues. Beyond the barriers mentioned in the earlier examples, of outright discrimination, the most obvious reason is that women who rise in a profession or domain must always consider the question of when to have a family and how to integrate being a mother with working in the domain. Perhaps another reason that few women become eminent might have to do with how intensely they pursue their passions for their domains because being a mother can mean being distracted and perhaps sidetracked. Faculty attitudes toward women students seem to be important, with the personality characteristics of the men being more valued than the real abilities of the women. Parental values might also play a part, as in the expectation that women should get married and have children. The necessity to achieve early and to continue producing, and the necessity for commitment and intensity in pursuing a career that calls for creativity, may also work against women. Women have different career and productivity patterns. Women, because of reproductive and family necessity, may peak later than men and may begin their career productivity later. It might then be too late for genuine eminence in the field. The bind of delaying having children, or having children early and not being able to single-mindedly create, seems to be the crux of the problem of diminished eminence for many creative women.

Developmental differences are not the only reason for the creative women's delayed achievement of eminence. Women have been found to favor connectedness rather than separateness. Women experience conflict between the expectations of being selfless mothers and being superwomen. Although some evidence indicates that creative women may have more androgynous personalities than other women do, there is no reason to suspect that they are not as culturally and socially tied to the expectations of what is called "domesticity" as are less creative, or more traditionally feminine women.

Profiles

Nevertheless, some women are well known. Women of power and politics are those who are most probably described with the adjective, *eminent*. Margaret Thatcher, Golda Meier, Indira Gandhi, Condoleeza Rice, Hillary Clinton, and Aung San Suu Kyi are examples. Among the many lists of women achievers is one that is multidimensional, including women in the arts and humanities, in athletics, in aviation, in business, in civil rights, in education, in invention, in government, in law, in medicine, in the military, and the like. The requirement is U.S. citizenship. Most of the women have been achievers in the arts and humanities (33), civil rights (36), and government (24). Again, the question of eminence is value-laden and cannot be decided, but inclusion in this hall would seem to be a preliminary step. Table 1 combines the biographical work of the Goertzels on U.S. women and the nomination process of the Women's Hall of Fame to include 20th-century eminent women who have, at least, made news, had books written about them, and been talked about.

Themes

Several scholars have studied the lives of eminent women to search for themes that reveal why these women were able to succeed in fulfilling their dreams when others could not. In *Smart Girls,* Barbara Kerr analyzed the lives of 33 women from

several countries who had multiple biographies written about them, Carolyn Yewchuck analyzed the lives of Canadian eminent women, and Leonie Kronborg interviewed and analyzed the data for Australian eminent women. Kerr and Amber Larson then synthesized all these findings to yield the following themes:

- Loss of a parent or alienation from one (one of the strongest, but most puzzling findings across all eminence studies)
- Early and continued investment in learning
- Connection with a mentor or master teacher
- Love of solitude
- Strong sense of identity
- Boundaries
- Resistance to stereotyping and discrimination
- Resistance to the culture of romance
- Courage
- Egalitarian partnerships and shared child-rearing
- Capacity to fall in love with an idea

Implications

These themes, as well as the details of the life experiences of eminent women, have many implications for gifted girls, with the most important possibly being the ability of resilient, intelligent young women with a life purpose to meet difficulties, to gather resources, and to rise above cultural barriers to their goals.

Jane Piirto

See also Eminence; Genius; Girls, Gifted; Women, Gifted

Further Readings

Cox, C. M. (1926). *Genetic studies of genius* (Vol. 2). Palo Alto, CA: Stanford University Press.

Goertzel, V., Goertzel, M. G., Goertzel, T. G., & Hansen, A. M. W. (2004). *Cradles of eminence: Childhoods of more than 700 famous men and women* (2nd ed.). Scottsdale, AZ: Great Potential Press.

Kerr, B. A. (1997). *Smart girls*. Scottsdale, AZ: Great Potential Press.

Kerr, B. A., & Larson, A. L. (2008). How smart girls become talented women. In S. Lopez (Ed.), *Positive psychology perspectives*. Westport, CT: Greenwood Press.

Piirto, J. (2004). *Understanding creativity.* Scottsdale, AZ: Great Potential Press.

Piirto, J. (2007). *Talented children and adults: Their development and education* (3rd ed.). Waco, TX: Prufrock Press.

Schlosser, G. A., & Yewchuk, C. (1998). Growing up feeling special: Retrospective reflections of eminent Canadian women. *Roeper Review, 21*(1) 78–85.

Simonton, D. K. (1999). Eminence. In M. Runco & S. Pritzer (Eds.), *Encyclopedia of creativity* (Vol. 1, pp. 646–649). San Diego, CA: Academic Press.

Twenty most eminent women in the world. (1913, June 15). *The New York Times.*

Emotional Development

Research in the area of the emotional development of gifted children is relatively new and has frequently not represented all populations of students with gifts and talents. Furthermore, not all gifted children are properly identified. Certain groups, such as Native Americans, African Americans, and Hispanic Americans, are often noticeably missing from the ranks of children identified as gifted.

Even so, some characteristics have been identified as more prevalent in gifted students, as have some circumstances that can leave gifted children vulnerable to a variety of emotional issues. Learning is not a purely cognitive phenomenon; rather, it is a process that is interwoven with students' emotional functioning within the context of their individual learning environments. For example, current brain research indicates that emotions play a part in supporting or inhibiting learning. This entry describes aspects of emotional development in gifted children.

As gifted children engage in learning, they often receive mixed messages about academic expectations, gender roles, and cultural expectations from their teachers, families, and friends. Struggling to succeed both academically and socially, despite all these conflicting expectations, may cause the child considerable emotional distress. When the child is unable to reconcile conflicting expectations, the child may feel overwhelmed and may, at times, simply give up trying to satisfy all the different individuals, including educators. Gifted students often have a strong sense of what they consider to

be just and unjust. If the student feels that the situation he or she is being placed in is grossly unjust, then feelings of frustration and powerless may also enter the picture.

Feelings of confidence and affirmation are important to all children, including those with exceptional gifts and talents. Unfortunately, gifted students do not always receive the nurturing and positive feedback one might expect. Once identified, gifted children sometimes find themselves burdened with unrealistic expectations to do extremely well in all academic areas. If the child fails to meet those expectations, labels such as "lazy," "underachiever," or even "failure" may be placed on the child. This can add additional stress to the child's emotional well-being and may lead to a new array of problems, including perfectionism, anxiety, and depression.

Gender issues can sometimes play a pivotal role in a gifted child's self-concept and emotional well-being. Maureen Neihart and Barbara Kerr both have provided evidence suggesting that gifted girls are not appropriately identified as often as boys are and that some teachers still believe that boys have innate ability, while girls must work harder. Gifted males face their own challenges. Developing a strong sense of self may be difficult to do if little is done to foster emotional well-being, and if the student's abilities and interests are not in sync with those of his or her peers. Male mentors can play an important role in supporting the emotional health of gifted young men across different cultural groups.

Gifted children frequently develop asynchronously, with their cognitive abilities quickly surpassing their emotional development. Gifted children may possess the cognitive ability to understand a concept, but not the emotional ability to deal with it properly. In today's age of instant information, children are bombarded with issues ranging from global warming to war. A gifted student's comprehension of these concepts does not necessarily mean that the student is prepared to navigate these monumental conflicts emotionally. Thus, some gifted students have been known to become distraught simply from listening to the news.

Some evidence suggests that some gifted children have heightened sensitivities in areas besides cognitive ability. However, as Neihart and her colleagues concluded from their review of the literature of gifted children's adjustment, there is no definitive research evidence concluding that gifted children are any less emotionally fit than their peers. What gifted children do have is different cognitive abilities and often different experiences than their non-gifted peers have. Therefore, gifted children's developmental growth may be less predictable. In addition, they may not have the emotional support of a peer group with which to commiserate about their experiences, leaving them at risk for social isolation.

The emotional development of students with gifts and talents is complicated. Unfortunately, the research base is still lacking in its ability to fully represent their development. As additional data are drawn from the underrepresented groups, nuance and specificity can be added. Until then, researchers will use a series of studies and general developmental theories of both gifted and students of average ability to depict their development.

Patricia Gillespie

See also Emotional Intelligence; Social-Emotional Issues; Supporting Emotional Needs of Gifted

Further Readings

Burney, V. H., & Cross, T. L. (2006). Impoverished students with academic promise in rural settings: Ten lessons from Project Aspire. *Gifted Child Today, 29*(2), 14–21.

Cross, T. L. (2004). *On the social and emotional lives of gifted children* (Academic ed.). New York: Bantam Dell.

Goleman, D. (2005). *Emotional intelligence: Why it can matter more than IQ* (10th anniversary ed.). New York: Bantam Dell.

Hébert, T. P. (2002). Gifted males. In M. Neihart, S. Reis, N. Robinson, & S. M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 137–144). Waco, TX: Prufrock Press.

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Roeper, A. (1982). How the gifted cope with their emotions. *Roeper Review 5, 5*(2), 21–24.

Emotional Intelligence

Emotional intelligence, in general, is one's ability to interpret and manage emotions. A number of key concepts, and their relationship to emotional intelligence, are important for understanding and defining giftedness. In his 1983 book *Frames of Mind,* Howard Gardner drew attention to the concept of "multiple intelligences," which is critically relevant to a wide array of human functioning and performance, naming interpersonal and intrapersonal intelligence as an integral part of this concept. In addition, Robert Sternberg suggested, when describing "practical intelligence" in 1985, that intelligent functioning revolves around the ability to solve complex problems efficiently, effectively, and economically. By combining these two concepts that are considered to be associated with emotional intelligence, emotional intelligence would appear to include a type of problem solving that uses emotional capacities in interpersonal contexts, which may have been what Charles Darwin and Edward Thorndike were leading to as early as 1872 and 1920, respectively. The idea of "emotional-social giftedness" based on emotional intelligence (EI) is more recently being discussed in the definition of giftedness by Reuven Bar-On and Jacobus Maree. The critical importance of creativity is emphasized within all of these contributions to the literature. Moreover, theories and definitions of creativity are frequently based on problem solving, discovery, and innovation as well as on the development of caring, concerned, compassionate and committed individuals who develop and use their giftedness for society's behalf as well as for self-fulfillment as suggested by A. H. Passow and J. H. Schiff in 1989. The meaning of "gifted" has shifted from largely Western concepts to more diverse concepts because giftedness is a sociocultural phenomenon that cannot be measured directly. Conceptualizations of giftedness differ widely from culture to culture, making it difficult to define universally despite its universality.

This entry describes measures of giftedness and talent, defines emotional intelligence, discusses emotional-social giftedness, and discusses education for emotional intelligence and creativity.

Measures of Giftedness and Talent

As early as 1979, E. M. Madge indicated that measures of (cognitive) intelligence cannot predict an individual's ability to become a fully self-actualizing member of society, discussing factors that are now considered aspects of emotional intelligence.

High intelligence and academic achievement as the only measures of giftedness and talent are currently regarded as inadequate. Research findings, published by Vanessa Druskat, Fabio Sala, and Gerald Mount in 2006, indicate that emotional intelligence has a significant impact on achievement in various areas of life. In addition to cognitive intelligence, an intricate configuration of interrelated emotional and social factors plays a role in promoting and creating success in life.

Defining Emotional Intelligence

Whereas the term *emotional intelligence* was coined in 1966 by B. Leuner, the construct itself, as mentioned earlier, has been researched by others for a long time.

Building on a paradigm shift that has progressed over more than 80 years, Peter Salovey and John Mayer claimed in 1990 that human intelligence should be redefined to include the ability to discriminate among emotions, to monitor (one's own and others') feelings, and to use this information to guide one's thinking and actions, which was almost exactly the way Thorndike defined social intelligence in 1920. This move toward a more inclusive and comprehensive definition of intelligence, intellectual capacity, and intelligent behavior has been fuelled by the limited predictability of cognitive intelligence in determining life success as was empirically demonstrated by Richard Wagner in his 1997 article that appeared in the *American Psychologist.*

The 2004 edition of the *Encyclopedia of Applied Psychology* delineates three major conceptual models of emotional intelligence: (1) the *Mayer-Salovey model,* (2) the *Goleman model,* and (3) the *Bar-On model.* Whereas the Bar-On model focus on the noncognitive, emotional, and social facets of EI, defining *EI* in terms of personal and interpersonal behavior, Salovey and Mayer conceptualize EI as a cognitive ability and potential for

performance based on the processing of emotional input. These authors believe, moreover, that ability measures that assess this potential are likely to have more validity than are self-report measures. However, research findings to date do not indicate that ability measures have stronger construct or predictive validity than the self-report measures of emotional intelligence, as is shown in Glenn Geher's 2004 review of the major emotional intelligence measures.

In a number of publications, Bar-On has argued that most definitions of emotional intelligence comprise at least one of the following five clusters of emotional and social competencies, which are the ability to

1. Understand one's emotions and express feelings
2. Understand how others feel and to relate with them
3. Manage and control emotions
4. Manage change and solve problems of a personal and interpersonal nature
5. Generate positive mood and be self-motivated

This construct is essentially tactical and immediate in nature; it reflects a person's common sense and ability to get along in the world.

Emotional-Social Giftedness

Emotional-social giftedness as a concept is only recently being discussed in the literature, largely by Bar-On and Maree. Previous references to the emotional and social aspects of giftedness in publications relate primarily to the emotional and social side of the gifted in the context of their development and special needs that should be dealt with at home and at school, emphasized particularly by M. M. Piechowski in 1991 and J. Delisle in 1992, as well as to an approach to promote social-emotional learning (SEL) to bridge the gap between one's emotions, feelings, and thoughts as argued by Maurice Elias and his colleagues in 1997. The literature deals mainly with the possible connection between giftedness, academic achievement and SEL, and possible ways in which to facilitate improved student behavior at school by means of effective SEL programs. That social-emotional competencies can be taught is confirmed by the effectiveness of SEL programs as shown by a meta-analysis of more than 300 studies performed by J. A. Durlak and R. P. Weissberg in 2005.

Educating for Emotional Intelligence and Creativity

This overview of the literature implies that gifted individuals can be educated by means of "special" coaching and counseling as well as via formal training and more conventional educational programs to realize their creative potential in an emotionally intelligent way; it also implies that SEL is essential for actualizing the gifts and talents that some individuals possess. Therefore, education for the gifted and, indeed, formal education for all children could include SEL as a standard part of their development and education—it should not be reserved for the cognitively gifted or the cognitively limited child. Further, creativity is viewed as an attribute that stands at the cusp of EI, giftedness, and talent. Moreover, creativity builds upon a number of important EI competencies and skills. Ultimately what makes gifts and talents noticeable is creativity, which is doing things in ways differently than have been done before, using gifts and talents in ways that are distinctive and fuelled by taking different perspectives, having different feelings about one's experiences, and having different kinds of empathic understandings of prior work in one's talent areas. Based on those EI competencies and skills that appear to affect giftedness and ultimately creativity the most, SEL programs could be implemented to strengthen children's ability to understand feelings in themselves and others, manage and control emotions, express feelings, validate feelings and keep things in correct perspective, flexibly solve problems of a personal and interpersonal nature, and sustain motivation in doing their best and actualizing their potential. This will also help those who are gifted to sustain their efforts in the face of jealousy and disbelief that often greet creative efforts.

Various educational programs are already available that focus on the development of emotional intelligence. As it is already done in a growing number of countries worldwide, these programs

could begin as early as possible and could be delivered to all children but particularly supplemented for gifted youth to help them learn and develop without the risk of social isolation and lack of challenge that contributes to underachievement. It is also advisable to have parallel programs for parents, encouraging them to nurture emotional intelligence in their children as has been recommended by Robin Stern and Maurice Elias in 2007. Beyond being taught what they need to know for eventually completing school, gifted youth might be provided with assignments that are intellectually challenging, emotionally engaging as well as demanding creativity and the application of their talents to matters relevant to the world around them.

Jacobus G. Maree, Maurice J. Elias, and Reuven Bar-On

See also Intelligence; Multiple Intelligences; Social-Emotional Issues; Triarchic Theory

Further Readings

Bar-On, R. (2006). The Bar-On model of emotional-social intelligence (ESI). *Psicothema, 18,* supl., 13–25.

Bar-On, R. (2007). The impact of emotional intelligence on giftedness. *Gifted Education International, 22*(1), 122–137.

Elias, M. J., Zins, J. E., Weissberg, R. P., Frey, K. S., Greenberg, M. T., Haynes, N. M., et al. (1997). *Promoting social and emotional learning: Guidelines for educators.* Alexandria, VA: Association for Supervision and Curriculum Development.

Passow, A. H., & Schiff, J. H. (1989). Educating gifted persons who are caring and concerned. *Gifted Education International, 6,* 5–7.

Piechowski, M. M. (1991). Emotional development and emotional giftedness. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 285–306). Boston: Allyn & Bacon.

Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition and Personality, 9,* 185–211.

Stern, R., & Elias, M. J., (2007). Emotionally intelligent parenting. In R. Bar-On, J. G. Maree, & M. J. Elias (Eds.), *Educating people to be emotionally intelligent* (pp. 37–48). Westport, CT: Praeger.

Enrichment Theories

Many different enrichment theories have been proposed in the field of gifted education/enrichment during the last three decades. One of the first was the Renzulli *enrichment triad model,* developed by Joseph Renzulli in 1977. Renzulli believes that enrichment for gifted and high-potential students should include strategies for increasing student effort, enjoyment, and performance. He believes enrichment is an opportunity for integrating a range of advanced-level learning experiences and thinking skills into all curricular areas. Renzulli believes that gifted students possess the highest potential for advanced-level learning, creative problem solving, and the pursuit of rigorous and rewarding work; thus, enrichment should extend beyond having students merely acquire information. Schools, according to Renzulli, can and should be places for developing the talents of students. He believes that the field of gifted education has been a true laboratory for the many enrichment innovations that have subsequently become mainstays of the U.S. educational system.

Enrichment theories relating to gifted education generally fall into two broad categories, including those in which enrichment experiences are constructed around the interests and talents of children, and those in which enrichment is based on what teachers and other professionals determine to be appropriate content and curriculum for the enrichment process. This entry first describes the work of several enrichment theorists and then discusses the common elements of enrichment theories for gifted education.

Enrichment Theorists

Renzulli developed the *enrichment triad model* and subsequently developed the *schoolwide enrichment model* (SEM) in cooperation with Sally Reis. In the SEM, the role of the student is transformed from that of a learner of lessons to that of firsthand inquirer, fully engaged in the joys and frustrations of creative productivity. The SEM has three components for providing services to students: the *total talent portfolio, curriculum modification and differentiation,* and *enrichment.* These three services are delivered across the regular curriculum, a

continuum of services, and a series of enrichment clusters. Once students are identified for the talent pool, they are eligible for these services. First, interest and learning-style assessments are used with talent pool students, in the development of a total talent portfolio for each student. Second, curriculum compacting and other forms of modification are provided to all eligible students for whom the regular curriculum must be adjusted. This elimination or streamlining of curriculum enables above-average students to avoid repetition of previously mastered work and guarantees mastery while creating time for more appropriately challenging activities. Third, a series of enrichment opportunities organized around the enrichment triad model offers three types of enrichment experiences through various forms of delivery, including enrichment clusters. Type I, II, and III enrichments are offered to all students; however, Type III enrichment is usually most appropriate for high-potential and gifted children. This approach is a comprehensive system of enrichment.

Another early theorist was Frank Williams, author of the Williams model: *cognitive-affective interaction model for enriching gifted programs*. The main focus of the Williams model is on divergent thinking or creativity. The model has eight educational objectives, four of which are cognitive in nature (fluency, flexibility, originality, and elaboration) and four of which are affective (curiosity, imagination, risk-taking, and complexity). Williams emphasizes the importance of specific instructional strategies aimed at encouraging students' divergence and stresses the importance of applying these strategies in the regular curriculum. Williams also discussed the interaction between a continuum of cognitive-affective and a second continuum of convergence-divergence, emphasizing the interactions between divergence and cognitive ability and divergence and affective ability.

George Betts developed the *autonomous learner model* focusing on enrichment, with the goal of encouraging gifted students to assume responsibility for their own independent learning. Betts believes that as students' cognitive, emotional, and social needs are met, they will become more self-directed. The Betts *autonomous learner model* emphasizes self-esteem, social skills, student interests, in-depth study, and broad-based content. Five dimensions are included in Betts's research-based model: orientation, individual development, enrichment activities, seminar, and in-depth study. Once involved in the model, students are encouraged to use both divergent and convergent thinking in these diverse and varied enrichment activities, which are ultimately designed to improve the affective and cognitive skills necessary to solve problems and develop new ideas.

John Feldhusen and Penny Britton Kolloff developed the Purdue *three-stage elementary enrichment model*. This model has three areas of skill development: divergent and convergent thinking abilities, development of creative problem-solving abilities, and development of independent study skills. The main goal is developing creativity in gifted students, but other skills such as research and independent thinking are also included in the model. The three-stage enrichment model is also designed to improve and maintain positive self-concepts in gifted students and increase awareness of and interest in "higher level occupations." Successful independent study is a major component of the model; ideally, the result of implementing this model with a student will be both self-actualization and self-fulfillment. Three separate, sequential stages provide a course of instruction in thinking skills, complex thinking strategies, and self-directed learning during the school year. In the Purdue secondary model for gifted and talented youth, Feldhusen and Ann Robinson suggest that provisions can be made to address the diverse needs of gifted, talented, and high-ability students at the secondary level. The model is designed to address an individual's cognitive and affective needs through acceleration, enrichment, and appropriate counseling. The premise of this model is that no single educational experience or program will meet all students' needs. The Purdue secondary model also includes visual and performing arts, consumer science, business, foreign language, industrial arts, core subjects, and cultural experiences because students may display their talents in a variety of areas.

Carol Schlichter used the work of Calvin Taylor's multiple talent approach as a basis for an enrichment model called *talents unlimited*. Talents unlimited is a systematic, user-friendly enrichment program for teaching thinking skills in regular education classrooms and gifted programs. This research-based model identifies five "thinking

talents" (productive thinking, decision making, planning, communication, and forecasting) that may be applied to academic talent to improve thinking skills and make students aware of their own thinking processes. Schlichter developed a comprehensive step-by-step guide for implementing talents unlimited in the classroom. Her model addresses the traditional barriers to teaching thinking skills by detailing how and when to teach them and by providing systematic directions for their instruction, such as introduction, reinforcement, extension, and practice. Though not developed for use solely with gifted students, Schlichter recognizes its appropriateness as a training process for those students involved in Renzulli Type III investigations.

Donald Treffinger developed the *individualized programming planning model* (IPPM), which is similar to Renzulli and Reis's enrichment triad and SEM. The goal of Treffinger's IPPM is to promote effective, independent learning based on the strengths and talents of the student. He identifies four components as necessary for the development of effective independent learning: characteristics and identification, process development, content, and management/environment. Treffinger believes that students need to develop process skills at a variety of levels and need to have access to programs that promote advanced content acquisition in an atmosphere that encourages and fosters effective independent learning. Treffinger stresses the importance of making enrichment activities available to all students, not just those identified as gifted. Among the services with which a student may be matched are individualized basic instruction (adjusting content, rate, pace, and level of curriculum), compacting and mentoring, appropriate enrichment experiences, systematic instruction in methods to develop self-directed learning, personal and social guidance, and exposure to career possibilities. Treffinger believes that the responsibilities for providing appropriate services for those students should be shared among a variety of adults, including the classroom teacher, the enrichment specialist, parents, and community members. He believes that cooperation among all these individuals is necessary to meet the needs of students with unique learning styles, interests, and abilities.

Sandra Kaplan developed a curriculum model incorporating enrichment that focuses on the three major components of differentiating curriculum: content, process, and product. Her approach centers on the goal of recognizing the characteristics of the gifted and then providing reinforcements and extensions of the curriculum to meet the needs of those characteristics. Kaplan defines different processes for constructing differentiated curricula for the gifted, including methods to determine the essential elements of a unit as well as the format in which to present it. Kaplan emphasized the importance of creating curriculum units around significant and open-ended themes instead of topics to be more inclusive of various subtopics students might want to explore. Her accessible, practical system for organizing and expanding curriculum involves focusing units on broad themes such as power, and then exploring a variety of seemingly unrelated subjects and blending them around the theme. This system emphasizes research and critical thinking skills as well as basic skills.

Joyce VanTassel-Baska has completed extensive work on developing curriculum units to enrich curriculum for gifted students. Her work is designed to extend basic curricular concepts with units that integrate advanced content and processes. She also created model units for this curriculum approach across content areas. In her most recent work, she developed an integrated curriculum model for the gifted with a content mastery dimension, a process/product research dimension, and an epistemological concept dimension.

Renzulli developed the *multiple menu model* in which six practical planning guides—or menus—are provided to guide teachers in designing in-depth curriculum units for classroom use. This model differs from traditional approaches to curriculum design in placing greater emphasis on balancing authentic content and process, involving students as firsthand inquirers, and exploring the structure and interconnectedness of knowledge.

Common Elements

This sampling of enrichment theories illustrates seven elements commonly found in enrichment theories for gifted education. Most of these enrichment theories are interest-based; integrate advanced content, processes, and products; include broad interdisciplinary themes; foster effective independent and autonomous learning; provide individualized and differentiated curriculum and

instruction; develop creative problem-solving abilities and creativity; and integrate the tools of the practicing professional in the development of products. All the enrichment theorists discussed have integrated some or all of these elements into their work.

Sally M. Reis

See also Elementary Enrichment; Enrichment Triad Model; Middle School Enrichment; Purdue Model; Schoolwide Enrichment Model

Further Readings

Renzulli, J. S. (1977). *The enrichment triad model.* Wethersfield, CT: Creative Learning Press.

Renzulli, J. S. (1988). *The multiple menu model for developing differentiated curriculum.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S. (Ed.). (2007). *Systems and models for developing programs for the gifted and talented.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence.* Mansfield Center, CT: Creative Learning Press.

Enrichment Triad Model

The *enrichment triad model* was developed in 1976 by Joseph Renzulli and initially implemented mainly in school districts in the United States. The model is designed to encourage creative productivity by young people by exposing them to various topics, areas of interest, and fields of study, and to further train them to *apply* advanced content, process-training skills, and methodology training to self-selected areas of interest. The model, which was originally field-tested in several districts in New England, proved to be quite popular, perhaps because of the dissatisfaction with programs based only on acceleration and a focus on the use of IQ tests as a primary method of identification. Research on the model began in the late 1970s and has been conducted over three decades, as is summarized by Sally M. Reis in "Research That Supports Using the Schoolwide Enrichment Model and Extensions of Gifted Education Pedagogy to Meet the Needs of All Students."

Requests from all over the United States for visitations to schools using the model and for information about how to implement the model increased. Knowledge about the enrichment triad model increased, and it is often cited as the most widely used model in gifted education both nationally and internationally. A book about the enrichment triad model was published, and more and more districts began asking for help in implementing this approach. Dozens and then hundreds of programs based on the enrichment triad were and continue to be developed.

Three types of enrichment are included in the enrichment triad model (see Figure 1). Before enrichment learning and teaching can be applied systematically to the learning process of all students, it must be organized in a way that makes sense to teachers and students and the enrichment triad model can be used for this purpose.

The enrichment triad model is based on the ways in which people learn in a natural environment rather than in the artificially structured environment that characterizes most classrooms. External stimulation, internal curiosity, necessity, or combinations of these three starting points cause people to develop an interest in a topic, problem, or area of study. Children are, by nature, curious, problem-solving beings, but before they can act upon a problem or interest with some degree of commitment and enthusiasm, the interest must be a sincere one and one in which they see a personal reason for taking action. The enrichment triad model enables the *interaction* between and among the three types of enrichment, creating a stronger program than can be achieved through the application of just one of the types of enrichment. In other words, the arrows in Figure 1 are as important as the individual cells because they give the model dynamic properties that cannot be achieved if the three types of enrichment are pursued independently. A Type I exposure experience, for example, may have value in and of itself, but it achieves maximum payoff if it leads to Type II or III experiences.

In this regard, it is a good idea to view Types I and II enrichments as identification situations that may lead to Type III experiences, which are the most advanced type of enrichments in the model.

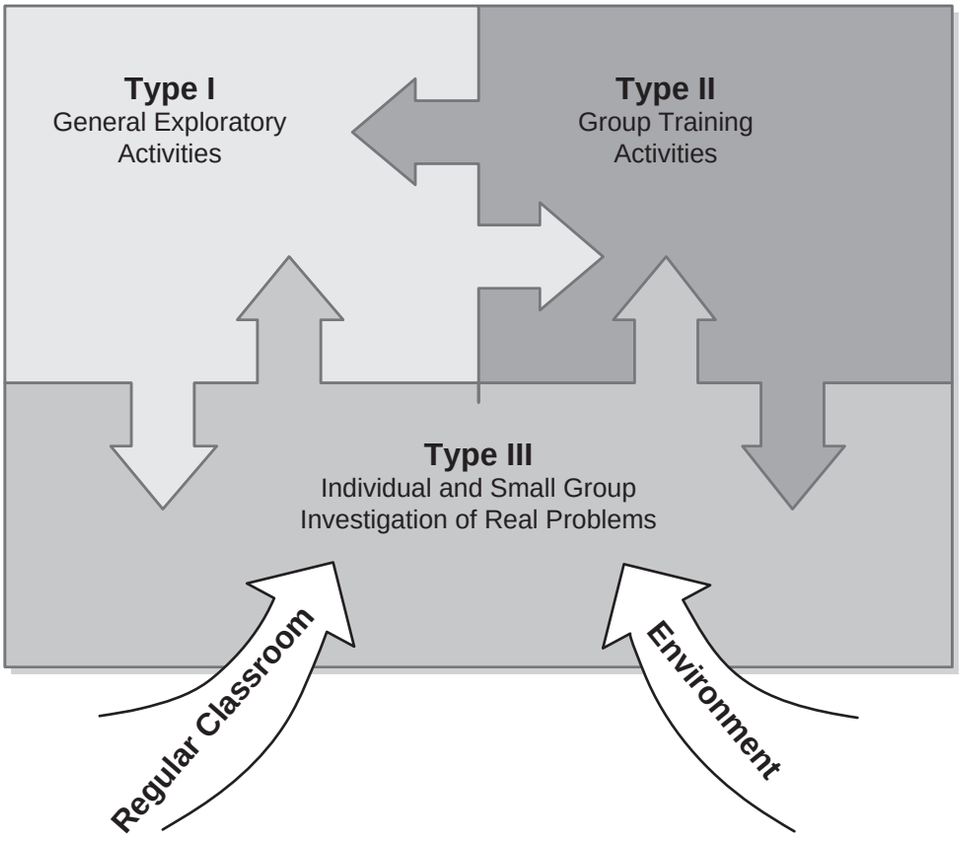


Figure 1 The Enrichment Triad Model

The interactive nature of the three types of enrichment also includes what are sometimes called the backward arrows in Figure 1 (e.g., the arrows leading back from Type III to Type I). In many cases, the advanced work (i.e., Type III) of students can be used as Type I and II experiences for other students. Thus, for example, a group of students who carried out a comprehensive study on lunchroom waste presented their work to other groups for both awareness and instructional purposes, and for purposes of stimulating potential new interests on the parts of other students.

The enrichment triad model can be used as the curriculum and instructional model for the schoolwide enrichment, a model for classroom curriculum enrichment, and/or as a school magnet or charter theme. The enrichment triad model has been adapted and adopted in diverse suburban and urban schools throughout the country. As stated earlier, there are three types of enrichment in the model, which are described in this entry.

Type I Enrichment: General Exploratory Experiences

Type I enrichment is designed to expose students to a wide variety of disciplines, topics, occupations, hobbies, persons, places, and events that would not ordinarily be covered in the regular curriculum. In schools using this model, an enrichment team of parents, teachers, and students often organizes and plans Type I experiences by contacting speakers, arranging minicourses, demonstrations, or performances, or by ordering and distributing films, slides, videotapes, or other print or nonprint media. Type I experiences can motivate students to such an extent that they will act on their interests in creative and productive ways. The major purpose of Type I enrichment is to include within the overall school program selected experiences that are purposefully developed to be motivational. This type of enrichment can also expose students to a wide variety of disciplines,

topics, ideas, and concepts. Typical Type I methods of delivery include bringing in a guest speaker, creating an interest center, showing slides, or hosting a debate.

Type I enrichment experiences can be based on regular curricular topics or innovative outgrowths of prescribed topics, but to qualify as a bona fide Type I experience, any and all planned activities in this category must stimulate new or present interests that may lead to more intensive follow-up by individual students or small groups of students. In Type I experiences, students are aware that the activity is an *invitation* to various kinds and levels of follow-up. A systematic debriefing of the experience will enable further involvement and the ways the follow-up might be pursued. Various opportunities, resources, and encouragement for diverse kinds of follow-ups are available in Type I.

An experience is clearly *not* a Type I if every student is required to follow up on an activity in the same or similar way. Required follow-up is a regular curricular practice, and although prescribed follow-up certainly has a genuine role in general education, it almost always fails to capitalize on differences in students' interest and learning styles. To make Type I experiences exciting to students, visiting speakers, for example, should be selected for both their expertise in a particular area and their ability to energize and capture the imagination of students. Persons presenting Type I experiences should be provided with enough orientation about the model to understand the objectives described previously and the need to help students explore the realms and ranges of opportunity for further involvement that are available within various age and grade considerations. Without such an orientation, these kinds of experiences may not be viewed as exciting experiences with potential for follow-up.

It is important to incorporate Type I activities into the regular classroom because these activities need to be seen as rooted in classroom instruction. Following any Type I activity, an assessment of the levels of interest of all students in the group can be conducted and an advanced Type I activity might be planned for highly interested students that pursues the material in greater depth. In this case, there is an interest-based rationale for a special grouping or field trip that is different from offering field trips only to high-ability students. A general or introductory Type I activity should, of course, include all students at given grade levels.

The Type I dimension of the enrichment triad model can be an extremely exciting aspect of overall schooling because it creates a legitimate slot within the school for bringing the vast world of knowledge and ideas that are beyond the regular curriculum to students' attention. This dimension is also an excellent vehicle for teams of teachers, students, and parents to plan and work together on a relatively easy-to-implement component of the model. Type I enrichment is an excellent vehicle for getting started in an enrichment cluster.

Type II Enrichment: Group Training Activities

Most educators agree about the need to blend into the curriculum more training in the development of higher-order thinking skills. This section discusses a systematic approach for organizing a process skills component related to Type II training. Type II enrichment includes materials and methods designed to promote the development of thinking and feeling processes. Some Type II enrichment is general, consisting of training in areas such as creative thinking and problem solving, learning how to learn skills such as classifying and analyzing data, and advanced reference and communication skills. Type II training is usually carried out both in classrooms and in enrichment programs and includes the development of (1) creative thinking and problem solving, critical thinking, and affective processes; (2) affective and character development skills; (3) a wide variety of specific learning how-to-learn skills; (4) skills in the appropriate use of advanced-level reference materials; and (5) written, oral, and visual communication skills. Other Type II enrichment is specific because it cannot be planned in advance and usually involves advanced instruction in an interest area selected by the student. For example, students who became interested in botany after the Type I described earlier would pursue advanced training in this area by doing advanced reading in botany; compiling, planning, and carrying out plant experiments and more advanced methods training for those who want to go further. When referring to these strategies, the term *process skills* is used, and examples of specific skills within each of these five general categories (and related

subcategories) are included. Type II enrichment also serves a motivational purpose similar to that discussed in connection with Type I activities.

In general, Type II training provides students with various learning opportunities designed to improve their independent learning skills as well as the quality of their personal assignments, projects, and research. Type II enrichment also includes a broad range of affective training activities designed to improve interpersonal and intrapersonal skills and to promote greater degrees of cooperation and mutual respect among students. By placing this instruction within the framework of the regular curriculum or the enrichment clusters, teachers can offer these valuable training activities without the risk of having the training viewed as an end in and of itself. Renzulli has consistently maintained that Types I and II enrichment are good for all children, as research on this model has demonstrated.

Type III Enrichment: Individual and Small Group Investigations of Real Problems

Type III enrichment includes investigative activities and the development of creative products in which students assume roles as firsthand investigators, writers, artists, or other types of practicing professionals. Although students pursue these kinds of involvement at a more junior level than adult professionals, the overriding purpose of Type III enrichment is to create situations in which young people are thinking, feeling, and doing what practicing professionals do in the delivery of products and services. Type III enrichment experiences should be viewed as vehicles in which students can apply their interests, knowledge, thinking skills, creative ideas, and task commitment to self-selected problems or areas of study. In Type III enrichment, students acquire advanced-level understanding of the knowledge and methodology used within a particular discipline, they develop authentic products or services directed toward bringing about a desired impact on one or more audiences, and they gain self-directed learning skills in the areas of planning, problem finding and focusing, organizational skills, resource utilization, and time management. Type III projects develop task commitment, self-confidence, feelings of creative accomplishment, and the ability to interact effectively with other students and adults who share common goals and interests.

Type III enrichment is the vehicle through which everything from basic skills to advanced content and processes blend in student-developed products and services. In much the same way that all the separate but interrelated parts of an automobile come together at an assembly plant, this form of enrichment serves as the assembly plant of mind. This kind of learning represents a synthesis and an application of content, process, and personal involvement. The student's role is transformed from one of lesson learner to firsthand inquirer, and the role of the teacher changes from an instructor and disseminator of knowledge to a combination of coach, resource procurer, mentor, and, sometimes, a partner or colleague.

Joseph S. Renzulli

See also Elementary Enrichment; Enrichment Theories, Middle School Enrichment; Purdue Model; Schoolwide Enrichment Model

Further Readings

Reis, S. M. (2008). *Research that supports using the schoolwide enrichment model and extensions of gifted education pedagogy to meet the needs of all students*. Retrieved from http://www.gifted.uconn.edu/sem/semresearch.html

Reis, S. M., & Renzulli, J. S. (2003). Research related to the schoolwide enrichment triad model. *Gifted Education International, 18*(1), 15–40.

Renzulli, J. S. (1977). *The enrichment triad model.* Wethersfield, CT: Creative Learning Press.

Renzulli, J. S. (Ed.). (2007). *Systems and models for developing programs for the gifted and talented.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Entrepreneurial Ability

Entrepreneurship has played a critical role in the economic success of individuals and nations because the creation of new businesses produces

new jobs. So, entrepreneurial ability has been identified as a talent that makes significant contributions to the successful economic development of our society. Entrepreneurial ability is the talent to create new businesses through the organization of new resources or the modification of existing resources. Bill Bolton and John Thompson defined an entrepreneur as a person who consistently creates and innovates to construct something of acknowledged value around perceived opportunities. Recently, enterprising activities in the United States have been dynamic and widespread. In 2005, about 15 million people in the United States were involved in attempting to establish new businesses, and 7 million new firms were started. Because there is strong competition among businesses, successful entrepreneurs create valuable products and innovate change. Because originality of ideas is a critical element for entrepreneurs to survive in a competitive business environment, most business schools acknowledge the importance of creativity training. This entry describes characteristics of entrepreneurial ability.

Entrepreneurship is critical to economic success, so much research has been done to identify potential indicators of this ability. The research has not been limited to the business sector. In the educational sector, especially in field of gifted education, researchers have been interested in identifying the elements of entrepreneurial ability and personality attributes of successful entrepreneurs. Regardless of the disciplines, researchers have long debated the issue of whether entrepreneurs' ability is innate or nurtured. Although many researchers argue that entrepreneurial ability is related to the inborn temperaments of individuals such as energy and independence, many other researchers believe that the entrepreneurial person is influenced by both genetic factors and environmental factors. Researchers have sought common traits as well as common experiences of entrepreneurs.

Many studies find these common traits: having energy, setting goals, listening to others, having strong self-efficacy, being a coach or a trainer, being passionate for work, strongly desiring to learn new and different things, having resiliency, taking risks, being persistent, having intuition, and being cooperative. Many of these attributes are similar to the characteristics of creative persons who are eminent in various disciplines. Some of these personal attributes are also similar to the characteristics of professionals other than entrepreneurs. Most people having professional jobs enjoy learning, have strong self-efficacy, and work hard in a persistent way. However, abilities of listening to others, being a good trainer, and being socially skilled are distinct characteristics of great entrepreneurs. Entrepreneurs should be able to work with and lead others to change. They should be good at networking and good at making connections among any resources needed to fit their situations, depending on what customers want and how customers' needs are changing.

In addition to these personal attributes, motivation is another critical element of entrepreneurial ability. Mostly, entrepreneurs are assumed to want to primarily pursue monetary rewards. However, entrepreneurs expressed their higher need for achievement than for monetary rewards. A study found that entrepreneurs who run their companies at a performance of almost 80 percent high growth showed a high need for achievement. Although great entrepreneurs obtain monetary rewards from their high achievement, most value their achievement more than monetary rewards. For example, a study showed that 30 percent of surveyed entrepreneurs considered "challenge" as a main motivator compared with the 12 percent who considered money as a motivator. Because of this drive for achievement, entrepreneurs tend to take risks and can be more resilient than are others when they fail. Many entrepreneurs have the experience of failing, but theirs is not complete failure because they learn from that experience.

In addition to personal attributes and motivation, environmental factors cannot be overlooked in considering how entrepreneurs' abilities are developed. Environmental influences, family background, and work experience are considered critical factors. Research showed that the father's career is a significant influence. Among several samples, 48 to 65 percent of the sample entrepreneurs had fathers who were self-employed. Another study on 500 female entrepreneurs showed that the majority of them had self-employed fathers. From this family background, entrepreneurs have more opportunities to be exposed to and learn things related to business. In addition to family background, entrepreneurs have the opportunity to learn about business from apprenticeship. Even though a regular

educational path is not a critical factor in becoming great entrepreneurs, studies support that apprenticeship is an influencing factor for being a great entrepreneur. Studies have shown that about 90 percent of entrepreneurs start their business in the same market in which they are already employed. Researchers suggest that 5 to 10 years of experiences are required to develop entrepreneurial ability, and to be a successful entrepreneur.

Mihyeon Kim

See also Creative Personality; Creativity in the Workplace; Gifted in the Workplace; Leadership

Further Readings

Bolton, B., & Thompson, J. (2004). *Entrepreneurs: Talent, temperament, technique*. Boston: Elsevier.

McDaniel, B. A. (2002). *Entrepreneurship and innovation: An economic approach*. Armonk, NY: M. E. Sharpe.

Reynolds, P. D. (2007). *Entrepreneurship in the United States: The future is now.* New York: Springer.

EUGENICS

Eugenics can be defined as an effort to selectively improve human hereditary traits through encouraging the reproduction of those possessing desirable genes and, conversely, restricting reproduction among individuals whose genetic makeup is considered undesirable. A more inclusive definition would also interpret this practice as a social, political, and economic philosophy, one perhaps most graphically illustrated by the rise of Nazism and the mass exterminations committed by the Third Reich. However, the genesis of this ideology can be ascribed to the preeminent scientific and philosophical minds of the 18th and 19th centuries. Its perpetuation in contemporary Western society is manifest in the practice of choosing the sex of an unborn child. The potential for eye color, hair color, athletic prowess, musical ability, and superior cognitive capacity to eventually be predetermined is an issue fraught with controversy. On one side of the conflict are those who see exciting new possibilities for technology, the economy, public health, citizenship, and moral standards of the intellectually distinguished increase in number. On the other side are those who predict a scenario in which new social strata would be formed, and in which the rights and privileges afforded the gifted would supersede those of marginalized populations, as well as those of the preponderance of humankind who do not meet the criteria for giftedness. This entry describes the history and influence of the concept of eugenics and the status of the eugenics controversy today.

Records of regulated human reproduction designed to eliminate the physically and mentally impaired from the population date back to ancient Greece and Sparta. In 1798, Thomas Malthus's theory of population growth laid the early foundations of the modern eugenics movement. In predicting that humankind's proliferation would cyclically outstrip food supply and result in famine, he proposed stabilizing population growth through sexual abstinence and delayed marriage among the poor and working classes, a method with the added benefit of containing transmission of genetic weakness.

Charles Darwin's theory of evolution was significantly influenced by Malthus's work, in that Darwin viewed the process of natural selection as one conducive to the quality of the human gene pool. However, the phrase *survival of the fittest* is attributed to the English philosopher and Darwin contemporary Herbert Spencer, who borrowed from evolutionary theory in contending that the social order operated according to a natural selection dynamic and that public assistance programs for the poor represented impediments to this process. Social Darwinism arose from this equating of material success with fitness, and financial hardship with genetic qualities undesirable in the human species.

Francis Galton's coining of the term *eugenics* in 1889 ushered in a new science, one devoted to the improvement of humanity through selective mating. In an era when Mendelian genetic experiments revolutionized the scientific community, Galton proposed a statistical relationship between success and accomplishment (or lack thereof) and heredity, one uninfluenced by environmental factors. He maintained that the future of society lay in positive eugenics, which promoted the breeding of humans based on their superior fitness, and did not endorse controlling the reproduction of dysgenic individuals.

However, the great wave of immigrants that washed over U.S. shores during the early 20th century inspired a pervasive fear over the potential dilution of genetic stock. Although the eugenics movement had, until then, focused on non-Whites, a new concern arose over degeneration of the White race through the breeding of pure Whites with so-called tainted Whites. The former were of Anglo-Saxon or Nordic origin; the latter, largely comprising "off-White" immigrants from Central and Eastern Europe, also encompassed the poor and those judged lacking in civilization-building skills. No longer was the concept of feeblemindedness limited to non-White races. Alleged scientific support was lent to this furor through the application of psychometrics to intelligence testing of immigrants at Ellis Island, where feeblemindedness was putatively demonstrated among 80 percent of those with "off-White" lineage. Of particular concern to eugenicists was the danger posed by so-called high-grade morons, who could lead functional lives and thereby pass as normal. These individuals were judged the most capable of degrading the gene pool by producing offspring with mates of superior stock.

To avert perceived threats to the quality of the human germ plasm, laws governing immigration and interracial marriage became increasingly stringent. Mandatory sterilization was enacted by more than half of the states. Harry Laughlin, as director of the Eugenic Records Office in the United States, created a Model Eugenic Sterilization Law that was espoused by the Nazi regime and used in their ethnic cleansing program.

Eugenics also exerted great influence over access to education. With the advent of the Binet-Simon Scale, standardized intelligence testing was used to distinguish normal children from retarded children and to ensure that all children were schooled in a manner commensurate with their abilities. However, the scale was adopted and revised by U.S. eugenicists, who subsequently employed it to generate spurious data supporting the intellectual inferiority of immigrants and other minority populations. A movement to weed "unfit" children out of public schools ensued. Lists of symptoms indicating mental deficiency were distributed to schools to identify and remove such students from the classroom (including those with blindness, deafness, motor abnormalities, physical deformities, speech pathology, or stubborn or careless temperaments). The social climate was such that, despite efforts at reform, equal treatment in the classroom was foreclosed to those deemed genetically impure. Although giftedness was considered the genetic dowry of White Protestants, substandard intelligence and degeneracy was the established norm for other groups.

Even in the late 20th century, the vision of a society composed of intellectual giants lingered. In 1980, the Repository for Germinal Choice, also known as the Nobel Prize Sperm Bank, was instituted with the goal of reversing genetic decline. Neither the illustrious donors nor the recipients aspiring to the birth of a genius were charged because their participation was regarded as a gift to humankind. Although it was intended that the development of the offspring be tracked and their IQs and accomplishments recorded, the results were never monitored during the project's 19 years of operation. Consequently, neither this experiment, nor any other to date, has lent conclusive support for the endowment of superior intellect through eugenics programs.

Nonetheless, the dispute is far from over. Although eugenics theory no longer explicitly shapes attitudes regarding intelligence, cultural biases are not easily eradicated. Cognitive ability and disability have been depicted as social constructions in a sense similar to designations of gender, race, and socioeconomic status. As such, the meritocratic criteria of giftedness represent the norms and the consensus of the dominant order. How important, then, is intelligence to the quality of the human race? In the words of Richard Herrnstein, who expounded eugenic principles in his best-seller *The Bell Curve*, "One of the problems of writing about intelligence is how to remind readers often enough how little an IQ score tells about whether the human being next to you is someone whom you will admire or cherish. This thing we know as IQ is important but not a synonym for human excellence" (p. 21).

Barbara Wells

See also Controversies in Gifted Education; Genetics of Creativity; *Genetic Studies of Genius;* History of Creativity; History of Gifted Education in the United States; Intelligence Testing; Socioeconomic Status

Further Readings

Herrnstein, R. J., & Murray, C. (1994). *The bell curve.* New York: Simon & Schuster.

Plotz, D. (2005). *The genius factory: The curious history of the Nobel Prize sperm bank*. New York: Random House.

Stubblefield, A. (2007). "Beyond the pale": Tainted whiteness, cognitive disability, and eugenic sterilization. *Hypatia, 22,* 162–181.

Winfield, A. G. (2007). *Eugenics and education in America: Institutionalized racism and the implications of history, ideology, and memory.* New York: Peter Lang.

Europe, Gifted Education

Giftedness as part of national school curricula in Europe has been, and still is, surrounded by some controversy because school systems generally and invariably reflect the philosophical foundation and the political will of any nation. The European Union alone accounts for 27 nations, each of which has a different culture and political structure, often a different language, and not least, a different view of how to cater for gifted students. Some national education policies state it is of the utmost necessity to accommodate their needs, whereas others do not use terms such as *giftedness* or *talent* at all, suggesting that these students do not qualify for any special consideration. School systems currently indifferent to the identification of and provision for the highly able tend to divide students somewhat arbitrarily into categories of "strong and privileged" (that is, easy-learners including the gifted and talented) and "the weak and needy" (that is, the slow learners and the learning disabled).

Europe is ambivalent toward selecting and providing for gifted students. One faction argues the right to be different for the common good, in which case, special provision for talent as well as for the learning disabled is seen as a necessity. The other faction, however, argues the right to be similar—also for the common good—in which case, selection is seen as creating an undemocratic and privileged societal stratum that denies the rights of all children to develop their full potential.

Gifted education as an academic discipline as well as national education-political effort does not yet function across Europe in the same way as it does in the United States or in the Asia Pacific Region. Typically, European endeavors in the area of gifted education have concentrated on alerting policy makers to the students' special needs and encouraging legislation for its implementation. Success varies greatly. A handful of researchers—interestingly, all psychologists—are largely responsible for pioneering gifted education and related issues in all of Europe, namely Joan Freeman (United Kingdom), Pieter Span (the Netherlands), Franz J. Mönks (the Netherlands), Kurt A. Heller (Germany), and Harald Wagner (Germany).

This entry describes gifted education in European countries and discusses the European approach to serving gifted students.

The United Kingdom

The leading country in Europe in gifted education is the United Kingdom, because of the Labour government's strong emphasis on education and forceful efforts to improve compulsory education overall. Giftedness is a notion actively promoted by UK authorities and effort is spent on training teachers, advising parents, and making special provision for gifted students. Though the government initiates action, it is carried out by local education authorities (LEAs), each of which has at least one staff member fully or partly focused on issues pertaining to gifted children. Every school is expected to have a policy for their gifted and talented pupils.

Teacher and parent organizations have been paramount in prompting the development of special provision in England and Wales. The parent organization, the National Association for Gifted Children (NAGC), was founded in 1966 to provide understanding and practical help, and in 1984, teachers founded the National Association for Able Children in Education (NACE) to support and train teachers.

Central and Southeastern Europe

Bulgaria, Croatia, Hungary, Poland, Romania, Slovakia, Slovenia, and the Ukraine generally recognize high ability through legislation, which regulates how the issue of high ability is dealt with,

though the remit is broad. Some prescribe provision for talents as obligatory for state organizations (e.g., ministries, public schools, and so on). Others only mention it for calling the attention to the issue. Such legislation has mainly developed in the 1990s, directly reflecting the political changes since the Soviet Union dissolved. With a new political and democratic agenda, a long-standing experience of nurturing talent facilitates the further development of gifted education in this middle and eastern part of Europe. Unfortunately, money there is short, but this is already beginning to resolve. The legacy from the old regime is a strong conviction of understanding gifted education. During the Communist era, serious programs for the gifted had already been initiated: children's palaces, special language schools, science schools, circus schools, gymnastics, and more.

Western, Middle and, Southern Europe

State ordinances and legislation guiding education in Austria, Belgium, France, Germany, Italy, Portugal, Switzerland, Spain, and the Netherlands tend to be *inclusive*. This means they contain general formulations on the rights of all children to adequate education and describe how such education should support and meet their abilities and interests, implying special provision for the most able. Usually, this emphasizes enrichment and acceleration through early admission to schools, grade skipping, or moving through grades at a faster rate than normal. Educational moves such as these, however, are not accepted practice in all Western, middle, and Southern European countries. Enrichment is normally more attractive and is most frequently suggested as a way of expanding and deepening knowledge and skills, which is vital for gifted education.

Northern Europe

Although the ethos of egalitarianism is a potential problem for gifted individuals in much of Europe, Scandinavia—notably Denmark, Norway, and Sweden—is exceptional in this respect. There, the strict notion of equality and social collectivism at all levels of society is best understood as an inherent cultural characteristic in which certain political ideals have merged with indigenous traditions. There are no official policies or implementations of gifted education in any Scandinavian country.

Finland, however, not as strictly egalitarian as her neighbors, is currently the leading Scandinavian country in the field of gifted education. There have been several recent individual research initiatives in this area in Finland. Interestingly, Finnish school outcomes, despite providing no actual extra resources, have been shown to be leaders in the world in international academic competitions.

Russia

High ability is recognized politically by the post-Communist Russian government, but there are no stated priorities regarding which subjects or fields of pursuit in which particular provision should be developed. In providing training for gifted and talented individuals in Russia, the term *gifted* is usually avoided. For example, in Moscow, where there are approximately 1,250 federal and about 250 private schools, half of these host enrichment programs rather than "programs for the gifted." Special schools and special classes are available that range in focus from academic skills to music, the arts, and sports as well as vocational and practical skills. There are also special boarding schools for mathematically gifted children from the remote and rural areas of Russia. During the transition from communism to democracy, a particular concern has been that gifted individuals must not be wasted or overlooked during societal change. Rather, they represent a necessary national investment, which eventually may help solve societal problems.

Is There a Specific European Approach?

The conditions for developing provisions for the highly able in Europe are unique in that the complexity of the issue demands European-based research to find ways of implementation and to develop strategies commensurate with the psychological nature of highly able individuals, compatible with the particularly wide variety of cultural legacies of Europe, and agreeable to current political ideologies. Also, all European school systems tend to follow inclusion as a main principle in any kind of development. Gifted

education in Europe, therefore, is mainly education pursued in inclusive settings and is education signified by cultural variety.

Roland S. Persson

See also Cultural Conceptions of Giftedness; Global Issues

Further Readings

Centro Para Jovenes Con Talento (Spain): http://www.ctys.net

Centrum nadáni (The Czech Republic): http://www.centrumnadani.cz

Centrum voor BegaafdheidsOnderzoek (the Netherlands): http://www.ru.nl/socialwetenschappen/cbo

The European Council for High Ability (Pan-European): http://www.echa.ws

Internationales Centrum für Begabungsforschung (Germany): http://www.icbf.de

National Association for Gifted Children in Education (UK): http://www.nace.co.uk

Organisation for Economic Cooperation and Development (OECD). (1999). *Measuring student knowledge and skills: A new framework for assessment*. Paris: OECD.

Persson, R. S., Balogh, L., & Joswig, H. (2000). Gifted education in Europe: Programs, practices, and current research. In K. A. Heller, F. J. Mönks, R. A. Sternberg, & R. Subotnik (Eds.), *International handbook of giftedness and talent* (pp. 703–734). Oxford, UK: Pergamon.

Urban, K. K., & Sekowski, A. (1993). Programs and practices for identifying and nurturing giftedness and talent in Europe. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 779–795). Oxford, UK: Pergamon.

Evaluation of Programs

Program evaluation is defined as the process of gathering data about a program systematically, reliably, and validly for the purpose of making informed value judgments about the quality of the program components and operations and the impacts of the program, including its effectiveness in achieving its goals and objectives. The kinds of data collected to make those determinations can be formative (for the purpose of providing information to decision makers about the ongoing program operations and intermediate achievements of the goals of the program) or the data may be summative (judging the outcomes of program). Program evaluation is structured to ensure that once gifted programs are established, decision makers have systematic information about the effectiveness of the services offered in providing for the education and development of the students for whom those services are designed. Otherwise, gifted students may be wasting valuable educational time, resources may be squandered on ineffective practice, and a false sense of confidence may hide educational malpractice.

Gathering reliable and valid information provides the basis to improve programs, assesses the degree to which students are learning and achieving the goals of instruction, and provides information to others about the impact services are having. The National Association for Gifted Children provides guidelines for best practices and standards in planning and revising programs, and appropriate implementation in the right context with specific groups of students should lead to expected outcomes. But often a large gap exists between intentions and practice. The way in which individual administrators and teachers translate best practice guidelines into program administration, curriculum, or classroom instruction may be flawed in minor or fundamental ways resulting in inadequate services and inferior learning opportunities. Furthermore, what translates into best practice in one school setting or classroom may not translate into best practice in another because of the unique context. This entry describes general models of program evaluation, gifted education program evaluation models, principles in gifted education program evaluation, and research on gifted education program evaluation.

General Models of Program Evaluation

Within the discipline of program evaluation, experts have offered many models for evaluating educational programs. Jody Fitzpatrick, James Sanders, and Blaine Worthen have classified these into five categories. The objectives-oriented

approach focuses on specifying goals and objectives and judging the degree to which those have been achieved. One such model developed by Malcomb Provus, the *discrepancy evaluation model,* focuses on identifying all the components of a program, the program resources (Inputs), program activities (Processes), and the objectives or expected outcomes (Outputs) and provides a guide to the evaluator in assessing the ways the relationships between these components work toward achieving program goals. The outcomes-oriented model is countered by the goal-free evaluation model, which does not assume that goals are a given but, rather, that the goals themselves should be examined as part of the evaluation and that evaluation should focus on actual outcomes not just intended outcomes. Management evaluation models are designed to serve decision makers who are the audience for the evaluation. For example, in Daniel Stufflebeam's context, input, process, and product (CIPP) model, the evaluator will focus on (a) the situation in which a program exists and evaluate it relative to the potential for productivity that the environment provides; (b) the resources available to the program and whether they are adequate for the program design and are being used effectively and efficiently; (c) the activities of the program to judge whether they are being implemented as planned and the likelihood they will produce desired goals; and finally, (d) the outcomes of the program to ascertain whether the goals of the program have been achieved. Consumer-oriented evaluation approaches are used primarily in evaluating education materials. In expertise-oriented models, the focus is on using professional expertise to judge the institution, program, product or curriculum. The model of evaluation is one that all educators have been exposed to frequently as the accreditation or certification model in which the aspects of a program are evaluated against a set of standards established by the accrediting agency such as the public school accreditations that are carried out by state departments of education. Elliot Eisner notes that this model relies on connoisseurship and criticism. Robert Stake provided the impetus for participant-oriented evaluation that begins by focusing on the values and needs of the individuals and groups served by the program (the stakeholders), which has evolved into responsive evaluation and case study approaches. These models have been widely used in evaluations focusing on in-depth understanding of how a program is functioning relative to all the stakeholders involved and has a basis in qualitative methodology. Michael Patton advocates for utilization-focused evaluation that focuses on using stakeholders to identify the ways in which evaluation data will be used. No research exists that clearly identifies relative merits of one model over the other leaving the choice among alternatives a matter of the evaluator's preference and the purpose of the evaluation.

Gifted Education Program Evaluation Models

In gifted education, three models have evolved based on blending the principles and approaches of these standard models. The first to emerge in the literature was the *key features model.* In this model, Joseph Renzulli advocated first identifying prime interest groups, which are then surveyed and interviewed to determine the major concerns or questions they deem important. Then data is collected and organized around the key features of program quality that Renzulli had identified in earlier research. The second model was developed by Carolyn Callahan and Michael Caldwell based on the *discrepancy evaluation model.* Finally, an eclectic model, the William & Mary model, has been outlined by Joyce VanTassel-Baska and Annie Feng.

Principles in Gifted Education Program Evaluation

Although unique in approach, each of the general and gifted education program evaluation models seeks to address the Program Evaluation Standards of the Joint Committee on Standards of the American Educational Research Association and the American Psychological Association. The set of principles are organized around the *utility* of the information that is collected and reported, the *feasibility* of collecting the data needed, the *propriety of the design* (ethical and moral standards), and the *accuracy* of information. These standards are designed to ensure that the time and effort devoted to collecting data is expended in efforts to document program outcomes and to improve program functioning.

Research on Gifted Education Program Evaluation

Research on gifted program evaluation is scant. Reviews of evaluations of gifted program have revealed heavy reliance on summative reporting, using questionnaires as the dominate mode of data collection, limited efforts to involve a broad array of audiences or to provide data to audiences beyond administrators, failure to focus on program outcomes—particularly student learning outcomes—and lack of effort to use outcomes for policy development or program improvement. Research on characteristics of the strongest evaluations (based on the degree to which evaluation data was actually used in decision making in gifted programs) identified several critical components: (a) development of a clear evaluation focus or foci (e.g., the dropout rate of minority students from gifted services instead of the degree to which the program is working); (b) identification of a broad array of stakeholders and using multiple data sources in gathering evaluative information; (c) measurement of student outcome data such as achievement test scores (with adequate ceiling to measure growth), ratings of student products, and affective and cognitive outcomes; (d) complex descriptive and analytic approaches to data analysis (combining quantitative and qualitative data collection and analysis to combine judgments of outcomes with reasons for those outcomes); (e) clear implementation plans that involve the input from multiple stakeholders; (f) evaluation reports written for multiple audiences; (g) qualified evaluators, usually external evaluators with credentials in evaluation and gifted education; and (h) focused and robust recommendations for classroom and programmatic changes.

Two key factors underlie the use of evaluation findings. First is the will to evaluate, which includes commitment by key personnel in the school district and systematic procedures put in place by those persons. The second is skill, which includes the following: evaluation of gifted programs as part of districtwide policies requiring evaluation of all school programs; creation of systematic written plans delineating steps and procedures for ensuring implementation of findings; open and encouraged involvement of multiple stakeholders in planning, monitoring, and reviewing the evaluation process and findings; stakeholder groups who know how to play an active role in advocating with policy makers for program change based on evaluation findings; and key program personnel knowledgeable about gifted education, evaluation, and the political process in the school division.

Examination of research and best practice in the fields of general education evaluation and evaluation of programs for the gifted provides guides that can be broken down into four stages. During the first stage, preparing for the evaluation, individuals charged with planning the evaluation should ensure the following: (a) the program specifies clearly developed goals and objectives that can be a focus of the evaluation; the articulated goals and objectives are those valued by key stakeholders; (b) the school district has made a commitment to meaningful evaluation by providing adequate resources (time money, and personnel); (c) representatives of key stakeholder groups serve as an active steering committee and provide sufficient political sophistication to identify and gain access to key decision makers to inform actions resulting from the evaluation; (d) the plan provides for formative and summative evaluation; (e) the evaluators are knowledgeable in gifted education and qualitative and quantitative evaluation strategies; (f) roles of evaluators, stakeholders, administrators, steering committee, and so on are clearly articulated; (g) the plan includes clear timelines with adequate planning to influence decision making; and (h) plans include provisions for confidentiality and sensitivity in handling data. During the second stage, data collection, evaluators must articulate clearly stated evaluation questions that address program goals, structures, functions, and activities; evaluation questions should be likely to generate findings that will have a positive impact on programs and participants; evaluation plans should include multiple data sources and varied data collection strategies and modes; both process and product data should be included—particularly regarding student outcomes as well as quantitative and qualitative data as appropriate; valid and reliable assessment tools should be used; how data will be reported should be specified; and staff should be for the process and their roles in the process. When actually conducting the evaluation (stage three), the evaluators and the steering committee's goals should be to ensure appropriate management of data and use of findings. To ensure that

multiple stakeholders are involved in data collection, evaluators are visible to varied audiences, and multiple stakeholders are involved in reviewing the evaluation process and its evolving findings, there is a plan for quick turnaround of data and analysis and feedback, and there is a commitment to using findings for positive program change. Finally, in stage four, the evaluators and steering committee should assess the impact of evaluation findings and interpret them according to interests and needs of stakeholder groups; review evaluation reports to ensure they are free of jargon and clearly describe the program, the evaluation questions, the process, the participants, data collection strategies, and analysis; develop a process for follow-through with specific recommendations for action; present data in a timely fashion with oral as well as written presentation and opportunity for discussion; and make plans for ongoing evaluation follow-up and a cycle of future evaluation.

Carolyn M. Callahan

See also Best Practices; Research, Qualitative; Research, Quantitative; Student Attitudes; Test Development

Further Readings

Callahan, C. M. (Ed.). (2004). *Program evaluation in gifted education.* Thousand Oaks, CA: Corwin Press.

Callahan, C. M., & Caldwell, M. S. (1995). *A practitioner's guide to evaluating programs for the gifted.* Washington, DC: National Association for Gifted Children.

Fitzpatrick, J. L., Sanders, J. R., & Worthen, B. R. (2004). *Program evaluation: Alternative approaches and practical guidelines* (3rd ed.). Boston: Allyn & Bacon.

Gangopadhyay, P. (2002). Making evaluations meaningful to all education stakeholders. Retrieved from http://www.wmich.edu/evalctr/checklists/makingevalmeaningful.pdf

Renzulli, J. S. (1975). *A guidebook for evaluating programs for the gifted and talented.* Ventura, CA: Office of the Ventura County Superintendent of Schools.

Stufflebeam, D. L. (1999). Evaluations plans and operations checklist. Retrieved from http://www.mich.edu/evalctr/checklists/plans_operations.pdf

Stufflebeam, D. L. (2004). Evaluation design checklist. Retrieved from http://www.wmich.edu/evalctr/checklists/evaldesign.pdf

Tomlinson, C. A., Bland, L., Moon, T. R., & Callahan, C. M. (1994). Case studies of evaluation utilization in gifted education. *Evaluation Practice, 15,* 153–158.

Tomlinson, C. A., & Callahan, C. M. (1994). Planning effective evaluations of programs for the gifted. *Roeper Review, 17,* 46–51.

Everyday Creativity

Discussions of creativity often invoke images of artistic masterpieces, trendsetting musical accomplishments and scientific and technological breakthroughs. Yet, such images can cast a shadow on everyday expressions of creativity. Indeed, a student's creation of an original and personally meaningful iMovie or a parent's unique and engaging nighttime tales can seem quite insignificant when compared with the master works of Martin Scorsese or the classic tales anthologized by the Brothers Grimm. However, the concept of everyday creativity asserts that the student's iMovie and the parent's bedtime stories are still important and meaningful forms of creative expression. Moreover, such everyday creative expressions can imbue life with meaning, joy, and personal or even social transformation. This entry discusses the nature and history of everyday creativity, everyday creativity in classrooms, and nurturing everyday creativity.

The Nature of Everyday Creativity

Definitions of *creativity* typically include the combination of originality, uniqueness, or novelty with meaningfulness, appropriateness, or usefulness. For example, a chef might combine several ingredients in an unexpected manner, but unless the resulting dish is edible, such a novel combination of foods might be considered eccentric—not creative.

All forms of creativity require originality and meaningfulness, but expressions of creativity vary along a broad continuum. This continuum ranges from personally original and meaningful insights—what has been called "personal" or "mini-c" creativity—all the way to revolutionary examples of originality and impact, called eminent or "Big C" creativity. Everyday creativity dwells somewhere in between the two poles of mini-c and Big C creativity and pertains to the process of living life creatively.

The focus of everyday creativity is not so much on producing creative outcomes, but rather approaching everyday activities with a creative, open, and flexible mind-set. Examples of everyday creativity include everything from an elementary teacher's innovative lesson planning to a sixth grader effectively deescalating a potential fistfight between two of his classmates.

A Rich History of Everyday Creativity

Ruth Richards and her collaborators have contributed greatly to increasing awareness and propelling the idea of everyday creativity. Their work adds to a rich history of educators, psychologists, and philosophers who have highlighted the importance of recognizing the everyday nature of creative, imaginative, and aesthetic experiences. Taken together, this body of work effectively highlights that everyone has creative capacity—necessary for coping with uncertainty, daily problem solving, and sometimes even survival. The expression of everyday creativity also has the potential to result in a healthier, happier, and more meaningful life experience.

Everyday Creativity in Schools and Classrooms

Schools and classrooms would seem like an ideal setting for cultivating and expressing everyday creativity. Although long-standing and successful efforts have been aimed at cultivating creativity in schools and classrooms, researchers have also documented how creativity frequently is overlooked and sometimes actively undermined in schools and classrooms.

This devaluing of creativity in schools and classrooms may not be too surprising when one considers commonly held misconceptions about the nature of creativity. For instance, many people believe that creativity only pertains to the arts, only certain people can be creative, and that those few "creative-types" are nonconformist and, therefore, potentially disruptive. Such narrow and problematic conceptions are reinforced by popularized images of creativity that focus exclusively on creative eminence and eccentric behaviors associated with eminent personalities. Consider, for example, the portrayal of Mozart in the 1984 film *Amadeus*. Given such narrow conceptions of creativity, it is easy to understand how teachers and students would feel that creative expression often is not appropriate for the classroom. Everyday creativity offers a broader, more positive and universal conception of creativity. In this view, creativity can be seen as having an additive relationship to the curriculum—imbuing the curriculum with personal meaning and individual expression.

Nurturing Everyday Creativity

Increasing awareness of the positive, enriching, and transformative benefits of everyday creativity will go a long way in helping educators and students approach teaching and learning more creatively. Increasing awareness of the positive aspects of creativity is a first step toward nurturing everyday creativity in the classroom. In addition to increasing awareness, students' expressions of everyday creativity need to be encouraged, recognized, and modeled to take root and fully flourish in schools and classrooms. For instance, rather than simply dismissing a students' unexpected ideas—teachers should welcome and explore the relevance of such ideas in relation to the curricular topic of discussion. This will require moving away from pedagogies of intellectual hide-n-seek—students' puzzling out and reproducing predetermined and predigested bits of information—toward pedagogies of creative transformation. Creative transformations are possible in classroom environments that support intellectual risk taking, encourage and model creative approaches to learning and problem solving, and focus on developing students' understanding, knowledge, and identities in relation to the curriculum, classroom, schools, and society. Such a move requires a good measure of effort and rethinking of schooling by teachers, students, parents, administrators, and related stakeholders. However, everyday creativity offers the promise that such efforts will pay off in the form of a much more powerful and transformative pedagogy.

Ronald A. Beghetto

See also Creative Communities; Creative Problem Solving; Creative Process; Creative Teaching; Creativity, Definition; Eminent and Everyday Creativity; Schoolwide Enrichment Model

Further Readings

Beghetto, R. A. (2007). Ideational code-switching: Walking the talk about supporting student creativity in the classroom. *Roeper Review, 29*, 265–270.

Kaufman, J. C., & Beghetto, R. A. (in press). Beyond big and little: The four C model of creativity. *Review of General Psychology.*

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? Potential, pitfalls, and future directions in creativity research. *Educational Psychologist, 39,* 83–97.

Richards, R. (2007). *Everyday creativity and new views of human nature*. Washington, DC: American Psychological Association.

Runco, M. A. (2004). Everyone has creative potential. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization* (pp. 21–30). Washington, DC: American Psychological Association.

Runco, M. A., & Richards, R. (Eds.). (1998). *Eminent creativity, everyday creativity, and health*. Norwood, NJ: Ablex.

Existential Depression

Depression is a psychological disorder that is characterized by a collection of symptoms including depressed mood, decreased pleasure, weight changes, inability to concentrate, abnormal sleep patterns, agitation, fatigue, or a preoccupation with death. The *existential theory of psychology* posits that human pathology, such as depression, arises from contact, either real or imagined, with one of the four ultimate existential concerns that face humanity: death, existential isolation, freedom, and meaninglessness. These concerns are not discrete constructs, but are intertwined concepts that create the fabric of our psychological lives, as discussed in this entry.

A preoccupation with death is the centerpiece of existential theory. Experiences that evoke death, the inevitable annihilation that faces every living creature, boggle the mind and create extreme anxiety. These boundary experiences commonly involve direct encounters with death, such as the loss of a loved one, or the symbolic encounters, such as anniversaries, life transitions, or birthdays.

Humans create defense mechanisms to combat death anxiety and depression. The two most commonly employed are the belief in an ultimate rescuer and the belief in personal specialty. The ultimate rescuer is anyone or anything that will save one from death and often takes the form of a parent, spouse, or deity. Personal specialty is the belief that one is somehow different, set apart from the others who will eventually die. This is a form of death denial: Death is reserved for the them, not for the I. These defense mechanisms permeate one's psychological state and are usually able to control the threat from death. When, however, boundary experiences are immediate and intense, defense mechanisms may break down, leaving the individual vulnerable to depression. An exaggerated defense response may result in an anxiety disorder.

Another existential concern is freedom. In existential theory, humans are bound to choose. Interpretations and perceptions of the external world are malleable and changeable. Often, however, it easier to view life as a string of imperatives (e.g., "I must be loved," or "I have to do this"), or to relinquish choice to some superior power, such as God, a leader, or loved one. By doing this, one has failed to authentically author one's own life. When made aware of this failure, feelings of guilt and a loss of control can result. Called "bad faith" by Jean Paul Sartre, this existential guilt, conscious or unconscious, can result in pathology and depression.

The third ultimate concern, existential isolation, refers to human's inability to be fully entwined with another. In the end—at one's death—we are alone. Our subjective experience is solely our own; our lives may be experienced with another, but never by another. Each creature's fate is uniquely his or her own. This awareness is in stark opposition to the social nature of humans, in which the fate of any one human is tied to that of the group. This creates the illusion of safety in numbers. When that illusion is broken, and one is forced to face the inevitability of their aloneness, depression and grief may follow.

Meaning in one's life is the final existential concern. Viktor Frankl, one of the European psychologists responsible for bringing existentialism to the United States, designed an entire therapeutic style, logotherapy, around the supposition that meaning and purpose is essential for a healthy psychological

life. Without purpose to motivate behavior, apathy, avolition, and anhedonia are natural consequences. When one fails to autonomously and authentically create meaning or loses a long-standing source of purpose, an "existential vacuum" is created. Unless filled, the lack of meaning can result in depression. For instance, it is not uncommon for a caregiver to suffer a bout of depression after the death of the one he or she supported. Without purpose, an existential vacuum is formed, and depression ensues. Loss or lack of meaning is the most common source of existential depression.

For gifted children, existential depression may be the result of the asynchrony of intellectual development with emotional development. Gifted children may be capable of reading about death, aloneness, and meaninglessness, but unable to integrate the resulting emotions. In addition, reading about world crises and tragedies may create feelings of meaninglessness when the child realizes that he or she can understand the issues involved, but is unable to act to do anything to help solve the problems of the world. Linda Silverman, Barbara Kerr, and others have written about how to help gifted children with existential depression.

A number of measures have been developed to assess aspects of existential depression. The Life Purpose Questionnaire and Purpose of Existence Scale specifically address the presence or lack of existential meaning in an individual's life. These measures are positively correlated with several forms of psychopathology, including depression. The Existential Anxiety Questionnaire is based on the work of the philosopher Paul Tillich and assesses one's apprehension of meaninglessness and death. This measure was created to assess existential anxiety, but it can also be applied to existential depression. The Quality of Existence Scale has been used as a measure of existential depression, and the widely used Quality of Life Scale has a particular existential subscale. Finally, the Existential Depression Scale is a general measure of potential existential etiological factors in the development and maintenance of depression.

Research supports a strong connection between the onset of depression and subjective feelings of meaninglessness and a lack of life purpose. Although grief after the death of a loved one is not considered pathology, unresolved grief and the concomitant existential anxiety has been shown to be a significant risk factor for depression. In general, studies indicate that existential variables account for a unique amount of variance associated with depressive symptoms, above and beyond traditional psychosocial, demographic, and situational stressors. Many researchers have suggested that long-term existential depression may be responsible for chronic fatigue syndrome.

Treatment for existential depression includes traditional "talking" therapies. Therapists from humanistic or existential orientations may be highly effective because they are likely to be more aware of existential concerns and their consequences. Pharmacological interventions are less effective because the root cause of existential depression is nonbiological. Those treated with drug therapies have higher relapse rates and a greater chance of recurrence.

Thomas C. Motl

See also Depression; Existentially Gifted; Meaning of Life; Spiritual Intelligence; Spirituality

Further Readings

Frankl, V. E. (1984). *Man's search for meaning.* Pocket Books: New York.

Kerr, B. A., & Cohn, S. C. (2001). *Smart boys: Talent, masculinity, and the search for meaning.* Scottsdale, AZ: Great Potential Press.

Silverman, L. (1993). *Counseling the gifted and talented.* Denver, CO: Love Publishing.

Yalom, I. D. (1980). *Existential psychotherapy.* New York: Basic Books.

Existentially Gifted

The term *gifted* implies a set of domain-specific abilities that surpass those of one's same-age peers. The evaluation of ability through a measurable and comparable assessment is commonly considered intelligence. As such, those who are considered to be existentially gifted can be said to have high existential intelligence. Howard Gardner's *theory of multiple intelligences* is the only current intelligence theory that has applied the term *intelligence* to existential concerns. There has been

considerable effort to delineate a discrete "existential intelligence" factor that includes a spiritual-philosophical component. Gardner has advanced the most widely accepted definition of existential intelligence: "the capacity to locate oneself with respect to the furthest reaches of the cosmos—the infinite and infinitesimal—and the related capacity to locate oneself with respect to such existential features of the human condition as the significance of life, the meaning of death, the ultimate fate of the physical and the psychological worlds and such profound experiences as love of another person or total immersion in a work of art" (1999, p. 60). In short, this is the ability to successfully place transcendent concepts within a meaningful context. This entry describes existential giftedness and how it fits within the context of multiple intelligences and spiritual intelligence.

Traditionally, existentialism has been incorporated into psychology through the examination of four "ultimate concerns": meaning, responsibility, isolation, and death. *Meaning* refers to the creation or assignment of significance to life experience; *responsibility* to the understanding of how one's choices affect one's relationship to the world and to oneself; *isolation* refers to the unbridgeable separation between the self and the outside world; and *death* refers to the annihilation that befalls all living creatures. These concerns are considered ultimate in that they are universal and inevitable aspects of the human condition.

Existential giftedness is the ability to comprehend and appreciate these aspects of life and includes spiritual connectedness and subjective experiences of aesthetic ecstasy. Those who are gifted in the existential domain are comfortable grappling with the ineffable, infinite, and symbolic components of life; are concerned with larger themes and patterns; and look for larger frameworks of meaning, purpose, and truth. They seek answers to the fundamental questions that underlie their world. Those without strengths in this area may avoid these topics because they are nebulous, abstract concepts that often lack definitive answers.

The abilities associated with existential giftedness include the ability to create meaning from life experiences, determine and internalize existentially significant patterns within the world, and foster—within themselves and others—a sense of purpose. People with existential giftedness are adept at seeing the big picture and usually work best when integrating and synthesizing information. The occupational interests of these individuals may include jobs with overtly existential characteristics, such as the clergy and philosophy, or they may use their existential mindedness in more common fields, such as education or business. For instance, a corporate executive may use existential intelligence to pose such questions as, "Why does this organization exist?" "Where does this company fit into the larger economy?" and "What are the ultimate goals of this corporation?"

Existential intelligence is closely related to intrapersonal intelligence, which is the knowledge of one's own predilections and behavioral patterns, including one's strengths, weaknesses, and biases. The ability to understand internal experiences is integral to existential intelligence. To examine the larger questions of the human condition, it is first necessary to have the introspective abilities to gather evidence from individual existence, and adopt a set of values or principles to guide philosophical inquiry. Knowing oneself is intrapersonal intelligence, whereas placing oneself into the context of reality is existential intelligence.

It appears that existential and intrapersonal intelligences may be purely human qualities. No known correlate to these intelligences exists in any other animals or in artificial intelligence. U.S. males tend to rate themselves higher on existential intelligence than do U.S. women, but the opposite is true for intrapersonal intelligence.

Social positions for those deemed existentially gifted exist in every culture. In the West, politicians, clergy, writers, and philosophers fill this role. Shamans, medicine men and women, and tribal leaders have done the same in past cultures, and still exist in many societies today. The Dalai Lama, for instance, is an example of an existentially gifted individual in such a position.

No measures have been developed to calculate existential intelligence, and many doubt its validity as a unified, separate intellectual entity. Indeed, the inability to quantify the phenomenology of transcendent thoughts and experiences combined with the philosophical nature of the content has lead Gardner to conclude that existential intelligence does not, as currently described, fully qualify as a discrete intelligence. Instead, he determined that

the theory of multiple intelligence has reached "8 ½" defined intelligences. The intuitive appeal of a spiritual component to intelligence, however, has led to the adoption and inclusion of an existential domain of intelligence by many researchers and educators. Until existential intelligence can be defined and measured, it seems that the term *existentially gifted* will remain a controversial, nebulous concept.

Thomas C. Motl

See also Attitudes Toward Religion and Spirituality; Giftedness, Definition; Intelligence; Intelligence Theories; Meaning of Life; Multiple Intelligences; Spiritual Intelligence

Further Readings

Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.

Gardner, H. (2006). *Multiple intelligences: New horizons*. New York: Basic Books.

Expertise

Many North American theorists conceptualize expertise as a precondition for creativity, arguing that to be truly creative, one must master a field to make unique and remarkable contributions to advance it. This position reveals inherent assumptions about the nature of creativity, reflecting the themes of "eminence" and "unique in all the world" found in the literature. This entry begins by defining expertise and then explores its relationship to creativity and giftedness.

What Is Expertise?

Experts are individuals who have worked for a decade within a specific domain and have achieved high levels of competence, irrespective of their novel contributions. It is assumed that after a decade, one has mastered the skills and knowledge needed to perform at the domain's highest levels.

Expertise involves the acquisition, storage, and utilization of two kinds of knowledge: declarative knowledge of the domain (facts, major ideas, principles, and formulae) and tacit knowledge of the field. Some characteristics of expert thinking are the ability to perceive and reproduce large meaningful patterns in the expert's domain; rapid performance of procedures; extensive, rich, well-organized, interconnected, and easily accessible knowledge structures; superior short-term and long-term memory; and rich repertoires of strategies for problem solving. Experts are inclined to use data-driven reasoning when solving well-defined problems. With ill-defined problems, experts change their strategy to hypothesis-driven reasoning. Experts tend to represent problems at a deeper, semantic level. They are likely to work forward from given information to implement strategies for finding unknowns, while monitoring their effectiveness. Experts spend a great deal of time analyzing problems qualitatively, tending to retrieve solution methods as part of their comprehension of the task. However, there is no inherent originality in expert performance. For Howard Gardner, expertise is mainly related to the achievement of the most important skills and mastery of the knowledge domain.

Expertise and Creativity

The strongest proponent of the position that creativity requires expertise is Mihaly Csikszentmihalyi. Within his systemic perspective, anyone who wants to make a creative contribution must first learn the rules and the content of the domain, and fully internalize its knowledge and conventions before changing or advancing some aspect of it. This creative contribution must then pass through the gatekeepers of the field, experts whose "job" is to decide whether a new idea or product should be included in the domain. The cognitive functions of experts operate smoothly and efficiently, so they are assumed to have greater potential for creativity in their field and a greater likelihood to extend the domain. Research substantiates this view. Expertise is associated with innovation, and there is an interaction between an individual's knowledge of a domain and the ability to creatively solve problems.

Robert Sternberg has suggested that experts are more likely to arrive at creative solutions because of their ability to see deeply into problems. This process of insight corresponds to abilities within

his triarchic conception of expertise. An expert's ability to selectively encode allows an individual to differentiate information that is highly relevant to solving a problem from extraneous detail. Selective combination permits an expert to combine information in ways that are useful for solving problems and can result in creative approaches based on novel combinations. An expert's ability to make selective comparisons facilitates the application of information acquired in one context to problems in another. In creating analogies between problems, an expert can arrive at creative solutions that might never occur to a novice. As Gardner has pointed out, however, tension exists between the concepts of creativity and expertise; one can be an expert without being creative.

Not all streams of research about creativity make such strong statements about expertise. A body of empirical work focusing on everyday creativity is growing. Anna Craft in the United Kingdom has argued that because all people, from early childhood on, are capable of creativity, we need to accept a continuum of adaptive creative behaviors. Still, some level of expert thinking may come into play. Craft has described possibility thinking as a strategy to cultivate creativity. Possibility thinking involves posing questions that assist in the exploration of a problem space and cultivate an exploratory attitude, both dimensions reflecting an expert skill in problem representation. Possibility thinking involves seeking solutions with an outcome-focused approach. Solutions are posed, discussed, experimented with, and evaluated. This mirrors the expert's rich repertoire of strategies for problem solving along with mechanisms for assessing these strategies. Much like Sternberg's selective comparison, possibility thinking involves making comparisons.

Expertise and Giftedness

Bruce Shore and his associates at McGill University have attempted to juxtapose the cognitive psychology and giftedness literature. In a series of studies spanning more than a decade, researchers examined the thinking patterns of children, ranging in age from preschool to college, who were labeled as high ability (those who would comply to giftedness criteria). Shore and colleagues found that gifted performance resembles expert performance especially in the areas of metacognition, strategy flexibility, strategy planning, use of hypotheses, and the organization of domain and procedural knowledge. High-ability children used the expert thinking processes of perspective-taking and selective encoding. They frequently used solving strategies that resembled those of expert adults (working with a plan) and took time to explore the problem space (problem finding). Differences were found in the extent to which strategies were invoked, the fluency, and speed with which they were used. Expertise is situated, often specific to tasks within domains, so Shore has suggested that the thinking patterns associated with expertise that are visible in the gifted may reflect domain-general habits of mind that support creativity and giftedness.

Rosemary C. Reilly

See also Cognitive Development; Thinking Skills

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Gardner, H. (1999). *Intelligence reframed*. New York: Basic Books.

Shore, B. (2000). Metacognition and flexibility: Qualitative differences in how gifted children think. In R. Friedman & B. Shore (Eds.), *Talents unfolding: Cognition and development* (pp. 167–187). Washington, DC: American Psychological Association.

Sternberg, R., & Horvath, J. (1998). Cognitive conceptions of expertise and their relation to giftedness. In R. Friedman & K. Rogers (Eds.), *Talent in context: Historical and social perspectives on giftedness* (pp. 177–191). Washington, DC: American Psychological Association.

Extracurricular Activities

Extracurricular activities are opportunities for children to attain levels of enjoyment and learning outside of their regular school day. These activities variously complement the kinds of learning experiences generally incorporated within the school

curriculum, and may be leisure-oriented, scholastic, artistic, athletic, or recreational in nature. Sometimes gifted, talented, or high-ability learners find that a school program does not have the capacity to meet their particular learning needs or exceptionalities, such that they require additional challenges on an extracurricular basis, before or after school, evenings, or during organized and targeted sessions throughout the scheduled lunch hour. These activities may be developed administratively (as might occur with mentorships, or yearbook writing) or they may be co-created by parents, teachers, or children based on current interests (such as involvement in topical or news events–related initiatives). Extracurricular activities are often appreciated by students, and these learning alternatives can provide relevant and mind-stretching ways to broaden conventional educational offerings.

Extracurricular activities provide an exploratory and social outlet for children, enabling them to extend their boundaries in venues that are often considerably less formal than traditional schooling is. Activities or programs may be presented in a variety of forms, such as enrichment, down time, subject-specific learning alternatives, or pursuit of special interests. Benefits include keeping children engaged in meaningful learning; honoring individuals' choices in what they want to know more about (beyond the standard curriculum); alleviating before and after school boredom; helping children find pleasure in doing something new, creative, or challenging; and facilitating social interaction among those who have a common interest or shared enthusiasm. Each of these benefits has the added potential of enriching other areas of a child's life by developing or improving their feelings about learning (e.g., engagement and achievement); their feelings about self (e.g., what they can and cannot do); their feelings about others (e.g., sharing ideas and building relationships); and their feelings about life itself (e.g., all the excitement and myriad experiences that it has to offer). This entry discusses options and fundamentals of extracurricular activities.

Considering the Options

Extracurricular activities can be sourced directly through schools, or at the district or board level. Parents and children might also consider checking local newspapers, community centers, and active parent associations for offerings. It takes time to carefully and discerningly network online venues, but this approach, too, can yield extracurricular possibilities. With a bit of creativity and a resourceful attitude, there is no limit to the types of extracurricular involvement children might envision, tap into, and enjoy. Options include but are not limited to the following:

- *Music*—playing an instrument or participating in a choir, band, or other ensemble
- *Physical activity*—gymnastics, sports, martial arts
- *Theater*—costumes, make-up, clowning, script development, lighting, sets, puppetry
- *Art*—painting, sculpture, photography
- *Crafts*—woodworking, pottery, quilting, model-building, jewelry design
- *Writing*—stories, poems, articles
- *Robotics*—design, development
- *Performance*—dance, song, comedy
- *Leadership opportunities*—tutoring, interest groups, religious and community organizations
- *Clubs*—chess, astronomy, cooking, computers

Extracurricular activities can serve as a bridge between the sterility of the more "official" school milieu and the vitality of real-life learning. However, there are important preparatory matters and other factors to keep in mind. Parents (and teachers) should listen carefully to a child's opinions about activities, and respect his or her personality, concerns, viewpoints, time constraints, and preferences. Consider, too, the advantages of any one activity relative to expense, expectations, and distance from home and school. The activity's social atmosphere should align comfortably with how the child functions, whether independently, in pairs, or in small or large groups. Are special learning needs accommodated? High-level development cuts across cognitive, affective, social, and behavioral domains and areas of experience, and thus, a child's learning profile should be considered. Accelerated programs may be advantageous. Think about what is new, interesting, potentially useful, and career oriented. And, can possibilities be combined? Some children thrive when they are given multiple opportunities to be actively involved in the world around them, whereas others relish a

chance to have quiet time for reflection, reading, or relaxation. Overprogramming children can be counterproductive. A schedule that is overwhelming or that demands constant juggling can compromise a child's well-being. Too much out-of-class activity can lead to stress and fatigue, and threaten healthy productivity and family harmony.

Fundamentals

All in all, choice is good. As a result of choice, more reflection, planning, and extensive decision making may be required; however, it makes sense to offer children a broad range of options from which they can then select (with guidance) the activities that will be most meaningful to them. Some of these may not be well represented in academic programs. Ultimately, children should find pleasure in the supplementary activities in which they choose to participate, and they should be able to experience a sense of accomplishment that is not based on grades. They may be encouraged to take reasonable risks and to try something different just for the sake of trying something different—and to accept errors in areas of relative weakness, as well as areas of strength. There should be flexibility, and an ongoing effort to ensure that an extracurricular program matches the needs and aspirations of the individual.

For many children, the social aspect of extracurricular involvement provides a welcome opportunity for informal get-togethers, pleasant interaction, and fun. The sharing of commonalities can be a wonderful springboard to friendship. Examples of extracurricular activities beyond those mentioned previously that can help to build and cement relationships include community service involvement (for instance, in youth organizations, global causes, political affiliations), camps (summer or weekend experiences specializing in interests such as sailing, language immersion, or horseback riding), university-affiliated programs (in cross-disciplinary areas, geared at or beyond high school level), and competitions (whereby teams work collaboratively in different subjects such as math, science, or history, and then compete locally, regionally, or even nationally in organized events). Extracurricular activities are real-world options that can enhance learning and the joy of learning. They can mean the difference between a day and a curriculum that is full, and a day and a curriculum that is fully extended and shared in meaningful ways.

Joanne F. Foster

See also Competitions; Friendships; Out-of-School; Saturday Programs; Summer Programs

Further Readings

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators.* Scottsdale, AZ: Great Potential Press.

Rogers, K. (2002). *Re-forming gifted education: Matching the program to the child.* Scottsdale, AZ: Great Potential Press.

F

Factor Analyses Creativity

Factor analyses are used to study patterns and relationships among many variables, with the goal of discovering the nature of such variables, their dependence and independence, even though some variables may not be measured directly. Factor analyses have been used to study patterns and relationships among the variables that characterize intelligence and creativity in individuals. Researchers using factor analyses have most often concluded that creativity and intelligence are separate constructs and that typical intelligence tests do not measure creativity. Therefore, creativity tests, such as the Paul Torrance's Torrance Tests of Creative Thinking (TTCT), were developed and have been widely used as a measure of creative potential. Factor analyses of the results of these tests most often indicate creativity itself has two or more dimensions usually modeled with Michael Kirton's *adaptor-innovator theory of creativity.* This entry describes multifactor, single-factor, and two-factor models, as well as additional research.

Multifactor Model

J. P. Guilford, a prominent early researcher in the field of creativity, based his research on creative thinking on factor analyses. His theory of intelligence and creativity dominated the factor analytical approach regarding creativity in the 1960s and 1970s. Seeking the underlying factors in the ability to answer test questions with alternate solutions, he described the overall factor of divergent production as a creative operation.

Guilford's *structure of intellect model* has three dimensions: operation, content, and product. The first dimension, operation, has five categories: cognition, memory, divergent production, convergent production, and evaluation. The second dimension, content, has four categories: figural, symbolic, semantic, and behavioral. The third dimension, product, has six categories: units, classes, relations, systems, transformations, and implications. The intersection of these dimensions provides 120 hypothetical three-dimensional intellectual factors.

Creative problem-solving ability consists of a number of factors: sensitivity to problems (the ability to recognize problems), fluency (the ability to produce many ideas), flexibility (the ability to shift in approaches), and originality (the ability to produce novel or uncommon answers). The operation factor of divergent production is the most important to creative problem-solving ability. Divergent production can be combined with a product and a content category in 24 separate ways that combine into and define divergent thinking. Guilford's concepts of fluency, flexibility, and originality became the basis of TTCT, one of the best known and widely used measures of creativity.

Guilford concluded that intelligence is not unitary but a cluster of specific intellectual abilities. Divergent production is one operation of intellect, which makes creativity a subset of intelligence. However, creative abilities are not measured by conventional intelligence tests that require convergent operations to

produce a single correct answer to multiple-choice questions. Guilford subjected the scores of numerous people on intelligence tests to a factor analysis and found zero correlation between most of the factors of intelligence and reaffirmed that intelligence is a composite of many distinct factors.

Many researchers have come to the conclusion that creativity consists of several psychological factors because of Guilford's proposition that divergent thinking consists of distinct factors including fluency, flexibility, and originality. Similarly, Torrance discouraged the use of composite TTCT scores and warned that using a single score is misleading because each subscale score has an independent meaning.

Single-Factor Models

Several factor analytic studies have concluded that creativity is one dimensional within divergent thinking tests, which are the most commonly used estimate of creative potential. Several researchers have concluded that Torrance's TTCT and Guilford's divergent thinking tests measure only one dimension rather than several independent dimensions. Most researchers concluded that only fluency measures truly represent divergent thinking and that flexibility and elaboration scores have more in common with convergent thinking. Another researcher, however, noted that resistance to premature closure explained the highest amount of the variance in the creativity index (a general indicator of creative potential) of the TTCT. Several other researchers also concluded that the scores of the TTCT primarily reflected one general factor.

Two-Factor Models

Recently, however, a two-factor model of creativity, based on Kirton's adaptor-innovator theory, has been found to be a better fit than are one-dimensional models. Using the TTCT, Kyung Hee Kim and her colleagues found that the two-factor model provided a much better fit than did a model that assumes one general factor. Michael Kirton's adaptor-innovator theory postulates that some creativity is merely adaptation of previous experiences and some creativity is truly innovative. The factor measuring "innovative" creativity was measured by combining fluency and originality scores on the TTCT, and the factor measuring "adaptive" creativity was measured by combining elaboration and abstractness of titles scores; however, resistance to premature closure was also used in both adaptive and innovative factors. The double loading by resistance to premature closure is consistent with Torrance's theory that creative people keep their minds open long enough to make mental leaps, whereas less creative individuals tend to leap to conclusions prematurely. In addition, Kirton postulated that innovators prefer to create change by threatening the paradigm, but adaptors prefer to create change by working within existing paradigms. Further, Torrance and others have found that innovators are significantly more fluent and original. Other researchers have also found that innovators gravitate toward creativity that was original, transformational, and expressive, whereas adaptors are linked to creative endeavors that were logical, adequate, and well crafted. This two-factor approach supports the informal classification of the two types of people found by the scoring experiences of the TTCT: one type produces quick and novel responses and scores better on fluency and originality, whereas the other type gives detailed responses, which indicates greater depth of thought, and scores better on elaboration and abstractness of titles.

Creativity researchers have emphasized that creativity consists of two separate elements, originality and adaptiveness. Originality is not a sufficient indicator of creativity because social value, aesthetic appeal, and appropriateness are also necessary. By itself, originality may be characterized as bizarre and inappropriate work or behavior. Thus, the original idea or product must prove adaptive in some sense. The recipients of that idea or product, rather than the originator, judge an original idea or product as adaptive.

The main elements of innovative factors are fluency and originality, according to Kim and her colleagues' factor model. Fluency, the number of ideas generated, is thought to be related to originality because many researchers have reported high correlations between fluency and originality. Some researchers have concluded that a person's originality is a function of the number of ideas formulated (e.g., the more ideas are generated, the more likely original ideas are generated). However, Torrance concluded that even though fluency may

increase the chance that original ideas will be produced, there is no guarantee that this will occur.

Additional Research

Several factor analyses done on divergent thinking tests other than the TTCT have yielded more than one factor and contradict the idea that creativity is one-dimensional within divergent thinking tests. A researcher factor-analyzed a modified version of the Remote Associates Test and a battery of tests of creativity and yielded a two-factor model in which fluency and originality loaded on Factor 1 and other creativity indexes loaded on Factor 2. Another researcher factor-analyzed the Creative Product Semantic Scale and yielded a three-factor model with Resolution, Novelty, and Elaboration and Synthesis. Another researcher factor-analyzed the TTCT–Figural and Verbal and two creative interest inventories, How Do You Think? and How Creative Are You?, and yielded a three-factor model with Interests and Attitudes, Verbal Divergent Thinking, and Figural Divergent Thinking. Several researchers factor-analyzed 30 measures of the Torrance Tests of Creative Thinking and yielded seven different factors.

Several factor-analysis studies support Guilford's conclusion of creativity as a separate factor from intelligence. He concluded that the correlations between divergent thinking tests and intelligence tests scores are generally quite low. Although above average intelligence is necessary for doing well in divergent thinking tests, high intelligence is not necessary. Two researchers factor-analyzed 11 divergent tests, 4 nondivergent tests, and 2 IQ tests and found that creativity and intelligence are separate factors. A researcher factor-analyzed the Lorge-Thorndike Intelligence Tests and five creativity tests including Jacob Getzels and Philip Jackson's Uses tests, the Word Association Test, the Make-up Problems test, and Torrance's Circles Test and Incomplete Figures Task and yielded a three-factor model with Verbal Intelligence, Reasoning, and Creativity. Another researcher factor-analyzed and yielded a three-factor model with Intelligence, Verbal Creativity, and Figural Creativity. Two researchers factor-analyzed the TTCT–Figural and Verbal, the Picture Interpretation Test, the Metropolitan Readiness Tests, and the California Test of Mental Maturity and yielded a four-factor model with Intelligence, Academic Achievement, Figural Creativity, and Verbal Creativity. Thus, all these factor analyses have identified creativity and intelligence as separate factors. In addition, Kim's meta-analysis in 2005 indicated that the relationship between creativity test scores and IQ ($r = .17$) is negligible, which also supports the underlying belief that creativity and intelligence are separate constructs.

Several researchers, however, factor-analyzed Getzels and Jackson's data of 1962 and did not find any evidence that creativity is a separate factor from intelligence. One limitation is that Michael Wallach and Nathan Kogan concluded that creativity is distinct from intelligence but that the distinction only emerges if creativity tests are administered under untimed and gamelike conditions. Two researchers factor-analyzed Wallach and Kogan's data of 1965 and yielded a three-factor model with General Intelligence, Verbal Creativity, and Visual Creativity and confirmed that creativity and intelligence are distinct under untimed and gamelike conditions. Another researcher factor-analyzed 10 Wallach and Kogan tests using an unrotated principal component solution and yielded a single general component. Later, however, Kogan yielded a three-factor model with Creativity and two of Intelligence when he used rotated promax factor analysis. Two researchers factor-analyzed seven different data sets including Wallach and Kogan's data of 1965, Thomas Ward's data of 1968, Arthur Cropley's data of 1968, Richard Murphy's two data sets of 1973, creative achievement data and creative ability data, and J. A. Hattie's two data sets of 1980, gamelike situation data and testlike situation data, and confirmed creativity and intelligence as distinct. Kim's meta-analysis in 2005 found that the mean correlation coefficient between the Wallach-Kogan divergent thinking measures and IQ tests was statistically significantly ($p < .001$) lower than those between other creativity tests (e.g., the Guilford Tests, the Torrance Tests of Creative Thinking) and IQ tests. This may confirm that creativity factor is distinct from intelligence only when creativity tests are administered under untimed and gamelike conditions.

Kyung Hee Kim

See also Creativity, Definition; History of Creativity

Further Readings

Guilford, J. P. (1967). *The nature of human intelligence.* New York: Wiley.

Guilford, J. P. (1975). Creativity: A quarter century of progress. In I. A. Taylor & J. W. Getzels (Eds.), *Perspectives in creativity* (pp. 37–59). Chicago: Aldine.

Guilford, J. P. (1976). Factor analysis, intellect, and creativity. In A. Rothenberg & C. R. Hausman (Eds.), *The creativity question* (pp. 200–208). Durham, NC: Duke University Press.

Kim, K. H. (2005). Can only intelligent people be creative? A meta-analysis. *Journal of Secondary Gifted Education, 16,* 57–66.

Kim, K. H. (2006). Is creativity unidimensional or multidimensional? Analyses of the Torrance Tests of Creative Thinking. *Creativity Research Journal, 18,* 251–260.

Kim, K. H., Cramond, B., & Bandalos, D. L. (2006). The latent structure and measurement invariance of scores on the Torrance Tests of Creative Thinking–Figural. *Educational and Psychological Measurement, 66,* 459–477.

Kirton, M. J. (2003). *Adaption-Innovation in the context of diversity and change.* New York: Routledge.

Ochse, R. (1990). *Before the gates of excellence: The determinants of creative genius.* Cambridge, UK: Cambridge University Press.

Torrance, E. P., & Horng, R. Y. (1980). Creativity and style of learning and thinking characteristics of adaptors and innovators. *Creative Child and Adult Quarterly, 5,* 80–85.

Wallach, M. A., & Kogan, N. (1965). *Modes of thinking in young children.* New York: Holt, Rinehart, & Winston.

Family Achievement

For centuries, people have recognized a connection between family life and achievement. Many psychologists and researchers have been fascinated with studying this link and finding out just which family characteristics coincide with individuals who achieve greatness. Although traditional research points to the dysfunctional family roots that lead to eminence, more recent research on happy and strong families demonstrates there is also reason to believe a functional and supportive family life encourages both individual and family achievement. This entry discusses family qualities and achievement levels and enhancing family achievement and strengths.

Family Qualities and Achievement Levels

Family Demographic Correlates

For more than 30 years, Nick Stinnett, John DeFrain, Sylvia Asay, and several of their colleagues have studied more than 24,000 family members in the United States and 27 other countries around the world to find out which family characteristics make for a strong family unit and happy, successful family members. From completing such extensive work, they have learned that although demographic variables sometimes correlate with family well-being, family strengths largely have to do with the ways families function and not the internal structure of the family. Included in the strong families these researchers have worked with are two-parent families, single-parent families, stepfamilies, extended families, families with gay and lesbian members, families who have faced crises, parents who grew up in happy families, and parents who grew up in troubled families, among other demographic compositions. The authors also note that although each family has distinctive strengths and each culture has unique family strengths, considerable similarities exist between families and between cultures when it comes to family strengths and their development.

In their studies of happy families, Barbara Kerr and her colleagues have found likewise and have stated that no religion, class, or race holds a monopoly on family happiness. Though results from their work with happy family members indicate these families tend to have more members than the average U.S. family and that they tend to have both a father and mother present in the home, the families from the study were quite diverse. Of the 27 participating families, 4 had experienced divorce, 2 had endured an affair and a temporary separation, 1 included a mother with terminal cancer, 1 included an openly gay father who shared the household with the mother, and 1 had both a stepfather and father living in the same house with the mother and children.

However, although nearly any family structure can have strong and successful family members,

educational researchers also have expressed concern that children of single parents in the United States, on average, have lower achievement levels than do children of dual-parent families. Suet-Ling Pong, Jaap Dronkers, and Gillian Hampden-Thompson hypothesized that this finding may result more from national family policy than from an inherent problem with raising children in single-parent families. In 2003, Pong and colleagues completed a study to find out whether the achievement gap between children who live with both of their biological or adoptive parents, versus children who live in one-parent homes, varies from country to country according to the type of family policy each nation has. They looked at math and science achievement scores for children from 11 countries—Australia, Austria, Canada, England, Ireland, Iceland, the Netherlands, New Zealand, Norway, Scotland, and the United States—to test their hypothesis. As predicted, their results suggested that the correlation between children's math and science achievement scores and the number of parents in the home is stronger when countries have less substantial welfare policies. The authors noted that in their study, samples from New Zealand and the United States had the strongest correlations, whereas in Austria and Iceland, the correlations were not significant and the achievement gap appeared to be nonexistent.

Family Qualities Associated With Eminence and Underachievement

When families have gifted individual members, which family qualities help determine whether these gifted individuals will reach their full potential or underachieve? In 1988, Sylvia Rimm and Barbara Lowe attempted to answer this question by studying families of underachieving gifted students and comparing their findings with those from studies on families of eminent achievers. In some ways, families from Rimm and Lowe's sample and families of previously studied eminent individuals were similar. Both groups tended to have hardworking and success-driven parents who provided their children with early enrichment and lessons to develop talent, and who clearly expressed their expectations for achievement early on in their children's lives.

However, the authors discovered clear differences between these types of families as well. For example, in the families of Rimm and Lowe's underachieving participants, once children reached a certain age, their childhood enrichment morphed into overwhelming routine activities that detracted from the children's motivation to carry out their own intrinsically rewarding projects. The parents in these families also failed to model the pleasure in learning for learning's sake rather than for meeting extrinsic expectations. Furthermore, in contrast to parents in families with eminent individuals, these parents tended to complain about their work without communicating the value in it so that the children became disinterested in the world of work as well. Although most mothers in both groups were full-time stay-at-home ones and were constantly busy, the mothers of eminent children tended to express contentment with their roles whereas the mothers of underachieving gifted children expressed frustration over the lack of opportunity to pursue their own desired careers. In addition, Rimm and Lowe found that in the families in their sample, the parents adopted more of a "good cop–bad cop" inconsistent parenting style, whereas the previously studied mothers and fathers of eminent individuals agreed more on which parenting approach they wanted to exercise together.

Strong, Happy Families and Achievement

With their development of the *international family strengths model,* Stinnett, DeFrain, Asay, and their colleagues have studied how families rise effectively and creatively to challenges that face them. From this framework, these researchers have identified six traits indicative of strong families: appreciation and affection, commitment to family, positive communication, enjoyable time together, spiritual well-being (which may or may not include religion), and the effective management of stress and crisis. In addition, the researchers have learned that strong families have faith in the potential and value of each member in addition to appreciating the family as a whole.

Although some psychological literature highlights the ways happy and strong families contribute to the achievements of each member, the more commonly held belief is that the most creative and infamous achievers develop their talent in response to tragic or dysfunctional family lives. In an

attempt to test empirically this belief—and guided by findings from research such as Nicholas Colangelo and colleagues' 1991 study of highly prolific U.S. inventors that revealed families full of support, humor, and love—Barbara Kerr, Michael Gottfried, Corissa Chopp, Sanford Cohn, and Amy Harkins gathered a sample of individuals who were identified as being from happy families. That is, out of the group of people who took an assessment of family functioning and style, these individuals reported the highest scores and scored in the top 10 percent of the assessment's national norms. With this sample, the researchers were able to explore whether the participants' happy and functional families included notably talented individuals despite being devoid of major dysfunction or constant turmoil.

What they found was that the children from these families were multitalented, and many of the participants from these families who denied being creative reported having at least one considerably creative sibling. In addition, the participants noted categorically that their families were emphatically supportive of each member's original ideas and attempts to take appropriate risks. They also reported that this support helped them to be confident in their capabilities for learning, resourceful in overcoming barriers, and motivated to value intrinsic evaluation over external judgment. Other findings from these families were that their homes were welcoming and comfortable, that members had a lot of fun with each other and enjoyed educational activities, and that the children often kept records of their experiences (e.g., journal entries) because they felt their experiences were worth documenting. From these results, the authors hypothesized that happy families encourage everyday sustained creativity, such as that of an inventor, as opposed to eminent creativity or intense creativity that achieves fame, such as that of an acclaimed poet.

Enhancing Family Achievement and Family Strengths

The findings from work of family researchers such as Asay, Colangelo, Mihaly Csikszentmihalyi, DeFrain, Kerr, Lowe, Rimm, Stinnett, and their colleagues suggest that families can employ several strategies to enhance and maintain individual and family achievement. Among them are the following:

- Do plenty of fun activities together.
- Approach life with a sense of humor.
- Encourage individual goal setting and attainment.
- Have a strong work ethic, but make sure to express the personal satisfaction that comes from accomplishments and not just the labors of difficult work.
- Model intrinsic rewards and encourage them in children. Be unwaveringly supportive, but pay attention to what is rewarding about the learning experience other than parental or external praise.
- Give space, time, and support for independent projects and encourage the whole process, not just the finished product.
- Keep track of family growth and express the idea that every family member's experience is important. Growth charts, hand prints, scrapbooks, home videos, and correspondence with infrequently seen family members are a few ideas for accomplishing this goal.
- Eat together and use mealtimes for positive enjoyable time together rather than for corrections and reprimands.
- Invite interesting people to visit the home to share their stories and personalities with the whole family.
- Help family members learn about and celebrate ancestors.
- Be a good listener. Try to understand each family member's perspective, and consider ways to help each member live a more fulfilling life.
- Treat conflicts and challenging conversations as opportunities for education rather than chances to pointing out a family member's faulty viewpoints.
- Look for ways to grow and learn during a crisis.
- Express gratitude for the ways family members enrich each others' lives.

Kristin Rasmussen

See also Achievement Motivation; Family Creativity; Underachievement

Further Readings

Colangelo, N., Kerr, B., Hallowell, K., & Huesman, R. (1991). The Iowa Inventiveness Inventory: Toward a

measure of mechanical inventiveness. *Creativity Research Journal, 5,* 157–163.
Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.
DeFrain, J., & Asay, S. (Eds.). (2007). *Strong families around the world: Strengths-based research and perspectives*. New York: Haworth Press.
DeFrain, J., Lodi, K., Brand, G., Fenton, A., Friesen, J., & Hanna, J. (2006). *Family treasures: Creating strong families*. Lincoln: University of Nebraska–Lincoln Extension.
Kerr, B., Gottfried, M., Chopp, C., & Cohn, S. (2003). *The happy family studies: Exploring the origins of creative lives*. Paper presented at the annual meeting of the American Psychological Association, Chicago. Retrieved from http://www.cleoslab.org
Pong, S., Dronkers, J., & Hampden-Thompson, G. (2003). Family policies and children's school achievement in single- versus two-parent families. *Journal of Marriage and Family, 65,* 681–699.
Rimm, S., & Lowe, B. (1988). Family environments of underachieving gifted students. *Gifted Child Quarterly, 32,* 353–358.
Stinnett, N., Beam, J., & Beam, A. (1999). *Fantastic families*. West Monroe, LA: Howard.

Family Creativity

The link between family and creativity has long-standing, mythic origins. In Greek mythology, the Nine Muses were seen as the sources of inspiration and the creative spark in the arts and sciences. The Muses were sisters, and the daughters of Zeus and Mnemosyne, the Titan goddess of memory, who received her own gifts of innovation, creativity, and imagination from her parents, Uranus, the sky god, and Gaia, the earth goddess.

Just as children's creativity differs from adult creativity, so does family creativity differ from other creative joint performances. But what is the "product" of family creativity? Virginia Satir characterized the family as the place of " peoplemaking." Therefore, the focus of family creativity is twofold: the creation and organization of the family system and the self-actualization of its individual members. Both are valid locales for everyday creativity, that is, creativity expressed in the natural environment that focuses on tackling the issues and solving the problems of everyday life. Family creativity is concerned with the expression of change, development, and evolution in the subjective life of the family and its members. It is a response adaptation to the need for new ways of being, relating, and organizing. This creativity could be intrapsychic (the adaptation of feelings and insights or the establishment of meaning and purpose through the formulation of goals) as well as extrapsychic (creative altruism, for example, that leads to new forms of cooperation and reciprocity between people). In other words, the co-creation of a shared family life is a creative endeavor. As well, the family can be an "organizer" that focuses and mobilizes its energy and the surrounding social environment to develop the creativity, giftedness, or talent of its members. This entry describes the family as a creative system and as cultivator for creativity and giftedness.

The Family as a Creative System

Using the lens of systems theory, the creative family can be seen as having unique dynamics that contribute to the nurturing of creativity as a property of the system. Creativity, then, is a product of the relationships and interactions within the family system, and between the system and its milieu. In creative families, individual members have a hand in shaping their family environment through curiosity, passion, perseverance, exploration, and the acquisition of complex skills. A mutually influencing dynamic emerges: parents influence children (exposing them to varied experiences and the arts and sciences, or by valuing original thinking) and children influence parents (a child may have a special interest and parents then seek out additional experiences to support these interests). This mutually influencing dynamic may include the extended family (grandparents or other significant family members).

Creative families provide increased opportunities for learning; high, but realistic expectations coupled with high support; and a richness of resources and stimulation. Day-to-day interactions between parents and children, and the transactional patterns between the adults, are characterized by responsiveness, spontaneity, authenticity, and sensitivity. The family's structure and organization are such that it enhances the creative expression of the

members and the family as a whole. The family provides environmental and emotional supports for its members that are appropriate to their individual, and possibly variable, maturity levels. Conflict and problems are approached as opportunities for learning and applying problem-solving skills to generate innovative solutions. Metacognitive strategies are revealed when adults talk out loud about their problem-solving strategies. Members of the family are encouraged to master challenges autonomously, yet as a family, they maintain common areas of interest that instill the values of achievement, self-discipline, the importance of doing one's best, and satisfaction in accomplishment. Family rituals are created to enhance affective responsiveness and involvement between members; family traditions are created to allow the family to renew itself and strengthen emotional connections. By attending regularly and consistently to family relationships, members become closer to each other, creating healthy patterns of interaction. This increases their capacity to develop close, intimate relationships with others outside of the family system. Creative well-functioning families tend to demonstrate high levels of adaptability when dealing with change or stress, which can include modifications to power structures and role relationships.

The creative family is an open, dynamic, interactive system, so it affects the development of its members, and is, in turn, influenced by the outside environment. For example, family communication can be improved when there are positive family-environment exchanges because activities and topics of conversation can be imported into the family system from the surrounding milieu. Creativity, therefore, is critical to family development because it creates an assortment of potential structures and processes that will meet the developmental needs of its unique members. Creativity allows a family to discover who they are as individuals and as a family system, reveals members' capacities, and allows for a distinctive family trajectory to evolve.

The Family as Cultivator for Creativity and Giftedness

The family, as a primary socializing force, shapes the development of the creative individual. Family background has long been seen as an important variable linked to creativity and giftedness. However, its influence has been difficult to determine. Families affect the potentialities of its members by limiting or enriching the informal learning opportunities that are open to them. But the family's influence is also moderated by the individual's reactions to these factors.

Family Composition and Structure

Many studies of creative eminent individuals found that between one third and one half of the people sampled had lost a parent before the age of 21. This has been termed the *orphanhood effect*. Theorists posit that the loss of a parent at such an emotionally sensitive time causes an individual to compensate later on in life with higher levels of achievement. Another premise is that the loss leads a child to live a more unusual life, thereby setting unconventionality as a lifelong norm. Some believe that if one grows up in a stable, happy household, an individual may have it "too good" to be driven to greatness. Some research supports the idea that creative individuals grow up on the margins of society or have some early trauma. However, this represents only a portion of the early family life experiences of some individuals. Mihaly Csikszentmihalyi interviewed 91 exceptional people in the arts and humanities, sciences, business, and politics, and found that more than half of them grew up in stable, happy families. Barbara Kerr and her colleagues in the Happy Family Studies also found that family happiness was associated with sustained creative productivity of all members.

Birth rank order effects are also controversial. The early works of Francis Galton and Havelock Ellis found an overrepresentation of first-born children in the sciences and other domains. However, more recent investigations have noted that first-born children are less likely to be innovative revolutionaries; the creative iconoclast is more likely to have a middle position in the family.

Generally, though, in families with a gifted or talented member, creativity becomes the organizing principle for the family structure. Role allocation, responsibility, and the maintenance and management of the family system will be focused on supporting the gifted member.

Family Environment

Parents want to create an optimum environment to foster the full development of the creative members of the family. They do this by creating and providing stimulating experiences that appropriately encourage creativity and talent; promoting imaginative play and self-expression; and eliminating gender scripts from opportunities to play with and manipulate toys or building materials. Creative family environments tend to be child-centered. Linda Silverman reported that gifted teens described their family environment as characterized by warmth, affection, respect and honesty; supportive of their interests; and stimulating. Their home lives were composed of an enriching variety of activities and opportunities to develop their talents and interests. Parents set aside time to work and play together, yet still created opportunities for the adolescents to develop independence. However, good intentions can create pitfalls: feelings of unceasing pressure to not waste time that might be devoted to more "productive" pursuits or the need for constant praise. These psychological drawbacks can become the source of later difficulty: anxiety, a diminished sense of capacity, skepticism, or the sense of being an imposter.

Family Processes and Relationships

One of the primary functions of the family is to provide a place of balance for the creative individual: experimentation with feedback, freedom with structure, setting goals and striving for high achievement with the delight in meeting a challenge regardless of the outcome. This family balancing act may be linked to the creative adult's ability to manage the dialectical tensions within a paradoxical personality that generates creative energy. This ability to effectively move from one end of a polarity to another is described by Csikszentmihalyi. For example, in the creative family, discipline may be viewed as somewhat lax because creative children are given more freedom and autonomy than is generally deemed acceptable. However, this approach still gives children a sense of security and safety. It allows them to play, explore, and experiment within a structure that is appropriate to their precocity.

In terms of family relationships, gifted children tend to be products of stable well-adjusted systems. This may mean a stable marriage or, in the context of low-income lone-parent families, a stable extended family network. These families have developed empowering family cultures, which are characterized by relationships that are flexible and resilient, with high levels of hardiness and cohesion. Relationships exhibit the appropriate degrees of emotional separateness and connection. Parents give talented children space without controlling them, balanced with close, caring, warm relationships.

Use of Family Resources

Giftedness can be a nonnormative stressor for the family, calling upon adaptive responses, family reorganization, and the use of family resources to support the nurturance of the member's talent. Family support and assistance is crucial to this process. Though children provide energy, enthusiasm, and determination, they cannot secure the resources and opportunities to foster their creativity. The responsibility for mobilizing and monitoring these resources falls to the adults in the family. Parents do this by allocating extra time to the gifted child. They may foster strong alliances with outside organizations or individuals; this may involve relocating the family to be closer to an institution that is key in supporting a child's talent. This process entails high family commitment, availability, and support—all key family resources.

Family Values

Transformation of early giftedness into a set of appropriate values, drives, and abilities begins in the family. This permits the gifted individual to engage in highly creative work later in life. Family values are tacit rules that govern the social interactions within the family. Does a family's values reflect an emphasis on practicality or encourage creativity? Does the family reject innovation because they value traditional ideals? Does the family see creative activity as low status or not financially rewarding? The lived values within the family system play a key role in determining whether an individual chooses a creative path or not.

Creative families instill the value of engaging in productive work for its own pleasure and satisfaction. Creativity and risk taking go hand-in-hand, resulting in family systems whose motto is, "Each

attempt leads to another," rather than focusing solely on the output. In comparing effective creative families with those who experience conflicts, the difference is the degree of emphasis placed on the child's performance: performance at all costs versus being loved regardless of performance. For high-IQ, high-achieving members, values that enhance development are supportive close relationships, high standards for education and achievement, and valuing stimulating intellectual and cultural activities. For the creatively gifted, values that enhance development are independence, support for goal achievement, unconventionality, and openness to varied modes of expressing thoughts and feelings.

Rosemary C. Reilly

See also Everyday Creativity; Parenting

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Kerr, B. A., Gottfried, M., & Chopp, C. (1999). Families and creativity. In M. Runco (Ed.), *Encyclopedia of creativity* (pp. 709–715). San Diego, CA: Academic Press.

Moon, S., Jurich, J., & Feldhusen, J. (1998). Families of gifted children: Cradles of development. In R. Friedman & K. Rogers (Eds.), *Talent in context: Historical and social perspectives on giftedness* (pp. 81–99). Washington, DC: American Psychological Association.

Satir, V. (1988). *The new peoplemaking* (3rd ed.). Mountain View, CA: Science and Behavior Books.

Silverman, L. (1986). Parenting young gifted children. In J. Whitmore (Ed.), *Intellectual giftedness in young children: Recognition and development* (pp. 73–87). New York: Haworth Press.

Film and Film-Making Gifted

The art and science of film and film-making could, arguably, be called the most creative among domains. As such, these occupations appeal to creatively gifted young people. Most people stand up to leave a movie when the actors leave the screen and the credits begin to roll. Few stay for the 5 minutes or so it takes to acknowledge the many people it takes to make even small-budget, independent films. The credits include the executive producer, the director and the assistant directors, the camera operator and assistants, the sound mixer, the boom operator, the producers, the cinematographer, the costume designer, the set designer, the art director, the writer, the production manager, the unit production manager, the line producer, the assistants for all of these, the sound mixer, the gaffer, the key grip, the best boy, the Foley artist, the visual effects director, the stunt coordinator, the music mixer, the boom operator. Each of these is a subdomain within the domain of film. Many take special training and schooling, and have apprenticeship levels on the way to expertise. This entry describes some of these positions.

The Producer

Producers acquire the film script and work to get the film made, including hiring the director, seeking or providing financial backing, supervising the various versions of the script, and working to keep the film within budget while filming. Louis B. Mayer, a native of New Brunswick, and the child of Russian Jewish immigrants, who became the head of Metro-Goldwyn Mayer (MGM), started as a theater owner in Massachusetts, and then became a producer, seeking to create films that had a certain appeal to the general public.

The Director

The director is hired by the producer. The director is in charge of hiring the actors, deciding on the locations of the scenes, keeping the film within its budget, and managing the shots. A director is called an *auteur* (French for *author*) if he has a recognizable style that is much admired by critics. Examples of auteurs are Woody Allen, Michelangelo Antonioni, Robert Altman, Ingmar Bergman, Jean Cocteau, Francis Ford Coppola, Federico Fellini, John Ford, D. W. Griffith, Jean-Luc Godard, Alfred Hitchcock, Stanley Kubrick, John Sayles, Martin Scorsese, Steven Spielberg, and François Truffaut. Critics such as Pauline Kael and Andrew Sarris have criticized the auteur theory of directing, noting that the art of film

requires many other master creators, and that the "look" of a film is often the province of the cinematographer and the art directors. However, the director is the one who is responsible overall for the approval of the look.

The Writer

The film writer is often undervalued, according to film writers, who argue that the film would not even exist if the writer had not created it. Film writers may write original screenplays, or write adaptations from other media, such as books or plays. The Writers' Guild of America determines who gets the writing credit for a film because many writers might work on one script. Often, literary writers are asked to write on films, and several literary works have come out of the experience, for example, F. Scott Fitzgerald's *The Last Tycoon.*

The Cinematographer

The cinematographer is the artist who works with the director to create the look of the film, working with lighting and helping frame shots. The cinematographer is also called the director of photography (DP), and is the head of all the photographers, though he or she may not hold or shoot with a camera. The American Society of Cinematographers (ASC) was founded in 1919 and is the oldest professional film society still operating. Many directors have favorite cinematographers with whom they work. Examples are Sven Nyqvist, who worked with Ingmar Bergman. Some cinematographers tell stories about their early passion for photography. Bonanza Emmy Award–winning cinematographer in 1962, Haskell Boggs, ASC (1909–2003), who worked with actor and director Michael Landon on *Bonanza, Little House on the Prairie,* and *Highway to Heaven,* said that seeing *The Birth of a Nation* in the 1920s inspired him to make his own 35-millimeter camera in his high school machine shop, and he never stopped being amazed at the wonders of light and shadow.

The Production Designer

Working with the cinematographer is the production designer (PD), who supervises the building of scenery and sets for films. Closely collaborating with the director, the production designer creates a look for a movie. Knowledge of interior design and architecture is crucial, as is knowledge of historical periods and construction methods. The PD must also work closely with the costume designer, the artists who plan and design makeup and hair, the artists who design special effects for the film, the people who work with the places and locales where the film will take place, the art director and his or her assistants, the set decorator, the model makers, the graphic designers, and various other specialists. The film must look coherent, and that is what the production designer does. Some eminent production designers are William Cameron Menzies, who worked on the iconic *Gone with the Wind*, and James Davies, who designed several of the Star Wars movies. One can see these movies in the mind's eye because of the production design.

The Editor

Working with the director, the editor cuts the movie. The term *left on the cutting room floor* is a tribute to the power of the editor. Some have argued that the editor may be the more creative of the two, in the ability to visualize how snippets of scenes, music, dialogue, continuity, coherence, will convey the collective visions of the producer, director, designers, writers, and actors. An editor first makes an editor's cut, then the director works with the editor to make the director's cut. The studio that is producing the film usually has the final cut, though auteur directors often negotiate to have their cuts be the final ones. Directors and editors of independent films have more freedom in the editing. Editors used to work on equipment called a *Moviola,* which permits a film to be physically cut within the shot; now they mostly work digitally, on flatbed editors, with computer software. Michael Kahn, who won an Academy Award in 2006 for Steven Spielberg's *Munich,* and who won Academy Awards for *Raiders of the Lost Ark, Schindler's List,* and *Saving Private Ryan,* is the most recent award-winning editor who still works on a Moviola.

The Actors

Society appears to have an ambiguous attitude toward actors and acting. On the one hand, a

famous actor is venerated and paid millions of dollars to do a blockbuster action film; on the other hand, the actor may be thought to be somewhat frivolous, weird, and outside of the norm. We may not remember the names of the characters our favorite actors played in their roles; we often remember that the movie or play starred Al Pacino or Tom Cruise, but not the characters they played. In movie acting, "the look" is so important that passion for the domain may be subsumed to the desire to make money. Many contract actors from the old MGM studios were hired for their looks rather than for their passion to act.

Biographies of people who became known as actors during their adulthood often show the actors had childhood turmoil such as moving often (John Wayne, Marlon Brando, Wally Cox), death or abandonment of a parent (James Dean, Steve Allen, Rene Russo, Drew Barrymore), parental alcoholism (Greta Garbo, Carol Channing, Richard Burton, Joan Crawford), poverty (Marilyn Monroe, Jim Carrey), and bohemianism (Robert Mitchum, Robert Downey, Jr., Johnny Depp), and the like. It is not known whether actors experience more turmoil than do other artists such as writers. But, chances are that if you pick up a biography of an actor you will find an unconventional childhood. Jack Nicholson, for example, grew up thinking his grandmother was his mother, while his real mother, a dancer who had Jack without being married to his father, lived far across the country with her husband and other children. Such deception may have laid the foundation for the later duplicity practiced by the actor.

The "outsider" role could be imposed from without or within; the actors could have been conscious rebels, such as Marlon Brando or Jack Nicholson, or they could have been painfully shy and rejected by peers, as were Meryl Streep and Dustin Hoffman. The young actor may turn to acting as a way of healing old hurts. The opportunity to play a role may be a chance to create metaphors for situations that are too raw to explore outright. Often these metaphors are healing or insightful for the viewers as well. The arts as self-therapy often function in metaphorical healing ways.

Jane Piirto

See also Career Counseling; Performing Arts

Further Readings

Eikleberry, C. *The career guide for creative and unconventional people.* Berkeley, CA: Ten Speed Press. Retrieved from http://www.creativecareers.com

Flow

Flow is an autotelic state that a person experiences while doing a challenging, interesting activity. *Autotelic* means that the flow experience is itself rewarding regardless of any external benefits or outcomes the activity might bring. A person having a flow experience finds deep enjoyment and motivation during a period of being fully immersed in a challenging or deeply engaging task in which he or she is involved. Flow is related to motivation, a key aspect of the definitions of the gifted and their education. The flow experience is pleasant and encourages those who experience it to pursue more activities like those that provided flow. Flow experiences can occur among gifted students, teachers, and their parents at times when their ability and opportunity to experience flow coincide. It is possible, though, to experience junk flow or faux flow, which superficially resembles flow but is not satisfying and integrative.

The person in a flow experience enjoys the activity for its sake and is not necessarily thinking about its benefit for the future. The concept of flow was proposed by Mihaly Csikszentmihalyi in the 1970s in relation to human motivation. In flow, he sought not to explain what motivated people, but to describe the experience a person has when motivated.

The flow state occurs while a person is doing the task. Flow goes away when the task is completed or when the person's performance gets better and the task becomes too easy to really challenge the person. During flow experiences, the person achieves an ordered unity of consciousness and an alignment of his or her feelings, thoughts, wishes, and current actions. These experiences are metaphorically like being carried along in a swift current, smoothly and without consciously trying hard to move along so well. Flow has been described as riding the crest of a giant wave.

Flow does not happen continuously, but at selected times of activity when the individual is

involved in a task that is well matched to his or her abilities and current talents. It does not happen with tasks that are too easy or uninteresting. Experiencing flow once encourages the person to seek it more often. The flow experience does not happen every time the person does the task, but often enough to continue to seek similar opportunities.

Flow often begins when the person is deeply involved and absorbed in the activity and is focusing on clearly defined goals with unambiguous feedback. Individuals report that during the flow experience, time passes unnoticed, they forget about themselves, and they become lost in the activity. Individuals having a flow experience often feel a very pleasant sense of transcendence, alignment, a goodness of fit between themselves, others involved in the same activity, and the activity itself. Flow produces a sense of timelessness and boundlessness, so that, for example, an artist is unaware of working long hours or of being hungry or thirsty.

Some common examples of flow experiences are the intensity and absorption gifted students show when engaged in an activity they find enjoyable and challenging. Friends may experience flow while engaged in an interesting and deep conversation. Artists report flow experiences as they become engrossed in creating their work. An athlete is "in the zone," experiences flow, during those times their performance is effortlessly successful.

Flow is related to the development of talent. Flow experiences occur more often when gifted students take challenging academic or enrichment classes or when they are deeply challenged and successfully accomplish the tasks in an accelerated class or program. Adolescents, including the gifted, who were curious, open to new experiences, and who regularly worked hard and with order reported more flow experiences. Families that encouraged their gifted children and adolescents to take challenging courses and who supported the children and youth emotionally were more likely to have these children experience flow. Teachers of the gifted may experience more flow activities while working with the gifted in challenging, engaging curricular activities. The experiences of flow may encourage teachers to engage in the extra effort and planning required for teaching the gifted.

A less than ideal form of flow is called *faux flow* or *junk flow.* Faux flow shares some of the emotional excitement of real flow such as engagement and absorption, but without the rigorous intellectual challenge and the sense of well-being that is associated with flow. The kinds of activities that bring on faux flow require little deep integrative mental processing and are empty of important content. Unlike real flow experiences, faux flow experiences leave the person weary and unsatisfied, tired not energized, grouchy not happy, and self- not other-oriented.

Some examples of things that often provide faux flow experiences for the gifted are boring and unchallenging classroom experiences, long periods of playing video games, browsing the Internet or watching online videos, watching a lot of television, and unfortunately, some experiences in gifted programs. Classrooms that lack academic rigor or those gifted programs that focus on fun and exciting but intellectually weak activities are more likely to produce no flow or faux flow only. Curriculum that is poorly matched to the needs of the gifted child does not have the necessary intellectual challenge nor do they require enough mental integration to produce and sustain true flow experiences.

Michael F. Sayler

See also Achievement Motivation; Friendships; Life Satisfaction; Talent Development

Further Readings

Coleman, L. J. (1994). "Being a teacher": Emotions and optimal experiences while teaching gifted children. *Gifted Child Quarterly, 38,* 146–152.

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* New York: HarperCollins.

Csíkszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: HarperPerennial.

Csikszentmihalyi, M. (2000). *Beyond boredom and anxiety: Experiencing flow in work and play.* San Francisco: Jossey-Bass. (Original work published in 1975)

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure.* Cambridge, UK: Cambridge University Press.

Nakamura, J., & Csikszentmihalyi, M. (2002). The concept of flow. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 89–105). New York: Oxford University Press.

Whalen, S.P. (1999). Finding flow at school and home: A conversation with Mihaly Csikszentmihalyi. *Journal of Secondary Gifted Education, 10,* 161–165.

Fluid and Crystallized Intelligence

Raymond Cattell identified fluid (*Gf*) and crystallized intelligence (*Gc*) as two facets of general intelligence. He classified them as subsets of general intelligence (or Spearman's *g*), as his shorthand notation makes plain.

Fluid intelligence is the ability to solve novel problems and to manage ambiguous or completing data. It is the ability to perceive and infer relationships between ideas. It has no specific scope or limitation; Cattell conceived of it as "fluid" because the nature of novel problem solving is that it can be directed toward any type of problem.

Crystallized intelligence is the ability to use existing sets of skills, knowledge, and experiences deftly. It presupposes knowledge and intact long-term memory, but the terms are not synonymous; crystallized intelligence is specifically about the quality of how one uses facts and skills rather than simply their accumulation. Crystallized intelligence is often boundaried because it presupposes acquired competence (e.g., playing a cello, knowledge of 19th-century American literature, or mathematics). This entry describes how fluid and crystallized intelligence are evaluated and viewed across the life span, neuroanatomical correlates, and fluid intelligence in gifted children.

Evaluating Fluid and Crystallized Intelligence

Fluid intelligence generally correlates with measures of abstract reasoning, ideational fluency, and visual-spatial problem-solving tasks. Crystallized intelligence correlates with abilities that depend on knowledge and experience, such as vocabulary, fund of information, reading comprehension, and analogies. All the standardized intelligence batteries, such as Stanford-Binet V or the Wechsler series, include several subtests measuring both fluid and crystallized intelligence.

Fluid and Crystallized Intelligence Across the Life Span

Fluid intelligence peaks in young adulthood and then steadily declines. This is considered the primary reason that conceptual fields, such as physics and mathematics, are often seen as domains for the talented young.

Crystallized intelligence, which relies on experience and the accumulation of skills and knowledge, shows the inverse pattern. It builds in the early years and remains stable across the adult lifespan, showing a gradual decline in older age. Writers, for example, tend to peak in their later years. Crystallized intelligence remains a dynamic system in its own way because the expanding knowledge tends to revise what is already known.

There are two primary hypotheses about why fluid intelligence declines. The first hypothesis is that cognitive processing speed declines with age and fluid intelligence depends on cognitive speed to make perceptual comparisons and conceptual leaps. The second hypothesis is that age-related declines in executive functioning and the system loops mediated by the frontal cortex of the brain undermine planning, judgment, self-monitoring, and attention. At this point, both hypotheses appear to have good research support, and the hypotheses together appear to account for much of the decline.

Neuroanatomical Correlates

Some theorists have tried to neatly link *Gf* and *Gc* to corresponding brain systems, but the brain has been less cooperative with this model. Intelligence is an integrative function that relies on several foundational abilities. Intelligence rests on the health and functional integrity of a wide range of structures. Some of these base capabilities, as mentioned already, include processing speed, executive functioning and attention. Another related base capability includes working memory (the mental scratch pad) that allows a person to hold multiple ideas or problems in mind while manipulating them in the imagination.

Linking neuroanatomical regions or nuclei to fluid or crystallized intelligence has been fraught with difficulty. Ironically, most of the contemporary research associates the frontal lobes with both general intelligence and fluid intelligence, but

Cattell predicted that there would be little association between fluid intelligence and brain regions. Cattell assumed that fluid intelligence was rarely affected by brain injuries; his assumption does not appear to be true. Ideational fluency, responding well with novelty, and pattern recognition are particularly vulnerable to mild or moderate traumatic brain injury

Individuals with discrete frontal lobe lesions may have strong scores on standardized IQ tests, yet be unable to manage normal social interactions and maintain employment. Essentially, they have intelligence without wisdom.

Fluid Intelligence in Gifted Children

According to a number of writers on the social and emotional life of gifted children, there is a similar gap between intelligence and wisdom in gifted children. Recent longitudinal studies of gifted children show an atypical pattern of slowed frontal lobe development. This has a couple of important implications: First, the complexity of an organism's development is consistent with the time needed for its maturation. Second, this delay in maturation would mirror the pattern noted by John Duncan in his adults with frontal lobe lesions: superior IQ combined with lags in judgment, novel problem solving, and ideational fluency (i.e., executive functioning and fluid intelligence). As gifted children enter their middle to late teens, the frontal cortex appears to complete its last developmental push and closes the gap. This developmental asynchrony between high formal intellectual ability and weaker fluid intelligence and executive functioning may be the underlying explanation for many of the commonly observed emotional self-regulation difficulties in gifted children that are often lumped into fuzzy categories such as Kazimierz Dabrowski's overexcitabilities or sensory motor integration issues. The literature on neurotypical children and the development of fluid intelligence assumes that that the development of processing speed, working memory, and fluid intelligence all follow a matched time course, developing in conjunction with one another. Gifted children appear to be an exception to this normal developmental trajectory.

Nadia E. Webb

See also Creative Problem Solving; Intelligence; Neuroscience of Creativity

Further Readings

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytic studies.* New York: Cambridge University Press.

Cattell, R. B. (1971). *Abilities: Their structure, growth, and action.* Boston: Houghton Mifflin.

Cattell, R. B. (1987). *Intelligence: Its structure, growth, and action.* New York: Elsevier Science.

FRIENDSHIPS

The need for friendship is a powerful force in human relationships. We seek friends to fulfill a number of intellectual and social-emotional needs including the need for companionship, affection, physical and emotional support, and intellectual stimulation. An additional need, however, is *self*-validation; although we may value various friends for their different views of the world and although we may enjoy friendly debate and even occasional argument with them, we feel a greater sense of *self*-acceptance when we have friends who share, and endorse, our own fundamental beliefs, opinions, and values. Intellectually gifted children can experience difficulties in finding friends who share their abilities and interests. This entry outlines the influence of social-emotional maturity, influences on friendship choice such as shared interests, levels of giftedness and acceleration, and children's conceptions of friendship.

Like Draws to Like

The social comparison theory developed by Ralph Festinger suggests that people actively seek to compare themselves with others in their social or academic environment as an aid to self-evaluation, and that, given the choice of relatively similar or dissimilar "others," we are more likely to select people similar to ourselves as bases for this comparison. The tendency to compare ourselves with some other specific person decreases as the difference between their ability and our own increases.

In the same way, children tend to choose friends who are at similar *stages* of intellectual and emotional development. This can be a problem for some gifted children. Intellectually gifted children differ from their age-peers of average ability in their cognitive development as well as in many aspects of their social and emotional development. Emotional maturity is much more closely linked to mental age than to chronological age, and this is particularly noticeable in highly able children. A 6-year-old with a mental age of 9 may have the emotional maturity of an 8-year-old. A 10-year-old with a mental age of 15 may be more like a 13- or 14-year-old in emotional development.

Because of this emotional maturity, gifted children's conceptions and expectations of friendship tend to be more akin to those of older children, and they generally seek out, as friends, either older children or age-peers who are also bright or gifted. The mixed-ability classroom may not provide gifted students with the most facilitative environment for finding friends; a recognized advantage of ability grouping or acceleration is that these interventions can give gifted students regular access to other children who share their abilities or interests.

Influences in Friendship Choice

Psychologist Robert Selman found that children form friendships not primarily on the basis of chronological age but on the basis of similarities in developmental stages. Children with intellectual disabilities gravitate toward age-peers with similar ability levels, or younger children. Similarly, gifted children gravitate toward older children or (when they are available) age-peers who are also gifted.

Similarity of play preferences is another important bonding agent in childhood, and the play preferences of gifted children tend to resemble those of children some years older. In the elementary school years, average ability children tend to feel more secure with games whose rules are clearly defined and adhered to, whereas gifted children prefer games of intellectual skill where new ideas can be developed. Gifted children's play can become an uneasy compromise between the child's own developmental level and his or her desire to be accepted by classmates. A third factor in friendship choice is reading interests. Gifted children tend to read, and enjoy, books and genres of fiction that are commonly written for children some years older; many particularly enjoy books that portray intellectual, emotional, or moral striving by the protagonist, for examples, *chronicles* that follow a character's growth to moral maturity or *quests* which portray a conflict between good and evil.

A further influence on friendship choice is the capacity to distinguish between popularity and friendship. Gifted children seem to leave behind, rather earlier than their age-peers, the social behaviors which characterize a desire for popularity; the deliberate acquisition of a wide circle of playmates, peer dependency, and conformity to peer rules and routines. Rather, they seem to have moved forward to seek relationships with a smaller circle of playmates that displays more of the functions of friendship—companionship, stimulation, intimacy, and affirmation.

Peer Relationships of Gifted Children

Leta Hollingworth, a U.S. psychologist working in the 1920s and 1930s, was the first researcher to undertake a systematic study of peer relationships of children scoring at different levels of intellectual giftedness. She defined the IQ range 125 (1 in 20 in the population) to around 155 (1 in 5,000) as "socially optimal intelligence." She found that children scoring within this range were self-confident, outgoing young people who were able to establish excellent peer relationships with classmates and other students. She claimed, however, that above the level of IQ 160 (1 in 10,000), the difference between the exceptionally gifted child and his or her age-mates is so great that it leads to special problems of development that are correlated with social isolation. Hollingworth further claimed that these difficulties appear particularly acute between the ages of 4 and 9. She also believed strongly that the difficulties in peer relationships experienced by highly gifted children did not arise from deficiencies within the children themselves but through the difficulty they experienced in finding other children who shared their abilities and interests.

Studies conducted in the United States, Britain, and Australia during the last 60 years have validated Hollingworth's conclusions. In the United States, James Gallagher, comparing the friendship patterns of gifted children scoring below and above

IQ 165, noted that the exceptionally gifted group tended to have greater problems of social acceptance than did children scoring between IQ 150 and 164. Robert DeHaan and Robert Havighurst found that children with IQ scores between 125 and 159 achieved much better peer relationships than did children of IQ 160+. DeHaan and Havighurst believed that the more moderately gifted group developed positive relationships with age-peers because they were bright enough to work out ways of overcoming minor social difficulties but at the same time they were not "different" enough to induce the severe problems encountered by the exceptionally gifted whose abilities and interests often set them apart from their age-peers.

Also in the United States, Paul Janos, Kristi Marwood, and Nancy Robinson compared two groups of children averaging 8 years of age, an exceptionally gifted group of average IQ 168 and a group of age-peers of average IQ 131. The exceptionally gifted children tended to report that most of their friends were older, that they had fewer friends than they wanted, and that being smart made making friends harder. Parents of the exceptionally gifted group tended to report that their child had only one close friend or no close friends at all.

In England, Joan Freeman compared a target group of gifted children of average IQ 147 with two control groups, the first of average IQ 134, the second of average IQ 119. Children in Freeman's target group said they felt "different" from other children 17 times more often than did children in the moderately gifted control group. Target group children also reported having substantially fewer friends than did the moderately gifted group; 83 percent reported having few friends compared with 30 percent in the control groups, and 7 percent said they had no friends at all, compared with 1 percent in the control groups. The friends that the target group *did* have were described, more often than the friends of the control group children, as being older, rather than the same age or younger.

Effects of Acceleration on Friendship Development

Longitudinal studies that trace gifted children's development through to adulthood are able to examine both the short-term and long-term outcomes of various educational interventions.

One of the best known of all longitudinal studies was established in California in the early 1920s by Lewis Terman, and consisting of 1,528 children of IQ 130+. The researchers reported that the 35 members of the gifted group whose IQs were 170 or higher tended to have considerably more difficulty with social relationships than did the more typical members of the group, with 60 percent of the boys and 73 percent of the girls being reported by their teachers and parents as being definitely solitary or "poor mixers." These social difficulties, however, tended to lessen significantly when the child was accelerated.

A 20-year longitudinal study conducted by Hollingworth focused specifically on young people of IQ 180+. Children at this level of ability appear in the population at a ratio of fewer than one in one million. Hollingworth found that for these children, life in the mixed ability classroom offered neither intellectual stimulation nor social companionship. Hollingworth was a passionate advocate of both acceleration and full-time ability grouping for gifted students, and her research findings strongly substantiated her beliefs. In this study, the children who were accelerated, especially those who were accelerated by 3 or more years, and those who were placed in special classes for gifted children, experienced significantly greater academic success and substantially happier social lives.

Miraca Gross's 25-year longitudinal study of 60 young Australians of IQ 160+ found that those who, as children, were retained in the mixed-ability classroom with age-peers or permitted a token grade advancement of a single year experienced significant and ongoing difficulties with peer relationships that continued into adulthood. Many reported that they had few friends, or no friends at all, despite deliberate and prolonged academic underachievement in efforts to gain acceptance, or at least tolerance, from age-peers. By contrast, the 17 young people who were accelerated by 3 or more years, and who entered university aged between 11 and 15, reported warm and fulfilling friendships with the older students with whom they learned and socialized through their childhood and adolescence.

A Hierarchy of Conceptions of Friendship

Gifted children's conceptions of friendship develop as a hierarchical progression from simple and

unifactorial to complex and multistructured. In the early years of school, a friend is generally seen as someone who will play with you and share toys and games. At around age 8 to 9, conversation becomes important; a friend is someone you can talk to about topics of mutual interest. In the third stage, which centers around ages 10 to 11, emotional and social support become important; a friend is someone who will support and comfort you when you are in need. Only later, in the early teenage years, does the individual's obligation to return this support become a critical factor in their conception of friendship; at this fourth stage, support and affection must flow both ways and a friend is seen as someone with whom you can share your innermost feelings. In the fifth and highest stage, a friend is seen as a "sure shelter"—someone who will stay faithful and true through good times and bad; the friends may differ in opinion—even quarrel—but the loyalty, trust, deep affection, and "unconditional positive regard" that underpin the relationship will keep it intact.

Gifted children progress through these stages of friendship conception earlier and faster than do children of average ability, and girls are generally further along the hierarchy than boys of the same age. This may partly explain why gifted boys in elementary school sometimes gravitate toward girls for friendship rather than to other boys. They may be seeking a friend who shares their own conceptions and expectations of friendship. It can also explain why Hollingworth found that social difficulties were especially acute for exceptionally gifted children between the ages of 4 and 9. If a gifted 5- or 6-year-old has already reached the second or third stage of friendship conception and is looking for conversation and emotional affirmation from a classmate who simply wants someone to play with, neither child will have his or her needs satisfied. It is not surprising that, even in the early childhood years, gifted students tend to seek older children as friends.

Miraca U. M. Gross

See also Acceleration/*A Nation Deceived;* Emotional Development; Enrichment Triad Model; *Genetic Studies of Genius;* Group Dynamics; Highly Gifted; Social Development; Stigmatization

Further Readings

DeHaan, R., & Havighurst, R. (1961). *Educating gifted children* (Rev. ed.). Chicago: University of Chicago Press.

Festinger, R. (1954). A theory of social comparison process. *Human Relations, 7,* 117–140.

Freeman, J. (1979). *Gifted children.* Lancaster, UK: MTP Press.

Gallagher, J. (1958). Peer acceptance of highly gifted children in the elementary school. *Elementary School Journal, 58,* 465–470.

Gross, M. U. M. (2002). Gifted children and the gift of friendship. *Understanding Our Gifted, 14*(3), 27–29.

Gross, M. U. M. (2004). *Exceptionally gifted children* (2nd ed.). Oxford, UK: RoutledgeFalmer.

Hollingworth, L. S. (1931). The child of very superior intelligence as a special problem in social adjustment. *Mental Hygiene, 15*(1), 3–16.

Janos, P., Marwood, K., & Robinson, N. M. (1985). Friendship patterns in highly intelligent children. *Roeper Review, 8*(1), 46–49.

Selman, R. L. (1981). The child as a friendship philosopher. In S. R. Asher & J. M. Gottman (Eds.), *The development of children's friendships* (pp. 242–272). Cambridge, UK: Cambridge University Press.

Terman. L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children.* Stanford, CA: Stanford University Press.

Future Problem Solving

The Future Problem Solving Program was founded in 1974 by E. Paul Torrance, a pioneer of creativity research. His goal was to create a program that encouraged students to think creatively about real and imagined problems and issues affecting the world. Success as a future problem solver is not determined by conventional thinking or following traditional problem-solving steps; truly novel ideas are encouraged, and students who are able to "think outside of the box" succeed in the program.

Future Problem Solving (FPS) competitions are divided into three divisions: Junior (Grades 4–6), Intermediate (Grades 7–9), and Senior (Grades 10–12). There are also an adult competition and an action-based problem-solving competition. Students compete to reach the regional, state, and finally the International Conference of Future Problem Solving. FPS coaches (typically teachers

and other educators) serve as guides and coordinators for students; they can help facilitate access to materials and information, but may not contribute to the solving of the future problem. Their role is to encourage, support, and motivate, but the creative thinking should come from the students themselves. This entry describes the future scene and the problem-solving process.

The Future Scene

Students are presented with a future scene (formerly known as the "fuzzy situation") in which they are faced with an imaginary problem. The future scene is used throughout the process of completing an FPS booklet for each future problem.

Typically in the form of a short story, the future scene is set at some point in the future (usually 20–30 years). Each future scene is based on one of the school year's competition topics and is the basis for solving the problem pertaining to that topic. Sample topics from the 2007–2008 school year include Body Enhancement, Simulation Technology, Neurotechnology, Debt in Developing Countries, and Child Labor.

The purpose of a future scene is to provide details, challenges, and potential obstacles for the student Future Problem Solvers to address. The last paragraph of a future scene, called the "charge," describes the students' responsibilities in completing the booklet. The future scene represents the context students will use as their reference throughout the FPS process.

All students worldwide use the same future scene, contributing to a feeling of healthy competition and interconnectivity with students around the globe. Problems such as debt in developing countries affect all governments and peoples, and by introducing students to these problems in a creative and engaging way, FPS has successfully incorporated real-world problems into the public school curriculum.

Process

Students begin the problem-solving process by brainstorming potential challenges they found in the future scene. Next, students must choose the most essential or critical problem or issue from the list they have generated. Critical thinking, creativity, and team work are essential during these two steps. Students must begin to formulate solutions to the problem they have chosen to focus on; each student on a team is responsible for contributing possible solutions to the problem. Identifying criteria to judge the solutions is the next step; students must suggest at least five criteria to use in judging their solutions to the problem. Using the student-generated criteria, the best solution is found by applying the criteria to each suggested solution. The highest scoring solution as found using this grid of criteria is then used to develop an action plan; a detailed and logical plan to address the problem with the identified solution is the focus in this step.

Booklets are mailed into the FPS headquarters where they are judged and scored by evaluators trained in the FPS process. FPS coaches are responsible for facilitating the mailing process and share the evaluator's scores with the students after every booklet has been sent. Evaluators judge each booklet on creativity, logical solutions, and clarity.

The specificity of requirements within each step of the FPS process is clearly outlined in the future scene and booklet that each team receives. For example, in identifying potential problems from the future scene, students are required to identify the underlying problem or U.P. Within the U.P., students must include parameters such as date, time, and place. These guidelines help improve students' communication skills during the problem-solving process; creative and critical thinking are the foundation of FPS, but the use of structure and routine support organization and clear communication.

Students are able to complete a booklet individually or on a team of no more than four students during the competition. Teams of students have no more than 2 hours to complete a booklet, and can generate no more than 16 problems and solutions for the future scene provided.

Other Competitions

Students are also able to compete in a scenario writing competition where they are charged with writing a short story set at least 20 years in the future and based on one of the school year's competition topics. Scenarios are typically completed at the student's home and later mailed in, so they are therefore not timed during an actual

FPS competition. Scenario writers who are invited to compete at the international competition are randomly grouped into teams of four and given a future scene to read. Each team member chooses an aspect of the future scene to address and is given 2 hours to complete his or her scenario.

The skit competition caters to students who possess dramatic or expressive talent, allowing their skills in acting, prop creation, or screenplay writing to be used. Students participating in the skit competition are required to act out their action plan using a provided list of materials for props. Alternative team members such as students from schools in the same district as a team participating in the skit competition may contribute, and each team has between 2 and 4 minutes to present its dramatic performance. The skits are judged on creative use of materials and penalized for use of unsanctioned materials.

The community problem solving (CmPS) competition encourages students to apply the FPS process to a problem in their own community. Throughout a school year, students use the FPS process to address an issue they face in their school or larger community; they are expected to identify various aspects of the problem and possible solutions. During the CmPS process, FPS coaches are expected to be advisors more than facilitators, supporting student autonomy, especially in the intermediate and senior divisions.

Jenna Bachinski

See also Creative Problem Solving; Problem Solving; Torrance Center for Creativity and Talent Development

Further Readings

Future Problem Solving Program International, Inc.: http://www.fpspi.org

Torrance, E. P. (1969). Prediction of adult creative achievement among high school seniors. *Gifted Child Quarterly, 13,* 223–229.

Torrance, E. P., & Horng, R. Y. (1980). Creativity and style of learning and thinking characteristics of adaptors and innovators. *Creative Child and Adult Quarterly, 5,* 80–85.

Treffinger, D. (2007). Does teaching for creativity and CPS matter? *Creative Learning Today, 15*(2).

Volk, V. (2008, January). A global village is a small world. *Roeper Review, 30*(1), 39–44.

G

Gay, Lesbian, Bisexual, and Transgender Gifted

Gifted gay, lesbian, bisexual, and transgender (GLBT) youth, like their high-potential straight peers, display high potential or excellent performance in various competencies important to schools and communities. These gifted sexual minorities meet federal, professional, and cultural definitions of giftedness at least as frequently as do other students and have access to increasing opportunities for pro-GLBT advocacy and resources in their communities and schools. This entry describes the data available on GLBT youth and education, support, and advocacy strategies for GLBT gifted youth.

Data

The exact prevalence of gifted GLBT youth is related to definitions for *gifted* and *GLBT*. According to some traditional educational definitions of giftedness—those predicated on student attainment of very high scores on intelligence or achievement measures—the gifted population is 1 to 2 percent. However, if giftedness is judged to be participation in a school-based high-potential program, then about 6 percent of youth will be considered gifted. Further, if giftedness is seen simply as the meeting of one or more school-based criteria for outstanding performance, then the percentage of giftedness may be as high as 20 percent or more of the whole student population.

Sexual-minority youth also vary in number, depending on whether GLBT students are defined by their identities, their same-sex feelings, or their same-sex sexual behaviors. As mentioned by Alfred Kinsey and other sex researchers from the 1940s on, GLBT students will be more numerous if defined by their behaviors and feelings rather than by their self-proclaimed identities.

If one uses the definitions clearest to most of the public (i.e., gifted students are those students in gifted programs, and GLBT youth are those with self-acknowledged sexual-minority identities), then there may be as many as 260,000 U.S. gifted GLBT students in the United States. Terence Friedrichs and R. L. Etheridge, in a survey of eight U.S. metropolitan GLBT social-and-support groups in the mid-1990s, discovered that there certainly can be many gifted GLBT students in some metropolitan communities. Thirty-six percent of the 53 youth in these groups were students in gifted programs (including 24 percent of the boys and 48 percent of the girls). Of these, all but two had IQ scores higher than 130, possessed grade-point averages of at least 3.5, or attained youth awards for leadership, creativity, or athletics, either at school or in the community.

Only limited data is available on possible causal or correlative explanations for these and other GLBT youths' excellent outcomes on varied gifted-assessment measures. GLBT students' intellectual giftedness may be associated with their oral language proficiencies. Their strength in academics and leadership may reflect, in some cases, a desire to make up for their second-class GLBT status.

Their creativity, as with many youths' divergent thinking, has been attributed partly to socialization in a creative sexual-minority community. As with other high-potential students, their educators often nominate some GLBT youth for gifted programs because these students may fit stereotypical notions of the academically proficient and conventionally creative pupils whom educators want to see in such programs.

Education, Support, and Advocacy

There are different high-potential and general classroom strategies for instructing diverse gifted GLBT students, depending on whether these youth have been assessed as excelling in intelligence, achievement, creativity, visual or performing arts, or leadership. However, certain instructional suggestions can be offered across these strengths. Gifted GLBT pupils, for instance, can be offered psychological "safe spaces" in which to focus on their assets. These youth should be able to reflect in journals, discuss in class, or converse privately with teachers about their same-sex identities and sexual feelings (feelings that will vary, depending on a particular student's gay, lesbian, bisexual, or transgender identity). They also should be able to engage in inclusive curricula that cover sexual-minority history, literature, art, sexuality education, dance, sports, and physical education. Also, they can interact with GLBT peers, instructors, and counselors within school environments sensitive to GLBT culture. These interactions may be especially beneficial to gifted sexual-minority pupils, with their sometimes early and strong interest in GLBT people and issues.

To assist gifted GLBT youth outside the regular school day, educators can use at least three support and advocacy approaches. First, teachers and counselors can develop gay–straight alliances (GSAs). In developing these alliances, these adults can conduct initial inventories of outstanding student strengths and can then seek opportunities for youth with those strengths. In GSAs, students can foster their talents (especially creative, artistic, and leadership competencies), as they broaden their awareness about GLBT identities and civil rights, through engagement in networking opportunities with other youth at local, statewide, or regional GLBT conferences.

Second, educators can offer various high-potential GLBT youth—whether they are GSA participants or not—information about and encouragement to join community activities drawing on their strengths. One activity, for a promising GLBT actor, might be a tryout for a community play, whereas another opportunity, for a high-potential scientist, might be a lab internship with a university or corporate scientist.

Third, educators can connect gifted GLBT youth with community mentorships in their strong areas. Thus, a talented creative writer can study under a GLBT professional writer, whereas another student with speaking, writing, and organizing capabilities can develop those skills at a community-based HIV education center.

The past decade has seen growing education, support, and advocacy efforts on behalf of GLBT youth within some major gifted education organizations. Since 1995, the Council for Exceptional Children's (CEC) GLB Caucus has undertaken such efforts among GLBT students' gifted and special educators. And since 1998, the National Association for Gifted Children (NAGC) has had a GLBT Task Force (NAGC-GLBT), which studies the well-being of U.S. gifted GLBT youth, examines the status of GLBT issues in the organization, and distributes basic information on gifted GLBT students. In 1998, NAGC passed a GLBT-inclusive nondiscrimination resolution for its members and, in 2001, approved a position paper that urges educators to treat sexual minorities fairly and sensitively.

Terence Paul Friedrichs

See also Boys, Gifted; Bullying; Girls, Gifted; National Association for Gifted Children

Further Readings

Cohn, S. J. (2002). Gifted students who are gay, lesbian or bisexual. In M. Neihart, S. M. Reis, N. M. Robinson, & S. Moon (Eds.), *Social and emotional needs of gifted children: What do we know?* Waco, TX: Prufrock Press.

Davis, G. A., & Rimm, S. B. (2004). *Education of the gifted and talented.* Needham Heights, MA: Allyn & Bacon.

Friedrichs, T. P. (2005). *Contextual social and emotional needs, and preferred educational approaches, for gifted gay and bisexual males.* Ann Arbor, MI: UMI.

Friedrichs, T. P. (2005). LGBT students in gifted education. In J. T. Sears (Ed.), *Youth, education, and sexualities: An international encyclopedia*. Westport, CT: Greenwood Press.

Friedrichs, T. P., & Etheridge, R. L. (1995). Gifted and gay—Reasons to help. *Association for the Gifted (TAG) Newsletter, 17*(1), 4–5.

Hallahan, D. P., & Kauffman, J. M. (2005). *Exceptional children: Introduction to special education* (10th ed.). Needham Heights, MA: Allyn & Bacon.

Kerr, B., & Cohn, S. J. (2001). *Smart boys: Talent, manhood, and the search for meaning*. Scottsdale, AZ: Great Potential Press.

Kinsey A. C., Pomeroy, W. B., & Martin, C. E. (1948). *Sexual behavior in the human male*. Philadelphia: Saunders.

Kinsey A. C., Pomeroy, W. B., Martin, C. E., & Gebhard, P. (1953). *Sexual behavior in the human female*. Philadelphia: Saunders.

National Association for Gifted Children. (2001). *Position paper on the education of gifted students who are gay, lesbian, bisexual, or transgendered*. Washington, DC: Author.

National Center for Education Statistics. (2002). *Digest of education statistics*. Washington, DC: Department of Education.

Peterson, J. S., & Richar, S. (2000). Gifted and gay: The adolescent experience. *Gifted Child Quarterly, 43,* 430–444.

General Creativity

Humanity's innovative spirit and creativity lies beneath the comforts and security of today's technologically evolved society. Creativity is a paradoxical construct to study because it is self-defining in many ways. In other words, we are able to engage or judge acts of everyday creativity such as improvising on a recipe, use a tool in a way it wasn't intended, or intuit emotions and intended meanings from gestures and body language in day-to-day communication. Children are particularly adept at engaging in creative acts such as imaginary role playing or using toys and other objects in imaginative ways. "Aha!" experiences occur in individuals working on scientific problems as well as in day-to-day problems such as realizing a person's name or relational identity after having forgotten it. However, it is important to distinguish between everyday creativity and domain-specific or paradigm-shifting creativity. Domain-specific creativity or extraordinary creativity causes paradigm shifts in a specific body of knowledge, and it is generally accepted within that works of extraordinary creativity can be judged only by experts within a specific domain of knowledge. Some researchers have described creativity as a natural "survival" or "adaptive" response of humans in an ever-changing environment. This entry discusses approaches to studying creativity, culture and social aspects of creativity, and pedagogical principles of studying creativity.

Approaches to Studying Creativity

The Handbook of Creativity edited by Robert Sternberg contains a comprehensive review of all research available in the field of creativity suggests that most of the approaches used in the study of creativity can be subsumed under six categories: mystical, pragmatic, psychodynamic, psychometric, social-personality, and cognitive. The *mystical* approach to studying creativity suggests that creativity is the result of divine inspiration, or is a spiritual process. In the history of mathematics, Blaise Pascal claimed that many of his mathematical insights came directly from God. This is somewhat analogous to the ancient Greeks' belief in muses as a source of inspiration for artistic works. The *pragmatic* approach is focused on developing creativity. For instance, George Polya's emphasis on the use of a variety of heuristics for solving mathematical problems of varying complexity is an example of a pragmatic approach. The *psychodynamic* approach to studying creativity is based on the idea that creativity arises from the tension between conscious reality and unconscious drives. This approach was popularized by Jacques Hadamard, who constructed case studies of eminent creators such as Albert Einstein. The *psychometric* approach to studying creativity entails quantifying the notion of creativity with the aid of tests such as the Torrance Tests of Creative Thinking developed by Paul Torrance. Many gifted programs in middle and high schools use these tests to identify students who are gifted/creative and show traits of divergent thinking. The test is scored for fluency, flexibility, and the statistical rarity of a response.

Some researchers also call for use of more significant productions such as writing samples, drawings, and so forth, to be subjectively evaluated by a panel of experts instead of simply relying on a numerical measure. The *social-personality* approach to studying creativity focuses on personality and motivational variables as well as the sociocultural environment as sources of creativity. Finally, the *cognitive* approach to the study of creativity focuses on understanding the mental processes that generate new and novel ideas. Most of the contemporary literature on creativity suggests that creativity is the result of confluence of factors from the six aforementioned categories. Two of the most commonly cited confluence approaches to the study of creativity are the *systems approach* of Mihaly Csikszentmihalyi, and *the case study as evolving systems approach* of Doris Wallace and Howard Gruber.

The systems approach considers the social and cultural dimensions of creativity, instead of simply viewing creativity as an individualistic psychological process and studies the interaction between the individual, domain, and field. The field consists of people who have influence over a domain. For example, editors of research journals would have influence on any given domain. The domain is defined as a cultural organism that preserves and transmits creative products to other individuals in the field. Thus creativity occurs when an individual makes a change in a given domain, and this change is transmitted through time. The personal background of individuals and their position in a domain naturally influence the likelihood of their contribution. It is no coincidence that in the history of science, there are significant contributions from clergymen such as Pascal, Copernicus, and Mendel, to name a few, because they had the means and the leisure to "think." Csikszentmihalyi argues that novel ideas that result in significant changes are unlikely to be adopted unless they are sanctioned by a group of experts that decide what gets included in the domain.

In contrast to Csikszentmihalyi's argument that calls for focus on communities in which creativity manifests, the case study as evolving systems approach treats each individual as a unique, evolving system of creativity and ideas, where each individual's creative work is studied on its own. The case study as an evolving system has the following components to it. Creative work is multifaceted. So, in constructing a case study of a creative work, one has to distill the facets that are relevant and construct the case study based on the chosen facets. These facets are as follows: uniqueness of the work, epitome (a narrative of what the creator achieved), systems of belief (an account of the creator's beliefs system), modality (whether the work is a result of visual, auditory, or kinesthetic processes), multiple time-scales (construct the time-scales involved in the production of the creative work), dynamic features of the work (documenting other problems that were worked on simultaneously by the creator), problem solving, contextual frame (family, schooling, teachers' influences), and values (the creator's value system).

Cultural and Social Aspects of Creativity

Cultural and social aspects play a significant role in what the community, in general, and the school system, in particular, considers as "creativity" and how they deal with it. Numerous studies indicate that the behavioral traits of creative individuals often go against the grain of acceptable behavior in the institutionalized school setting. For instance, negative behavioral traits such as indifference to class rules, display of boredom, cynicism, or hyperactivity usually result in disciplinary measures rather than appropriate affective interventions. In the case of gifted students who "conform" to the norm, these students are often prone to hide their intellectual capacity for social reasons, and identify their academic talent as being a source of envy. History is peppered with numerous examples of creative individuals described as "deviants" by the status quo. Even at the secondary and tertiary levels, there have been criticisms about the excessive amount of structure imposed on disciplines by academics as well as Eurocentric attitudes and male epistemology-centered attitudes toward knowledge generation. Such a criticism particularly resonates in the world of science and mathematics, especially during elementary and secondary schooling experiences, where minority, ethnic minorities, first nation, and female gifted and creative students are marginalized by practices that are alien to their own cultures.

Pedagogical Principles

Based on extensive classroom-based research and informed by findings from the field of psychology and the history of science, five pedagogical principles to maximize general creativity in the classroom have been posited by Bharath Sriraman. The five principles are (1) the Gestalt principle, (2) the aesthetic principle, (3) the free market principle, (4) the scholarly principle, and (5) the uncertainty principle.

The Gestalt Principle

Although psychologists have criticized the *Gestalt model of creativity* because it attributes a large "unknown" part of creativity to unconscious drives during incubation, numerous studies with scientists and mathematicians have consistently validated this model. In all these studies, after one has worked on a problem for a considerable time (preparation) without making a breakthrough, one puts the problem aside and other interests occupy the mind. Hadamard put forth two hypotheses regarding the incubation phase: (1) The *rest-hypothesis* holds that a fresh brain in a new state of mind makes illumination possible. (2) The *forgetting-hypothesis* states that the incubation phase gets rid of false leads and makes it possible to approach the problem with an open mind. The Soviet psychologist Vadim Krutetskii explained that the experience of sudden inspiration is the result of previous protracted thinking, of previously acquired experience, skills, and knowledge the person amassed earlier. This period of incubation eventually leads to an insight on the problem, to the "Eureka" or the "Aha!" moment of illumination. Most of us have experienced this magical moment. New neuroscience findings by Mark Jung-Beeman seem to point to a period in which the mind must briefly ignore rational thought to experience the "Aha!" moment. Yet the value of this archaic Gestalt construct is ignored in the classroom. This implies that it is important that teachers encourage the gifted to engage in suitably challenging problems over a protracted period, thereby creating the opportunities for the discovery of an insight and to experience the euphoria of the "Aha!" moment.

The Aesthetic Principle

Many eminent creators have often reported the aesthetic appeal of creating a "beautiful" idea that ties together seemingly disparate ideas, combines ideas from different areas of knowledge or uses an atypical artistic technique. In mathematics, Georg Cantor's argument about the uncountability of the set of real numbers is an often-quoted example of a brilliant and atypical counting technique.

The Free Market Principle

Scientists in an academic setting take a huge risk when they announce a new theory or medical breakthrough or proof to a long-standing unsolved problem. The implication for the classroom is that teachers should encourage students to take risks. In particular, teachers should encourage the gifted/creative students to pursue and present their solutions to contest or open problems at appropriate regional and state math student meetings, allowing them to gain experience at defending their ideas upon scrutiny from their peers. Sternberg suggests that creative people should "buy low and sell high"; that is, invest in ideas about which most other people in the domain have little interest, betting that eventually these ideas will be highly valued.

The Scholarly Principle

K–12 teachers should embrace the idea of "creative deviance" as contributing to the body of knowledge, and they should be flexible and open to alternative student approaches to problems. In addition, teachers should nurture a classroom environment in which students are encouraged to debate and question the validity of both the teachers' as well as other students' approaches to problems. Gifted students should also be encouraged to generalize the problem or the solution as well as pose a class of analogous problems in other contexts. Allowing students problem-posing opportunities and understanding of problem design helps them differentiate good problems from poor, and solvable from nonsolvable problems. Independent thinking can also be cultivated by offering students the opportunity to explore problem situations without any explicit instruction. Creative students need to be encouraged to seek the domain expertise

needed to give them the knowledge and tools to become even more creative.

The Uncertainty Principle

Real-world problems are full of uncertainty and ambiguity, as indicated in this analysis so far. Creating, as opposed to learning, requires that students be exposed to the uncertainty as well as the difficulty of creating original ideas in science, mathematics, and other disciplines. This ability requires the teacher to provide affective support to students who experience frustration from being unable to solve a difficult problem. Students should periodically be exposed to ideas from the history of mathematics and science that evolved over centuries and took the efforts of generations of artists, scientists, and mathematicians to finally solve. At the K–12 level, one normally does not expect works of extraordinary creativity; however, the literature indicates that it is certainly feasible for students to offer new insights into existing or current scientific problems or a new interpretation or commentary to a literary, artistic, or historical work.

Bharath Sriraman

See also "Aha!" Experience; Cognition; Gestalt Psychology and Creativity; Intelligence Testing; Mathematical Creativity

Further Readings

Craft, A. (2002). *Creativity in the early years: A lifewide foundation.* London: Continuum.

Csikszentmihalyi, M. (1996). *Creativity.* New York: Harper.

Sriraman, B., & Dahl, B. (2009). On bringing interdisciplinary ideas to gifted education. In L. V. Shavinina (Ed.), *The international handbook of giftedness.* New York: Springer Science.

Sternberg, R. J. (Ed.). (2000). *Handbook of creativity.* Cambridge, UK: Cambridge University Press.

Torrance, E. P. (1974). *Torrance tests of creative thinking: Norms-technical manual.* Lexington, MA: Ginn.

Wallace, D. B., & Gruber, H. E. (1992). *Creative people at work: Twelve cognitive case studies.* New York: Oxford University Press.

Genetics of Creativity

Genetics is the study of how living things pass on traits from generation to generation. *Genes* are the hereditary units that determine what traits are expressed in the body. Genes are key components that determine how an individual develops (e.g., physical appearance) and functions. In general, variation among people is caused by the interaction of both genetic and nongenetic factors (e.g., one's environment), called multifactorial inheritance. This entry reviews the genetic aspects of creativity, including heritable abilities and personality factors related to innovative behavior.

Research on the genetic makeup of creativity is scarce, and little is known about its biological underpinnings. Studies that have been conducted struggle with measuring creativity partly because of disagreement about the definition of creativity. Some scientists view creativity as a process and claim creativity to be a trait that is normally distributed in the general population, whereas others view creativity as a process in which exceptional creative production is essential. Further, a combination of both, the process-trait approach, relies on the assumption that divergent thinking (i.e., originality, flexibility, and elaboration) are central to the concept of creativity and are found in the general population.

A great deal of research has been conducted on intelligence and results indicate that a large component of intelligence depends on genetics. In some intelligence models, creativity and divergent thinking are considered to be a part of intelligence; therefore, it is easy to assume that creativity would have a strong genetic basis as well. Moreover, intelligence alone does not account for creative eminence or general creativity.

Research suggests that creative traits are emergent, or an interaction of multiple genes. Emergent traits are not likely to run in families because families rarely share all or even the majority of a cluster of genes that may cause a particular interaction. Similar to personality and cognitive traits, research suggests genes that influence the expression of creativity are multiplicative, not additive. In other words, multiple genes are involved in the complex trait of creativity and the variation observed is the result of a proportion of each gene that has been multiplied together, not added.

Family studies have found little evidence for genes having a large role in creative talent. Research shows that creative achievement is rarely carried on in families beyond one generation. Further, children of creative achievers are not usually high-achievers like their parents.

Twin studies have generally found positive, but low, heritability for tests of creative thinking. Monozygotic twins have identical genes, whereas dizygotic (or fraternal) twins are not likely to share similar gene configurations. Reported average identical- and fraternal-twin correlations are .61 and .50 in a review of 10 studies of divergent thinking. Hence, approximately 22 percent of the variance is due to the influence of genes. This genetic influence is primarily because of the correlation between creativity and IQ, though. When IQ was controlled for, identical and fraternal twins correlations for creativity test were scarcely different.

When personality traits are related to creativity, significant connections are found between the characteristic "openness to experience." In addition, creative people are found to be less "agreeable" and less "conscientious," leading to the commonly observed tendency of creative people to be nonconforming and to be less concerned about others' approval than are average people. When twin studies are performed on the heritability of these traits, they are found to be moderately heritable, with openness to experience about 50 percent heritable, and agreeableness and conscientiousness between 41 and 44 percent. It is likely therefore, that these traits, associated with creativity, may also be passed down through generations. Only in interaction with the environment, however, can these traits bring about creative behavior.

Candidate genes, or specific genes that are associated with a particular trait, are under investigation, but have yet to be identified for creativity.

Rhea L. Owens

See also Creative Communities; Creative Personality; Creativity, Definition; ***Genetic Studies of Genius***

Further Readings

Jang, K. L., Livesly, W. J., & Vernon, P. (1996). Heritability of the Big Five personality dimensions: A twin study. *Journal of Personality, 64*(3), 577–591.

Reuter, M., Roth, S., Holve, K., & Hennig, J. (2006). Identification of first candidate genes for creativity: A pilot study. *Brain Research, 1069,* 190–197.

Waller, N. G., Bouchard, T. J., Lykken, D. T., Tellegen, A., & Blacker, D. M. (1993). Creativity, heritability, familiality: Which word does not belong? *Psychological Inquiry, 4*(1993), 235–237.

Genetic Studies of Genius

Between 1925 and 1959, Lewis M. Terman edited five volumes under the series title *Genetic Studies of Genius* (*GSoG*). Terman was also author or coauthor on every book except the second, a volume that constitutes the doctoral dissertation of his graduate student Catharine Cox. Also with the exception of this second volume, *GSoG* represents one of the most ambitious longitudinal investigations ever conducted. It has also become a classic contribution to the field of intellectual giftedness.

However, the series title is misleading in two ways. First, Terman used the term *genetic* in its older and secondary sense of "developmental" rather than the more modern and primary sense of "concerning genes or genetics." None of the volumes explicitly deal with genetics in the latter meaning. Second, his use of the word *genius* was somewhat idiosyncratic for the time. The usage betrayed the marked influence of Francis Galton, who in 1869 had defined *genius* according to natural ability in the upper tail of the normal distribution. Again with the exception of volume 2, the volumes actually deal with youths who scored high on an intelligence test. Hence, the book series perhaps should have been more accurately titled *Developmental Studies of the Intellectually Gifted*. This entry discusses the background, methodology, results, and aftermath of *GSoG*.

Background

In 1916, Terman published what became known as the Stanford-Binet Intelligence Scale. A few years later, he conceived the idea of conducting a large-sample study of children who scored unusually high on this scale. Terman was especially interested in dispelling certain myths about highly intelligent children, such as the prevalent idea that

there was something pathological about intellectual precocity. Terman was able to collect a sample of 1,528 boys and girls who were around 11 years old in 1921. This sample provided the basis for volumes 1 and 3 through 5 of *GSoG*.

Yet only one year after devising the Stanford-Binet, Terman published a study showing how an IQ score could be calculated using biographical data about early development. Specifically using a recent biography of Galton, Terman concluded that he had an IQ close to 200. This historiometric inquiry can be considered a pilot study for volume 2 of the series.

Methodology

The *GSoG* sample consisted of children who (with few exceptions) had scored 140 or higher on the Stanford-Binet Intelligence Scale. These boys and girls (or a subset of them) were then subjected to a variety of measures relating to family background, physical health, educational history, childhood interests, and various personality and character traits. The results were published by Terman "and others" in 1925 (vol. 1). Several years later, the participants—now teenagers between 16 and 17—were reexamined using a range of psychological measures. In 1930, these findings appeared in a book authored by Barbara S. Burks, Dortha W. Jensen, and Terman (vol. 3). The participants were in their late 20s before they were revisited by Terman and his collaborators. Because the participants were now in early adulthood, it was possible to evaluate how they turned out with respect to educational attainments, career achievements, and family life. The results were reported in 1947 in a book authored by Terman and Melita H. Oden (vol. 4). A dozen years later, the same two authors published the final main book in the series (vol. 5)—Terman himself having actually died 3 years before. Even so, Oden published a separate monograph in 1968 that constituted a 40-year follow-up of the same sample.

Meanwhile, back in the 1920s, Cox initiated an investigation that was retrospective rather than longitudinal. Beginning with a sample of 301 highly eminent creators and leaders, she and a team of research assistants (including Terman) calculated IQ scores using extensive chronologies of intellectual development. In addition, a subset of 100 geniuses was assessed on 67 personality traits, again using biographical materials. This historiometric study was published just one year after the first volume.

Results

Given the number of volumes in *GSoG* and the richness of the information presented in each volume, it is difficult to provide a thumbnail sketch of the central findings. However, the gist of the four longitudinal volumes can be given as follows. As children, the highly intelligent were superb by almost any criterion, whether physical or psychological, personal or educational. This positive picture stayed fairly stable throughout the school years. Moreover, the positive outcomes persisted when the majority of the participants showed themselves capable of doing well in college, launching professional careers, and having successful marriages and families. It is only in the final volume that the conclusions become more ambivalent. First, it became clear that most of the women in the sample did not live up to their intellectual potential. As was typical of their sex for that generation, they usually became homemakers rather than pursuing full-time careers. Furthermore, few if any of the men in the sample could be viewed as geniuses in the restrictive sense of highly eminent achievement. A significant proportion could even be classified as underachievers. Although the more successful men in the sample could not be distinguished from the less successful in terms of intelligence, they could be differentiated on the basis of family backgrounds and motivational attributes.

The retrospective and historiometric study of 301 geniuses came out with a somewhat more optimistic inference: Those who attain the high degrees of eminence in their fields tend to have high IQs as well. In addition, the higher the level of intelligence, the greater the expected level of achieved eminence. Nonetheless, it was also pointed out that intellectual ability only translated into achievement if it was supported by an exceptional amount of drive, persistence, and determination.

Aftermath

Not long after the volumes in *GSoG* began to appear, Terman found his magnum opus subjected

to numerous criticisms. One complaint had to do with the manner in which the initial pool of participants was selected. Rather than test the entire school population, which would not have been practical given a one-on-one test like the Stanford-Binet, Terman tested students who first had been nominated by the teachers. This selection procedure may have introduced a bias in the expected outcomes. Years later, it also became apparent that some of the instruments that Terman had available when he commenced his studies no longer satisfied more modern standards of reliability and validity. Nevertheless, subsequent investigators also attempted to replicate or extend the findings of both the longitudinal and retrospective studies. Some of the more important findings have survived with minimal qualifications. For instance, intellectual giftedness is clearly more an asset than a liability respecting an individual's personal and professional life.

It is also worth noting what happened to the longitudinal study. Two of the study's participants, Robert R. Sears and Lee J. Cronbach, joined the Stanford University faculty and became involved as researchers as well as subjects. Also, the participants eventually became sufficiently old that they became the target of inquiries focusing on aging and life expectancy. For example, in 1995, Carole K. Holahan and Sears published a volume on a gifted group who had by then become octogenarians. Even if it is still patent that these subjects should have been identified as gifted rather than as geniuses, it remains true that *GSoG* ranks among the most significant empirical studies ever undertaken in the history of psychology.

Dean Keith Simonton

See also Eminence; Genius; Historiometry; Intelligence; IQ; Stanford-Binet

Further Readings

Holahan, C. K., & Sears, R. R. (1995). *The gifted group in later maturity.* Stanford, CA: Stanford University Press.

Oden, M. H. (1968). The fulfillment of promise: 40-year follow-up of the Terman gifted group. *Genetic Psychology Monographs, 77,* 3–93.

Subotnik, R. F., & Arnold, K. D. (Eds.). (1994). *Beyond Terman: Contemporary longitudinal studies of giftedness and talent.* Norwood, NJ: Ablex.

Terman, L. M. (1925–1959). *Genetic studies of genius* (5 vols.). Stanford, CA: Stanford University Press.

GENIUS

The word *genius* has ancient origins, dating back at least to Roman times. It has evolved and changed its meaning over the centuries and has become part of the field of the study of giftedness, creativity, and talent during the past century and a half. During this period, two basic defining qualities of genius have been emphasized, sometimes singly and sometimes in combination: eminence and IQ. In addition, a persistent theme linking genius to insanity has been part of the term's history for centuries. This entry discusses definitions of *genius,* nature and nurture roles, genius and insanity, and future research.

Definitions

Francis Galton may have been the first to give *genius* one of its contemporary meanings in his classic 1869 work *Hereditary Genius.* Galton's work emphasized the idea that genius is defined in relation to reputation or eminence (subject to revision over time). This definition of *genius* keys on actual accomplishments that are valued and preserved within a given cultural tradition and within a given field of endeavor. Galton's studies showed that eminence tended to be achieved within family traditions and interpreted this observation to mean that the potential for genius is largely inherited, a quality closely linked to the second most prominent meaning of the term.

Following Galton's work by several decades and greatly influenced by it, pioneers in the field of gifted education Lewis Terman and Leta Hollingworth shifted focus from achievement of eminence to the presumed potential for great achievement that was believed to be reflected in a child's IQ. A score sufficiently beyond the average was taken to be a reliable indicator of genius potential. Just how far above average varied from researcher to researcher (e.g., Terman thought that

IQ 140 or higher was the right place to set the mark, but Hollingworth thought IQ 160 was more accurate). Variations in which IQ test was used and on what scale it was standardized added to the lack of consensus about what IQ score to use as a cutoff for genius. In practice in the field of gifted education, Terman's mark of IQ above 140 has tended to be the standard.

A classic large study by Terman's associate Catharine Cox attempted to provide scientific support for the idea of IQ-based genius. Cox estimated the childhood IQ scores (as well as the scores in early adulthood) of more than 250 "geniuses" from Western culture. The methods used were largely based on anecdotal records and biographical and autobiographical reports. As biologist Stephen Jay Gould recently pointed out, the methodological issues in this study were legion, casting major doubt on the value of the IQ estimates. For example, cases where little was known, especially those from poor families, received lower IQ scores because the written record of their accomplishments was so meager. Nonetheless, the study was highly influential and is still often cited.

Dean Keith Simonton suggests four advantages of the eminence definition of *genius* over the IQ based one: it rests on actual accomplishment; it is closer to what most people mean when they use the word *genius;* it suggests a special and rare quality that current usage includes; and finally, because eminence is subject to revision, there are ways of assessing degrees of genius. To be sure, there are drawbacks to the eminence definition as well. It may be mistaken or imprecise; it is subject to fads and trends that may be short lived; it initially depends on the judgments of peers who may not be unbiased in their views; and it diminished the notion of a general genius mind in the sense that Samuel Johnson meant when he wrote that "the true Genius is a mind of general powers, accidentally determined to some particular direction" (quoted in Simonton, 2003, p. 3). The eminence definition tends to be more specific to the field in which genius manifests itself; the IQ definition tends to emphasize the protean and all encompassing power of a genius mind.

Nature and Nurture

Like Galton, Terman, Hollingworth, and their many followers to the present day, both the eminence definition and the IQ definition assume a large role for hereditary influences. The achievement of eminence worthy of the label *genius* and the potential for that achievement as represented by IQ in childhood have been associated with strong nativist beliefs from their initial inception right through and including many contemporary scholars and educators in the field of gifted.

Where the two defining criteria have generated controversy, it has tended to focus on the question of how adequately an IQ score reflects a person's potential for genius and on how much of one's intellectual potential is based on one's genes. It has been a common practice, especially in the popular media, to place the label "genius IQ" on someone who has scored above Terman's 140 criterion, and this practice can easily lead a reader to believe that a child of above-140 IQ is a genius. The pioneers of IQ recognized that IQ was one of several qualities that were requisite to great achievement worthy of the label *genius,* but this nuance has been ignored in many accounts. More recently, IQ itself has been questioned as a good indicator of potential genius, especially in fields outside the natural sciences. Howard Gardner's *theory of multiple intelligences* has added weight to the questioning of a general measure of potential genius.

As for the possible hereditary influences on genius, the issue was often cast in either-or terms, forcing an unnecessary choice between heredity and environment as the only way to resolve the issue. In more contemporary discussions, it is widely recognized that all human behavior, including the most extreme, reflects a constant and ongoing interaction and interplay between the natural physical features of an organism and the contexts within which that organism develops. At the extremes where cases of genius are found, there appears to be little doubt that powerful biological potentialities are involved, but it is equally true that the expression of great potential that we call *genius* requires sustained coordination of conditions that foster it for a decade or more.

It is now also widely recognized that the specific qualities that contribute to the achievement of eminence worthy of the label *genius* may vary from culture to culture, from field to field, and even within fields at different points in time. The unique qualities that led Albert Einstein to tackle fundamental relations of energy, mass, and the speed of

light, and the questions of general relativity and unified field theory powerfully in the early years of the 20th century may not have helped him revolutionize physics a century later. The frontiers of the field have been pushed to a different place, requiring different (if perhaps equally unique) powers of mind and character.

Genius and Insanity

Within Western cultures, the idea of the lone genius, contending with demons and enduring lesser mortals, has been part of the genius tradition. Every field has its famous cases of tortured, tormented, or even certifiably insane geniuses. The tendency to link genius and madness was given great impetus by the 19th-century Italian psychiatrist Cesare Lombroso's book *The Man of Genius*.

Among classical composers, for example, Peter Ostwald, a psychiatrist specializing in musical creativity, wrote, "Among great composers only Bach seems immune from psychiatric speculation. The earliest biographies of Mozart already suggest that there may have been something unhealthy about his creativity. . . . [as] Ludwig Tieck put it in 1812 'if we are obliged to call Mozart insane, then Beethoven can not be distinguished from the raving mad'" (p. 167). Among writers and poets, the number who had bipolar tendencies, if not full-blown bipolar disorders, has been estimated to be substantially greater than among the general population.

More recently, studies of correlations between various psychiatric disorders and creative contributions in various fields have yielded a mixed picture. Still, there are books and articles that make the case for a strong association between mental illness (particularly bipolar disorder) and genius.

If the issues surrounding the definition of genius are complex, as indeed they are, then the issues surrounding possible relationships between genius and insanity are if anything more complex. That there have been individuals of genius who have manifested mental illnesses of various kinds is beyond dispute. How prevalent such examples might be and on what basis to make such claims are matters of great interest but relatively little established evidence. How compelling the idea of genius and madness is will tend to reflect the preoccupations of a given time and culture. As music historian Neil Zaslaw has recently shown, images of Mozart have shifted from a perfect, godlike ideal to disturbed manic-depressive, to idiot savant–like man/child, to a fairly normal working stiff, and we learn as much about a culture as we may be learning about a genius.

Future Research

Genius is a powerful concept with a long history in Western thought. Its meaning has evolved from the Roman notion of special qualities that animate a person or place to a label for the highest and rarest of human abilities and achievements. Consensus on a contemporary meaning of genius is not complete, but the two most common features are abilities of surpassing power and achievements that transcend the ordinary to such an extent that they are of singular value. Whether the abilities of genius are of the more general sort (like IQ) or more specific to each field (or even to each field at each moment in time) is a question still not fully answered. And whether the criteria for a work of genius are sufficiently rigorous for good scientific work to be carried out is not yet settled. Also of great interest, but far from resolved, is a concern that the price of genius may too often include mental illness.

The idea of genius as an individual, lone quest has become an issue for some scholars. Psychologists Vera John-Steiner and Keith Sawyer, among others, have questioned the "myth" that anyone actually ever achieves genius without being closely involved with others in a specific domain of activity. It may be that the next chapter in the effort to capture the meaning of *genius* will lead to a more contextualized social- and domain-based definition of this venerable term.

David Henry Feldman

See also Creativity and Mental Illness; Eminence; IQ

Further Readings

Cox, C. (1926). *The early mental traits of three hundred geniuses*. Vol. 2 in L. Terman (Ed.), *Genetic studies of genius*. Stanford, CA: Stanford University Press.

Galton, F. (1869). *Hereditary genius: An inquiry into its laws and consequences*. London: Macmillan.

Gardner, H. (1983). *Frames of mind*. New York: Basic Books.
Gould. S. (1981). *The mismeasure of man*. New York: W. W. Norton.
Hershman, D., & Lieb, J. (1988). *The key to genius*. Buffalo, NY: Prometheus Books.
John-Steiner, V. (2003). *Creative collaboration*. Oxford, UK: Oxford University Press.
Lombroso, C. (1913). *The man of genius* (3rd ed.). London: Scott. (Original work published 1890)
Ostwald, P. (1993). Genius, madness, and health: Examples from psychobiography. In P. Ostwald & L. Zegans (Eds.), *The pleasures and perils of genius: Mostly Mozart*. Madison, CT: International Universities Press.
Sawyer, K. (2007). *Group genius*. New York: Basic Books.
Simonton, D. K. (2003). *Origins of genius: Darwinian perspectives on creativity*. Oxford, UK: Oxford University Press.
Zaslaw, N. (1994). Mozart as a working stiff. In J. Morris (Ed.), *On Mozart* (pp. 102–112). Cambridge, UK: Cambridge University Press.

Gestalt Psychology and Creativity

Gestalt is a German word that does not have a direct translation in English but can be described as a quality of wholeness, form, pattern, and configuration. A gestalt is an organized field, form quality, or underlying structure of a situation perceived as a subjective whole. Classical Gestalt psychology grew out of experiments in sensory phenomena, which led to a new way of understanding mental phenomena, emphasizing organismic and contextual variables. Gestalt psychologists applied the concepts of perception to problem solving and creative thinking, and emphasized the role of insight in productive and creative thinking. Gestalt concepts have been applied or extended to the study of disciplines including perception, cognitive sciences, problem solving, creativity, psychology in art, musicology, linguistics, social psychology, psychotherapy, and even economics and politics. This entry reviews the history, the principles, and the applications of Gestalt psychology to creativity and cognition.

Czech-born Max Wertheimer is regarded as the founder of classical Gestalt psychology. Wertheimer studied with Christian von Ehrenfels and Carl Strumpf of the Brentano school. Von Ehrenfels had earlier demonstrated the Gestalt phenomena in the perception of melody in 1890, arguing that the perceptual form quality, or Gestalt, of a melody may not be reduced to the sum of its parts (notes), but is rather more properly viewed as a whole. While working with Wolfgang Kohler and Kurt Koffka, Wertheimer established the Gestalt school with his 1912 publication of experimental studies on the *Phi phenomenon* or perception of apparent motion. Wertheimer demonstrated that perceptual experiences such as the apparent motion of flashing lights are due to how perceptual information is organized in the brain.

Gestalt psychology challenged the notion that perception and external physical stimuli correspond directly, and proposed instead that the mind organizes and reconfigures perceived physical phenomena. That is, the observer actively perceives perceptual stimuli and reorganizes it in his or her brain. Wertheimer proposed that the whole is greater than the sum of its parts and that the properties of the parts are governed by the laws of structure of the whole. Wertheimer also asked fundamental questions about the nature of insight in problem solving. Gestalt psychology formulated many laws and principles of perception (e.g., isomorphism: there is an isomorphic relationship or match between events and experience, perception, and brain activity). Early Gestalt psychologists then applied the theories of perception to problem solving and insight.

Wertheimer's research on problem solving was published after his death in the 1945 book *Productive Thinking*. He maintained that in *productive thinking* individuals are able to arrive at solutions through insight or breakthroughs in thinking (the "Aha!" experience). In productive thinking, individuals must find novel solutions to problems, where as in *reproductive thinking*, they must use procedures and solutions they have used or learned in the past. Wertheimer argued that insight occurs when an individual restructures or views a problem situation in a new way and finds new ways of thinking about and solving problems.

Kohler conducted classic and widely known research on insight during problem solving while

studying chimps and summarized his findings in his book, *The Mentality of Apes* (1917/1925). Kohler challenged the associationist explanations of insight as resulting from trial and error. He emphasized the visual nature of insight and maintained that *creative problem solving* involved restructuring and reorganizing visual information. Kohler used electromagnetic and thermodynamic (field theory) "force" analogues to describe his theorizing of brain activity.

Karl Dunker's 1945 publication *On Problem Solving* has been recognized as one of the most important publications on insight. He argued that *fixation* prevents insight. In his view, prior experiences and expectations may lead to unhelpful assumptions and may cause individuals to misinterpret situations while fixating on inappropriate views and past experiences. Overcoming fixation allows individuals to achieve insight and find new solutions to problems.

In Gestalt psychology, creative thinking involves approaching and solving problems through insight, novel goals, and solutions. Problem solving through insight involves solving a problem by recognizing a *gestalt* or organizing principle. Gestalt emphasizes a *top-down* approach, or the capacity to comprehend the fundamental relations in the context of the whole situation or problem. Through insight, an individual shifts from not knowing how to solve a problem to finding a solution by *restructuring* or looking at assumptions and goals in a new way, akin to the popular notion of "thinking outside the box." Gestalt psychology established criteria for insight: the solution must be both appropriate to the structure of the problem and transferable to structurally identical problems.

Rudolph Arnheim extended Gestalt psychology principles of perception and organization to the creation and appreciation of the arts. His influential writings include the book *Art and Visual Perception: A Psychology of the Visual Eye,* originally published in 1954. Arnheim helped shape the discipline of psychology of the arts and creativity.

Gestalt psychology generated important and yet unanswered questions about the nature of insight, problem solving, and creative thinking. Critics have questioned Gestalt psychology's scientific methods, theoretical clarity, and application of perceptual concepts in explaining problem solving and insight. Some argue that past experiences, problem-specific knowledge, and analytical problem solving are more important than recognized by *Gestalt theory,* and that fixation and the removal of fixation are not useful concepts in explaining insight. During the past 25 years, there has been a renewed interest in cognitive psychology research on the role of insight in problem solving and creative thinking. Researchers have begun to examine differences in left and right brain hemisphere regions while solving problem through insight. In neuroscience (e.g., visual neuroscience) research, scientists have revisited Gestalt concepts (e.g., contour salience and figure segregation), specifically in the study of the neural mechanism involved in perception and cognition. In the neuroscience of creativity, cognitive psychologists such as Mark Jung-Beeman have renewed interest in the study of the brain processes underlying the experience of creative insight that was first discovered by Gestalt psychologists.

Thomas Kirsch

See also "Aha! Experience; Creative Problem Solving; Neuropsychology; Neuroscience of Creativity; Problem Solving; Self-Actualization

Further Readings

Cupchik, G.C. (2007). Introduction to the special issue. *Psychology of aesthetics, creativity, and the arts, 1*(1), 3–5.

Gardner. H. (1987). *The mind's new science: A history of the cognitive revolution.* New York: Basic Books.

Sharps, M. J., & Wertheimer, M. (2000). Gestalt perspectives on experimental psychology. *Review of General Psychology, 4,* 315–336.

Sternberg, R. J., & Davidson, J. E. (1995). *The nature of insight.* Cambridge: MIT Press.

Van de Riet, V., Korb, M. P., & Gorrell, J. J. (1985). *Gestalt therapy: An introduction.* Elmsford, NY: Pergamon.

Weisberg. R. W. (2006). *Creativity: Understanding innovation in problem solving, science, invention, and the arts.* Hoboken, NJ: Wiley.

Gifted Child Quarterly

The *Gifted Child Quarterly* (*GCQ*) is the research journal of the National Association for Gifted

Children (NAGC). Since it was first published in 1954 as *The Gifted Child Newsletter, GCQ* has evolved into one of the most respected journals in the field of gifted education. In 2007, the journal had more than 6,500 subscribers in the United States and abroad. It publishes primarily empirical research and theoretical articles on a wide variety of topics affecting gifted students. It has also served as an outlet for the publication of NAGC position papers and other official documents of the organization. This entry describes the history, the major topics, and the policies of *Gifted Child Quarterly.*

During the past decade, *GCQ* articles have focused heavily on educational practice and identification, with an emphasis on multicultural students with gifts and talents. In its long history, the journal has published articles primarily concerned with educational programs, although the single topic with the most articles published (191 articles) was creativity. This was due, at least in part, to the numerous contributions of E. Paul Torrance, who published 65 articles from 1961 to 1984, sometimes having multiple articles in a single issue. The number of articles on creativity published in *GCQ* has seen a downswing since its peak in the 1970s. During the 1980s, it was common for only a single article on creativity to appear in an entire volume of four issues. This dramatic change is largely because new journals focusing on creativity emerged at that time.

There have been trends over the years in the subjects of interest to *GCQ* readers and editors. Parenting was of the greatest interest in the early years of the journal, peaking in the 1970s. Few articles on parenting gifted children have appeared in recent years, again perhaps because of the influx of new parenting publications in the field. Identification has received significant attention in the journal since the early 1980s. More articles have been published on education and programming combined than on any other topic. Teaching has also been the focus of numerous articles throughout the life of the journal.

Manuscripts are submitted to the editor, generally online via electronic mail. Once they are received, the editor reviews the article to determine its appropriateness for the journal's mission. If the article appears to be a good fit, it is sent to three or more members of the editorial review board, researchers and educators who are knowledgeable about the topic or who have a specific expertise in the research methodology chosen. These reviewers carefully consider the content and quality of the research and its presentation in the manuscript. For the past 10 years, there have been three possible outcomes of the review process of those manuscripts deemed appropriate for the journal and of a quality that warranted being reviewed: reject, accept with revision, or revise and resubmit. An accepted article is published with minor revisions from the author. Authors with rejected manuscripts are not encouraged to resubmit. Authors who receive a revise and resubmit designation are typically given considerable feedback and direction to guide their resubmissions. The *GCQ* Article of the Year Award is given each year at the NAGC convention. The editor empanels a group, often made up of former authors who have been given the same award, to screen nominated papers. The most highly rated paper receives the award.

The *GCQ* editor works with a publication committee that includes the NAGC association editor. The NAGC Publications Committee meets annually to deal with issues of policy as they pertain to all the NAGC publications. The *GCQ* editors have involved advisory boards in differing manners over the years. In some years, the Advisory Board helped with policy and provided guidance; in other years, they provided advice and reviewed manuscripts but did not directly influence policy.

The journal editor is expected to be knowledgeable about many topics relevant to gifted education as well as competent in both quantitative and qualitative research. This person makes decisions that affect what research or theoretical proposals will be shared with thousands of researchers, educators, parents, and professionals interested in gifted education.

There have been eight ongoing editors of *GCQ* and a variety of editors of special issues. The longest serving editor was the first, Ann Isaacs, who edited volumes 1 through 18. Isaacs was instrumental in the founding of NAGC and one of the most frequently published authors in the early years of the journal, with 69 publications. The second ongoing editor was John C. Gowan, a professor of education from the University of California at Northridge. In addition to being the author of several books on creativity and giftedness, Gowan was editor for volumes 19 through 23. Donald

Treffinger, who was editor for 4 years (volumes 24–28), also specialized in creativity and gifted education and had been a professor and consultant in addition being to the author of numerous texts on creativity, problem solving, and talent development. John Feldhusen was the editor for volumes 29 through 36. Now retired from Purdue University, he served as editor for 8 years and published widely in the field. Ann Robinson, an education professor at the University of Arkansas at Little Rock, was editor of volumes 37 through 41. Tracy L. Cross, distinguished professor of gifted studies and professor of psychology at Ball State University, edited volumes 42 through 46 of *GCQ*. Paula Olzewski-Kubilius, Director of the Center for Talent Development at Northwestern University, was editor of volumes 47 through 51. Each of these editors has made significant contributions to the outstanding journal that *GCQ* has become. Carolyn Callahan, of the University of Virginia, began her tenure as editor with the publication of volume 52 in January 2008.

Tracy L. Cross and Jennifer Riedl Cross

See also Diversity in Gifted Education; Identification; National Association for Gifted Children; Teachers of Gifted

Gifted Education Centers

There are a number of gifted education centers in the United States and abroad. Gifted education centers are sites often associated with institutes of higher education; when looking for a gifted education center, one can check with the nearest university or college. Most centers provide various services to the general public, such as assessment of giftedness, professional development, programs for students, assistance to parents of gifted children, program evaluation, coursework in gifted education, curriculum development, counseling services, consulting services, and other information about giftedness and gifted education. Many of the gifted education centers also conduct a program of research in various areas of giftedness and publish the results in journals of both gifted education and general education. A number of gifted education centers provide opportunities for graduate study in gifted education and research opportunities for these graduate students. Personnel from many of the gifted education centers present the results of their research as well as suggested best practices at local, state, national, and international conferences.

Gifted education centers fall into several categories based on their primary mission: national centers, counseling/assessment centers, youth programming centers, and multifunction centers. Each of these is discussed in this entry by using a specific example.

Types

National Centers and International Centers

In the United States, two gifted education centers serve as national centers. The National Research Center on the Gifted and Talented was established in 1990 through monies awarded by the Jacob K. Javits Gifted Program Fund through the U.S. Department of Education. Originally, the National Research Center on the Gifted and Talented was a consortium of four universities: the University of Connecticut, the University of Virginia, the University of Georgia, and Yale University. Currently, the National Research Center on the Gifted and Talented is a cooperative effort between the University of Virginia and the University of Connecticut. The center has been charged with conducting research to determine best practices for identifying and serving gifted students, particularly those from underserved populations, as well as designing curriculum and assessments to assist with meeting the needs of gifted students. Professional development and programming are also areas examined by the National Research Center on the Gifted and Talented. As with most other gifted education centers, the researchers here conduct both qualitative and quantitative studies.

The second national center, the Center for Gifted Education Policy in Washington, D.C., was established in 2002 by the American Psychological Association. The Center for Gifted Education Policy concentrates its efforts on young people who are talented in academics, sports, the performing arts, the professions, or other domains.

Advocacy, public awareness, and research aimed at refining the talents of these young people are the focus of this center. One of its most popular features is a listserv whose membership includes most of the prominent researchers and practitioners in the field of gifted education. Many topics have been discussed and often parents and graduate students pose questions, ask for assistance in finding particular research or help with a specific issue.

The Belin-Blank International Center for Gifted Education and Talent Development was originally a national center, but has recently expanded its focus to gifted education beyond as well as within U.S. borders. Begun as a program for increasing the knowledge of giftedness among regular classroom teachers, the Belin-Blank Center has during the last 20 years become a comprehensive center providing professional development, a wide variety of summer programs for youth, an international talent search, a counseling center, an early college admission program, and a strong research program that has particularly focused on acceleration and the provision of international research symposia. Many other countries have gifted education centers, such as the Centre for Gifted Education at the University of Calgary.

Focus on Counseling

An example of a gifted education center with a focus on counseling and assessment of giftedness is the Gifted Development Center in Denver, Colorado. This center seeks to assist with identifying highly gifted students (those above the 99th percentile), twice-exceptional gifted children (those who have another exceptionality such as a learning disability), and gifted children who are visual/spatial learners. The Gifted Development Center also provides counseling services to assist with meeting the social, emotional, and psychological needs of these students. Guidance and counseling laboratories have provided research through service programs at universities throughout the country. The Wisconsin Guidance Laboratory for Superior Students in the 1950s served as a model for the Nebraska Guidance Laboratory, the National Science Foundation–sponsored guidance laboratory for girls at Arizona State University, and the Counseling Laboratory for the Exploration of Optimal States (CLEOS) at the University of Kansas.

Focus on Programming

The Center for Gifted Studies at Western Kentucky University in Bowling Green is a good example of a center with a focus on programming for gifted youth. Advocacy for gifted education is also a focus. The Center for Gifted Studies is a leader in providing programming for gifted children and youth whose talents lie in a variety of areas such as academics, leadership, or performing arts. The center's mission is to enhance both the cognitive and social/emotional needs of these students.

Multipurpose Centers

The Center for Gifted Studies & Talent Development at Ball State University in Muncie, Indiana, is an example of a multipurpose center. The center's mission is to identify, promote, and foster the development of giftedness; conduct research to improve programs for, and create a better understanding of, the needs of gifted and talented individuals; provide professional development programs for all who work with gifted and talented individuals; and make information about all aspects of the gifted and talented more accessible. The center serves any parent, child, teacher, professor, grandparent, school administrator, or any other person who has an interest in, a question about, or needs services for giftedness. The center accommodates requests from all over the nation and the world, as well as serving Indiana. Research and publication on the gifted and talented population among faculty, school-based colleagues, and graduate students is also a focus, as is building collaborations with other local, regional, and national organizations. Center personnel actively publish research in leading education journals.

Other examples of multipurpose centers are the Center for Gifted Education at the College of William & Mary in Williamsburg, Virginia, the Center for Talent Development at Northwestern University in Evansville, Illinois, and the Torrance Center for Creativity and Talent Development.

Services and Information

Gifted education centers provide valuable services and a wealth of information on giftedness and gifted education. Most gifted education centers have Web sites that supply in-depth information

about their services, materials, conferences, and publications. They are dynamic institutions that conduct critical and crucial research to advance the field of gifted education.

Cheryll M. Adams and Rebecca L. Pierce

See also Academic Talent; Asia, Gifted Education; Evaluation of Programs; Twice Exceptional

Further Readings

Belin-Blank Center: http://www.education.uiowa.edu/belinblank
Center for Gifted Education at the College of William & Mary: http://cfge.wm.edu
Center for Gifted Education Policy: http://www.apa.org/ed/cgep.html
Center for Gifted Studies: http://www.wku.edu/Dept/Support/AcadAffairs/Gifted
Center for Gifted Studies & Talent Development: http://www.bsu.edu/gifted
Center for Talent Development: http://www.ctd.northwestern.edu
Centre for Gifted Education at the University of Calgary: http://gifted.ucalgary.ca
Counseling Laboratory for the Exploration of Optimal States: http://www.cleoslab.org
Gifted Development Center: http://www.gifteddevelopment.com/index.htm
Mönks, F. J., & Pflüger, R. (2005). Gifted education in 21 European countries: Inventory and prospectus. Retrieved from http://www.bmbf.de/pub/gifted_education_21_eu_countries.pdf
National Research Center for Gifted and Talented: http://www.gifted.uconn.edu/NRCGT.html
Torrance Center for Creativity and Talent Development: http://www.coe.uga.edu/torrance

Gifted Education Resource Institute

The Gifted Education Resource Institute (GERI), located within the College of Education on the Purdue University campus, is a comprehensive gifted education center. The mission of GERI is to further the development of gifts and talents in individuals throughout their life spans. This is accomplished through enrichment programs for gifted youth, graduate programs for future scholars and leaders, professional development and coursework for educators of gifted students, and ongoing research on the psychology of talent development, described in this entry.

Background

The roots of gifted education at Purdue University began in the mid-1950s, when Harriet O'Shea, a Purdue psychology professor (1931–1964), developed and taught Psychology of the Intellectually Gifted Child (PSY 544), in which students studied aspects of intellectually gifted children and explored ways to meet their needs.

About the same time, on the Madison campus of University of Wisconsin, a graduate student named John Feldhusen was working on a mathematical study of learning and retention, which included children of high intelligence. Feldhusen's interest in giftedness increased because of the outstanding results he obtained from the gifted students in his study. Upon completion of his dissertation, Purdue University hired Feldhusen as a professor in psychology and education, where he later taught O'Shea's PSY 544 course after she retired.

In 1974, having attended an Indiana Department of Education meeting on gifted education, Purdue Vice President Don Brown, a longtime supporter of gifted education, decided that he wanted to move the university more prominently into the emerging field of gifted education. He asked Feldhusen to develop a plan for a gifted education center at Purdue, and the result was GERI.

Enrichment Programs

Enrichment programs offered by GERI meet the interests and passions of students with intellectual, creative, and artistic gifts and talents. Students take courses that provide challenging, hands-on learning opportunities that emphasize creativity, critical thinking, independent learning, diversity, and achievement. The purpose of these programs is to supplement the general school curriculum with enriched and advanced university-based offerings. Classes, such as advanced mathematics, engineering, science, technology, and visual and performing arts, provide students with engaging

and interactive opportunities to learn with others of like interests and abilities. The *Purdue three-stage model* serves as the basis for the curriculum and instruction in the enrichment programs.

GERI currently offers three programs for youth:

1. Super Saturday runs 6 weeks in the spring and fall and is offered to students age 4 through Grade 8.
2. Super Summer offers week-long morning and afternoon classes to students age 4 though Grade 4.
3. Comet, Star, and Pulsar are residential summer programs for students in Grades 5 through 12.

Graduate Programs

The Gifted Education Graduate Program is housed in the Department of Educational Studies and offers three accredited graduate programs: (1) a licensure program, (2) a master's degree, and (3) a research-intensive doctoral degree.

The licensure program provides teachers with the professional training (online or on-campus) needed to add Gifted and Talented Education to their teaching license. Students develop an understanding of the cognitive, affective, and social/emotional characteristics of gifted and talented learners in different talent domains. Students learn how to differentiate curriculum and instruction, develop gifted and talented programs, enhance thinking skills, and facilitate the social and affective development of high-ability students. Students who successfully complete the program demonstrate proficiency on national and state professional standards for gifted education.

The graduate program offers master's and doctoral degrees with specializations in giftedness, creativity, and talent development. The program prepares students for assuming productive roles in research, teaching, and program development in many areas of educational psychology. An interdisciplinary approach to research and scholarship is encouraged. Required coursework includes departmental research foundation, core requirements in educational psychology, an area of specialization, a related area, and thesis credits. Doctoral students are also expected to gain experience and expertise in research, writing, teaching, leadership, and service.

Professional Development Programs

GERI hosts both a summer conference and workshops for educators interested in developing and expanding their understanding of educating gifted youth.

The DISCOVER! Institute is a high-quality summer institute for educators interested in serving gifted and talented children and discovering and developing talents in all children. Sessions focus on effective practices and practical strategies that work to help all children reach their potential. Special emphasis is placed on educating the whole child, integrating social and emotional aspects, differentiating curriculum to create optimal individual learning, and effective methods for delivering content in ways that facilitate learning.

GERI staff also engage in leading various workshops and in-service training in gifted education and talent development at local, state, and national venues.

Faculty and Research Focus

A hallmark of the gifted education program is the opportunity to work collaboratively and conduct research with the faculty who are nationally and internationally recognized experts. Faculty members are involved in ongoing, applied, and interdisciplinary research. They are recognized for their published work in highly regarded educational journals, presentations in national and international conferences, service on editorial boards, and leadership in professional organizations.

GERI serves as a locus for faculty and graduate student research. Research areas of interest include program planning, issues concerning identification; talent development in science, technology, engineering, and mathematics (STEM) disciplines; underrepresentation; differentiation; total school cluster grouping; curriculum models; social and affective needs; counseling; the Purdue three-stage model; creativity; twice-exceptional students; high-ability spatial learners; math creativity; personal talent development; and strategies for addressing underachievement.

GERI continually promotes the concept of holistic development of students with gifts and talents through innovative discovery, learning, and engagement programs. Thousands of youth, post-secondary students, teachers, and future gifted education scholars attend Purdue University, a leader in its field, upholding its original goal of being one of the most comprehensive gifted education centers in the world.

Michele L. Strutz

See also Elementary Enrichment; Middle School Enrichment; Purdue Model; Saturday Programs; Summer Programs; Teacher Training

Further Readings

Feldhusen, J. F. (1999). Talent identification and development in education: The basic tenets. In S. Cline & K. T. Hegeman (Eds.), *Gifted education in the twenty-first century* (pp. 89–100). New York: Winslow Press.

Gifted Education Resource Institute, Purdue University: http://www.geri.soe.purdue.edu

Gifted in the Workplace

Research has shown that high-IQ individuals are likely to perform well at a wide variety of cognitive skills, such as planning, memory, and attention. Assuming high IQ and the advanced cognitive skills that correlate with it are advantageous in most workplaces, it follows that the gifted employee is a sought after and valued employee. Yet there is little agreement about the exact relationship between IQ and career success. Given the wide range of factors that all contribute to professional achievement and job satisfaction, gifted employees will likely enjoy many of the same advantages and suffer many of the same frustrations in the workplace that they do in the rest of life. This entry describes for workplace issues for the gifted.

Indeed, with all of the effort expended on nourishing the gifted child's schooling, it is somewhat surprising how little has been expended on the challenges of life after school. Although the workplace presents the gifted adult with many of the opportunities and obstacles that school presented the gifted child, past performance is not necessarily a good indicator of future potential. The credentials and honors that the high-achieving gifted student acquired through his or her education are no guarantee of workplace success or happiness, but nor is the academically underperforming gifted student doomed to underperform in the workplace. Only some of the skills that helped the high-achiever through school will be transferable to the workplace, and the adult workplace may offer the underachiever the freedom and stimulation lacking in school.

In addition to their formidable talents, keen intelligence, and high potential, gifted individuals transitioning to the workplace bring with them the assumptions and behaviors that they developed as gifted children in school. Like gifted children, gifted adults will tend to bore easily and rarely take kindly to repetitive, mindless tasks. Like gifted children, they are naturally inquisitive and habitual tinkerers. And like gifted children, they will likely want to know the why's and wherefore's of a task and will resist things that don't make sense. But unlike gifted children, gifted workers can offer their organization what gifted students never could offer their schools: Gifted workers can invent the breakthrough product, outsmart the competition, see the best solution to the most challenge problems, and change the organization and their world.

Many of the world's most successful organizations owe their success to the brilliance of their employees, and human relations departments call for the best and the brightest. Yet the relationship between the gifted individual and his or her organization poses unique challenges as well. Facing these challenges offers opportunities not just for the organization to get the most out of its employees but also for the gifted individual to grow and develop in new ways.

Workplace culture can have a great effect on the success or failure of the gifted employee, and the essentials of a good fit are not always obvious. Just because gifted individuals may be nonconformist in their attitudes and different in their ways of thinking does not mean that they will thrive in a free, anti-authoritarian environment. Even the most gifted minds need structure and guidance, as

long as it is not too heavy handed or micromanaging. Gifted employees will likely thrive with good mentoring and coaching to help shepherd their talents. Being gifted is not the same as being self-organizing or being able to make the right decisions with their organization's best interests in mind. Nor is being gifted necessarily a substitute for wisdom, experience, or all the skills necessary to get the job done.

However, gifted individuals will typically respond enthusiastically to training and acquiring new skills. Some will gravitate toward highly technical fields such as technology, engineering, law or medicine, where staying current in the field requires continuous education. Others will find themselves in academic or other types of research positions where their curiosity and drive for understanding will motivate lifelong learning. As the well-researched *Holland theory of vocational choice* indicates, those individuals who find a work environment that is congruent with their vocational personalities are most likely to be satisfied and happy with their work. Investigation of the career interests of academic students usually shows that they have higher interests in artistic, scientific, and social occupations and lower interests in practical and clerical occupations. Receiving little guidance, gifted students often choose stereotypical occupations of bright people—physician, lawyer, engineer, business executive—but may find that their chosen occupation does not match their true interests, needs, or values. This can lead to mid-career changes of direction, stagnation, or chronic discontent. However, gifted individuals who received competent career guidance may find themselves in work settings that allow them to exercise their talents and to feel fulfilled and purposeful.

The workplace offers a chance to grow interpersonally as well as intellectually. In the workplace, behaviors that have been problematic in the past can be transformed. The chronically unpopular student might find himself revered for his professional skills, the iconoclast who used to drive teachers crazy might find herself the best litigator at the law firm; and the kid whose grades suffered because he couldn't be torn away from the video console might be the next great game developer.

Keys to this success include the right match between gifted individuals and their environments, good leadership, mentoring, and coaching, as well as the right balance between freedom and structure, remediating skills that lag behind, and harnessing the strengths that have distinguished the gifted individual. The gifted individual can be expected to respect the same rules as others around them and to learn to appreciate the diverse talents of colleagues and supervisors, and the organizations they belong to will need to adapt to accommodate their unique styles and approaches to maximize their efficacy and satisfaction. Fortunately, in all these endeavors, the interests of employee and employer coincide: to collaborate effectively, to reach the gifted employees' potential, and to help them achieve their goals.

Jack Marmorstein

See also Adult, Gifted; Career Counseling; Coaching

Further Readings

Holland, J. L. (1973). *Making vocational choices: A theory of careers*. Englewood Cliffs, NJ: Prentice Hall.

Hunt, E. (1995). The role of intelligence in modern society. *American Scientist,* August. Retrieved July 12, 2008, from http://www.americanscientist.org/issues/feature/the-role-of-intelligence-in-modern-society/1

Kerr, B. A. (1986). The career development of creatively talented adults. In J. V. Miller & M. L. Musgrove (Eds.), *Adult career development* (pp. 59–69). San Francisco: Jossey-Bass.

Kerr, B. A., & Sodano, S. (2003). Career assessment for gifted students. *Journal of Career Assessment, 11*(2), 168–176.

Giftedness, Definition

Definitions of giftedness offered in the literature are highly varied. Variability stems from differences in conceptions of intelligence and differences in values. The various definitions of giftedness range from the general (e.g., extraordinary intellectual ability or high IQ score) to the specific (e.g., precocity in specific disciplines such as mathematics), but nearly all definitions include reference to distinction or extraordinary accomplishment

in the field. Although many definitions of *giftedness* have been put forth and there is no consensus in the field on definition, most states and school districts use the following definition, or a variation thereof, from the Javits Gifted and Talented Education Act of 1993. This definition has evolved from a similar definition originally offered as part of a report to Congress in 1972 as the first federal definition of *giftedness* and includes dimensions that can be categorized as general (intellectual and creative) and specific (specific academic areas, artistic areas).

> Children and youth with outstanding talent perform or show the potential for performing at remarkably high levels of accomplishment when compared with others of their age, experience or environment.
>
> These children and youth exhibit high performance capability in intellectual, creative, and/or artistic areas, possess an unusual leadership capacity, or excel in specific academic fields. They require services or activities not ordinarily provided by the schools.
>
> Outstanding talents are present in children and youth from all cultural groups, across all economic strata, and in all areas of human endeavor. (Ross, 1993, p. 3)

Other definitions of giftedness have emerged from critical analyses of the federal definition. The most widely discussed and adopted alternative is the three-ring definition offered by Joseph Renzulli, which gained acceptance in conjunction with its relationship to a particular model for curricular modification, the *enrichment triad model*. In this definition, *giftedness* is a confluence of the traits of above-average ability, task commitment, and creativity in a particular area of endeavor. Although above-average ability is considered a stable trait, the other two traits are tied to particular times and experiences in the students' lives, and accordingly, Renzulli calls for the identification of gifted behaviors rather than gifted persons.

Conceptions of intelligence offered by Robert Sternberg and Howard Gardner have also been used as a basis for definitions of giftedness. Sternberg has demonstrated that students whose curriculum is matched to exceptional ability in one of the three areas of intelligence in his theory (analytic, synthetic, or practical) demonstrate greater achievement than do those whose curriculum is not matched. Gardner's multifaceted conception of intelligence has received extensive attention, but assessments and curricular interventions have not been validated. Each of these conceptions broadens the concept of giftedness to include more types of giftedness, and districts that adopt these definitions are more likely to serve more diverse populations of gifted students. This entry defines key terms relating to giftedness as well as the historical perspective, underlying issues, and explicit and implicit conceptions of giftedness.

Key Terms

Talent

At times, *talent* or *academic talent* is used as a synonym for *giftedness*. In the federal definition of *talent* given previously, the phrase *outstanding talent* is used as a synonym for giftedness. The substitution of *talent* for *giftedness* can be attributed to a sense that the term *gifted* carries negative connotations, which has led some educators to substitute the word *academic talent* for *giftedness*. In other cases, the term *talent* is used to refer to students with exceptional abilities in nonacademic areas such as art, music, or drama. Abraham Tannenbaum cautioned strongly against using the phrase *gifted and talented* or separating these two categories because of the danger that it will lead to differential values and favoritism toward some children over others.

Prodigy

Prodigies are defined by researchers as children age 10 or younger who already are performing at an adult professional's level of skill in a cognitively complex area. Prodigies have been identified only in chess, music, creative writing, languages, and mathematics. Their talents lie in areas in which other developmental factors or time and life experiences are not necessary for performance at the exceptional adult level. Although prodigies constitute only a small segment of the total gifted population, the public image of giftedness is often associated with this extraordinary early performance.

Highly Gifted or Genius

Stratification of the gifted population into categories such as highly gifted or genius stems from the use of the IQ score as a determinant of giftedness. The early studies by Leta Hollingsworth on children with higher than 180 IQ and later writings of Miraca Gross about children whose IQ scores exceeded 140 were the basis for our understanding of the highest levels of intelligence.

Historical Perspective

The evolution of giftedness as a label for children and adults and the scientific study of giftedness began in the late 19th century and was given the greatest impetus in the United States by the development of intelligence tests in the early 20th century by Lewis Terman and his longitudinal study of children identified as gifted based on earning scores greater than 120 on those intelligence tests. The term *intellectually gifted* was assigned to that group of children and the use of the label *intellectually gifted* has been associated with children who earn high IQ scores since that time. The definition has been broadened in many ways. Initially, use of general descriptors such as *ability to grasp concepts of greater difficulty easily, ability to acquire symbols and use them, deals effectively with abstractions* were terms used to expand the definition. Then Paul Torrance added his definition of a *gifted individual* as one who could identify problems or gaps in existing knowledge domains, generate new ideas or hypotheses, assess the ideas, and modify hypotheses and communicate results effectively. This came to be the definition most closely associated with creatively gifted. The more specific definitions emanate from the definition offered by Robert Havinghurst that focused on consistently remarkable achievements in any domain of human performance or endeavor. Renzulli also extended his definition to note that the characteristics he noted as part of the three-ring definition are brought to bear on the whole realm of human endeavor, deliberately including the areas such as mathematics, physical sciences, social sciences, and so forth, but also extending beyond the areas of typical school disciplines to include such areas as landscape architecture, cartooning, game design, and genealogy.

Underlying Issues

Creativity as Giftedness

Considerable attention has been given to creativity and its relationship to giftedness. Creativity is enumerated as one dimension in the federal definition of giftedness and is considered the mark of giftedness in others. In Sternberg's triarchic conception of intelligence, creativity is one type of intelligence, and hence, giftedness. Creativity is one of the factors critical to the manifestation of giftedness in Renzulli's three-ring definition.

Giftedness as Innate or Developed

The role of genetics and environment in the manifestation of giftedness is often debated. The prevailing consensus is that giftedness is an interaction between innate characteristics and the environment. Among family, school, and peer factors that have been found to enhance or inhibit both the intellectual and the affective development of gifted students are the following: (a) early recognition and nurturing of talent; (b) family stress on doing one's best and achieving; (c) engagement in challenging pursuits with friends; (d) teachers in the early stage of development who make initial learning pleasant and rewarding, who are rarely critical, but set standards, expect progress, and quickly reward steps toward reaching success in tasks just beyond the student's current level of functions, and help students reach the goals and correct flaws in performance; (e) as talent develops, teachers who are expert, expect high levels of attainment, emphasize precision and excellence in the area of giftedness, and helped students set short- and long-term goals; and (f) in the later years of development, teachers who raise demands and expectations constantly until it is clearly communicated that the student is expected to do what had never been done before (e.g., solve heretofore unsolved math problems, etc.). Finally, these teachers convey that real learning is based on doing what experts in the field do.

Potential or Achievement

Within the federal definition, the gifted child is defined as one with potential for outstanding accomplishment and as one with high performance

capability. The terms *ability* and *capability* in this definition and many others are oriented toward potential accomplishments of the gifted, and identification of gifted students using these definitions focuses on measures of aptitude that predict future performance. Many other definitions stress extraordinary accomplishment, high achievement, or unusually distinctive performance. The identification of giftedness based on these definitions is oriented toward achievement measures including standardized achievement tests, grades, or performance measures. Other definitions include both potential and demonstrated accomplishment. To resolve the seeming conflict between choosing potential or accomplishment, some propose that giftedness be regarded as potential in young children, as precocious performance or accomplishments in later developmental stages, and eminence of achievement in adults. Critics of the definitions that rest on potential argue that existing assessments do not predict gifted performance in adults. Critics of achievement-based definitions counter that measures of current performance are often biased and will not tap giftedness in students from minority students or students from impoverished environments.

Noncognitive Factors

Several theorists and researchers have posited that giftedness is not simply a cognitive-processing distinction. In particular, one critical component of the three-ring definition of *gifted* is task commitment, a factor described as the willingness to focus extraordinary time and energy to the solution of a problem, achieving excellence in performance, or creating a unique product. Other researchers have identified characteristics such as belief in self, determination, motivation, and independence. Tannenbaum also included environmental factors and chance factors in offering his definition.

Prevalence

In the report to Congress in 1972, the panel proposed that 3 to 5 percent of the population of children in the United States should be considered gifted. Since that time, questions have been raised about whether that means 3 to 5 percent of children are gifted intellectually, another 3 to 5 percent are gifted in the arts, and so forth, or whether that 3 to 5 percent is to include all categories. The range proposed in definitions offered in the literature is now from 1 to 20 percent. In the most recent statistics available, the percentage of students identified as gifted in the United States was 6.2 percent (1998). In 2004 to 2005, 6 states identified more than 10 percent of their school population as gifted, and only 1 state reported identifying less than 3 percent (data was not available or reported for 20 states).

Gender and Culture

Within the literature, considerable attention is paid to the ways in which definitions may or may not lead to identification procedures that discriminate against girls, particular cultural groups, or students from lower socioeconomic groups. Karen Arnold, Kathleen Noble, and Rena Subotnik suggested a model of giftedness that included ability, achievement, and distance from privilege. They argue that individual abilities and actual accomplishments must be considered relative to the distance one must travel from one's current status toward the center of power in each domain.

For example, a Navajo girl born to poverty in a remote area who graduates from high school may be as gifted as a White, wealthy urban boy who graduates from college. Barbara Kerr and Karen Multon have attempted to operationalize this model as a way of defining and predicting female giftedness in science, technology, engineering, and mathematics in their National Science Foundation–funded gender–equity studies. Distance from privilege, including geographical, socioeconomic, racial, and ethnic distance from the most empowered European American, wealthy, suburban populations is difficult to quantify. The impact of sexism, racism, and poverty, some have argued, may be too great in some cases to be remedied by modifications of current definitions. The debate has led some such as James Borland to argue the extreme position that the concept of "gifted child" is logically, pragmatically, and morally untenable; others to argue the term has outlived its usefulness. However, some scholars argue that multiple conceptions are useful, and with appropriate translation into measures, they have the potential to identify outstanding ability in more diverse groups of children.

Explicit and Implicit Conceptions

The federal definition of *giftedness* and the others discussed thus far are all explicit definitions that have evolved from theory and research. Relatively recently, researchers have also investigated implicit theories of giftedness and the similarities and differences between explicit and implicit theories. Studies of teacher conceptions of giftedness indicate they seem to either be unaware of the traits associated with broader and more inclusive definitions or are unable to recognize how these traits are manifest across cultural groups and socioeconomic levels. Further, there appear to be differences in the ways different cultural groups define and describe giftedness. All these recent developments guarantee continued controversy as well as continued theory making and research concerning the construct of giftedness.

Carolyn M. Callahan

See also Creativity, Definition; Identification; Intelligence; Prodigies; Talent

Further Readings

Arnold, K., Noble, K. D., & Subotnik, R. T. (1996). *Remarkable women: Perspectives on female talent development*. Cresskill, NJ: Hampton Press.

Gardner, H. (1983). *Frames of mind*. New York: Basic Books.

Renzulli, J. S. (1978). What makes giftedness? Re-examining a definition. *Phi Delta Kappan, 60,* 180–184, 261.

Ross, P. O. (1993). *National excellence: A case for developing America's talent*. Washington, DC: U.S. Government Printing Office.

Sternberg, R. J., & Clinkenbeard, P. R. (1994). The triarchic model applied to identifying, teaching, and assessing gifted children. *Roeper Review, 17,* 255–260.

Sternberg, R. J., & Davidson, J. E. (2005). *Conceptions of giftedness* (2nd ed.). Cambridge, UK: Cambridge University Press.

Gifted Rating Scales

The identification of gifted students in the schools may seem like a straightforward activity. However, how one approaches the process depends on one's conception of giftedness. For example, if one embraces a conception of giftedness based on the notion that giftedness equates to high intelligence or *g,* then one could select any number of IQ tests (including nonverbal scales) heavily weighted with *g*. Conversely, if one embraces a conception of giftedness that equates with multiple manifestations of giftedness, then the selection of tests should be different. Rating scales, along with nominations, authentic and portfolio assessment, and dynamic assessment, should play a role in gifted identification if one views giftedness as more than high IQ.

Rating scales are among the most widely used instruments for identifying students for gifted programs. There are a number of widely used teacher-gifted rating scales: the *Gifted Education Scale, Second Edition; Gifted Rating Scales; Gifted and Talented Evaluation Scales; Scales for Identifying Gifted Students;* and the *Scales for Rating the Behavioral Characteristics of Superior Students*. This entry describes the Gifted Rating Scales.

Measure of Multidimensional Giftedness

The *Gifted Rating Scales (GRS),* authored by Steven I. Pfeiffer, was published in 2003. The following principles guided the development of the *GRS:* requires minimal training to administer, score, and interpret; reliable and valid; standardization sample matches the latest U.S. Census in race/ethnicity, parent education level, and regional representation; based on a multi-abilities conceptualization of giftedness; designed to complement an IQ test and other procedures (e.g., auditions, portfolio samples, nonverbal tests); and standardization co-linked to the *Wechsler Intelligence Scale for Children–Fourth Edition* and *Wechsler Preschool and Primary Scale of Intelligence–Third Edition.*

The *GRS* includes a Preschool/Kindergarten Form (*GRS-P*) for ages 4:0 to 6:11 and a School Form (*GRS-S*) for ages 6:0 to 13:11. The *GRS-P* consists of five scales with 12 items each; the *GRS-S* consists of six scales with 12 items each. The items of the *GRS-P* represent skills and behaviors developmentally appropriate for younger children, and the *GRS-S* items reflect more developmentally advanced skills. The *GRS-S* includes a sixth scale, leadership. Both forms yield raw score

totals, which are converted to age-based *T*-scores and associated cumulative percentages.

The *GRS* is based on a multidimensional model of giftedness that incorporates the Edward Zigler and Kurt Heller's *Munich model of giftedness and talent* and the typology in the U.S. Department of Education Report, *National Excellence: A Case for Developing America's Talent*. Following is a brief description of each of the scales:

Intellectual Ability. This scale measures the student's verbal and nonverbal mental skills and intellectual competence. Items rate abstract reasoning, problem solving, mental speed, and memory.

Academic Ability. This scale measures the student's skill in dealing with factual and school-related material.

Creativity. This scale measures the student's ability to think, act, and produce unique, original, or innovative thoughts or products.

Artistic Talent. This scale measures the student's potential for, or evidence of ability in drama, music, dance, drawing, singing, playing a musical instrument, and acting.

Leadership Ability. This scale measures the student's ability to motivate others toward a common or shared goal. Items rate conflict resolution skills, initiative in groups, and understanding of interpersonal communication.

Motivation. Items on this scale rate the student's desire to succeed, tendency to enjoy challenging tasks, and ability to work well without encouragement. The motivation scale is *not* viewed as a type of giftedness.

Each item is rated by a teacher on a nine-point scale divided into three ranges: below average, average, and above average. The *GRS-S* classification system indicates the *likelihood* that a student is gifted, based on his or her *T* score. The higher the student's *T* score on one or more of the gifted scales, the higher the probability that he or she is gifted.

The *GRS* has undergone extensive investigation since its publication. Findings are encouraging; articles in peer review journals consistently report evidence of high reliability and support for test validity.

For example, coefficient alpha reliabilities ranged from 0.97 to 0.99 and standard error of measurements ranged from 1.0 to 1.41 across the six scales. Data from the standardization sample was used to analyze diagnostic accuracy. Multiple statistical analyses were conducted, including the following: *sensitivity,* the proportion of children that the *GRS-S* correctly detected as intellectually gifted; *specificity,* the proportion of children correctly identified by the *GRS-S* as *not* intellectually gifted; *likelihood ratio,* an index of the accuracy of a test that depicts what the odds are that a positive test result comes from a youngster who is gifted; and *overall correct classification.*

The *GRS-S* was successful in both correctly identifying individuals who are intellectually gifted (test sensitivity) and correctly identifying individuals who are not intellectually gifted (test specificity), especially when intellectually gifted was operationally defined as intellectual ability in the top 5 percent.

Measure of Reliable Change Over Time

In addition to its use as a gifted screening test, the *GRS* was designed to measure change over time in a student's profile of abilities. The *GRS* as a measure of reliable change over time is helpful in determining gifted program eligibility when a bright student comes close but doesn't quite make the district cut-score for gifted eligibility. The *GRS* as a measure of reliable change over time can also be used to measure a student's progress in a gifted program.

The procedure to measure change using the *GRS* is straightforward. The practitioner compares a student's original *GRS* scale score(s) with a range of scores that account for the variability expected by both regression to the mean and measurement error. Standard error of prediction (SE*p*) scores provide confidence bands for *T* scores so that a second and more recent set of *T* scores can be compared with an original set of *T* scores.

Role in Multidimensional Model

Although most people think only of intellectual giftedness, children display artistic, musical,

athletic, dramatic, interpersonal, aesthetic, leadership, and other gifts. The view that there are multiple manifestations of giftedness leads to different implications for gifted identification than does the view that equates giftedness exclusively with high intelligence. Identification based on a multifaceted view of giftedness should include multiple measures and multiple sources of evidence. Rating scales can play an important role within this model.

Steven I. Pfeiffer

See also Early Identification; Emotional Intelligence; Intelligence Testing

Further Readings

Pfeiffer, S. I. (2003). Challenges and opportunities for students who are gifted: What the experts say. *Gifted Child Quarterly, 47,* 161–169.

Pfeiffer, S. I. (Ed.). (2008). *Handbook of giftedness in children*. New York: Springer.

U.S. Government. (1993). National excellence: A case for developing America's talent. Retrieved from http://www.ed.gov/pubs/DevTalent/intro.html

Zigler, A., & Heller, K. A. (2000). Conceptions of giftedness from a meta-theoretical perspective. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik (Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 3–21). Amsterdam: Elsevier.

Gifted Readers

Gifted readers are those who, by nature of their advanced understanding of language, are reading at least 2 years in advance of their grade-level peers. Gifted readers, also termed *talented readers,* have characteristics and learning needs that differ from their peers. Educators and parents who understand the learning needs of gifted readers are better able to challenge them and further develop their talent. This entry provides an overview of the general characteristics of gifted readers, illustrates differences in their reading behaviors and strategy use from their non-gifted peers, and provides several recommendations for their instruction.

Characteristics

Gifted readers are those with decoding and comprehension skills 2 years or more in advance of their peers based on reading performance indicators. Gifted readers are often precocious readers in that they learn to read at a young age. However, not all gifted readers begin reading early. Similarly, many readers who begin reading early and demonstrate precocity in reading, later read on a level equal to their typically developing peers and do not develop into gifted readers.

The gifted reader has an advanced understanding of language and communicates easily using a well-developed vocabulary. These readers are able to read fluently using speed and tone appropriate to a given text, but also use visual clues such as punctuation to support their textual understanding. As they read, these students monitor the text to detect new ideas and self-evaluate to determine their own understanding. When comprehension breaks down, they use metacognition to determine which strategies should be used and choose from a repertoire of mastered reading strategies. These students use a wider variety of reading strategies in context than do their non-gifted peers, including the following: rereading, analyzing structure, predicting, inferring, evaluating, relating information to the context area, asking questions, and remembering the main idea and details. These students also access their own prior knowledge and experiences while reading, which deepens their comprehension as well.

Gifted readers read with ease and automaticity. Their proficiency with the reading process may be the reason that gifted readers tend to like reading more than their peers do. Perceptual differences exist in the two populations as well; gifted readers cite reading first as a pleasurable activity and second as a way to get information, whereas non-gifted readers cite finding information as the primary reason for reading, with pleasure being secondary. Gifted readers spend more time reading and do so in a wider variety of literature and genre than do non-gifted readers. Gifted readers are also better able to self-regulate their behavior to read, a strategy that allows them to use the strategies mentioned earlier and to avoid becoming distracted while reading.

Instruction

Regular reading instruction based on grade-level texts is often too easy for gifted readers and may not improve their reading ability. Long-term exposure to unchallenging instruction may cause gifted readers to become complacent or lazy because they may be accustomed to being rewarded for doing work that is easy for them. Texts slightly above their current reading level, along with diagnostically based instruction, will provide appropriately challenging experiences in the students' zone of proximal development and enable them to make further growth. Because of their advanced strategy use, these students need high-interest texts geared toward their ability level that are challenging enough to require them to purposely practice the use of advanced metacognition. Higher-level questioning, particularly in challenging texts, will help them develop these advanced cognitive skills. These learners should also be encouraged to work on long-term projects that allow them to apply information and skills learned in their reading.

Although their talents are specific to reading, their instructional needs are like those of all gifted students who require adequately challenging curriculum, training in the use of higher-order thinking skills, and time to meet with other learners of similar cognitive ability. Curriculum compacting is advocated as a way to eliminate previously mastered content and can be used to allow time for advanced study of text, such as that provided in the Great Books or Junior Great Books program. Teachers may need to provide varied grouping structures, including cluster grouping, cross-grade grouping, and within-class grouping to effectively meet the needs of their gifted readers.

Recent studies indicate, however, that little is done to provide gifted readers with adequately challenging curriculum, causing their school experiences to be analogous to those of their non-gifted peers. Though the nature of literacy continues to change rapidly because of advances in technology, advanced instruction in technological literacy such as blogging, searching, and critical reading is also lacking. Whether the needs of gifted readers are met depends on teachers' ability to differentiate the materials and process in their reading instruction to provide challenges.

Elizabeth A. Fogarty

See also Classics/Great Books; Elementary School, Literature Curriculum; Language Arts, Curriculum; Middle School, Literature Curriculum; Precocious Reading; Secondary School, Literature Curriculum; Talented Readers

Further Readings

Catron, R. M., & Wingenbach, N. (1986). Developing the potential of the gifted reader. *Theory Into Practice, 25,* 134–140.

Dooley, C. (1993). The challenge: Meeting the needs of gifted readers. *Reading Teacher, 46,* 546–551.

Fehrenbach, J. (1991). Gifted/average readers: Do they use the same strategies? *Gifted Child Quarterly, 35,* 125–127.

Levande, D. (1999). Gifted readers and reading instruction. *CAG Communicator, 30,* 19–20, 41–42.

Reis, S. M., Gubbins, E. J., Briggs, C. J., Schreiber, F. J., Richards, S., Jacobs, J., et al. (2004). Reading instruction for talented readers: Case studies documenting few opportunities for continuous progress. *Gifted Child Quarterly, 48*(4), 315–338.

Girls, Gifted

Gifted girls are a population with high ability, cognitive characteristics, and complex affective needs that left unaddressed may reduce their academic achievement in school, jeopardize their creative contributions to the world around them, and significantly impair their personal journey toward self-awareness and actualization. Academic research studies during the past century provided longitudinal data to dispel a distorted view of the gifted as socially inept, physically weak boys, although research on gifted girls only began in the 1980s with Barbara Kerr's, Sally Reis's, and JoAnne Smutny's writings. Research study recommendations included accelerated and enriched school curricula for gifted boys and girls. At the federal government level, officials responded to 20th-century world events by recognizing the value of the gifted men and women to the country. U.S. officials commissioned educational reports, enacted policies to improve educational opportunities and established policies for gifted education, all of which included girls. However, long-held

cultural and societal expectations that inculcate values, beliefs, and behaviors continue to limit academic achievement and place barriers on talent development for girls who may hide their giftedness through a variety of coping strategies. Girls with extraordinary abilities from low socioeconomic status and ethnics groups remain unrecognized and receive little or no assistance to realize their exceptional talents. Encouraging trends and practices that effectively nurture gifted girls include parents, schools, and communities that support gifted girls' needs with ongoing encouragement, understanding, and appropriate challenge resulting in holistic development at the personal level and beneficial contributions to society. This entry describes the history, the characteristics, and the findings of research on gifted girls.

Coming Out of the Kitchen

Two eminent educational researchers who emerged in the 1920s significantly challenged prevailing views of gifted girls as homogeneous in intellectual ability and well-suited primarily for homemaking responsibilities. At Stanford University, cognitive psychologist Lewis Terman countered the *early ripe, early rot* view of precocious children and dispelled myths of social ineptness, physical inferiority, and mental instability to provide a profile of well-adjusted social skills, above-average height, and capable leadership abilities. Terman began the classic longitudinal study *Genetic Studies of Genius* work in 1921 with 1,528 11-year-olds (856 boys and 672 girls) who scored 135 or higher on the newly developed Stanford-Binet IQ test.

In addition to repeated IQ measures, Terman collected data on gifted children's personal interests, family life, and other nonintellectual areas. Rather than burning out precocious abilities at a young age, he found the gifted children emerged successfully as high-achieving adults who made productive contributions to society. Still in progress with the aging *Termites,* as they're called, results indicate many of the grown-up gifted girls in Terman's study became professional career women who remained unmarried or married later in life and either did not have children or raised fewer children. Although he held a view of inherited intelligence that placed greater emphasis on genetics than environment in developing gifts and talents, Terman advocated early identification of gifted, accelerated study, differentiated curriculum, a focus on student interests, and specialized training for teachers of the gifted.

Leta Hollingworth, an educational psychologist at Columbia University, challenged cultural and societal limitations for women throughout her life and conducted large-scale gender research to disprove the implications of the variability hypothesis applied to mental ability: that men demonstrated a wider range of mental abilities and therefore achieved eminence or required institutionalization in greater numbers than did women who possessed a more static range of intellectual ability. Examining 1,000 newborn boy and 1,000 newborn girl babies, Hollingworth found more similarities than differences between genders, indicating the possibility of great accomplishment for girls given similar educational and career opportunities as boys.

In 1922, Hollingworth began an 18-year study with gifted students in New York City public schools with 50 7- to 9-year-old students with IQs higher than 155 in Special Opportunity Classes at P.S. 165. Equally divided into higher (IQ median 165) and lower (IQ median 146) groups, gifted boys and girls progressed at their own paces through the standard curriculum then received enriched (history of civilization, biography, French, music, writing, and field trips) rather than accelerated instruction in an educationally homogeneous class setting. Hollingworth found special challenges for gifted girls in overcoming attitudes about girls as the mentally inferior gender and disinterest in the traditional play habits of girls. With its emphasis on real-world application, Hollingworth encouraged an expanded range of talent development for gifted boys and girls, which helped dispel the myth that capable students will succeed in the regular curriculum without special assistance or opportunities.

Hollingworth established the P.S. 150 Speyer School in 1936 for 175 gifted boys and girls aged 7 to 9 years old. Further expanding the enriched curricula, the Speyer School created *Evolution of Common Things* units that students themselves helped develop and assemble. Yielding nearly two decades of research data, the Speyer School and Hollingworth's previous studies with gifted children resulted in almost 40 published studies and produced the first gifted textbook, *Gifted Child:*

Their Nature and Nurture. Although she believed heredity influenced giftedness, Hollingworth embraced the role of environment and education in developing gifts and talents, a vital position that placed gifted girls on a level playing field with gifted boys. Hollingworth herself demonstrated unusual capacity in her rise to eminence despite numerous obstacles and opposition faced as a lone female voice advocating for gifted girls.

Golden Age of Gifted Girls

Academia provided empirical evidence demonstrating the existence of exceptional gifts and talents in girls, and the Nineteenth Amendment to the Constitution in 1920 gave women the right to vote and solidified the Women's Rights Movement's earlier advocacy for admission to higher education institutions denied at the time as harmful for women. Legislation enacted by the federal government following World War II stimulated educational benefits for men and women veterans through the 1944 GI Bill of Rights, and the National Science Foundation Act in 1950 provided funding for the gifted through research and education in math, science, and engineering. Following the launch of *Sputnik* in 1957, the U.S. federal government mounted an energetic effort to provide advanced classes in math and science for gifted boys and girls in response to the perceived endangerment of U.S. democracy during the Cold War.

The National Defense Education Act (NDEA) in 1958 recognized outstanding students through the NDEA Title V Guidance, Counseling, and Testing; Identification and Encouragement of Able Students provision. In 1972, the Marland Report issued a multilayered definition of the gifted and talented that protected gifted girls by virtue of inclusion and established the Office of Gifted and Talented in the U.S. Department of Education. The 1983 *Nation at Risk* report promoted enrichment and accelerated curriculum for gifted students. In 1988, the Jacob Javits Gifted and Talented Students Education Act (part of the Elementary and Secondary Education Act) established funding for research centers, funded grants for underrepresented populations in states and issued grants for program implementation in states. Although government agencies promoted excellence for gifted girls, the report *National Excellence: The Case for Developing America's Talent* in 1993 forecast concerns about America's talented youth as a *quiet crisis*. Since the early 1990s, the National Science Foundation's Gender Equity programs for women and girls has been a leader in funding research and creating policy on the education and guidance of girls who are gifted in science, technology, engineering, and mathematics.

Belief Barriers and Roadblocks to Success

Although academic research and government appropriations for gifted boys and girls paved the road to success, deeply entrenched cultural beliefs and societal attitudes about achieving gifted girls created roadblocks not easily overcome. Kerr reviewed the internal and external barriers to success for gifted girls in *Smart Girls, Gifted Women* first published in 1985. In 1992, the American Association of University Women (AAUW) published an extensive study, *How Schools Shortchange Girls,* to address serious concerns about the impact of schools on the self-esteem and career aspirations with 3,000 boys and girls in Grades 4 through 10. Although boys and girls both experienced a decrease in self-esteem during their teen years, girls' self-esteem dropped more deeply. The study found girls enrolled in math and science courses maintained higher self-esteem and career aspirations. Rather than a closing gender gap, the AAUW report found increased gender inequities in schools with behaviors that included teachers calling on boys more frequently than girls, reinforcing assertive behavior more readily in boys than in girls, evaluating written work from boys for creativity and writing from girls for neatness, and providing time and guidance to boys when solving problems but giving the correct answer to girls. When girls repeatedly encountered these behaviors throughout their school experiences, the increasing loss of self-esteem and confidence formed a sharp contrast to the buoyancy they possessed earlier during their primary grade years.

Environmental influences create tension in career choices for gifted girls who feel they must choose between career expectations and family responsibilities. Karen Arnold studied valedictorians in Illinois who entered college in the early 1980s and found most of the young women planned to interrupt their professional careers to raise children,

whereas none of the young men planned a professional leave of absence to care for children. Dorothy Holland and Margaret Eisenhart conducted an ethnographic study during the late 1970s and early 1980s with high-ability college students and concluded the young women accomplished status through relationships with high-profile young men. These young women lowered their career goals and accepted marginalized jobs after graduation because of a culture of romance that prioritized relationships rather than academic accomplishment in their thoughts and conversations.

Given prevailing cultural stereotyping for smart girls and environmental roadblocks to achievement, gifted girls may adopt a posture of invisibility as a coping mechanism for the pressure of high expectations and feeling disconnected, alienated, or different from others. The *Horner effect* or *fear of success syndrome* describes a pretense of lesser ability from otherwise capable girls who hold back correct answers or full engagement when competing with boys as an avoidance of rejection strategy. The *imposter phenomenon* affects girls who discount their achievement by attributing their academic success to luck or external factors rather than to their own efforts. These girls live in fear that someone will discover what they consider intellectual fraud rather than high ability and effort. The *Cinderella complex* demonstrates a dependency as girls wait for their princes to rescue and care for them.

Although gifted girls may receive high grades in school, underachievement concerns persist with increasingly lower levels of performance when compared with their overall potential or self-belief of what they may accomplish. Conversely, when gifted girls adopt a superwoman approach to success in all areas of their lives, perfectionism may hinder their achievements when they fail to set attainable goals for themselves. Ever-increasing levels of accomplishment performed compulsively to attain perfection derail a more balanced approach to excellence in achievements. As gifted girls consider roles traditionally found in career, wife, and mother, psychological androgyny describes the complex interaction of masculine characteristics and feminine qualities needed to attain equilibrium in their chosen fields of accomplishments.

Lower socioeconomic status may determine the level of accomplishment as gifted girls from more affluent homes and backgrounds may possess financial resources and support structures and expectations less available to impoverished families unfamiliar with college scholarship opportunities and professional career preparation. Karen Arnold, Kathleen Noble, and Rena Subotnik developed a model of female talent development that consider distance from privilege and power. The distinct characteristics of ethnic populations influence achievement with cultural values, support systems of encouragement, and family expectations of caregiving and housekeeping. Asian girls may receive continual support for achievement in math and sciences. Self-esteem among Black girls remains strong during the teen years because of ongoing support in their families. Identification of Hispanic girls for gifted programs may require alternate assessment instruments sensitive to their intellectual and creative abilities to avoid underrepresentation.

The Best Is Yet to Come

Parents, schools, and communities that listen without judgment to the dreams of gifted girls and challenge them toward their goals provide an ethic of caring needed by gifted girls to reach their potential. Rather than perspectives based on deficit models or pathology, positive psychology may provide a framework of strength-based support needed for successful adjustment. School programs that promote affiliation with female groups such as Girl Scouts, that build high-quality library offerings to satiate voracious reading habits, that encourage mentorships, and that provide research opportunities send gifted girls messages of hope and inspiration to attain excellence. In-service training for teachers on the diverse characteristics and needs of gifted girls help build the resilience needed to persevere through difficult circumstances encountered on the road to achievement. Healthy competition with reasonable risk-taking, creative guidance with those who may wish to remain invisible, and innovative research ensure a brighter future for gifted girls.

Connie L. Phelps

See also Eminent Women; Hollingworth's Studies of Highly Gifted Students; Sex Differences in Creativity; Sex Differences in Mathematical and Spatial Ability; Talented Girls, Mathematics; Women, Gifted

Further Readings

Arnold, K. D. (1993). Academically talented women in the 1980s: The Illinois Valedictorian Project. In K. D. Hulbert & D. L. Schuster (Eds.), *Women's lives through time: Educated American women of the twentieth century* (pp. 393–414). San Francisco: Jossey-Bass.

Arnold, K., Noble, K. D., & Subotnik, R. T. (Eds.). (1996). *Remarkable women: Perspectives on female talent development*. Cresskill, NJ: Hampton Press.

Bailey, S., Burbridge, L, Campbell, P., Jackson, B., Marx, F., & McIntosh, P. (1993). Girls, gender, and schools: Excerpts from *The AAUW report: How schools shortchange girls*. In S. M. Matteo (Ed.), *American women in the nineties: Today's critical issues* (pp. 274–305). Boston: Northeastern University Press.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development*. Cambridge, MA: Harvard University Press.

Holland, D. C., & Eisenhart, M. A. (1990). *Educated in romance: Women, achievement, and college culture*. Chicago: University of Chicago Press.

Johnsen, S. K., & Kendrick, J. (Eds.). (2005). *Teaching and counseling gifted girls*. Waco, TX: Prufrock Press.

Kerr, B. A. (1997). *Smart girls: A new psychology of girls, women, and giftedness* (Rev. ed.). Scottsdale, AZ: Great Potential Press.

Klein, A. G. (2002). *A forgotten voice: A biography of Leta Stetter Hollingworth*. Scottsdale, AZ: Great Potential Press.

Reis, S. M. (1998). *Work left undone: Choice and compromises of talented females*. Mansfield Center, CT: Creative Learning Press.

Rimm, S. B. (2003). *See Jane win for girls: A smart girl's guide to success*. Minneapolis, MN: Free Spirit Publishing.

Global Issues

The global approach to gifts and talents offers perspectives that can cut right through unrecognized cultural assumptions. It shows differences in attitudes about who might be seen as gifted, and how those who are considered gifted should be treated. Parent organizations for the gifted exist in most parts of the world; because adequate support for the specialized education for these children is widely lacking in schools, parent organizations have become the major force for advocacy of gifted. Internationally, organizations such as the World Council for Gifted and Talented Children and the European Council for the Highly Able work on a voluntary basis to coordinate and communicate experience and research findings. This entry describes global cultural differences, specifically differences between Eastern and Western views, and cross-cultural research.

Global Cultural Differences

Factors such as economics, beliefs, and politics strongly influence global cultural differences. Identification of the gifted and talented, in particular, focuses on what is most esteemed in a society. Religion, for example, is the major influence in directing the everyday lives of millions outside the Western world, and interpretations of holy writings often determine what children may and may not learn. In the Western view, non-Western parts of the world instruct children in nonrational ways. There, fate, in the form of a god, gods, or holy men, will decide an individual's life-path. This means that children's exercise of free will, following one's own interests to reach excellence, or questioning what one is taught, is unacceptable.

In the Western world, old-style schooling involving corporal punishment, dividing curricula into boys' and girls' subject areas, and didactic instruction has largely gone. This is not the case elsewhere. For example, the daughters of the Taliban are not the only girls forbidden education beyond the minimum; this is equally true in many other regions, such as Pakistan, where illiteracy among women is the acceptable norm. The concept of giftedness in such societies is more likely to be one that is morally and socially approved than any quality based on personal achievement.

All children grow up in families, although in developed countries, the term indicating the basic unit in a society varies widely. The term *family* now includes a high and growing percentage of families headed by a single woman (one-third of all in the United Kingdom) and some with same-gender parents. In the United States, many more high achievers come from two-parent compared with one-parent homes. But in other parts of the world, families may be extended and organized in a hierarchy of age and gender. Three generations under

one roof means privacy may be unknown and income as well as ideas and daily rituals may be pooled. Powerful forces shape the outlooks of the young, so that a child's achievements and aims may be ascribed (especially for girls) rather than chosen. Individual, personal hopes are not an option, and sanctions for breaking convention can be as severe as death.

Millions of the world's children have to work to support themselves or help support their families and so have minimum, if any time, at school. This severely limits their knowledge acquisition, as well as their taste for school-type learning. For most, there is no alternative to contributing to the family's essential life support. This problem is relatively more acute for children with the potential to reach a high standard. In addition, the environments of poor children are often unhealthy places to grow up in, both physically and psychologically, so that their loss is not only of health and education, but also of normal psychological development. Dire poverty can stunt their maturation, as well as their intelligence and ability to think ahead, though the time they are able to spend in school, limited as it may be, can have lifelong value.

The greatest risk factor in the development of gifted potential is low socioeconomic status—the mixture of poverty and cultural attitudes that brings children feelings of low self-worth because perception of the self and others is both subjective and cultural. These deep cultural differences make the search for universal aspects of giftedness extremely complex.

Though it is difficult to point to a precise correlation between countries' cultural attitudes toward giftedness and the overall attainment of its young people, the Organisation for Economic Co-operation and Development (OECD) comparative Programme for International Student Assessment (PISA) study found that countries with the highest performing young people, notably Finland and Korea, have comprehensive approaches to schooling. The United States, which has the most developed provision for gifted and talented children, was a weak performer. Britain's performance was high. Much appears to depend on the overall standard of basic education, which is related to the standard of living and, thus, opportunities for individual development.

East Is East and West Is West

Globally, the biggest differences between cultures are between the Western and the Eastern worlds.

The Western View. Western-style education normally distinguishes children for an appropriate education along a graded spectrum of abilities, so that the gifted will form a small percentage that scores above a chosen cutoff point in intelligence or achievement. Abilities judged in this way are seen as relatively genetically determined. Accordingly, identification of the gifted is usually by working out how best to measure abilities, choosing a high cutoff point, and selecting those who score above it. Most Western concern with gifts and talents is measured in that linear way. This is also the dominant idea and practice in the country that produces the most prolific and influential research, the United States, thus influencing the way other countries see giftedness.

The Eastern View. Eastern approaches take the opposite view, being geared to individual effort toward a potentially high standard for the mass of children. In most Asian and Pacific Rim countries, environmental influences are seen as dominant, to the extent that the teacher's and the parents' as well as the child's hard work are considered as vital inputs for the child's future. High potential is considered most children's birthright, and the main difference in children's achievements is their rate of development, along with personal effort.

These two approaches to giftedness overlap in practice, and both can be found in many countries. For example, there are programs for the selected gifted as well as for untested volunteer children who want to sample extra education in China, Israel, the United Kingdom, New Zealand, and others. But in the egalitarian Scandinavian countries, there is virtually no special provision for the gifted, although their children score highest in most international comparisons of academic achievement.

India is experiencing a clash between ancient Hindu spirituality, described in the Vedas, and Western materialism inherited from the 200 years of British rule. In Vedic education, excellence means reaching the highest ideals of "being," such

as truthfulness, generosity, compassion, sacrifice, and service to the society. In the Vedic view, the Western idea of excellence, which seeks measurable evidence of "doing," is mere competence.

Culturally, learning to be an independent individual in control of one's own life and aspirations (the highest ideal for Maslow, Bandura, and Rogers, for example) is incompatible with a culture of collectivism, where action is taken for the benefit of the group. In parts of Africa and among the Inuit, for example, competition is seen as unseemly, and however potentially gifted children may be, they are strongly discouraged from flaunting superior abilities. The effect is the same for children of low caste in the Indian subcontinent. Such outlooks are part of a child's identity. The awareness of whether or not boundaries exist between oneself and others can define whether one can be gifted in anyone's eyes. Talent searches, self-selection for extra provision, pull-out programs, competitions, and so on are inconceivable in such societies. But here and there, schools for wealthy children are being founded that set high goals of learning at any international level.

In the United States, the dominant view of giftedness still most widely used is that in the 1972 Marland Report in which the checklist for giftedness includes "valued by society," "rarity," and "yield a product"—even though it might not be of wider social benefit. This view also stresses individual and competitive achievement, often in school learning rather than in community or altruistic values. Because of the international dominance of this view, it can threaten recognition of the altruistic use of gifts and talents.

Cross-Cultural Research

Research in cross-cultural development aims to distinguish between the behavior humans share and what may be culture-specific. Life between the certainties of birth and death will be affected by climate, work, longevity, food, and above all by the opportunity to develop each person's potential. The outcome of global research is, like all research, dependent on its design, which challenges the use of Western scientific methods as applied to people who function differently and for whom well-used Western hypotheses may not be entirely relevant. The outcomes from different research approaches have been compared in terms of international competitions or national scientific advances and economic success. Until now, however, no controlled experiments have been done regarding the relative value of each type of provision within the setting of any particular culture.

Globalization, the spread of a recognizable culture and the changes it may bring to family and public life has uncertain effects and may only be cosmetic. The availability of U.S. fast food and mobile phones, for example, has not affected the glory an Indonesian Catholic family may feel in sending their spiritually gifted daughter to be a nun, nor the pride Muslim parents may take in their memory-gifted son who can recite the Koran by heart. The child gods and goddesses of Nepal are gifted in the eyes of their worshipers, as indeed is the Dalai Lama, discovered in childhood by a team of searchers as the reincarnation of previous Dalai Lamas.

Although the Internet is increasing globalization, it is also splitting the world into those who can benefit from it and those who are left out. The Internet is only available in places that have electricity as well as connection, decided by governments or religious leaders, so that great swathes of the third world remain without it. The long-term effects of information technology, its benefits and debits, are unknown. Yet, it would be possible to examine immediate influences on children's aspirations in areas that are new to them, by looking at samples before and after its arrival.

Comparing global cultures requires specific methodological and ethical sensitivities. Western scientific method and outlook is certainly spreading, not least if researchers want their work to be printed in respected international journals. The pitfalls of giving Western IQ tests to non-Westerners are well known, particularly in the way that unfamiliarity with the English language, and even translations that incorporate the test makers' ways of thinking, can lower scores dramatically.

Provision and progress for the development of gifts and talents, at least in the Western world, depends on the basic standard of education on which it builds. This basis is related to the country's standard of living, which also defines opportunities and encouragement for high-level development of the individual. But importantly, the study of gifts and talents must include the

dynamics of individual psychology within its cultural context. Because of strong cross-cultural differences, it would not seem wise to copy any action directly from one culture to another without recognizing local outlooks and ways.

Joan Freeman

See also Cultural Conceptions of Giftedness; Multicultural Assessment; World Council for Gifted and Talented Children

Further Readings

Freeman, J. (1998). *Educating the very able: Current international research*. London: Stationery Office. (Translated into Thai). Retrieved from http://www.joanfreeman.com

Freeman, J. (2002). *Out of school educational provision for the gifted and talented around the world*. (Report for the UK Government). Retrieved from http://www.joanfreeman.com

Freeman, J. (2005). Permission to be gifted: How conceptions of giftedness can change lives. In R. Sternberg & J. Davidson (Eds.), *Conceptions of giftedness* (pp. 80–97). Cambridge, UK: Cambridge University Press.

Laungani, P. D. (2007). *Understanding cross-cultural psychology*. London: Sage.

Stevenson, H. W. (2002). Cultural interpretations of giftedness: The case of East Asia. In R. Friedman & K. B. Rogers (Eds.), *Talent in context: Historical and social perspectives on giftedness*. Washington, DC: American Psychological Association.

Governor's Schools

Governor's schools, described in this entry, are state-funded programs designed to provide unique educational experiences that match the needs of gifted and creative youths. Typically, these programs take the form of summer residential programs hosted on college campuses. The programs provide enriched curricula designed to challenge the students and foster critical thinking skills. Students focus on a particular topic, problem, or field within the sciences, arts, or humanities during the program and are directed in the production of an independent and creative project that is often presented at the end of the program. As of 2008, more than 22 states have state-funded residential governor's schools. However, the number and the specifics of the programs are constantly changing with the prevailing educational priorities and the availability of funding.

According to the Web site of the National Conference of Governor's Schools (NCoGS), the first governor's school was created in Winston-Salem, North Carolina, in 1963 by Governor Terry Sanford. The program was initially funded through the Carnegie Corporation and was later maintained through the North Carolina Board of Education. The Governor's Program for Gifted Children in Louisiana can trace its roots even further back to 1959, when it was created as the McNeese Summer Enrichment Program by George Middleton. The program became funded by the state in 1964 under Governor John McKeithen, making it officially the second oldest governor's school. Numerous states began to create similar programs based on the success of several pioneering institutions, particularly during the 1980s. In 1987, the leaders and organizers of governor's schools across the country held a conference that led to the formation of the NCoGS. Its charter was formally ratified at the 1988 conference held in Little Rock, Arkansas, hosted by then-Governor Bill Clinton. The organization currently promotes the formation and support of governor's schools throughout the country, facilitates communication and collaboration between programs, and hosts a biennial conference.

Current governor's schools differ widely in their structure, focus, and format. Most governor's schools take the form of 1- to 6-week summer residential programs. However, governor's schools vary from nonresidential programs to full 9-month residential academies. One program, the Blue Ridge Virtual Governor's School in Virginia, operates primarily through online collaboration supplemented by field trips and group projects. Many programs have a general focus within the sciences, humanities, or arts. However, specialized governor's schools and tracks exist for specific studies such as agriculture, teaching, electronics, and leadership. Highlighting the diversity of the programs, not all governor's schools affiliated with the NCoGS are affiliated with the governor of their states, or endorse the title of "school."

Governor's schools are typically highly selective and will often require a nomination by educators and an application or audition process. Because programs are state funded, they are often only available to residents of that state. However, because of that funding, they are often able to offer free or partially subsidized tuition. A list of programs affiliated with the NCoGS is located on the NCoGS Web site.

Ryan Hansen

See also Critical Thinking; Giftedness, Definition; Summer Camps; Summer Programs; Talent Identification Program

Further Readings

Governor's Program for Gifted Children: http://www.gpgc.org
National Conference of Governor's School: http://ncogs.org
Virginia Governor's Schools Program: http://www.doe.virginia.gov/VDOE/Instruction/Govschools
Welsh, G. S. (1969). *Gifted adolescents: A handbook of test results*. Greensboro, NC: Prediction Press.

Grade Skipping

See Acceleration/*A Nation Deceived;* Enrichment Triad Model

Graduate Education

Research, programming, and social policies focusing on children and youth with high potential have a long-standing history. Faster-paced learning for bright students is documented as early as the mid-19th century. Systematic research on intelligence, creativity, and psychological dimensions of talent has grown steadily since Lewis M. Terman instituted his longitudinal study of high-potential children in the early years of the 20th century. However, specialized graduate education for teachers of these young people is a relatively recent innovation. There are few common expectations for gifted education teachers from state to state. Programs tend to be focused on the graduate level for the most part; however, there are pockets of preservice opportunities. Some universities and colleges offer programs resulting in a degree with an emphasis on gifted education. Others include an added license (at the state level). Depending on state policies, a district employing a licensed gifted education teacher receives reimbursement for a portion of a teacher's salary in addition to a supplemental per pupil expenditure for each identified student. The diversity is largely because of the interplay among the recognition of gifted students as a distinct population, public policy, and local and state practices for gifted/talented/creative learners. This entry describes gifted and teacher education, public policy, preparation of gifted child educators, and implications for the future.

Gifted Education and Teacher Education

A review of the writings of key researchers in gifted education in the early 20th century reveals a focus on operationalizing intelligence and creativity, analyzing the individual's life path, and studying the family context. Educational provisions emphasized faster-paced programs. Specialized schools (e.g., St. Louis, Cleveland, and New York City) were structured around an acceleration or enrichment approach. Studies of creativity in adults were applied to understanding and nurturing creative thinking in children. Investigations into achievement motivation and vocational success were applied to gifted samples. Despite these advances establishing a research foundation and the legitimacy of giftedness as a field of study, there was virtually no crossover to teacher preparation. Teachers were often assigned by seniority to work with highly able students rather than on completing specialized preparation, despite a growing body of descriptive studies indicating that teachers who completed at least one graduate course in understanding giftedness displayed much more positive attitudes, sensitivity, and skills relative to identifying and teaching gifted students.

Public Policy

The watershed event of the 20th century regarding gifted education policy was the publication of the

U.S. Office of Education's comprehensive report on the status of gifted education, in part a follow-up on the effects of specialized mathematics and science programs of the post-*Sputnik* era (circa 1957). The Marland Report (Sidney P. Marland was the U.S. Commissioner of Education) was presented to Congress in 1972. Its reception resulted in the establishment of the national Office of the Gifted and Talented, the first federal definition of giftedness, and the formation of the National/State Leadership Training Institute on the Gifted and the Talented (LTI). The latter entity traveled the country, working with grassroots groups to establish state policies and comprehensive plans for identification and programming. The LTI provided direct staff development as well as collaborating with education agencies to create and implement training in giftedness for practicing teachers. A smattering of universities across the country also worked with the LTI to develop graduate education for teachers, counselors, and administrators, focusing on identifying, teaching, and programming for gifted/ talented/creative students.

In 1974, the passage of P.L. 94–142, the Education for All Handicapped Children Act, mandated services for youngsters identified with exceptionalities: a free and appropriate education in the least restrictive environment. Unfortunately, giftedness was not included under the special education umbrella of legislative protections, including the requirement of a certified teacher to provide needed services. As states adopted the provisions of the federal mandate, several included giftedness as a protected exceptionality. Some of these states as well as states that did not adopt mandates or that enacted mandates limited to identification *or* programming included the requirement of a licensed teacher as a condition for a local district to receive state reimbursement for programming costs. As of 1994, a graduate endorsement, or add-on license, was available in 19 states (required in 17 of those states).

The lack of a federal mandate continues to affect the number and qualities of gifted education licensure and supporting coursework. Currently, 4 states require preservice coursework in gifted education for a general education certificate, and 18 states require licensed gifted education teachers to work with students placed in gifted education. Thirteen states require administrators to have completed gifted education coursework if they coordinate gifted education services. Four states require general education teachers to complete annual staff development hours in gifted education. The quality of graduate education in giftedness is highly variable, ranging from some states including compulsory completion of a state-approved program at a state-accredited institution of higher education to states requiring only that the teacher candidate pass a state-developed comprehensive examination (coursework optional).

Licensure for school counselors, school psychologists, social workers, and other support professionals does not generally feature demonstrations of competencies relative to knowledge of giftedness or skills in identifying or working with students and their families.

Preparing Gifted Child Educators

Despite the nation's fluctuations in its acknowledgment of and support for gifted education, higher education institutions continue to offer courses for prospective or practicing teachers. A review of the current national directory of higher education institutions, compiled by the National Association for Gifted Children, indicates the diverse intellectual homes for these free-standing courses and programs. Departments of curriculum, followed by special education, educational psychology, administration/foundations, or counselor education are the common locations for gifted education teacher programs. This situation might reflect institutional philosophy, state certification requirements, or the background of the individual directing the program.

A review of graduate programs reveals that the three most common courses are nature and needs or characteristics of gifted/talented/creative students, methods and materials for teaching gifted/ talented/creative learners, and a graduate practicum. Courses in differentiating curriculum and instruction, affective needs, program development and evaluation, and twice exceptional learners (giftedness and disability) are the second tier of popular courses. Third are courses focusing on needs of underserved populations: rural/urban, culturally diverse, English language learners. Mirroring other changes in the delivery of graduate education, more universities are offering courses through distance or online systems.

Future Implications

The recent passage of gifted teacher education standards, by the National Council for the Accreditation of Teacher Education in collaboration with the National Association for Gifted Children and the Council for Exceptional Children, brings with it the promise of more uniformity of program offerings as well as identifying key knowledge and skills for gifted education teachers. Given a downward trend in the prevalence of graduate education programs at the masters, doctoral, and graduate endorsement levels (from 101 U.S. institutions in 1984 to 66 U.S. institutions in 2007), it is hoped that these standards will seed more comprehensive graduate education for professionals working with gifted/talented/creative learners.

Reva Friedman-Nimz

See also Council for Exceptional Children—The Association for the Gifted; History of Gifted Education in the United States; National Association for Gifted Children; Teachers of Gifted; Teacher Training

Further Readings

Hanninen, G. E. (1988). A study of teacher training in gifted education. *Roeper Review, 10*(3), 139–144.

National Association for Gifted Children. *Directory of courses, degrees, and services.* Retrieved July 2, 2008, from http://www.nagc.org/index.aspx?id=2880

Parker, J. P. (2004). *Directory of graduate degree programs and services in gifted and talented education.* Circle Pines, MN: National Association for Gifted Children.

Passow, A. H., & Rudnitski, R. A. (1993). *State policies regarding education of the gifted as reflected in legislation and regulation.* Storrs, CT: National Research Center on the Gifted and Talented.

Grandparenting

Traditionally, the term *grandparent* has been defined as the biological mother or father of one's own mother or father. More recently, the grandparent relationship has broadened to also include marital, legal, foster, surrogate, and even volunteer relationships. Historically, within the extended family, grandparents have been regarded as wise and respected elders. During the past century, family forms have changed dramatically, with only a minority of the population now living in households with only traditional nuclear or extended families.

Grandparents can play especially important roles in recognizing and developing the abilities of gifted children. Grandparents serve as connectors to the past, able to delineate traditions and cultural rituals. At the same time, they provide support and encouragement for the future. Key areas of influence for grandparents include the identification of giftedness, advocacy for appropriate educational options, and emotional support for the parents. Grandparents can also serve as companions in the talent development process, mentors in areas of interest, and as social and emotional sounding boards for the grandchild. Although parent and grandparent roles do overlap, there are notable differences in how each best helps young people develop into accomplished adults. This entry describes the identification, advocacy, parental supports, and talent development roles grandparents can play for their gifted grandchildren.

Identification

Current grandparents of gifted grandchildren will likely have already experienced the ups and downs of educating their own high-ability child, or they may, themselves, have been participants in post-*Sputnik* gifted programs. This does not mean, however, that grandparents will easily recognize giftedness in young children.

Questions of the identification of giftedness might occur if a grandparent's own child was neither recognized nor selected to be part of a school's gifted program. Other problems with recognition of gifted traits might occur if the grandparents raised an underachieving gifted child, one for whom there was a large discrepancy between measured academic ability and subsequent performance at academic tasks. In terms of recognizing gifted traits, grandparents can roughly be divided into four major groups. First are those whose own children were identified as gifted and who continue to learn, as adults, with an expectation of achievement. Second are those whose children may have been identified as gifted, but who were "unsuccessful" in school for a variety of reasons. Third are grandparents who believed they recognized gifted

traits in their own child, but were not validated by schools. Fourth, there are those who did not recognize the gifted abilities in their own child, although they were present. Each level of experience with the success of raising a gifted child will influence future relationships with gifted grandchildren.

Grandparents who have an understanding of giftedness can focus a parent's attention on a child's abilities and can then serve as both a sounding board for the parent and a supportive advocate in the school.

Advocacy

Advocacy includes several levels of outreach to advance the needs of gifted and talented learners. Grandparents who have developed skills in working with educational institutions through their own parenting of gifted children are positioned to be effective advocates at a personal level for their gifted grandchild. These grandparents can offer thoughtful perspective through experience. However, grandparents who struggled with finding appropriate educational options or who had negative encounters with schools may need to acknowledge their biases before they can be helpful advocates.

At a local level, grandparents can be regarded as important spokespersons by schools and school boards because they bring a more experienced, measured view than do most young parents. A well-grounded, prepared team of parent and grandparent can add value to parent-teacher meetings and conferences.

At a state and national level, grandparents generally have more time to devote to educating the public about the needs of gifted children than parents do. According to projections by AARP, there will be 80 million grandparents in the nation by the year 2010. This potentially powerful group of constituents is rarely tapped by educational organizations even though it is a valuable resource. By sharing successful strategies, these grandparents can offer practical experience and counsel for local, state, and national programs.

Parental Support

Parents of gifted children often describe a sense of isolation and loneliness. Grandparents may be of great help in coping with these feelings. In addition, parents of gifted children struggle to maintain balance among the pressures of work, basic family responsibilities, and the ongoing demands of a high-ability student. Grandparents can serve as a significant source of advice, helping parents find appropriate resources and assistance. Whether relieving parents from curious, persistent, insistent children for special occasions, or on a regular schedule, grandparents must find a balance between assuming the parental role and that of an encouraging support position.

Talent Encouragement

Retired, involved grandparents frequently find time and opportunity to encourage talent development at different stages. They offer new venues for exploration, provide fresh experiences, and observe their grandchild's reaction and subsequent involvement. Grandparents can bring a sense of history to learning through stories of their own experiences of failure and success.

Gifted children need significant adults in their lives. Retrospective studies highlight the importance of time spent reading books, playing games, and discussing meaningful topics of interest with a caring adult. Even those grandparents who live geographically apart from their grandchildren can still influence with regular, consistent communication. Grandparents most importantly serve as role models for their grandchildren through their own ongoing learning, creative problem solving, and positive advocacy efforts. Although little research exists about grandparenting gifted students, Robert Strom at Arizona State University has applied his research on grandparents' strengths to the role of the grandparent of gifted children, as well as studying optimal grandparenting across cultures.

Robin Schader

See also Guidance; Parenting; Social-Emotional Issues

Further Readings

Strom, R., & Strom, S. (1993). *Grandparent strengths and needs inventory.* Bensenville, IL: Scholastic Testing Service.

Webb, J. T., Gore, J, K., Karnes, F. A., & McDaniel, A. S. (2004). *Grandparents' guide to gifted children.* Scottsdale, AZ: Great Potential Press.

Group Dynamics

Gifted children and adults are accustomed to not being like those around them, and this can make them feel like they exist outside of groups. The term *gifted* defines individuals by their exceptionalism, by how they stand out or by how many standard deviations they are from the mean. This focus on the individual, however, risks losing sight of the fact that everyone belongs to many groups, such as their family, school, workplace, organization, team, or group of friends. Characteristics of human groups and the implications of group dynamics research for gifted students are reviewed in this entry.

Groups need not be cliques of enforced homogeneity. Indeed, families, schools, sports teams, and organizations of all types contain different roles for different individuals. They can be unified by a variety of common goals—like winning a game or making money—or by affiliations—such as a shared interest or religion. Yet, most groups necessitate a degree of sublimation of individuality and insist that members submerge the full spectrum of their differences for the sake of group cohesion. A church, for example, is not the place for someone to show off his or her stamp collection any more than a philatelic organization will tolerate endless proselytizing by the religious devotee.

How gifted individuals respond to group membership often depends on their past experiences with groups. The gifted girl who has been forced to hide her differences and talents might bristle at these constrictions on her individuality, but the gifted boy who was always singled out as different or isolated because of his talents might relish the feeling of belonging that groups offer. The girl whose parents pressured her to fit in might fight for her right to be herself, whereas the boy whose parents insisted he outperform all his peers might want nothing more than the opportunity to be like everyone else for a change.

To understand the unique challenges that the gifted member faces in groups, it is useful to understand how groups function. Group dynamics have been studied by psychologists since Kurt Lewin first suggested that the behavior of groups could be systematically investigated. Groups, like individuals, have conscious and unconscious motivations for their behavior. They are held together by the internal consistencies of identity and simultaneously strained by internal conflicts and uncertainties. Groups have stages of development that typically begin with their formation, followed by the development of overt and covert rules and norms for the behavior of the group. Only after this process of self-definition is complete can the group begin its work. This work can go on indefinitely, with membership and change happening organically in the flow of events, or the group can terminate its work and dissolve or re-form around new membership or a new task.

The group's initial stage of establishing identity, norms of behavior, rules, and tasks can determine a member's experience in a group. This can work to the disadvantage of gifted group members. Too often, the highly intelligent, reflective members will take a backseat to the more impulsive, power-seeking or quick-to-act members and end up with rules, norms, and tasks that aren't their own. This can lead to their marginalization and finally their bitter withdrawal from a group that has strayed from what they wanted it to be.

Gifted members' unique intelligence and talents do not automatically entitle them to special treatment any more than gregarious members automatically belong in the roles of leader, captain, or president. Members enter a new group equally authorized to contribute, help make decisions, and take on roles. Only later are structures established and boundaries defined between various roles and degrees of enfranchisement. In preexisting groups, members typically know in advance the role that they are entering, but there is often much more latitude than is explicitly acknowledged. Think, for example, of the wide range of commitment and power between members of the same official rank in any social, religious, or political organization. Indeed, how well groups can accommodate differences between their members can often be a good litmus test for the health of the group as a whole.

It is helpful for gifted individuals who are inclined to think before they act to consider the role that they want to play and the sort of group they want to belong to and then actively participate in these decisions. It might be useful for gifted individuals to revisit their role, their level of participation, and their contentment with the group.

Jack Marmorstein

See also Boys, Gifted; Friendships; Girls, Gifted; Social-Emotional Issues

Further Readings

Forsyth, D. R. (2006). *Group dynamics* (4th ed.). Belmont, CA: Thomson Wadsworth.

Kerr, S., & Jermier, J. M. (1978). Substitutes for leadership: Their meaning and measurement. *Organizational Behavior & Human Performance, 22,* 375–403.

Guidance

Providing guidance to gifted and talented students is a broad concept that can take many forms, including educational and career planning or psychological counseling. Individuals who work with gifted students should be aware of how guidance can be beneficial, as well as what concerns are unique among this population. This entry describes career, educational, and psychological guidance methods in general and provides recommendations for working with gifted students in an effective manner.

The guidance needs of gifted and talented children are complex and best understood within the context of the students' gifted identification. Recently, Jin Eun Yoo and Sidney Moon examined the referring concerns at a counseling center for gifted students to determine the most salient needs endorsed by parents of gifted children. Overall, educational planning and school issues were cited as students' greatest needs. Psychosocial concerns were also commonly reported by parents of gifted children older than 6 years of age. For parents of gifted children older than age 12, career planning was also an important area of attention. These predominant reasons for referral offer many suggestions for school counselors who are in guidance positions for gifted and talented students, such as the importance of providing a developmental perspective to students' presenting concerns, as well as highlighting the concept that gifted students need differentiated guidance methods just as much as they need differentiated curriculum methods. The results also emphasize that gifted adolescents particularly need guidance services because they reported more career and social and emotional concerns—such as pressure to meet others' expectations, perceptions of being different, perfectionism, hypersensitivity, and self-esteem and depression issues—than did gifted elementary-age students.

Educational and Career Planning

Educational and career guidance refers to a variety of interventions, including providing assistance selecting individual courses and programs of study, consultation regarding acceleration, guidance related to college selection, and vocational counseling. Many of these services can be provided by school counselors, school psychologists, and other educational personnel. Referrals outside the educational system (e.g., to a psychologist specializing in career counseling) also may be beneficial for some gifted and talented students. For research-based effectiveness, most attention in the gifted educational literature has been paid to vocational and career guidance interventions.

Although the career intervention literature outlines many career counseling needs that are general to all populations (e.g., decision making, narrowing the field of possibilities, pressure to follow certain paths, or lack of role models in talent area), issues pertaining to entering the workforce or college at an early age are specific to gifted students who are academically accelerated. For these students, guidance about available early entrance to college programs and the social and emotional adjustment issues related to early entrance choices is necessary. Linda Brody, Michelle Muratori, and Julian Stanley offer many guidance recommendations for counselors and educators working with the accelerated student considering early entrance: (a) enrollment in challenging coursework in high school, including rigorous college-level courses; (b) participation in other accelerative opportunities where the accelerated student would have the chance to interact with older students; (c) review and learning of adequate study skills; and (d) assurance that the student is motivated and excited to enter college early.

Another issue central to the career guidance of gifted students is selection of the appropriate career path. Some students have multiple areas of talent from which to choose possible career avenues, and they may need assistance finding the best

route to pursue. There is controversy about whether this phenomenon, commonly referred to as *multipotentiality,* exists given that gifted students enrolled in talent search programs do not score exceptionally in all ability areas. Other scholars believe that women and older adolescents who have high overall abilities may have less differentiated career paths than do men and adolescents with more specified talent areas.

For gifted students who do exhibit multipotentiality, several interventions could apply. Examples include having multiple careers (concurrent or sequential) or consideration of extra-occupational activities that tap interests. Providing role-models of individuals who have attempted either intervention would be helpful so that the student would have real-life examples of how these alternatives are possible. Also, multifaceted interventions—such as Barbara Kerr and Sharon Robinson Kurpius's career intervention, Talented At-Risk Girls: Encouragement and Training for Sophomores (TARGETS)—that have a values-based component are advantageous because examining values helps narrow the field of opportunities relative to one's social and personal ideals.

The TARGETS intervention, which is designed for working with talented, at-risk girls, is also valuable because of the attention to gender, cultural, racial, and social class influences on career decision making. For example, girls may feel a conflict between their career aspirations and social expectations, and many high school girls are not as well prepared for college, particularly in the math and sciences, as are boys. Other researchers have shown that gifted girls with elevated career aspirations are more concerned about balancing career and family than are gifted boys. For the gifted woman, guidance issues pertaining to lifestyle choices, family and career balance, and combating the myth that women are unable to have both a career and a family appear imperative. Gifted and talented students living in poverty or belonging to racial or ethnic minority groups may have few career models to follow, receive inadequate career counseling, or feel unable to follow personal dreams if these are contrary to cultural values or beliefs. For this population, it seems extremely important to provide a mentoring component to the career intervention.

Mentoring is a form of guidance that often is aimed at helping gifted students develop their abilities in a single domain. For instance, gifted musicians may seek mentors outside school for instruction, training, and guidance through the world of musical competition. Similarly, students interested in doing academic research at a young age may be aided by mentors with a connection to a university or college (such as professors) who can guide their scientific inquiries, teach specific methodologies and techniques, and help them understand how to have their work published and recognized. Often having a mentor with similar racial, cultural, and ethnic backgrounds is particularly helpful for minority students seeking careers in fields that are historically dominated by the majority culture. A professional providing guidance to the gifted student could play a central role in finding individuals outside the educational system who could serve in these various mentoring roles.

In summary, the professional offering career guidance to gifted students from all backgrounds should serve as a consultant to the student's pursuit of his or her personal career dreams. This is particularly important because many gifted adults identify their career as a central aspect of their identity, and most stay in the same area throughout their careers. Therefore, according to Meredith Greene, career guidance that is individualized, differentiated, multidimensional, and offered from a variety of sources should be considered a vital component of the middle and high school curriculum for gifted and talented students.

Social and Emotional Counseling

Traditional psychotherapy is a form of guidance that can benefit all individuals. When working with gifted students, perhaps the most important thing for therapists to consider is how a child's giftedness may affect the presenting problem. For instance, some gifted children may face social difficulties because of their talents, such as teasing and bullying, which can contribute to presenting problems in counseling. Individuals who provide counseling to gifted and talented children include, but are not limited to, psychologists, social workers, or master's level counselors.

Although gifted and talented students have not been shown to be at greater risk for social and emotional problems compared with their peers,

they do have unique counseling needs. For example, gifted students are often socialized into a unique subculture that includes a set of values, norms, and expectations related to achievement and high levels of performance. As a result, gifted students may experience problems with anxiety, depression, perfectionism, and jealousy, and may find it difficult to manage the expectations of others. In addition, numerous scholars have documented characteristics that commonly occur among gifted and talented students, including perfectionism, sensitivity, intensity, and a strong sense of justice. Individuals who provide counseling to gifted students should be familiar with these traits and how they might manifest in therapy.

Among the characteristics that Joyce VanTassel-Baska identified as commonly occurring among gifted students, perfectionism is one that can take on positive or negative manifestations. Although some forms of perfectionism can serve as a motivator for success, perfectionism can also be debilitating, especially when it relates to satisfying unhealthy internal and external expectations. For example, gifted and talented students may feel pressure to pursue the dreams of others or the paths recommended to them because of their areas of talent, and these influences can lead to stress and difficulty making decisions. The students may develop a pattern of approaching tasks that does not allow for risk-taking, learning from mistakes, and pursuing difficult academic choices out of fear of not performing perfectly or better than all their peers. Individuals working with perfectionistic students can provide a valuable service by acknowledging and exploring these influences on personal and academic development, and by encouraging students to take risks and pursue their own interests and goals. In addition, individuals providing guidance should be aware that students' perfectionism and competitiveness may drive them to aspire to only the most prestigious and competitive educational paths, which may be in conflict with their interests, values, and personality.

Another area that is worthy of consideration when providing psychological guidance is recognizing how the experience of being gifted might influence a student's assumptions and beliefs about themselves and the world. For instance, early academic success, coupled with feedback from peers and teachers, may lead some gifted students to expect that they will be able to rise to any intellectual challenge or grasp any concept easily. When these students encounter challenges and setbacks later in life, such as taking a challenging course in college, they may experience a significant amount of distress or feel that their identity as a gifted individual has been threatened. To spare their identity or risk future distress, these students may choose to disengage from challenging activities in the future. Research by Carol Dweck and her colleagues suggests that this phenomenon may be more likely if individuals believe that their intelligence is fixed rather than malleable. Encouraging students to view their intelligence as malleable, and to view failures as part of the learning experience, may help these students become better adjusted and more willing to approach challenges in the future.

Professionals providing psychological guidance to gifted students are also bound to work with students who have the dual identity of being both gifted and having a disability that negatively affects their functioning (i.e., a twice-exceptional student). Counseling and guidance methods should emphasize ways the students can reconcile and accept their gifts and their difficulties while enhancing their talents. Goal-setting and problem-solving ways to build on strengths and accommodate for difficulties would be important components to the guidance process, as well as teaching advocacy to students and their families.

In summary, professionals offering social and emotional counseling to gifted students should consider many factors to enhance their guidance techniques. Overall, the students' difficulties should be conceptualized in light of their experience as gifted students. In addition, issues that seem to be central to many gifted students, such as perfectionism, should be dealt with relative to the beneficial or detrimental role it can play in education planning and goal setting. For the twice-exceptional student, guidance should focus on resolving issues related to dual identification as both gifted and having a disability. Given these issues, professional development opportunities should be provided to educational and professional staff in guidance roles so that they develop a basic awareness of gifted and talented students' common characteristics and psychosocial needs.

Megan Foley Nicpon and Samuel J. Shepard

See also Career Counseling; Coaching; Mentoring Gifted and Talented Individuals

Further Readings

Achter, J. A., Lubinski, D., & Benbow, C. P. (1996). Multipotentiality among the intellectually gifted: "It was never there and already it's vanishing." *Journal of Counseling Psychology, 43*(1), 65–76.

Assouline, S. G., Foley Nicpon, M., & Bramer, D. M. (2006). The impact of vulnerabilities and strengths on the academic experiences of twice-exceptional students: A message to school counselors. *Professional School Counseling, 10*(1), 14–25.

Brody, L. E., Muratori, M. C., & Stanley, J. C. (2004). Early entrance to college: Academic, social and emotional considerations. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41,* 1040–1048.

Greene, M. (2003). Gifted adrift? Career counseling of the gifted and talented. *Roeper Review, 25*(2), 66–72.

Kerr, B., & Robinson Kurpius, S. E. (2004). Encouraging talented girls in math and science: Effects of a guidance intervention. *High Ability Studies, 15*(1), 85–102.

Milgram, R. M., & Hong, E. (1999). Multipotential abilities and vocational interests in gifted adolescents: Fact or fiction? *International Journal of Psychology, 34*(2), 81–93.

Reis, S. M. (1998). *Work left undone: Choices and compromises of talented females*. Mansfield Center, CT: Creative Learning Press.

VanTassel-Baska, J. (1998). Characteristics and needs of talented learners. In J. VanTassel-Baska (Ed.), *Excellence in educating gifted and talented learners* (pp. 489–510). Denver, CO: Love Publishing.

Yoo, J. E., & Moon, S. M. (2006). Counseling needs of gifted students: An analysis of intake forms at a university-based counseling center. *Gifted Child Quarterly, 50,* 52–61.

Habits of Mind

Many educators believe that intelligence and other forms of talent are fixed, quantifiable, and unchangeable; that intelligence is an entity displayed in one's measurable performance. Doing well means that one has ability; doing poorly means that one doesn't have ability. This view of the intelligent self influences effort. When people view their intelligence as fixed, they strive to obtain positive evaluations of their ability and to avoid displaying evidence of inadequacies in comparison with others. This entry defines habits of mind, lists the habits of minds associated with intellectual achievement, and describes the impact of teaching of these attitudes and skills.

More recently, psychologists have suggested that intelligence is composed of a continuously expandable repertoire of mental habits that can be learned, nurtured, and grown—habits of mind. When confronted with difficult, challenging tasks, students and teachers who have adopted this belief tend to invest energy to learn something new and to increase their understanding and mastery. They are more likely to focus on analyzing the task; to garner internal and external resources; to apply self-regulatory, metacognitive skills; and to generate and execute alternative strategies for problem solving.

Even though people may possess knowledge and skills, they must also be alert to opportunities to apply these skills, have the inclination to employ those strategies in appropriate situations, and reflect on and evaluate their effectiveness. Performing habits of mind, therefore, requires possessing the basic skills and capacities to carry out the strategy as well as the inclinations and dispositions to do so in situations that demand their application. A habit of mind includes the following:

Value: Choosing to employ a pattern of intellectual behaviors rather than other, less productive patterns.

Propensity: Feeling the tendency and inclination toward employing a pattern of intellectual behaviors.

Alertness: Perceiving opportunities for, and appropriateness of, employing the pattern of behavior.

Capacities: Possessing the basic thinking skills and capacities to carry through with the behaviors.

Commitment: Reflecting on and constantly striving to improve performance of the pattern of intellectual behavior.

Research in effective thinking and intelligent behavior indicates that effective thinkers have identifiable characteristics. Those demonstrating these behaviors are not necessarily scientists, artists, mathematicians, or the wealthy. These characteristics have been identified in successful mechanics, teachers, entrepreneurs, salespeople, and parents—people in all walks of life.

Although intelligent human beings are capable of thinking skillfully, their habits of mind provide the fuel to activate strategic thinking. To engage skillfully in problem solving, decision making, or knowledge generation, a person must possess the inclination to decrease impulsivity, display empathy, be inquisitive, and be persistent.

Habits of mind are developmental qualities that are never fully mastered. They transcend all subject matters commonly taught in school and apply to adults as well as to children. Although there is not a finite number of habits of mind, a list of 16 have been synthesized by Arthur Costa and his colleagues and are described as follows:

1. Persisting: Persevering in a task through to completion; remaining focused.
2. Managing impulsivity: Thinking before acting; remaining calm, thoughtful, and deliberative.
3. Listening with understanding and empathy: Devoting mental energy to another person's thoughts and ideas; holding in abeyance one's own thoughts to perceive another's point of view and emotions.
4. Thinking flexibly: Being able to change perspectives, generate alternatives, consider options.
5. Thinking about one's thinking (metacognition): Being aware of one's own thoughts, strategies, feelings and actions, and their effects on others.
6. Striving for accuracy and precision: A desire for exactness, veracity, fidelity, and craftsmanship.
7. Questioning and problem posing: Having a questioning attitude; knowing what data are needed and developing questioning strategies to generate information.
8. Applying past knowledge to novel situations: Accessing prior knowledge; transferring knowledge beyond the situation in which it was learned.
9. Thinking and communicating with clarity and precision: Striving for accurate communication in both written and oral form; avoiding overgeneralizations, distortions, and deletions.
10. Gathering data through all senses: Gathering data through the sensory pathways—gustatory, olfactory, tactile, kinesthetic, auditory, and visual.
11. Creating, imagining, and innovating: Generating new and novel ideas, fluency, originality.
12. Responding with wonderment and awe: Finding the world awesome and mysterious. Seeking and being intrigued with phenomena and beauty.
13. Taking responsible risks: Being adventuresome; living on the edge of one's competence.
14. Finding humor: Finding the whimsical, incongruous, and unexpected; being able to laugh at oneself.
15. Thinking interdependently: Being able to work in and learn from others in reciprocal situations.
16. Remaining open to continuous learning: Having humility and pride when admitting one does not know; resisting complacency.

These 16 habits were drawn from research and analyses of human effectiveness, descriptions of remarkable performers, and characteristics of efficacious people. They are attributes of peak performers whether in homes, schools, athletic fields, the military, governments, churches, or corporations. These habits make marriages successful, learning continual, workplaces productive, and democracies enduring.

The label *gifted* connotes a state of being. Either one has "it" or not. It assumes that if one doesn't have it, no amount of effort will ever help acquire it. However, some students identified as gifted are reluctant to take risks; they lack flexibility, are poor listeners, prefer to work in solitude, and are quick to jump to conclusions. Some students deemed "slow" are often insightful, venturesome, humorous, wondrous, and exploratory. Some researchers suggest that, instead, those learnable, teachable patterns of behaviors that describe intelligent action that, when practiced over time, can become habituated should be examined.

Children develop cognitive strategies and effort-based beliefs about their intelligence when they are continually pressed to raise questions and to accept challenges, to find solutions that are not immediately apparent, to explain concepts, to justify their reasoning, and to seek information. The goal of education, therefore, should be to liberate and develop these habits of mind and the skills associated with them. When children are held accountable for this kind of intelligent behavior, they take it as a signal that others think they are smart, and they come to accept this judgment. The paradox is that children become smart by being treated as if they already are intelligent.

Arthur L. Costa

See also Attitudes Toward Gifted; Intelligence Theories; Motivating Gifted Students

Further Readings

Costa, A. (2008). Describing habits of mind. In A. Costa & B. Kallick (Eds.), *Leading and learning with habits of mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Costa, A., & Kallick, B. (2008). Changing perspectives about intelligence. In A. Costa & B. Kallick (Eds.), *Leading and learning with habits of mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Dweck, C. (1999). *Self theories: The role of motivation, personality and development*. New York: Random House.

Ennis, R. (2001). An outline of goals for a critical thinking curriculum and its assessment. In A. L. Costa (Ed.), *Developing minds: A resource book for teaching thinking*. Alexandria, VA: Association for Supervision and Curriculum Development.

Feuerstein, R., Rand, Y., Hoffman, M., & Miller, R. (1980). *Instrumental enrichment: An intervention program for cognitive modifiability*. Baltimore: University Park Press.

Glatthorn, A., & Baron, J. (1985). The good thinker. In A. L. Costa (Ed.), *Developing minds: A resource book for teaching thinking*. Alexandria, VA: Association for Supervision and Curriculum Development.

Goleman, D. (2006). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam Books.

Perkins, D. (1995). *Outsmarting IQ: The emerging science of learnable intelligence*. New York: Free Press.

Perkins, D. N., Jay, E., & Tishman, S. (1993). Beyond abilities: A dispositional theory of thinking. *Merrill-Palmer Quarterly, 39*(1), 1–21.

Resnick, L. B., & Hall, M. W. (1998). Learning organizations for sustainable education reform. *Daedalus, 127,* 89–118.

Sternberg, R. (1984). *Beyond IQ: A triarchic theory of human intelligence*. New York: Cambridge University Press.

Tishman, S. (2000). Why teach habits of mind? In A. Costa & B. Kallick (Eds.), *Discovering and exploring habits of mind*. Alexandria, VA: Association for Supervision and Curriculum Development.

Halbert Robinson Center

The Halbert and Nancy Robinson Center for Young Scholars (Robinson Center) at the University of Washington (UW) is a pioneer in the practice of early university entrance and a regional, national, and international leader in working with gifted students and their families. The Robinson Center began in 1977 as the Child Development Research Group and admitted the first two early entrance students to the UW at that time. Since then, more than 500 students have enrolled at the UW through one of its two early entrance programs, the Transition School/Early Entrance Program and the UW Academy for Young Scholars. These programs are guided by the principal of optimal match, which holds that gifted students' passion and capacity for learning are best served when they are enabled to progress at the pace of their intellectual abilities rather than their chronological age. Three additional programs serve the needs of intellectually motivated and talented students, prekindergarten through college: Summer Stretch and Summer Challenge for students in Grades 5 through 9, and the Washington Search for Young Scholars, a regional academic talent search for students in Grades 5 through 8.

Since its inception, the Robinson Center has also been committed to conducting research to better understand and provide for students' intellectual, academic, social, and emotional well-being, as well as to guide program development, educate the general public about the needs of gifted students, and contribute to the academic discourse about early university entrance. Thus far, 13 studies, which span the earliest years to the present, have investigated multiple aspects of early university entrance from both students' and parents' perspectives, using both quantitative and qualitative methodologies. Early Entrance Program and UW Academy students have often served as research assistants for these studies and have received coauthorship in the resulting publications. This entry describes the Robinson Center programs.

The Transition School (TS) is an avenue through which academically advanced middle school–aged students can enter the UW. Each year, bright and motivated young scholars are recruited from a variety of cultural, ethnic, and socioeconomic backgrounds. Sixteen students are admitted annually to the school, which in one year prepares them for entry into the UW. This number is chosen to provide a peer group that is small enough for cohesion yet large enough for diversity and support. Students have completed seventh or eighth grade

when they enter TS, and all must be younger than age 15 as of August 31st of the year they begin. Students study literature and expository writing, history, mathematics, ethics, and physics and work to develop the critical thinking, writing, reading, and study skills they will need to become excellent university scholars. During the third TS quarter, physics and ethics are replaced by a five-credit university course of their choosing so that students can take this class while still under the protective umbrella of TS faculty and staff.

The Early Entrance Program (EEP) is for students who successfully complete TS and provides continuing psychological, academic, and social support for TS graduates after they matriculate to the UW as freshmen. EEP is structured to enable students to mature personally and socially at their own paces while exploring the academic and research opportunities, study abroad programs, career development services, and a myriad of other resources available at UW. EEP provides a network of support services including an academic counselor, specialized academic programming, and facilities that constitute a home base.

The UW Academy for Young Scholars (Academy), jointly developed with the UW's Honors Program, is for academically advanced, highly motivated Washington State high school–aged students. Students apply to the Academy during 10th grade and, if accepted, leave high school at the end of 10th grade to become freshmen in the UW Honors Program. Thirty-five students are admitted into the Academy annually. The Academy includes a 12-week Bridge Program that includes a 2-day orientation known as Academy Camp, and two courses during students' first quarter, which include an Honors seminar and a linked writing composition course. Academy students receive a network of support services, including specialized academic programming during the summer, autumn, and winter quarters of their first year, access to an on-site academic counselor, social programs, and facilities that constitute a home base. A first-year university exploration seminar is offered to both EEP and Academy students that helps them investigate their individual preferences, interests, values, and ambitions; craft a plan to choose majors; test and reframe that plan; reflect on it; and imagine reformulations of the plan.

Summer Challenge (Grades 5–6) and Summer Stretch (Grades 7–10) serve more than 400 middle and high school students annually. Fast-paced, challenging courses in 3- and 5-week blocks provide stimulating academic experiences for students. Summer Challenge classes approach underlying concepts through hands-on activities that are action-oriented, encouraging students to learn by exploring issues and solving problems with both their brains and their hands. Summer stretch classes enable older students to explore a particular subject area, satisfy a desire for a challenging, college-prep experience, receive a boost toward taking advanced placement courses, advance toward earlier graduation, or make room in their high school programs for electives and activities they might otherwise have to pass up.

The Washington Search for Young Scholars (WSYS) is a regional talent search for students in Grades 5 through 8. WSYS was launched in 2004 to knit together a network of resources for Washington State's most outstanding students and offer recognition ceremonies and opportunities for advanced learning. WSYS is modeled after similar talent search programs offered in different areas of the United States. WSYS works with school districts and higher education institutions throughout Washington to identify academically talented students and broaden services to them and their families.

Faculty, staff, and students at the Robinson Center have collaborated on many studies that have investigated multiple aspects of the early university entrance experience. These studies, using multiple methodologies and spanning the earliest years of the programs to the present, have guided the evolution of the EEP and the Academy. Research has focused on the following: the academic performance of early entrants compared with traditional-aged students; the causes of underachievement among early entrants; students' social and psychological adjustment to academic acceleration; early entrants' friendship patterns; students' perceptions of the intellectual, social, and emotional effects of early entrance; longitudinal follow-up studies of EEP participants; parental perspectives on the early entrance experience; and an analysis of the theory and practice of optimal match.

Kathleen D. Noble

See also Belin-Blank Center; Center for Talent Development; Study of Mathematically Precocious Youth; Talent Identification Program

Further Readings

The Halbert and Nancy Robinson Center Web site: http://depts.washington.edu/cscy

Noble, K. D., & Childers, S. A. (2009). A passion for learning: The theory and practice of optimal match at the University of Washington. *Journal of Advanced Academics, 19*(2), 236–270.

Noble, K. D., & Childers, S. A. (2009). Swimming in deep waters: Twenty years of research about early university entrance at the University of Washington. In L. V. Shavinina (Ed.), *International handbook of giftedness.* New York: Springer Science.

Noble, K. D., Childers, S. A., & Vaughan, R. C. (2008). A place to be celebrated and understood: The impact of early university entrance from parents' points of view. *Gifted Child Quarterly, 52*(3), 256–268.

Noble, K. D., Vaughan, R., Chan, C., Childers, S., Chow, B., Hughes, et al. (2007). Love and work: The legacy of early university entrance. *Gifted Child Quarterly, 51(2),* 152–166.

Highly Gifted

Highly gifted is a term used as one of the ways to convey the degree to which one is gifted. Giftedness is seen as a continuum of capacity ranging from average to exceptionally advanced and *highly gifted* is a term most often associated with children. Historically, the continuum was defined by scores on standardized intelligence tests. With the early work of Lewis Terman in the 1920s, children were tested using the Stanford-Binet Intelligence Scale and were categorized according to score levels on the test as ranging from normal intelligence to those who were exceptionally intelligent. Leta Hollingworth, an early colleague of Terman, also contributed to the understanding of highly gifted in her work that described differences in development as well as social and emotional understanding of highly gifted children. Miraca Gross contributed further to the understanding of highly gifted children with the categorization of giftedness according to intelligence test scores and identified students as highly gifted with IQs measured at 145 to 159, adding two higher categories of exceptionally gifted (160–179) and profoundly gifted (180+) to designated distinguishable differences among the population labeled *gifted*. Further, Gross identified prevalence levels in the population with highly gifted, exceptionally gifted, and profoundly gifted; with profoundly gifted students occurring in the population at a rate of fewer than 1 in 1 million. This entry reviews the various definitions of highly gifted and provides a description of the characteristics of this population of gifted individuals.

There is some debate about the use of IQ scores as a measure of giftedness including those identified as highly gifted and Gross also indicated that it was a simplistic definition. Linda Silverman described the highly gifted as being "significantly beyond the norm of the gifted" (p.71). She further criticized the simple nature of the classification of gifted as "yes" or "no" versus the notion of a continuum of giftedness that would also help educators to address the services needed based on the identifiable differences among gifted students. The Davidson Institute for Talent Development pinpoints profoundly intelligent individuals as "those individuals who have IQs that are at the 99.999% percentile" (p 1).

In addition to the use of standardized IQ tests to identify highly gifted students, lists of characteristics or behaviors have also been developed. These lists include the general characteristics of gifted individuals but are highlighted either by a much earlier appearance of the trait or the intensity level of the interaction (e.g., speech, mobility, literacy). Silverman further identified significant learning characteristics as the ability to skip more traditional steps in a learning sequence and the ability to make "giant intuitive leaps" (p. 75). Further, Silverman also noted the issue of developmental asynchrony as an attribute in highly gifted students; their ability to deal with abstract issues at an early age is not necessarily complemented by the ability to act in the same manner. Camilla Benbow and her colleagues have produced a great amount of research on the most extreme cases of giftedness emerging from their studies of mathematically and verbally precocious youth, including information about cognitive characteristics, personality, and goals. One of the most important findings of their studies, as well as those of others who have studied

perfect scorers on specific achievement tests, is the observation of more uneven abilities than at lower levels of giftedness, with highly gifted students often having perfect or extremely high scores in one area, such as mathematics, and high or moderately high scores in other areas, such as verbal ability. Additional characteristics noted by the Davidson Institute on highly gifted include the following: extreme need for constant mental stimulation, insatiable curiosity, precision in thinking and expression, inability to concentrate on mundane tasks, propensity toward underachievement.

A critical issue in the identification of highly gifted individuals when using a testing protocol is the ceiling effect of the test. Many assessments were not constructed to assess the intellectual abilities of highly gifted students. The items on the test are constructed in a limited manner with limited responses available; highly gifted students can score at the maximum level of the assessment and yet still not have reached an area where they do not know the answer. As noted by Julian Stanley, recommendations to address the ceiling effect include above-level testing such as the SAT, traditionally used for incoming college freshmen, now used to assess highly gifted junior high students. According to Jan Hansen, other above-level testing includes traditional assessments such as Advanced Placement (AP), the College Level Examination (CLEP), or the International Baccalaureate Diploma examinations.

In addition to the problems of identification of highly gifted children, differences in social and emotional development are also apparent. As noted by Silverman, asynchronous development is more typical than not; however, Hollingsworth's early work went even further. She noted that an IQ range of 125 to 155 was "socially optimal" and that with increasing IQ, the developmental problems between highly gifted students and their age-mates were also increased. Because of the differences in the ability to conceptualize as well as the rapidity of understanding, highly gifted children may not have much in common with their age-mates, which may lead to more feelings of isolation in highly gifted children. Further, there are suggestions that highly gifted children may be aware of these differences and consciously move to become "less" gifted in the eyes of their age-mates. Recent evidence, however, from the 35-year follow-up of highly gifted people who participated in out-of-level testing and accelerated programs with highly gifted peers show them to have achieved great success and life satisfaction. Highly gifted students need and benefit from these programs.

Beverly D. Shaklee

See also Davidson Institute for Talent Development; Genius

Further Readings

Benbow, C. P., & Minor, L. L. (1990). Cognitive profiles of verbally and mathematically precocious students: Implications for identification of the gifted. *Gifted Child Quarterly, 34,* 1, 21–26.

Davidson Institute for Talent Development. (2008). *Frequently asked questions about giftedness.* Available from http://www.gt-cybersource.org

Gross, M. (2000). Exceptionally and profoundly gifted students: An underserved population. *Understanding Our Gifted, 12*(2), 3–9. Retrieved January 3, 2008, from http://www.hoagiesgifted.org

Hansen, J. (1992, March/April). Discovering highly gifted students. *Understanding Our Gifted, Open Space Communications, 4*(4). Retrieved January 2, 2008, from http://www.gt-cybersource.org

Hollingworth, L. S. (1942). *Children above IQ 180: Their origin and development.* New York: World Books.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years: Uncovering antecedents for the development of math-science expertise. *Perspectives on Psychological Science,* 1, 316–345.

Silverman, L. K. (1989). The highly gifted. In J. Feldhusen, J. VanTassel-Baska, & K. Seeley (Eds.), *Excellence in educating the gifted* (pp. 71–82). Denver, CO: Love Publishing.

Stanley, J. C. (1990). Leta Hollingworth's contributions to above-level testing of the gifted. *Roeper Review, 13,* 166–171.

Terman, L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children.* Stanford, CA: Stanford University Press.

High-Stakes Testing

High-stakes testing refers to the practice of using educational or psychological tests to make decisions that have important consequences for the

test takers. Common examples of high-stakes testing include the use of competency tests in particular subjects to determine whether students should be advanced from one grade to another; the use of aptitude tests to place students in particular educational programs, including those for gifted and talented students; the use of entrance examinations for educational institutions; and the use of tests of various sorts to select candidates for job training programs and to screen applicants for employment. Though high-stakes testing has come to refer almost exclusively to minimum competency testing in the schools—for grade advancement and high school graduation, as well as for governmental evaluation of schools—the broader sense of the topic is treated in this entry. Emphasis, however, is on high-stakes testing in education rather than in employment.

Standards and Standardization

The high stakes of testing guarantee that testing procedures and the tests themselves are subject to intense public and scholarly scrutiny, and justifiable concern arises about whether the tests are sufficiently reliable (that is, consistent in measurement), valid for the specific purposes to which they are put, and free of bias against particular populations of test takers, such as members of ethnic minority groups. The American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education have jointly published *Standards for Educational and Psychological Testing,* revised most recently in 1999, as guidelines for test development, standardization, and use. These guidelines go a long way toward ensuring fair and effective testing, but controversy regarding particular tests and testing practices nevertheless remains.

Most high-stakes tests measure cognitive constructs, such as knowledge of subject matter, verbal skills, and quantitative skills. Personality tests are sometimes used as well—for example, to screen out serious psychopathology or to determine whether job applicants have particular qualities relevant to job performance—but personality tests are unlikely to be used in isolation, unaccompanied by other, again typically cognitive, assessments. Tests of cognitive constructs are also most likely to be used with gifted and talented individuals, and then only in talent domains that lend themselves to cognitive assessment. Other talent domains, such as art, athletics, creative writing, dance, invention, and music, are not particularly amenable to testing. Product and performance samples, such as auditions, tryouts, portfolios, and competitions, are used instead to make high-stakes decisions.

Tests used to make high-stakes decisions, like most educational and psychological tests available for public use, are standardized for a particular population of potential test takers. Standardization means that scores on the test—or, more typically, scores on each of the various scales of the test—have been converted to a common metric in a common distribution of scores, usually the normal curve. This facilitates interpretation of scores on a given test and makes it possible to compare scores on different tests in a meaningful way. An easy way to understand standardization is in terms of percentiles, which is one sort of interpretation that may be made from standardized scores. If a score lies at the 50th percentile, this means that 50 percent of the population of potential test takers perform *at or below* that level—in other words, that the test taker with a score at the 50th percentile performs *as well or better than* 50 percent of the population. The standardization of a test is not conducted with an entire population of potential test takers. That population is necessarily hypothetical. Rather, standardization is conducted with a sample of that population, a sample that is large enough, statistically speaking, to allow inferential interpretation of the scores of anyone who takes the test. This sample is the norm group, and the distribution of scores for this sample produce the norms for the test. Separate norms are produced for men and women in virtually all educational and psychological tests. Some tests also have norms for groups distinguished by other variables, such as age or ethnicity.

Validity

Two types of validity that are especially relevant to high-stakes testing are content and predictive validity. These two types of validity are different in conception and are established in different ways. Which of the two is relevant to a particular

test depends on how that test is used because the validity of a test is necessarily tied to its purpose. Content validity refers to how well the items of a test reflect an area, or domain, of content. Content validity is established, first, by defining the domain: What content does the domain include? What content lies outside the definition of the domain and is thereby excluded? The definition of a domain—and answers to these questions—is determined by scientific and professional consensus. Second, items are generated for the test that represent all aspects of the domain, the particularities of the domain's content, as defined. The items of the test are considered a sample drawn from the hypothetical population of all possible items in the domain. Once the items are compiled into a test, scores on the test are standardized, norms are produced, and performance on the test is interpreted in reference to the domain.

In competency testing, for example, a domain might be reading competence at the end of the fourth grade. The domain is consensually (and expertly) defined in terms of the essential knowledge and skills involved in reading at that grade level. Items are generated to reflect the essentials of the domain and are compiled into a test that is subsequently standardized and normed with a large sample of students who are at the end of their fourth-grade year. Scores on the test are interpreted as the degree of competence in reading relative to expectations for students at the end of the fourth grade. If the test is used to determine minimum competence, then a cutoff score is designated (again, according to scientific and professional consensus) below which students are considered not competent in reading at their grade level. A high-stakes decision resulting from scores below the cutoff would likely be for students to remediate fourth-grade reading.

Another prominent example of testing for which content validity is relevant is advanced placement testing. Test development and use are parallel to those just described. The domain is defined in terms of subject matter and academic level, typically corresponding to a college or university course, such as first-semester calculus. The cutoff score is that at or above which students earn advanced placement credit for the course.

Predictive validity refers to how well scores on a test predict a criterion of performance. Items of the test are not chosen to reflect a content domain, but instead for their contribution to the predictive ability of the test. Once the test is compiled from the chosen items, it is subjected to the same standardization and norming procedures described previously. In addition, the statistical relation of the test scores, called the predictor variable, to an indicator of performance, called the criterion variable, is determined. The prediction itself is expressed in a regression equation, a linear equation that serves as the formula for predicting the criterion from the predictor. Prediction is not perfect, however; it contains some degree of error. The greater the error, the less accurate the prediction, and the lower the predictive ability, and predictive validity, of the test. Predictive validity, in statistical terms, is expressed as a correlation between predictor and criterion.

Predictive validity is relevant when test scores are used to make a decision affecting the test taker's future. For instance, college entrance examinations such as the ACT and SAT, as well as graduate and professional school admissions tests such as the GRE (for graduate school), LSAT (for law school), and MCAT (for medical school), all rely on predictive validity. The scores on these tests are used, along with other selection criteria, to make decisions about which applicants to admit to graduate and professional training programs, based on the predictive assumption that present performance on the tests is correlated substantially with future performance in the program.

Controversy

Controversy regarding high-stakes testing takes several forms, but fueling the controversy is the fact of the high stakes themselves: These tests importantly affect people's lives. The public is understandably concerned that *any* high-stakes decision be made fairly and expertly. To the extent that tests are used in making such decisions, the tests must be psychometrically sound, by means of proper development, standardization, and norming, and as evidenced by strong reliability and validity indicators. The tests and testing procedures must be demonstrably fair and equitable to potential test takers, that is, as free as possible from bias with respect to gender, race, ethnicity, socioeconomic status, and other such

variables that may be relevant in a particular decision-making situation. Any time differences in test performance emerge as a function of these variables, questions are raised about test bias. Even when bias is found not to account for differences in test performance, as has been the case with most tests of ability and achievement, it is difficult simply to accept the conclusion that differences in test performance reflect real group differences. However justified this conclusion might be, it cannot be the end of the story, but the beginning. Why do the group differences exist? What interventions can be used be used to address the causes these differences? Even when these interventions are effective, can we as a society afford to wait the decades or the generations it might take for them to have their full effects? The answer to the last question is "No." The goals of diversity in education and employment are immediate, and quite often high-stakes testing works against such goals. Aside from ongoing questions of validity, high-stakes decisions cannot be made in a socially responsible way on test results alone. Other data, information more fully responsive to diversity goals, must be brought into the complex of factors that should be the basis of high-stakes decisions.

Charles D. Claiborn

See also ACT College Admission Examination; Advanced Placement; SAT; Test Development; Test Preparation

Further Readings

American Educational Research Association, American Psychological Association, and National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.

Porter, A. C. (2002). Measuring the content of instruction: Uses in practice. *Educational Researcher, 31*(7), 3–14.

Hispanic/Latino(a), Gifted

The topic of gifted Hispanics and Latino(a)s is one that has received little attention. However, given the growing number of Hispanics in the United States, this issue is of utmost importance. Further, many issues should be considered when one works with gifted Hispanics in any capacity, such as education, research, health, and mental health. This entry provides basic information to consider when working with gifted Hispanics and how this information can be helpful. Topics of discussion include demographics, immigration and acculturation, values common to many Hispanic groups, and the role of societal factors.

Demographics

According to the U.S. Census Bureau, in 2000, there were 35.2 million Hispanics in the United States, with 20.6 million identifying as Mexican, 3.4 million as Puerto Rican, 1.2 million as Cuban, and 10 million as other Latino. In 2007, the Census Bureau suggested that number had risen to 45.4 million, with approximately 23.5 million Hispanic men and 21.9 million women, making the Hispanic population the largest group of ethnic-racial minorities in the United States. These numbers are projected to increase to 59.8 million by the year 2010, and 102.6 million by 2050.

In 2006, the Census Bureau found that half of the Hispanics in the United States were native to the United States, and the other half were foreign born. Approximately 25 percent of Hispanics entered the United States in the year 2000 or later. Most of those entering the United States were born in Latin America. With these numbers, it is not surprising that approximately 80 percent of Hispanics speak English at home, with almost 20 percent speaking some other language. These statistics help educators and mental health providers understand the necessity of specialized training regarding the needs of this population and pertinent issues to consider when working with gifted and talented Hispanics. It is necessary to consider the particular culture and geographic area from which a Hispanic is coming and how this affects her or his experience with giftedness and the educational system.

Disparities exist with regard to educational attainment. According to the Census Bureau, in 2007, about 60.3 percent of Hispanics age 25 and older completed high school or above compared with 86.2 percent of Whites. Hispanics have the lowest rate of any ethnic-racial minority group in

the United States for completing high school. About 12.7 percent of Hispanics completed 4 years of college or more compared with 29.1 percent of Whites.

These disparities widen for advanced degrees. In 2004, the Census Bureau reported that more than 1.6 million Hispanics earned a bachelor's degree; 475,000 earned a master's degree; 110,000 earned a professional degree; and 36,000 earned a doctoral degree. These numbers were much greater among the White population, with more than 27.1 million bachelor's degrees, 10.2 million master's degrees, 2.3 million professional degrees, and nearly 1.7 million doctoral degrees. Thus, educators and mental health providers must foster and encourage those Hispanics who display giftedness whether they have been tested or not. This would help to propel more Hispanics into higher education and to seek advanced degrees, thus using their giftedness and talent. Hispanics often display aspects of giftedness long before they are tested for it, which is often related to Hispanics' ability to speak English. Without English proficiency, giftedness is much more difficult to recognize.

Hispanics come from various cultural backgrounds, including Latin America, Central America, South America, Puerto Rico, Cuba, and Spain. These various cultural backgrounds make the Hispanic population extremely heterogeneous. Cultures, historical experiences and linguistics differ from region to region. People from one group of Hispanics may feel little, if any, affiliation with another group of Hispanics. The term *Hispanics* often refers to those people who come from Spanish-speaking backgrounds or nations. However, given the differences in experiences, the updated term *Latino(a)s* has been used for those peoples coming from Latin America, Central America, South America, and islands such as Cuba and Puerto Rico. People coming from these regions have substantially different experiences than do those people coming from Spain. For example, many people from these nations have experienced forms of racial and political discrimination and oppression that set their cultural identities apart from that of people who hail from Spain. Further, there is a historical context in which the Spanish were conquerors of these lands upon the founding of the "Americas." Thus, the remainder of this entry focuses on the experiences of gifted Latinos rather than Hispanics.

Immigration and Acculturation

Immigration plays a large role in Latino families. There is a plethora of reasons for Latino families to immigrate, including seeking employment and educational opportunities, or fleeing from political and religious persecution. Latinos may have entered the United States legally, illegally, or as refugees. Taking these immigration issues into consideration can be extremely important—is this family here by choice or by force and how has this affected the family? Immigration is a historical moment in a Latino family's life. Adjustment to this situation can be smooth or may be extremely turbulent. Along with the immigration experience come generational differences that can affect the family functioning, as well as how well a Latino student may function in the educational system in the United States. As most Latinos enter the United States, they may speak primarily Spanish or some other language. As Latino children gain an education through the school system, these children may take on some of the values of the dominant culture in the United States. Thus, these Latino children become acculturated, meaning they retain some of the original culture while acquiring aspects of the new culture. Often the children end up speaking English much better than their parents do and may help interpret or mediate for their parents. Further, these children may better understand the system in which the family is now living. This ability to "walk between cultures" may be viewed as a talent in and of itself.

Because Latino children acculturate much quicker than their parents do, this may present some difficulty should they want to obtain a higher education. Latino parents who have immigrated may have much less knowledge about the educational system, have less education, and not understand the challenges faced by their gifted children. Further, these parents may lack adequate skills to help their gifted children succeed academically. This may cause gifted Latino children to feel alone in their struggles and could contribute to difficulties in attaining advanced degrees.

Latino students are often left to attempt to figure out the system on their own, which may prove difficult when attempting to learn the culture of higher education and the hidden rules of which other students may already have knowledge.

Hidden rules may include those such as learning to critically choose material from the library and to not assume all information is equal, using computers to engage in class discussion when it is available, reading materials related to class that are not part of the required reading, visiting with faculty during their office hours, meeting other students on campus or getting involved in clubs, and so on. Although these may seem to be obvious aspects of college life, for those students who are considered first-generation college students, or students who are the first in their family to attend college, these are not simple aspects of the college experience to initially acquire and understand without some guidance.

Role of Latino Values

Those who work with Latinos should have basic knowledge of values associated with these cultures. These values include *collectivism, familismo, respeto,* and *personalismo*. The first of these, collectivism, refers to the tendency for Latinos to view themselves not from an individualistic sense in which one sees herself or himself as independent from others but, rather, as interdependent. This means that Latinos think of themselves in terms of group membership and seek to maintain harmony in those groups. In these interdependent relationships, people tend to consider how their actions and decisions will affect the entire group, rather than how these might affect only themselves. Thus, in collectivistic societies, people think about how resources will be shared by the entire group and about how they present themselves to others and may be more accepting of others' viewpoints. Further, these societies seem to take a holistic approach to life, attending to the present as well as to the past. They see life as an interweaving of mind, body, and spirit.

This collectivistic worldview appears to be related to the value gifted Latino students place on solidarity and community. They may feel more comfortable working in collaborative communities in school. Further, Alan Brown found Latino students may view their academic success as involving the family and the community, rather than simply the results of one's own efforts. Thus, educators, researchers, and mental health professionals should invest in the inclusion of familial and community aspects of a student's academics. Standard assessments used in research may not adequately address these issues. Further, these assessments may fail to identify gifted Latinos, especially if language is an issue. The educational system in the United States venerates students who take an independent approach, including the promotion of one's personal goals and expressing one's opinion. For many Latinos, this may not be deemed appropriate to their collectivistic values. Thus, educators must seek alternative methods of encouraging and empowering Latino students that consider their cultural values.

Family is extremely important to Latinos. *Familismo* is a term that refers to extended family. Among Latinos, the extended family is just as important as the nuclear family. Latinos develop close bonds with their grandparents (*abuelas/os*), aunts and uncles (*tías* and *tíos*), and cousins (*primos*), as well as to nonblood relatives such as godparents (*padrinas/os*) and close family friends (*compadres*). Although this extended family can be a source of support, it can also be a source of stress when family members need help. Gifted Latinos may feel obligated to help other family members, taking the student away from studying or from engaging in clubs and other school activities. Further, depending on the family's socioeconomic status, the gifted Latino student may feel the need to help provide financially and will take a job to help pay the bills. This, too, can cause difficulty for the student in fulfilling her or his academic goals.

Finally, the values of *respeto* and *personalismo* are important to understand. *Respeto,* or respect, refers to the deference one holds for one's elders and those in authority. Gifted Latino students may have difficulty addressing teachers when they disagree with them. Further, the student may have difficulty with thinking critically about the material and expressing any ideas that may not maintain harmony in the group or with the teacher.

Personalismo, or the value in personal relationships, is often connected with seeking approval in an interpersonal relationship and may impact how the student deals with conflict in academic settings. This value may also affect the relationship with the teacher. A manifestation of personalismo is to take a great deal of time talking about average topics, such as the weather or one's health, before actually beginning to discuss the important topic. This behavior is a way to establish a personalized

relationship with others and is highly valued. Many teachers who are from the dominant culture may deem this a waste of time and not respect the gifted Latino students' value of this type of encounter.

The Role of Societal Factors

Societal factors can also affect options for gifted Latinos. Many Latinos in the United States make considerably less income per year than many other groups, and some Latino children live in poverty. This can affect the resources available to foster Latino children's giftedness. Latino adolescents may need to work after school to help the family financially. This can make it difficult for gifted Latinos to complete homework and to engage in extracurricular activities, which are associated with persistence, higher grades, and retention.

Another societal factor that may play a role in the success of gifted Latinos is that of discrimination, even though there are policies that help to protect from such things. A lack of advanced placement classes may occur within segregated schools. These courses allow high school students to earn college credit while still in high school and encourage college attendance. Some educators and mental health providers may inadvertently discourage gifted Latino youth. They may not allow gifted Latino students to speak Spanish and track them into low-achievement courses, thus affecting these students' self-efficacy, or their confidence, that they can attend college. Some educator and mental health providers might even suggest that these students would not succeed in college, thus further affecting gifted Latino students' expectations for failure.

Angela L. Zapata

See also Bilingualism and Creativity; Cultural Values; Diversity in Gifted Education; Latin America/South America, Gifted Education; Multicultural Assessment

Further Readings

Brown, A. V. (2008). Effectively educating Latina/o students: A comparative study of participation patterns of Hispanic American and Anglo-American university students. *Journal of Hispanic Higher Education, 7,* 97–118.

Perez, P., & Tovar-Gamero, Z. G. (2005). Working with at-risk, gifted Latina students. In S. Kurpius, B. Kerr, & A. Harkins (Eds.), *Handbook for counseling girls and women: Ten years of gender equity research at Arizona State University* (pp. 157–186). Mesa, AZ: Nueva Science Press.

Ramirez, M., III. (1998). *Multicultural/multiracial psychology.* New York: Jason Aaronson.

Santiago-Rivera, A. L., Arredondo, P., & Gallardo-Cooper, M. (2002). *Counseling Latinos and la familia: A practical guide*. Thousand Oaks: Sage.

Historiometry

Historiometry (or historiometrics) is a specialized but broadly applicable technique for the scientific study of highly eminent achievers. Unlike psychobiography and psychohistory, with which it is sometimes confused, historiometry applies quantitative techniques (measurement and statistical analyses) to large samples of famous persons to test nomothetic hypotheses about the causal factors behind exceptional achievement. For example, many historiometric studies have addressed the question of the association between general intelligence and achieved eminence. In contrast, psychobiography and psychohistory tend to scrutinize single cases using qualitative (narrative and interpretive) methods with the aim of explaining highly idiosyncratic events. For instance, psychobiographers have often tried to understand why Vincent Van Gogh cut off part of his ear. This question, though fascinating, sheds little light on the general nature of artistic genius.

Historiometry is most frequently used when the persons of interest are not available for direct psychological investigation. Thus, historiometry was first employed to investigate deceased creators, leaders, and celebrities. Yet the method may also be applied to persons who are still alive but who are otherwise unavailable for direct psychological examination. In these cases, it can be considered an at-a-distance assessment technique. Hence, historiometry can be used to study modern political leaders, such as prime ministers, presidents, and even dictators, who may not want to spare time (or put their reputations at risk) to become a research participant in a scientist's intrusive investigation.

Whether or not the research subjects are alive, the technique does demand that the persons under investigation possess an extensive historical record that can supply an objective source of reliable data. Accordingly, historiometry can be viewed as a particular type archival data analysis. That subset of archival analyses concentrates on geniuses or talents who have made names for themselves in an important domain of human achievement. This entry describes the history and methodology of historiometry.

History

The term *historiometry* was first coined in 1909 and was then proposed as a technique ideally suited for the psychological study of historic geniuses. Yet scientists were conducting historiometric research decades earlier, making the method among the oldest in the behavioral sciences. In 1835, the first bona fide application of historiometry was published by Adolph Quételet, the Belgian mathematician and physicist who is celebrated for introducing the normal bell-shaped curve in the description of individual differences. Quételet specifically examined the relation between age and creative productivity in a sample of distinguished French and British playwrights, and he arrived at conclusions that are still valid.

A far better-known example of historiometry is Francis Galton's 1869 *Hereditary Genius,* the first book-length study using the technique. Galton introduced the family pedigree method to investigate the age-old question of whether genius is born or made. The volume is often regarded as the first high-impact scientific study of genius and giftedness. Other notable psychologists have carried out historiometric research since Galton's day. The list of practitioners includes James McKeen Cattell, Lewis M. Terman, Edward L. Thorndike, and R. B. Cattell. Nonetheless, perhaps the most ambitious historiometric investigation ever published is Catharine Cox's 1926 *The Early Mental Traits of Three Hundred Geniuses,* which constitutes the second volume of Terman's *Genetic Studies of Genius*. Besides assessing 301 historic creators and leaders on four IQ measures, she also assessed a subset of 100 geniuses on 67 personality traits.

Although historiometry languished for a few decades after Cox's contribution, it underwent a revival in the latter part of the 20th century and has now become an accepted method for studying high achievers in a diversity of domains.

Methodology

Because many proponents of historiometry were trained in psychometric methods, it should not be surprising that historiometric research follows a similar progression. Given a hypothesis or set of hypotheses, the inquiry starts by defining a sample of subjects that is most suitable for empirical tests. However, historiometry does not seek a random sample from the larger human population. Instead, the samples are necessarily nonrandom because the subjects must represent an elite group. Sometimes a historiometric sample will exhaust the entire population of exceptional achievers (e.g., all presidents of the United States, all Nobel laureates in the sciences, all Oscar-winning film composers, or all Olympic medalists). Other times, the sample will be confined to the most eminent figures in a given field (e.g., generals who have won the most decisive battles, the authors of works included in great-book anthologies, or the classical composers whose creations dominate the repertoire). In any case, historiometric samples are not representative of the general population, nor are they intended to be.

Given an appropriate sample, biographical and historical information is then collected. These data are used to assess the subjects on two or more variables. These quantitative measures will often be supplemented by assessments obtained by applying content analysis to creative products, private correspondence, or public speeches. Often the sampled persons are assessed on historiometric adaptations of psychometric variables. As an example, extraordinary achievers have been measured on such variables as IQ or general intelligence, conceptual complexity, openness to experience, extraversion, conscientiousness, Machiavellianism, emotional stability, psychoticism, and the power, achievement, and affiliation motives. In theory, even if not in practice, any psychometric instrument can be converted into a historiometric coding scheme.

Because the data produced by historiometry are inherently correlational in nature, they cannot be analyzed using standard experimental approaches.

Therefore, the most common statistical techniques are multiple regression analysis, exploratory and confirmatory factor analysis, path analysis, structural equation and latent-variable models, time-series analysis, and hierarchical linear models. These advanced methods frequently permit the investigator to estimate the association between two variables after making adjustments for control variables that gauge sources of possible artifacts. In addition, when the data are longitudinal, then it is often possible to discern the operation of causal effects across time. The advent of these sophisticated statistical analyses is a major reason why historiometry has appreciably advanced our knowledge of giftedness, creativity, and talent.

Dean Keith Simonton

See also Creativity Theories; Eminence; *Genetic Studies of Genius;* Genius; Intelligence; IQ; Political Leaders

Further Readings

Albert, R. S. (1996). What the study of eminence can teach us. *Creativity Research Journal, 9*(4), 307–315.

Simonton, D. K. (1990). P*sychology, science, and history: An introduction to historiometry.* New Haven, CT: Yale University Press.

Simonton, D. K. (1999). Significant samples: The psychological study of eminent individuals. *Psychological Methods, 4,* 425–451.

History of Creativity

Creativity is a difficult concept to define, primarily because it is so diverse. In its broadest sense, creativity is the ability to transcend traditional ideas, rules, patterns, or relationships to create significant new ideas, forms, methods, or interpretations. Creativity is sometimes also known as originality, progressiveness, or imagination. It is used in various domains, from science and technology to history and the arts; it is employed by experts, everyday people, and even children. It is used to solve problems or as a form of personal expression. From ancient times to the Renaissance, all creative products were believed to be inspired by the gods or by God. During the Renaissance, the prospect of hereditary creative capacity emerged. More recently, creativity has been accepted as the result of a complex reaction between biological, psychological, and environmental factors. The concept of creativity and the domains of its expression have transformed over time, but humans have always been creative. This entry focuses on Western views of creativity; non-Western views are not described because in the philosophies of the Hindus, Confucius, Taoists, and Buddhists, the idea of individual creation "from nothing" has a different significance. Recently, however, creativity theorists have begun to examine the meanings of creativity in Eastern philosophies, particularly applying Zen ideas for moving beyond intellectualization to the understanding of creative process.

Historical Views

Pre-Christian Views

The ancient Greeks had no terms corresponding to "create" or "creator." Instead, they used the expression *poiein,* meaning "to make," and that only applied to poetry. For the early Greeks, creativity was something that was bestowed upon an individual by the gods. They noted that nature was perfect and was subject to laws of the gods, therefore man ought to discover its laws and submit to them. They also believed in the concept of what Julian Jaynes called a *bicameral mind,* in which the mind is composed of two separate chambers; the first is controlled by the gods and is meant to be filled with their creative ideas, and the second is used to express the gods' inspiration through speech and writing. Many philosophers also thought that the creativity chamber was a site for madness (not insanity; rather, furious inspiration) when one's muse was present. With the belief that the more original the creative product, the more likely that it was given by the gods, creativity took on a social value.

Early Romans believed in similar principles, except that they also extended some creative license to painters. The poet Horace wrote that painters as well as poets should be permitted to create as they wished. Figures such as Philostratus and Callistratos also drew similarities between the genres, noting that they both require the use of

imagination. Latin did have a term especially designated for "creating,"—*creatio*—and two for "to create"—*facere* and *creare*.

Early Western Views

With the rise of Christianity came the idea that all creative gifts are divine and bequeathed by God. However, Christianity also imposed a strict code of behavior, resulting in the discouragement of free thought; all products were created with the intention of glorifying God. The term *creatio* also came to represent God's creation of the world from emptiness and no longer was applied to human creations; instead, *facere,* "to make," referred to human products. In the 5th century CE, Saint Augustine may have been the first to question the idea that all creative ideas come from God. However, creative production continued to be at a minimum, perhaps because of numerous outside invasions and starvation. Yet, at the end of this period, the view of the bicameral mind began to dissipate; speech and writing started to become more complex, allowing the idea of human potential to emerge.

Renaissance Views

It is hypothesized that a new emphasis on the individual and his or her creative potentials were brought on by a variety of changes, including opening of trade routes, a growing merchant class in city states such as Venice, and the bubonic plague. With a third of the population dead, the traditional social structure was shaken. Society placed less emphasis on authority and the Church's power began to wane. To enhance their power, prestige, and influence, rulers and wealthy merchants patronized artists and gave them the venue for their expression. Artisans took pride in their work; people were motivated to create music, literature, and art. Still, the term *create* was not used until the 17th century, when poet and theoretician of poetry, Maciej Kazimierz Sarbiewski in his treatise, *De perfecta poesi,* wrote that a poet "invents," "after a fashion builds," and "creates anew."

Enlightenment Views

At the beginning of the 18th century, faith grew in humans' capacity to solve problems through their own abilities. Scientific discoveries by Nicolaus Copernicus, Galileo Galilei, and Sir Isaac Newton disrupted traditional cultural and religious paradigms; these findings gave new credence to human ability, as opposed to divinely imparted talents. Creativity began to be linked with the concept of imagination, rather than being exclusively descriptive of the arts.

During this time, the first investigation into the creative process occurred. In 1767, William Duff was interested in determining what accounts for differences in creative abilities that he observed in people. He proposed that to show great creativity, one must have three fundamental qualities: imagination, judgment, and taste. The degree to which one possesses each of these traits dictates how one will perform creatively. Duff's investigation commenced what is now research of creativity.

The Enlightenment contributed to a new concept of creativity in four ways, as laid out by Robert Albert and Mark Runco: (1) genius was divorced from the supernatural; (2) genius, although exceptional, was a potential for every individual; (3) talent and genius were to be distinguished from each other; and (4) their potential and exercise depend on the political atmosphere at the time.

Post-Enlightenment Views

As medical science produced support for the idea that physical traits are inherited from one generation to the next, so did the idea that mental abilities and creativity were heritable. Another area of investigation during this time was about the origin of creative ideas—was it from a problem's parts to the whole (associationist view) or from the whole problem to its parts (the Gestalt view)?

Sir Francis Galton, the second great psychologist after Aristotle, is credited with being the first to scientifically explore the nature of the creative mind. Through his work, he came up with two principles: (1) thoughts in the conscious mind are ordered and cyclical, and (2) ideas in the conscious mind are linked to those in the unconscious mind through association of thoughts, termed *free association*. Galton promoted the idea that mental abilities are inherited and studied individuals he termed *geniuses* to better understand the phenomenon. He also used statistical analyses to compare differences in mental capacities among individuals;

his methodologies were incorporated into the work of multiple researchers studying creativity.

The associationists were opposed by a group of German theorists known as the Gestalt psychologists, who believed that creativity was the result of a formation of *gestalts,* or mental patterns or forms. Instead of merely being associated, Gestaltists believed creative thoughts were connected through complex relationships. They envisioned the problem as a whole and then worked backward to complete the missing parts. Creative thoughts were not a bridge between the conscious and the unconscious; they originated wholly in either the conscious or the unconscious.

William James was the first scientist to propose the role of the interaction of genetic ability and the environment in creativity. James also promoted the thought supported by Galton that unconscious ideas are vital to creative production, although he did not pursue developing the theory.

20th-Century and Contemporary Views

In the 20th century, research on creativity became specialized, particularly in the areas of cognitive processes and the creative personality. During this time, creativity theory began to be developed. The most famous contributors to the study of creative cognitive processes were Max Wertheimer, Wolfgang Kohler, and Graham Wallas. Some of the most famous contributors to the idea of the creative personality were Sigmund Freud, Abraham Maslow, and Carl Rogers. Creativity theories also began to be translated into strategies for creativity, such as Alex Osborn's "brainstorming," Robert Crawford's "attribute listing," and Bob Eberle's "SCAMPER" (S = Substitute something? C = Combine your subject with something else? A = Adapt something to your subject? M = Magnify or modify—add to it or change it in some fashion? P = Put it to some other use? E = Eliminate something from it? R = Rearrange or reverse it?). Creativity no longer applied only to eminent people or arts; it was recognized in all people and in multiple domains.

Measuring the History of Creativity

Historical Context and Zeitgeist

Various historical events and situations seem to influence creativity (e.g., war, economic depression, opportunity), but all of these "causes" of creativity are different. Edwin Garrigues Boring used the term *Zeitgeist,* or spirit of the times, to explain what was considered creative in any given era. Zeitgeist includes attitudes, expectations, and assumptions about creative things and creative people. Whenever a person or product is evaluated on creativity, historical context and the Zeitgeist must be considered. Mihaly Csikszentmihalyi also noted that products are considered creative only in domains useful to contemporary society.

Several matters can change the Zeitgeist, in both positive and negative ways. Creativity does not always progress forward; it lapses and recurs. A few such examples follow: Tools and instruments are creative products themselves and influence the creative process. Most often, they accelerate the rate of change and then spur new creative products. Social, cultural, and technological change constantly alter the Zeitgeist. Along the same lines, humans' ever-changing sense of self transforms the environment for creativity. Chance and accidents often bring about changes that lead to creativity.

Studying the Creative Individual

Creativity in itself is complex, and another way to study it is to examine eminent creative individuals through the case study method. Many theorists who study creativity use biographies as a starting point to form hypotheses, which can then be tested through empirical methods. Even more helpful than biographies are psychohistories—biographies written by historians with a focus on referring to psychological processes and interpreting behavior from a psychological perspective. Especially pertinent are those psychohistories written by authors familiar with creativity literature. These studies have the methodological limitations of other qualitative studies and are considered to be subjective, depending on the quality of the information and the construals of the author.

Historiometry

A more objective alternative to studying psychohistories is historiometry. Historiometry, promoted by Dean Keith Simonton, applies quantitative

methods to archival data about historic personalities and events to test hypotheses about human thought, feeling, and action. According to Simonton, historiometry supports three common ideas about creative eminence: (1) being precocious and beginning to produce early; (2) generating a relatively large number of products on a regular basis; and (3) longevity. Given that this approach has been successfully applied to studying both groups and individuals, it is one of the most promising in researching creativity.

Kelly Kearney

See also Creativity, Definition; Creativity Assessment; Creativity Theories; Eminence

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Dacey, J. S., & Lennon, K. H. (1998). *Understanding creativity*. San Francisco: Jossey-Bass.

Runco, M. A. (2007). *Creativity: Theories and themes: Research, development, and practice*. New York: Elsevier.

Simonton, D. K. (1999). Historiometry. In M. A. Runco & S. Pritzker (Eds.), *Encyclopedia of creativity* (pp. 815–822). San Diego, CA: Academic Press.

Sternberg, R. J. (Ed.). (1998). *Handbook of creativity*. New York: Cambridge University Press.

History of Gifted Education in the United States

Educational practices for gifted students in the United States have been well documented for more than 150 years. William Torrey Harris, the superintendent of St. Louis public schools, initiated the earliest efforts for educating gifted children that allowed students to advance every 5 weeks based on academic performance. This promotion schedule allowed for rapid advancement through the curriculum. During the next 50 years, various systems of flexible promotion or grade skipping appeared across the United States, as described in this entry.

Early Schooling Efforts

In 1907, at the national meeting of the National Education Association, a special committee recommended that gifted students be grouped together in exceptional classes with special curricula and environment, taught by teachers who possessed the disposition to work with gifted students. Soon thereafter, "opportunity" or special classes for gifted students began to appear in cities such as Los Angeles and Cincinnati.

By 1920, grouping gifted children together was the most frequent approach to meeting the educational needs of these children with two-thirds of public school districts in large cities reported having some sort of programming for gifted students. One such practice was known as the X–Y–Z plan which began to appear across the United States. The brightest group of students was formed according to mental tests, grades, and work habits, whereas the bottom group was the slowest. Subjects offered to the brightest students often hinged on the teaching staff's skills, rather than on student aptitude or interest.

The Cleveland Major Works Program and the Winnetka Plan are examples of how school districts in the 1920s made more detailed provisions for gifted students. The Cleveland Major Works Program under the direction of Henry Goddard arranged classes primarily on the basis of intelligence scores of students who would participate in gifted classes at each grade level. The Winnetka Plan organized under Carlton Washburn called for students to move through a common curriculum in mathematics and reading, working at their own individual rates. Those students who mastered the curriculum more quickly were allowed to work on self-expressive activities.

Foundational Research

Experimental or laboratory schools of the 1920s and 1930s represented the next major effort to educate gifted children and undertake research agendas. These schools allowed systematic research to be conducted on differentiated teaching strategies, grouping arrangements, and student performance. For the first time, accurate descriptions were made through experimental lessons, observations, and demographic data collected from

students. The research conducted during this period could trace its origins to the mid-19th century. Francis Galton's landmark study of intelligence measuring mental capability and individual differences was the foundation for much of the original research done in gifted education. In 1865, Galton began to gather evidence regarding adults recognized as having notably contributed to fields such as the arts, science, politics, and scholarship, which were eventually compiled in *Heredity of Genius*. He described degrees of eminence, frequency of notable contributions, family demographics, and the general laws of distribution that pertained to notable achievements. Galton surmised that most men are of average ability. The farther a person diverges from average ability, the less frequently those occurrences appear in the general population.

Nearly 40 years later, French psychologist Alfred Binet became the first to develop a series of tests for classifying children according to intelligence. Although Binet's tests were originally intended to identify those children deemed feebleminded, the test also had merit in selecting gifted children. Binet's tests allowed measurement of a child's intellect for the first time.

The confluence of Galton and Binet's bodies of work set the stage for the pioneering forces of Leta Hollingworth and Lewis Terman, whose research helped legitimize the field of gifted education in the United States. Terman, often regarded as the father of gifted education, provided the underpinnings and insight into gifted education through his work with both intelligence tests and his groundbreaking longitudinal study of gifted children. In 1916, Terman began his own work, transforming the Binet-Simon into the Stanford-Binet for use with the U.S. population. His work on the Army Alpha and Beta tests used during World War I and the Stanford-Binet further entrenched intelligence testing in both academia and with the general public. Terman's longitudinal study of 1,528 gifted children began in 1921 with a grant from the Commonwealth Fund of New York City. Documented in *Genetic Studies of Genius,* Volume 1, Terman concluded that gifted students were (a) qualitatively different in school, (b) slightly better physically and emotionally in comparison with normal students, (c) superior in academic subjects in comparison with the average students, (d) emotionally stable, (e) most successful when education and family values were held in high regard by the family, and (f) infinitely variable in combination with the number of traits exhibited by those in the study.

Hollingworth, both psychologist and educator, has been referred to as the nurturant mother of gifted education. Her work included establishing experimental classes for gifted students, creating enrichment curriculum, and recognizing the unique needs of gifted girls and children with IQs higher than 180.

In 1922 with the cooperation of Teachers College, Hollingworth established the first public school for gifted children in New York City, P.S. 167. Much of the research conducted at P.S. 167 appeared in *Gifted Children: Their Nature and Nurture,* which is considered the first textbook on gifted children. In 1936, P.S. 500 or the Speyer School was the second opportunity Hollingworth had to create a school for gifted students. Speyer School offered both an advanced and enriched curriculum.

Hollingworth also recognized the emotional challenges resulting from the asynchronous development of gifted children. She argued that gifted children wasted a large majority of their time in regular classes, which often precipitated apathy or negativity toward schooling. Therefore, Hollingworth concluded, schooling for gifted students should include lessons on how to deal with persons of authority who often knew less than the students, help students avoid habits of chicanery, and keep gifted students from becoming loners.

Inconsistent Interest and Support

The initial flurry of interest in the gifted in the 1920s and 1930s was overshadowed by U.S. entrance into World War II and the mobilization of human power and resources toward the war effort. Although Terman continued to collect data on the subjects in his longitudinal study, gifted education quietly slipped off the public interest radar until the Soviet Union's launch of *Sputnik* in 1957. This event created a maelstrom of interest and activity in identifying and educating those with exceptional intellectual ability to compete with the technologically advancing Soviets. The most obvious example of this was the Great Talent Hunt. The identification and education of gifted students "to the limits of their potential" was

heralded as a priority by those in government. The late 1950s and early 1960s saw an upsurge in gifted education research. From 1956 to 1959, more research articles were published on the subject than in the 30 previous years. Creativity also came to the forefront with J. P. Guilford's 1950 presidential American Psychological Association address urging researchers to undertake a more extensive examination of creativity. Researchers such as E. P. Torrance and Calvin Taylor heeded Guilford's message, and the topic dominated gifted literature in the late 1950s and 1960s and continues to be an important line of inquiry in the field.

The Civil Rights Movement of the 1960s was a pivotal time for the field of gifted education. White middle-class homogeneity and elitism was a long-standing criticism of the field and came under greater scrutiny in the 1960s with greater emphasis on egalitarianism. The IQ test that had been the cornerstone for gifted identification was now seen as a tool of discrimination and was eliminated in some larger urban school districts with diverse student populations. The notion of multiple intelligences was set in motion with Guilford's *structure of intellect model* published in 1967. Some began to consider human intelligence as multifaceted rather than as one-dimensional.

The 1970s brought another resurgence in gifted education, and a formal federal definition emerged in the Marland Report, which included leadership and the arts as facets of giftedness. Gifted and talented children were defined as those who exhibited high performance or potential general intellectual ability, ability in a specific discipline, creativity, leadership, visual and performing arts, or psychomotor ability. The Marland Report also advocated that Congress provide support for gifted programming. This was the impetus for additional legislation and the establishment of the Office of the Gifted and Talented. Many individual states also recognized giftedness in their general education statutes or issued state definitions of giftedness.

The gains made in the 1970s were fleeting, as President Ronald Reagan's administration's Omnibus Budget Reconciliation Act (OBRA) disbanded categorical funding that combined gifted education with 21 other programs and cut funding by more than 40 percent, including the elimination of the Office of the Gifted and Talented. Despite the policy setbacks gifted education was experiencing, this same period included greater emphases on multidimensional approaches to giftedness and the development of potential talent. One of the models proposed at that time was Joseph Renzulli's three-ring conception of giftedness, which posited that gifted behavior results from above-average ability, creativity, and task commitment working together. Françoys Gagné's differentiated model of giftedness and talent explained giftedness using five separate elements to produce talent or skill: natural abilities (top 10 percent of age peers), intrapersonal catalysts, developmental processes, environmental catalysts, and chance. Abraham Tannenbaum's star model tendered "psychological filigree of factors" to explain giftedness, and included general ability, special aptitude, nonintellective requisites, environmental supports, and chance.

Gifted Education Toward the 21st Century

Although gifted education slipped under the public interest radar in the 1980s, the *National Excellence Report: A Case for Developing America's Talent* of 1993 resuscitated the field and brought it back into national consciousness. The report indicated that students were not being challenged in their schoolwork, that adequacy had replaced excellence as the measure of school success, and that many gifted and talented students spent their days without any special attention to their cognitive needs. In a partial answer to the *National Excellence* report, the Jacob K. Javits Gifted and Talented Students Education Act of 1994 authorized the U.S. Department of Education to make grant monies available for research and programming and to fund a national research center. However, with the passing of 2002's No Child Left Behind Act, gifted funding and opportunities for gifted students in school were once again limited. In many jurisdictions, resources normally reserved for gifted programs have been shifted to remedial programs so all children can meet grade-level requirements. There is reason for concern that the educational climate at the beginning of the 21st century leaves the field of gifted education and, more importantly, gifted students in a vulnerable state. With the publication of *A Nation Deceived: How America Holds Back Its Brightest Students* authored by Nicholas Colangelo, Susan Assouline, and Miraca Gross, this vulnerable state

has become a national concern. *Time* magazine devoted attention to the issue of gifted education, and a million people visited the report's Web site to read and download information about gifted education. This indicates that the pendulum may swing again in favor of special programming for gifted students.

Jennifer L. Jolly

See also Creativity Training; Guidance; Intelligence Testing

Further Readings

Cross, T. L. (1999). Top ten list (plus or minus two) for the 20th century. *Gifted Child Today, 22*(6), 22–25.

Davis, G. A., & Rimm, S. A. (2004). *Education of the gifted and talented* (5th ed.). Boston: Allyn & Bacon.

Delisle, J. R. (1999). A millennial hourglass: Gifted child education's sands of time. *Gifted Child Today, 22*(6), 26–32.

Gagné, F. (1985). Giftedness and talent: Reexamining a reexamination of the definition. *Gifted Child Quarterly, 29,* 103–112.

Gallagher, J. J., & Weiss, P. (1979). *The education of gifted and talented: A history and prospectus.* Washington, DC: Council for Exceptional Children.

Hollingworth, H. L. (1990). *Leta Stetter Hollingworth: A biography.* Boston, MA: Anker Publishing.

Khatena, J. (1992). *Gifted: Challenge and response for education.* Itasca, IL: F. E. Peacock.

Nazzaro, J. N. (1977). *Exceptional timetables: Historic events affecting the handicapped and gifted.* Washington, DC: Council for Exceptional Children.

Plucker, J. A. (2001). Introduction to the special issue: Commemorating Guilford's 1950 presidential address. *Creativity Research Journal, 13,* 247.

Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan, 60,* 180–184, 261.

Russo, C. J. (2001). Unequal educational opportunities for gifted students: Robbing Peter to pay Paul? *Fordham Law Journal, 29,* 727, 730–731.

Tannenbaum, A. J. (1983). *Gifted children: Psychological and educational perspectives.* New York: Macmillan.

Terman, L. M. (1925). *Genetic studies of genius: Vol. 1. Mental and physical traits of a thousand gifted children.* Stanford, CA: Stanford University Press.

U.S. Government. (1993). *National excellence: A case for developing America's talent.* Retrieved from http://www.ed.gov/pubs/DevTalent/intro.html

Hollingworth's Studies of Highly Gifted Students

Leta Stetter Hollingworth was a key figure in the establishment of gifted education as a field and a science. She was one of the first psychologists to study the unique strengths and needs of gifted children, and she was a strong advocate of developing specialized curriculum to meet their needs. She also challenged many of the scientific assumptions regarding the inferiority of women, and broke many societal boundaries constraining women at the beginning of the 20th century. She is remembered for her impressive contributions to a variety of fields, including gifted education, adolescent psychology, educational psychology, clinical psychology, and the psychology of women. This entry describes her life and career.

Leta Stetter was born May 25, 1886, near Chadron, Nebraska. Her mother died in childbirth when Leta was only 3-years-old, and she and her sisters were raised by her maternal grandparents until Leta was age 13. Her father remarried and reclaimed custody of the children, though there was much strife between Leta and her stepmother. Leta was a precocious child, having had a poem published in a local paper at the age of 14 and having entered college at the University of Nebraska at the age of 15. She established herself as an exemplary student, graduating with Phi Beta Kappa honors in 1906. During this time, she also became engaged to her future husband, Harry Hollingworth. After graduation, Leta worked as an assistant school principal and teacher in Nebraska while Harry moved to New York to begin his graduate education at Columbia University. After 2 years, Harry secured a position at Barnard College that provided enough financial security for her to join him in New York, and they were married on New Year's Eve in 1908. Leta Hollingworth was unable to work in New York, as, by law, married women were not allowed to be teachers. She unsuccessfully pursued writing, and after 3 years, she and Harry were able to save enough money for her to enroll in the educational psychology program at Columbia's Teachers College.

Throughout her graduate studies, Hollingworth expanded her role as an advocate of the women's suffrage movement by challenging the prevailing

assumptions, such as the inherent inferiority of women, that were common around the turn of the century and thus used to justify their exclusion from many roles within society. One such assumption was the variability hypothesis, originally articulated by Havelock Ellis. According to the variability hypothesis, men were thought to inherently exhibit a wider range of physical and mental abilities than were women. In the prevailing climate of Social Darwinism, this was interpreted as a sign of inferiority: Men, who were thought to be capable of both genius and stupidity, were targeted for education and opportunity, whereas women, who were seen as merely average, were thought to be better served by preparing them for their future roles as wives and mothers. Though the variability hypothesis was widely accepted, little empirical research had been conducted to support it: Much of its popularity came from its ability to support the cultural trends of its day.

Hollingworth challenged this theory by collecting data on the birth weight and length of 1,000 boy and 1,000 girl newborns. Her analysis demonstrated that the girl babies were actually more variable than were their boy counterparts, which, using the logic of the variability hypothesis, suggests that girls were actually the ones who were inherently superior. Hollingworth also collected data during her work at the Clearing House for Mental Defectives on 1,000 clients, finding that although men outnumbered women in the institution, the difference between the two decreased with age. Hollingworth argued that this discrepancy was not the result of inherent differences but, rather, because the restricted roles to which women were confined often masked any mental disabilities that were present. Thus, the convergence in the prevalence of mental disabilities could be explained by the fact that men simply had more opportunities to exhibit their disabilities and, consequently, women's disabilities would take longer to be detected.

Hollingworth attacked another common misperception through her doctoral dissertation entitled "Functional Periodicity: An Experimental Study of the Mental and Motor Abilities of Women During Menstruation." During that time, it was widely accepted in the professional literature that women were periodically incapacitated by physical, cognitive, and emotional difficulties caused by their menstrual cycle. Hollingworth measured the motor, memory, and learning capabilities of men and women over a period of 1 to 3 months. She found no evidence for variability tied to menstruation on these tasks, directly contradicting the prevailing assumptions of the scientific community. Interestingly, her advisor, Edward L. Thorndike, supported her research despite being a proponent of many of the theories that she dispelled.

After graduation, Hollingworth accepted a position at Bellevue Hospital where she eventually rose to the position of chief of the psychology lab. In addition, she became an instructor of educational psychology at Columbia's Teachers College, and a full professor in 1929. She quickly became a respected contributor to the study of mental testing and the psychology of children and adolescents, publishing *The Psychology of Subnormal Children* in 1920, *Special Talents and Defects* in 1923, and *The Psychology of the Adolescent* in 1928. She was also influential in establishing and maintaining the professional standards of clinical psychology and mental testing of her time.

Her interest in gifted education is often linked to a child, who was administered an intelligence test as part of a classroom demonstration in 1916. The child, subsequently referred to in publications as "Child E," was a 7-year-old, who had been accelerated to the fifth grade and whose IQ was found to be greater than 180. Hollingworth became one of the first of a handful of researchers in the 1920s to study gifted children and their needs. In 1926, she published *Gifted Children: Their Nature and Nurture,* which became a seminal text for the field and was adopted by education programs throughout the nation. In 1942, Hollingworth published a longitudinal study tracking Child E and 11 other gifted children through adulthood in *Children Above 180 IQ*. Hollingworth was a strong advocate of educational reform and special education that provided the support and opportunities to meet the needs of gifted children and adolescents. Her two major works went out of print, and her seminal work was unknown to many educators until the rediscovery of Leta Hollingworth by scholars in the 1980s. She challenged the prevailing views that brilliant children could take care of themselves and was instrumental in establishing subsequent scholarship support and policy changes at the state and federal levels.

Hollingworth's career was cut short by abdominal cancer and she died November 27, 1939, at the age of 53. During her career, she received numerous professional awards for her contributions to psychology, education, and the understanding of sexual differences and similarities. She was listed in *American Men of Science* and was one of the few women included in Robert Watson's *Eminent Contributors to Psychology.* She received an honorary doctorate from the University of Nebraska and a fellowship was established in her name at Columbia University. In addition, a collection of her poetry and public addresses was published in 1940.

Ryan Hansen

See also Adolescent, Gifted; Intelligence; Intelligence Testing; Terman's Studies of Genius

Further Readings

Benjamin, L. T., Jr., & Shields, S. A. (1990). Leta Stetter Hollingworth (1886–1939). In A. N. O'Connell & N. F. Russo (Eds.), *Women in psychology.* New York: Columbia University Press.

Hollingworth, H. L. (1943). *Leta Stetter Hollingworth.* Lincoln: University of Nebraska Press.

Hollingworth, L. S. (1926). *Gifted children: Their nature and nurture.* New York: Macmillan.

Hollingworth, L. S. (1942). *Children above 180 IQ* Yonkers, NY: World Book.

Shields, S. A. (1991). Leta Stetter Hollingworth: "Literature of Opinion" and the study of individual differences. In G. A. Kimble, M. Wertheimer, & C. L. White (Eds.), *Portraits of pioneers in psychology.* Washington, DC: American Psychological Association.

HOMESCHOOLING

Since the 1980s, homeschooling has become a larger movement within U.S. educational society. While many parents opt for homeschooling for religious or ideological beliefs, others choose homeschooling as a way to meet the unique needs of their children. For parents who feel that traditional public schools have failed to provide appropriate levels of challenge for their gifted children, homeschooling has become a viable option. This entry describes homeschooling, its background, social and academic development, options for gifted learners, and the effectiveness of homeschooling.

Definition

Students are considered to be homeschooled by the U.S. government if they receive instruction at home for more than 25 hours a week and do not attend public, private, or parochial school. In addition, students who were schooled at home because of a temporary illness are not counted as homeschooled. This data is typically reported by parents. To qualify for membership in the Home School Legal Defense Association, a parent must provide direct instruction to the student for at least 51 percent of the time.

Background

A 2004 study conducted by the National Center for Educational Statistics, from the U.S. Department of Education, estimated that there are 1.1 million homeschooled students in the United States. This indicates that as many as 1 in 25 U.S. students are homeschooled. However, this data is difficult to gather and interpret because states are inconsistent in how they count and track homeschooled students.

When parents were asked in this survey about the reasons for homeschooling their children, approximately 60 percent indicated that they were concerned about the environment of the schools for their children or they desired greater religious or moral instruction for their children. However, 16 percent cited concerns about the academic programs provided by schools.

In the context of gifted education, homeschooling has been considered an option for some families. However, there is no systematic identification procedure for gifted students. Therefore, there is a lack of reliable data about the number of gifted homeschooled students. To date, no empirical studies have investigated the role of gifted education in homeschooled populations. However, researchers have begun to document instances of homeschooling among gifted populations in small, nonrepresentative samples.

Critics of the homeschooling movement cite several concerns with the implementation of homeschooling for gifted learners. These concerns tend to focus on two areas—the social development of homeschoolers and the lack of quality control within homeschooling environments.

Social Development

One common concern is the social development of children. However, several options for the socialization of homeschooled students may be especially appropriate for gifted learners. Many communities across the country have local homeschool support groups that allow members to get together for field trips, weekly meetings, and social gatherings. These groups may provide support for particular ideologies (such as religious groups, unschoolers, or interest-based organizations). Other options for social development include virtual homeschooling groups in which young people may meet other homeschooled children through supervised online bulletin boards or chat rooms.

In addition to the social support provided by local homeschooling organizations, gifted children may find opportunities at local colleges and universities. Many colleges and universities provide opportunities for advanced learners to attend classes or workshops. Dual enrollment programs are common for high-ability students at the secondary level. In this case, high school–aged students may attend college classes as they complete the requirements for their high school diploma.

For younger gifted students, enrichment opportunities are offered in many cities through local libraries, museums, and community organizations. Saturday and after-school programming, in addition to programs developed specifically for homeschooled children, can provide additional time for the development of peer relationships in addition to the additional academic challenges of the programming. These programs often attract gifted students from a variety of backgrounds and can be the impetus for the development of friendships among students.

Although different from traditional schooling, these additional opportunities for social interactions may benefit gifted homeschooled students to greater extents. For example, these programs allow gifted students to interact with a broader range of age groups. Often gifted children benefit from working with older students, who may be a closer intellectual match than are peers of the same age. This conclusion is supported by preliminary research indicating that homeschooled students who are involved in community activities demonstrate greater social maturity and leadership skills.

Academic Development

With no national standards or accountability system for homeschool education, some critics are concerned about the academic development of these students. Certainly, there is huge variation in the quality of instruction and learning that occurs between homeschooling environments. Given appropriate levels of support and challenging materials, however, many homeschoolers excel.

Recent finalists and winners in national spelling and geography bees have been homeschooled. In addition, many children with exceptional talents in specialized areas (such as the arts, music, or sports) are homeschooled to accommodate their interests. Homeschooling allows flexibility in scheduling for students to pursue interests in greater depth and develop skills at the expert level.

In response to the prevalence of homeschooled students exhibiting exceptional talent, many elite colleges and universities have begun to actively recruit from this population. Some universities have gone as far as to employing special liaisons for homeschooled children. Thus, higher education has begun to recognize the potential of students outside of traditional educational practices.

Some research has supported this view, reporting that homeschooled students score higher on measures of achievement, such as the Iowa Test of Basic Skills and the SAT. Homeschooled students scored in the 75th to 80th percentile, compared with the 50th percentile that would be typically expected by a representative sample of the population. These studies, however, are limited by sampling bias. In addition, other factors may contribute to increased achievement, such as higher parental involvement and socioeconomic status.

Many critics of homeschooling are concerned about the ability of parents to provide appropriate levels of instruction to children. Parents not trained specifically in particular areas of the curriculum

may not be able to meet the needs of advanced learners in those areas. Gifted students, in particular, are likely to need expert-level instruction in areas of interest that parents may be ill-equipped to provide. Local homeschooling groups often provide learning co-ops in which parents can pool their intellectual resources to provide advanced instruction to students. In addition, mentors may be available in the community to support learning.

Interestingly, homeschooled students with parents with teaching credentials do not appear to have an advantage over students whose parents do not have training in education. Homeschooled students with college-educated parents do tend to have higher levels of achievement, but students in traditional schooling with college-educated parents tend to have higher levels of achievement as well.

Online and distance learning courses can also provide increased levels of challenge and academic rigor for homeschoolers. Advanced Placement courses are available through distance learning. Distance learning courses are often taught by experts in the content area, such as college professors and nationally recognized teachers.

Through careful planning and attention to the development of the student, homeschooling has the potential to provide quality academic instruction for gifted learners. Examples of highly talented students who have benefitted from homeschooling illustrate the ability of homeschooling for gifted learners.

Options for Gifted Learners

Gifted is a term that applies, in general, to a student in contrast to other students of his or her age or grade level. When a student is homeschooled, he or she most likely is educated in relative isolation, without a comparison group. Thus, gifted education may be a misnomer in the context of homeschooling. However, homeschooling hinges on the appropriate pace and level of instruction for learners and, thus, incorporates much of the best pedagogy for gifted learners.

Homeschooling provides a commitment to individualized education. Thus, students can learn at the most appropriate pace and depth for their intellectual needs. For gifted learners, this is at a faster level and includes more complex ideas than would be typically introduced to students. The flexibility of homeschooling provides the opportunity for students to work through material more quickly and to investigate topics in more depth.

Homeschooling also allows students the flexibility to explore areas of interest that might not even be covered in traditional schooling experiences. Through individualized instruction, students can participate in intense project-based learning in areas of interest. A student with an area of passion can take the time to learn about this topic and spend additional time researching, investigating, and exploring real-world applications to the area of interest.

Because of this individualization, students can typically move through the curriculum at the most appropriate pace for their level of ability. In addition, students may progress through different areas of the curriculum at different paces. For example, a student has the opportunity to move quickly through math, which may be an area of strength, but spend more time in reading instruction to ensure mastery of concepts. This may be especially important for twice-exceptional gifted students, who have areas of great strength but also areas of greater challenge.

The flexible nature of homeschooling also allows gifted children opportunities to pursue real-world experiences, such as community-based resources and internships. A student with an intense interest in a career-related field could participate in an extended internship through a corporation or business. Community resources—such as museums, libraries, and universities—offer additional extended opportunities, such as internships.

Effectiveness

Because there are inconsistencies among states and governmental organizations in the tracking and monitoring of homeschoolers, little data exists to evaluate the overall effectiveness or quality of their education. Evidence supports homeschooling in certain environments. The success of students in homeschooling environments, on achievement tests, in elite colleges, and in national competitions, illustrates the effectiveness of homeschooling, at least in specialized circumstances. The potential of homeschooling for gifted learners is in flexible scheduling that provides opportunities for advanced learning (either through faster pacing to move

through content more quickly or through enrichment allowing deeper and more complex learning). The key component in quality education, either through traditional schools or home schools, is attention to individual learner differences and matching instruction to those differences.

Hope E. Wilson and Kristina Ayers Paul

See also Individualized Instruction; Learning; Learning Styles

Further Readings

Basham, P., Merrifield, J., & Hepborn, C. R. (2007). *Home schooling: From the extreme to the mainstream*. Studies in Education Policy, Fraser Institute Occasional Paper. Retrieved July 15, 2008, from http://www.netzwerk-bildungsfreiheit.de/pdf/From_the_extreme_to_the_mainstream.pdf

Bauman, K. J. (2002, May 16). Home schooling in the United States: Trends and characteristics. *Educational Policy Analysis Archives, 10*(26). Retrieved July 15, 2008, from http://epaa.asu.edu/epaaa/v10n26.html

Jones, P., & Gloeckner, G. (2004). A study of admission officers' perceptions and attitudes toward homeschool students. *Journal of College Admission, 184,* 12–21.

Kunzman, R. (2008). Homeschooling. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education* (pp. 253–260). Waco, TX: Prufrock Press.

Princiotta, D., Bielick, S., & Chapman, C. (2004). *1.1 million homeschooled students in the United States in 2004*. (NCES Publication No. 2004115). Washington, DC: National Center for Education Statistics.

Rudner, L. M. (1999). Scholastic achievement and demographic characteristics of home school students in 1998. *Education Policy Analysis Archives, 7*(8). Retrieved July 15, 2008, from http://www.ericdigests.org/2000–3/home.htm

Honor Societies

Honor societies are organizations in which one is invited to belong through formal induction processes. The main purpose of honor societies is to recognize an individual's excellence in a particular academic field, as well as to encourage scholarship, leadership, and achievement. The oldest and perhaps best-known honor society is Phi Beta Kappa, founded at the College of William & Mary in 1776, which became a model for many future honor societies. Phi Beta Kappa chapters generally select less than 10 percent of students, and usually far fewer. Honor societies are relevant to the discussion of giftedness, creativity, and talent because they encourage the academic skill development of members. These organizations range in size and scope but typically have several core similarities. Research on membership in such societies has demonstrated positive benefits, as described in this entry.

By March 2008, 65 honor societies were members of the Association of College Honor Societies (ACHS), the only clearinghouse and certifying agency for collegiate honor societies in the nation. At present, there are 13,918 active honor society chapters associated with higher education or educational facilities across the United States and internationally.

ACHS sets standards for membership of various categories of honor societies. The categories are general, specialized, leadership, freshman, and 2-year honor societies. The admission standards generally are as follows: general honor scholarship society members, such as those of Delta Epsilon Sigma, must be in the top 20 percent of their class and are not eligible to join before their fifth semester of education. General leadership society members, such as those of Lambda Sigma, must be in the top 35 percent of their class and are not eligible for membership before their fifth semester. Specialized scholarship society members, such as those of Phi Sigma Tau, must also be in the top 35 percent of their class but are not eligible for membership before their fourth semester. Members of freshman honor societies, such as those of Phi Eta Sigma, must be in the top 20 percent of their class and are eligible after completing one curricular period as a full-time student. General scholarship honor societies at 2-year institutions, such as Phi Theta Kappa, require members to be in the top 20 percent of their class after completing a minimum of 12 credit hours toward an associate's degree. Specialized scholarship honor societies at 2-year institutions, such as Psi Beta for psychology, require members to be in the top 35 percent of their class, also after

completing a minimum of 12 credit hours toward an associate's degree. These standards are fairly selective but are the bare minimum.

However, many honor societies certified by ACHS have higher standards than those mentioned. All certified societies are organized in a particular manner to serve the organization's members. This organizational style includes full financial disclosure, membership participation in approving and revising society bylaws, elections of officers or board members by society members, and the participation of members in setting authority for control of the organization's affairs. Most societies offer scholarships or grants to assist highly motivated students.

The National Honor Society and National Junior Honor Society recognize high school and middle school students, respectively. More than a million students are involved in these two honor societies. Recognition is based on performance in the realms of scholarship, service, leadership, character, and citizenship. To become a member, a student must have a cumulative grade-point average of 3.0 on a 4.0 scale or a higher average set by the school, make voluntary contributions to the community, be a student leader who is resourceful and dependable, be honest and demonstrate morals and ethics and demonstrate the values of civic involvement. After being inducted, members are expected to uphold the standards of the society, to attend chapter meetings, and to participate in the chapter's service project for the year. They may also be expected to participate in fundraising for community-based projects to promote leadership and service.

Psi Chi, the specialized scholarship society for psychology, has 1,008 active chapters, making it the most widespread honor society of the ACHS. There are more than 500,000 lifetime members registered at Psi Chi's national office. Aside from providing members with academic recognition, Membership also provides them a climate for creative development. Members are encouraged to participate in presenting research at conventions at the national, regional, and local level. There are six Psi Chi regions: Eastern, Midwestern, South Eastern, South Western, Rocky Mountain, and Western. Members may participate in and attend any of the regional conventions. As further encouragement to conduct research, Psi Chi provides more than $250,000 a year in grants and awards.

Research by Joseph Ferrari and colleagues indicates that honor society membership is highly valuable beyond financial benefits. Involvement in student organizations allows members opportunities to develop organizational and leadership skills, close relationships with faculty who engage in scholarly research, and opportunities for becoming acquainted with others who are successful in their respective fields. Membership in academic societies is perceived as a source of status by students because members meet admission standards not achieved by all students. Beyond simply being a member of an honor society, higher benefits are seen in those who hold leadership positions in their chapter. Former leaders report more positive educational and employment skills, knowledge, and opportunities from engagement in their chapter. It has also been demonstrated that leaders, compared with nonleaders within an honor society, were more likely to enter doctoral programs, believing their undergraduate leadership roles enhanced their personal and educational development.

Joseph R. Ferrari and Emily G. Lattie

See also College Gifted; Graduate Education; Professional Development

Further Readings

Abrahamowicz, D. (1988). College involvement, perceptions, and satisfaction: A study of membership in student organization. *Journal of College Student Development, 44,* 233–238.

Ferrari, J. R., & Appleby, D. C. (2005). Alumni of Psi Chi: Does "membership have its advantage" on future education/employment? *Eye on Psi Chi, 9,* 34–37.

Ferrari, J. R., & Appleby, D. C. (2006). Psi Chi alumni: A national survey of psychology honor society graduates. *College Student Journal, 40,* 457–466.

Ferrari, J. R., Athey, R. B., Moriarty, M. O., & Appleby, D. C. (2006). Education and employment among alumni academic honor society leaders. *Education, 127,* 244–259.

Heitner, E., & Denmark, F. L. (2000). The impact of Psi Chi on eminent psychologists. *Eye on Psi Chi, 4,* 14–16.

Honors Programs

Honors programs exist as a means of enhancing the educational experience of academically gifted, talented, and motivated students. Although various forms of honors programs exist within K–12 education, this entry focuses on the honors programs at postsecondary institutions, specifically 4-year colleges and universities. Characteristics of an honors program and honors students are discussed as well as effects of these kinds of programs.

Characteristics

All but the most and least selective postsecondary institutions in the United States have created honors programs within their academic offerings. Guided by institutionally specific admissions criteria, public 4-year institutions house most honors programs, but public 2-year colleges have rapidly increased their offering during the last two decades. Honors programs typically provide courses within the core curriculum at an advanced level, but others also teach departmental honors courses that follow the requirements of the college major. More than half provide some combination of special seminars, colloquia, and independent study options. Honors programs typically require students to complete between 20 and 25 percent of their coursework within the honors curriculum. Most honors programs provide special learning facilities, either an honors library, lounge, or computer lab. Other honors programs have designated housing available to students, creating a seamless living-learning experience. As a response to the heterogeneity of honors programs, the National Collegiate Honors Council (NCHC) has developed a set of basic characteristics to serve institutions with an operational and organizational template.

One of the characteristics identified by the NCHC is that the honors program be both visible and hold a reputation of excellence throughout the institution. Contributing to this visibility are the faculty who have been selected because of their teaching excellence and interest in providing intellectual leadership and mentorship to able and motivated students. The culling of the best teachers from the common classroom to teach in the honors program is one of the fundamental criticisms levied against honors programs. Some argue that removing the best teachers, as well as the brightest students, from the classroom diminishes their ability to enrich the educational experience for all students. In addition, critics assert that in a time of scarce resources, honors programs redirect resources from programs serving the neediest students and place them in programs serving the most able.

Effects on Learning

Given the criticisms, it is important to review the research examining the extent to which students in honors programs differentially develop from their educational experience than their average ability peers. Anne Rinn has conducted several research studies and has extensively reviewed the literature on this topic. She reports that research has found students in honors programs feel more confident in their academic abilities (i.e., have a greater academic self-concept) than do their nonhonors peers. Students in honors programs also tend to have higher academic achievement, defined as higher grade-point average, and tend to persist in college at levels greater than do their average-ability peers.

Several studies have examined self-reported cognitive gains between honors students and their average-ability peers. On the whole, studies by John Ory and Larry Braskamp, Alexander Astin, and Frank Shushok found honors students reported greater gains in their intellectual development, analytic and problem-solving skills, general liberal arts and science areas, and technology than did their nonhonors peers. Using objective measures of cognitive development and a pretest for each outcome, Tricia Seifert and her colleagues found honors students scored higher on a composite measure of cognitive development, mathematics, and critical thinking. Both Shushok's and Seifert's studies found that honors programs seem to encourage more positive outcomes for men than for women. This does not mean that women do not benefit from their participation in honors programs but that participating in an honors program has a greater effect for men.

Given the basic characteristics of a college honors program detailed by the NCHC, it seems likely that part of the reason that honors students have greater levels of cognitive development during

college is due to the close contact they have with challenging and supportive faculty as well as motivated peers. Only two studies to date have examined to what extent students in an honors program experience the college milieu differently than do their average-ability peers. In a study at a single institution, Shushok found honors and nonhonors students had a markedly homogeneous college experience even though they reported significantly different gains in their cognitive and intellectual development. However, a multi-institutional study, conducted by Seifert and her colleagues, found honors students experienced greater levels of course-related interaction with peers, instructor use of higher-order questioning techniques, instructor feedback, and instructional skill and clarity. These findings support the NCHC's characteristics in advocating the use of faculty who identify with the aims of the program, teach with excellence, and provide intellectual leadership.

Based on the motivation to create spaces to enhance the educational experience of academically gifted students, one would expect students in honors programs would report a more intellectually stimulating and challenging academic experience. As public institutions continue to aggressively recruit academically talented students, having an honors program is merely the first step. Having an honors program that meets and exceeds the characteristics set forth by the NCHC will provide the most rigorous and rewarding educational experience.

Tricia Seifert

See also Academic Self-Concept; Cognitive Development; College Gifted; Controversies in Gifted Education; Men, Gifted

Further Readings

Austin, C. G. (1985). Honors teaching and learning: An overview. *Engineering Education, 76*(2), 85–88.

Long, B.T. (2002). *Attracting the best: The use of honors programs to compete for students.* Chicago: Spencer Foundation. (ERIC Reproduction Service no. ED465355).

Rinn, A. N., & Plucker, J. A. (2004). We recruit them, but then what? The educational and psychological experiences of academically talented undergraduates. *Gifted Child Quarterly, 48*(1), 54–67.

Sederberg, P. (2005). Characteristics of the contemporary honors college. A descriptive analysis of a survey of NCHC member colleges. *Journal of the National Collegiate Honors Council, 6*(2).

Seifert, T. A., Pascarella, E. T., Colangelo, N., & Assouline, S. G. (2007). The effects of honors program participation on experiences of good practices and learning outcomes. *Journal of College Student Development, 48*(1), 57–76.

IDENTIFICATION

Although gifted children exist with or without identification, services in gifted education frequently depend on a formal identification procedure. If students are not identified, then they often do not receive an education that will develop their abilities and interests. Moreover, some students are not easily identified—those who are shy, are linguistically or culturally different, have disabilities, are in classrooms that do not encourage their gifts, or choose to be "ungifted." Identification is therefore an important process to ensure an appropriate education for each child with gifts or talents. This entry discusses several aspects of identification of the gifted.

History

With the beginning of the testing movement, scientists embarked on an investigation of individual differences. Alfred Binet's work with Theodore Simon in 1905 resulted in the first intelligence test for children that was used in school settings and supported other investigations of characteristics that differentiated gifted from non-gifted adults. Binet and Simon's test was adapted in the United States and widely disseminated as the Stanford-Binet. Using this revised version, Lewis Terman and his associates at Stanford University studied more than 1,500 California children, identifying children as gifted with intelligence quotients (IQ) of 140 or higher. This IQ-type of definition (i.e., gifted children are those who score in the superior range on intelligence tests) was widely accepted in the 1920s and still persists. In the 1950s, however, J. P. Guilford suggested that multiple aptitudes existed, including divergent production or "creativity," and that intelligence tests could not be expected to find all of the gifted children. Similarly, in 1958, Paul Witty also cautioned against relying too heavily on the IQ as a means of identification and emphasized other factors such as persistence and drive. This diversity among the gifted population was recognized in Sidney Marland's 1971 federal definition that included demonstrated achievement or potential ability in any of these areas: general intellectual ability, specific academic aptitude, creative or productive thinking, leadership ability, visual or performing arts, psychomotor ability. The definition was revised in 1978 by requiring services for preschool, elementary, or secondary students that are not a part of most school's opportunities and eliminating psychomotor ability. The 1978 definition remained until the Javits Gifted and Talented Students Education Act in 1988 and the 1993 report, *National Excellence: A Case for Developing America's Talent*. The national definition reads as follows:

> Children and youth with outstanding talent perform or show the potential for performing at remarkably high levels of accomplishment when compared with others of their age, experience, or environment.
>
> These children and youth exhibit high performance capability in intellectual, creative, and/or

> artistic areas, possess an unusual leadership capacity, or excel in specific academic fields. They require services or activities not ordinarily provided by the schools.
>
> Outstanding talents are present in children and youth from all cultural groups, across all economic strata, and in all areas of human endeavor. (U.S. Department of Education, p. 26)

State Identification Procedures

Similar to the federal definition, most states do report diversity in their definitions with 30 (68%) recognizing intellectually gifted; 29 (66%) academically gifted; 20 (45%), performing/visual arts; 19 (43%), creatively gifted; and 13 (29.5%), leadership, according to the National Association for Gifted Children and the Council of State Directors of Programs for the Gifted. The 29 states that have criteria for identifying gifted students address this diversity by using more than one assessment with 21 (72%) using multiple criteria, 10 (34%) using nominations, 17 (59%) using achievement data, and 14 (48%) using intelligence test scores. The percentage of students identified using multiple assessments range from 2 to 15 percent with only two states indicating a specific percentage (2 or 5%). Although states may not have mandates or explicit state criteria, 39 state agencies report that local education associations (LEAs) do identify gifted students. LEAs are often given the latitude to establish their own criteria or select different assessments that are aligned with their populations, programs, or areas of giftedness.

Multiple Assessments

Even if states did not mandate multiple criteria, the variety of characteristics associated with each of the areas within the federal definition require more than one assessment to identify a student who is gifted and talented. Susan Johnsen and John Salvia and James Ysseldyke in several works suggest that using multiple assessments is important because they (a) sample a wider range of behaviors; (b) provide more sources of information, such as from peers, parents, teachers, and the student; and (c) add reliability and validity to the process (i.e., consistency in scores and multiple viewpoints).

To ensure that the assessments accurately represent the student's performance in an area of talent and across contexts, qualitative and quantitative instruments are frequently used and matched to the area of giftedness. For example, a school identifying students who are gifted in math might select the following assessments:

1. Out-of-level achievement tests in math to determine what knowledge students have already acquired and if they are more advanced than their peers. Out-of-level testing is important in identifying students who can profit from acceleration.
2. Peer, teacher, or parent checklists of academic and affective behaviors that might be characteristic of students who are gifted in mathematics.
3. Portfolios of math work that include the students' reflections of their products or performances and are collected over time.
4. Observations of improvements in student math performance over time where the teacher assesses, teaches, and reassesses.
5. General reasoning such as intelligence tests that focus on solving problems.

Phases in the Identification Procedure

Using multiple assessments, school district identification procedures generally include a systematic winnowing process to find students. The multilevel procedure often includes a nomination or identification phase, a screening or selection phase, and a placement phase.

Nomination Phase

During the nomination phase, a variety of sources such as teachers, parents, peers, counselors, and the student himself or herself may identify a student who needs services not ordinarily provided by the general education program. Typical assessments used during this phase include checklists, observations, portfolios of work, group-administered intelligence or achievement tests, and information in students' cumulative records (e.g., grades, state tests, teacher anecdotal information).

Screening Phase

During this phase, individually administered assessments or assessments that are specifically designed to identify gifted students are used. These assessments provide more in-depth information about the student's characteristics and include interviews, auditions, observations of learning new knowledge or skills, portfolios of specific talent areas, and individually administered intelligence, aptitude, or out-of-level achievement tests. Most grade-level achievement tests are not able to test all of the student's knowledge in a specific domain, so out-of-level tests are recommended, particularly when acceleration is being considered.

Placement Phase

At this phase, all the data collected during the nomination and screening phases are compiled and reviewed by a committee of professionals who make a decision about the types of services that the student requires to fully develop his or her potential. The committee organizes the information in a variety of ways such as in case studies, matrices, or profiles. Attention may be given to (a) the weighting of instruments with equal consideration of all assessments, (b) best performance as an indicator of potential, (c) describing a student's development of products or performances over time, (d) comparable scores such as standard scores, and (e) test error such as the standard error of measurement. Researchers tend to agree that scores on each assessment and each assessment's subtest should be separated so that the committee can view the student's relative strengths and weaknesses. Summing and averaging scores may lead to misinterpretations of the student's potential as well as to an increase in test error. Once the committee organizes, interprets, and makes decisions regarding placement, the committee recommends possible services that match the student's characteristics and talent domain.

Due Process and Appeals

The Fifth and Fourteenth amendments to the U.S. Constitution require that school districts adopt due process procedures. To ensure these rights, school districts often develop a time frame for a sequence of steps that progress from a local appeal to a state or federal appeal. These steps might include (a) an initial parent meeting with the principal, (b) a meeting with the school district placement committee, (c) a parent meeting with the school district director of the gifted program, and (d) a presentation to the board of trustees or superintendent. If none of the meetings at the district level resolve the issues, then most often the district involves an impartial, professional mediator. If the mediation is unsuccessful, then the parents or the school district generally contact the state education agency and initiate a formal hearing. At the state level, both sides may have counsel and present expert witnesses. Finally, if none of these steps resolve the conflicts, then the parents or the school district may choose to litigate in state or federal courts.

Underrepresentation of Special Populations

Although most states have definitions, policies, or rules that address the identification of gifted students from special populations, underrepresentation continues to be a problem. It is estimated that African American, Hispanic American, and Native American students are underrepresented by about 50 percent in programs for the gifted. Various explanations provided for this underrepresentation include exclusive definitions, attitudes, test fairness, and bias in the procedure

Exclusive Definitions

Narrow definitions requiring superior performance on intelligence or achievement tests (e.g., 130 or 98th percentile) may limit the number of students who are gifted, particularly those who are English language learners and those from lower income groups. Broader definitions that encompass a wider range of characteristics similar to the federal definition and use multiple assessments are more likely to identify students who exhibit their talents in a variety of ways.

Attitudes

Alberto Fernández, Lorraine Gay, Luretha Lucky and Marisal Gavilán suggest that teachers view language as important in identification and rate

English language learners lower than native English speaking students. Susan Johnsen and Susan Ryser also found that teachers in low-income schools tend to view their jobs as one of remediation rather than of talent development and nominate students who are achieving on state-required tests. Gifted children with disabilities also pose special problems because their disability may mask their ability or vice versa. Although parents from lower income backgrounds may be helpful in identifying their children for gifted programs, Marcia Scott and colleagues reported that some minority parents may not request evaluations of their child for future placement in the gifted program. Educating parents and teachers to the range of characteristics among gifted and talented students is recommended for improving attitudes and the number of students from diverse backgrounds who are nominated.

Test Fairness

Fairness relates to (a) the characteristics of the norming population, (b) the linguistic demands of the instrument, and (c) item bias. First, because test norms may reflect the population of individuals who live in the United States but not local norms, school districts with a greater number of individuals from minority or ethnic groups may establish local norms for comparison purposes to improve test fairness. Second, to reduce barriers for culturally and linguistically diverse students created by tests that require high language demands, researchers suggest using nonverbal or individually administered tests. These types of tests limit linguistic requirements and reduce the amount of previous information required in responding to the items. Finally, item bias can be reduced by having professionals review the items for gender or cultural stereotyping and analyze each item statistically (e.g., differential item functioning) to ensure that every special group has the same probability of answering the item correctly.

Bias in the Procedure

Researchers such as Gayle Gear, J. C. Jacobs, and Winifred Strange have suggested that teachers and parents are better at identifying gifted students when they are trained. Teachers who are trained also provide more classroom activities that are open-ended, problem-based, and require higher-level thinking so that students may demonstrate their talents. If no training is provided, then teachers might consider only students who fit within their preconceived conceptions of giftedness (e.g., teacher pleaser, verbal, mainstream cultural values). Another key to fair assessment is the use of *multiple sources of information* and multiple measures. Movement from one phase to the next phase should not be based on a single criterion or a single source of information such as a teacher nomination or a specific score on a standardized test.

The starting point for determining the need for services beyond those offered in the general education program is the student. The student's ability to demonstrate his or her talents may be influenced by a variety of factors so it is important that schools provide professional development and implement nondiscriminatory procedures to ensure that program participation is available to all qualified students.

Susan K. Johnsen

See also Adolescent, Gifted; Diversity in Gifted Education; Giftedness, Definition; Levels of Gifted; School Attitudes; Teachers of Gifted; Teacher Training; Very Young Gifted

Further Readings

American Educational Research Association, American Psychological Association, & National Council on Measurement in Education (1999). *Standards for educational and psychological testing*. Washington, DC: Author.

Fernández, A. T., Gay, L. R., Lucky, L F., & Gavilán, M. R. (1998). Teacher perceptions of gifted Hispanic limited English proficient students. *Journal for the Education of the Gifted, 21,* 335–351.

Ford, D. Y. (1996). *Reversing underachievement among gifted Black students: Promising practices and programs*. New York: Teachers College.

Johnsen, S. K. (Ed.). (2004). *Identifying gifted students: A practical guide*. Waco, TX: Prufrock Press.

Johnsen, S. K.,& Ryser, S. (1994). Identification of young gifted children from lower income families. *Gifted and Talented International, 9,* 62–68.

Karnes, F. A., & Marquardt, R. G. (1991). *Gifted children and the law: Mediation, due process and court cases*. Scottsdale, AZ: Great Potential Press.

National Association for Gifted Children and Council of State Directors of Programs for the Gifted (2005). *State of the states: A report by the National Association for Gifted Children and the Council of State Directors of Programs for the Gifted, 2004–2005*. Washington, DC: Author.

Salvia, J., Ysseldyke, J. E., & Bolt, S. (2007). *Assessment* (10th ed.). Boston: Houghton Mifflin.

Scott, M. S., Perou, R., Urbano, R., Hogan, A., & Gold, S. (1992). The identification of giftedness: A comparison of White, Hispanic and Black families. *Gifted Child Quarterly, 36,* 131–139.

U.S. Department of Education, Office of Educational Research and Improvement. (1993). *National excellence: A case for developing America's talent*. Washington, DC: U.S. Government Printing Office.

Imagery

Imagery is the word used to denote a cognitive process that has been used by people since the beginning of time. It is considered to be a process that produces a mental and nonverbal visual image that can be controlled to enhance performance, seek wellness, recall memory, invent solutions, and other outcomes. As any sensory experience in the mind—auditory, visual, tactile, olfactory, kinesthetic, organic—the process of imagery is highly subjective. Images are described differently by individuals, which has been one of the reasons that some researchers consider studying imagery to be difficult.

Studies have attempted to define the sequence of an image, the duration, frequency, or even the accuracy of images, which often proved less fruitful than studying the effects or outcomes of using imagery in a domain or specific performance context. In the 20th century, the study of imagery was under suspicion as proponents of behaviorism, such as J. B. Watson and B. F. Skinner, denied the possibility of investigating anything that cannot be overtly confirmed or observed, particularly notions such as mental images. However, cognitive psychologists reinstituted research on imagery in the 1960s, initially studying its relationship to memory, learning, and information processing. Recent studies document the outcome of using imagery individually or in groups, as described in this entry.

Where Do Images Come From?

There are two ways to think about the sources of images: memory images and imaginational images. Responding to an experience-based question, such as "What did you have for breakfast this morning?" creates an image that recalls a memory based on an actual event. On the other hand, thinking about what is needed for innovation in a new lawn mower creates imagery that might be less familiar, imaginative, or even bizarre. Carl Jung would say that archetypal images may emerge from the collective unconscious in our dreams, thoughts, or even memories. The collective unconscious is that unknown knowledge or wisdom that is shared by humanity, which does not need to be experienced individually to emerge as an image.

What Do Images Do for Us?

Applied research studies have been conducted to illustrate the value of imagery in improving human performance or well-being. Imagery has been linked to performance improvement in sports, such as playing golf, soccer, or basketball; in encouraging healthy lifestyle patterns, such as eliminating food craving, reducing stress, stopping smoking, or increasing exercise. Imagery has been used to facilitate relationships when living in community, such as nursing homes or residence halls at college. Alternative health professionals, including mental health professionals, use imagery and visual expression in various therapies, including art therapy. Imagery has been shown to be effective to help people recover from illnesses or deal with depression or anxiety.

Creative and eminent artists, musicians, inventors, and other visual or performing artists often describe with vivid detail the imagery that leads to their outstanding performances. Imagery is used in the education of novices in the arts, in much the same way as it is used in sports, to imagine performance. For writers, imagery has a specialized role as writers describe in language vivid images with great sensory detail. Creating a metaphor that produces imagery is a writing talent, for instance.

What Is the Relationship of Imagery to Creativity?

The word *imagery* is used in the creativity literature to mean a mental representation of imagination or innovation. One way to demonstrate the relationship between imagery and imagination is the use of guided imagery or creative visualization. Guided imagery is a creativity tool that stimulates imagination and assists with solving problems or conflicts. Guided imagery was introduced in PreK–12 classrooms in the 1980s as a means to reduce stress and promote creativity among children and youth. One of the benefits of using imagery in the classroom is that it can be applied in all content areas. The process of instructional imagery involves relaxation, meditation, and then listening to music or auditory suggestions for creating potential sensory images. For example, third-grade children might be led through an imagery activity that has them imagine the metamorphosis of caterpillar to butterfly. After a few minutes of thinking about the stages, the children might then draw their images or talk about their sensory impressions. Because imagery has the potential to uncover unconscious processes or alter consciousness states, some parents or communities may oppose its use with children believing that it too closely resembles spiritual practices.

Guided imagery or self-guided imagery is promoted in popular literature as a method to reduce stress, increase health, and connect to spiritual beliefs. Imagery can be used in a group or privately as individuals. Imagery can tap into deep psychology and unconscious knowledge, so sometimes there will be a need to interpret images for symbolic meanings. Intuition and knowledge of archetypal symbols assist in this interpretation and understanding.

Diane Montgomery

See also Creative Process; Guidance; Imagination

Further Readings

Bagley, M., & Hess, K. (1983). *200 ways of using imagery in the classroom*. New York: Trillium.

Fezler, W. (1989). *Creative imagery: How to visualize in all five senses*. New York: Fireside.

Rossman, M. L. (2000). *Guided imagery for self-healing: An essential resource for anyone seeking wellness* (2nd ed.). Tiburon, CA: Kramer.

Schwartz, A. E. (1995). *Guided imagery for groups: Fifty visualizations that promote relaxation, problem-solving, creativity, and well-being*. Duluth, MN: Whole Person.

Images of Gifted in Film

Hollywood's fascination with exceptional individuals has led to an assemblage of films about genius—the gifted and talented—that ranges from the time of the film industry's own birthing in the age of invention with "Great man" biopics (*The Story of Louis Pasteur,* 1935; *Edison, The Man,* 1940), to contemporary depictions of troubled and mentally unbalanced geniuses (*A Beautiful Mind,* 2001; *Shine,* 1996). This entry discusses images of the gifted in films since the beginning of the 20th century.

Throughout, whether based on historical figures (*Young Mr. Lincoln,* 1939*; The Story of Alexander Graham Bell,* 1939) or fictional characters (*The Fountainhead,* 1949*; Good Will Hunting,* 1997), the filmic drive for narrative conflict and resolution has often led to the overdramatization and even pathologizing of exceptional individuals. Historical portrayals often selectively report the torment or tragedy of a gifted individual's life story. Thus, for example, Vincent Van Gogh's poverty, illness, and possible insanity and suicide provide ripe issues to be harvested by acclaimed directors in major studio releases (Robert Altman's *Vincent & Theo,* 1990; Vincent Minelli's *Lust for Life,* 1956) whereas Leonardo da Vinci's less turbulent personal life qualifies him only to be a minor side character popping up in eclectic and singular roles (e.g., *Bill and Ted's Excellent Adventure,* 1989*; Star Trek: Voyager,* 1997, TV).

Noted music philosopher Peter Kivy conceptualizes representations of genius into three models: the possessor, the possessed and, to a lesser extent, the workaholic. The possessor model situates the genius as an active, focused creator with a powerful mind and high capacity for originality—a natural genius who breaks new ground and breaks rules to build innovations. Films that feature this

active model include the depiction of Beethoven in *Immortal Beloved* (1994), Jackson Pollock in *Pollock* (2000), and Michelangelo in *The Agony and the Ecstasy* (1965). The possessed or inspiration model positions the genius as a passive conduit through which uncontrollable creativity passes through and manifests itself in the need to create. Mozart is commonly held as the classic example for this type of genius, especially as portrayed in *Amadeus* (1984). The geniuses in these films often have childlike qualities, but are gifted with incredible talents that allow them to create with seemingly no effort though these geniuses are continually on the edge of being driven into madness (Van Gogh in *Lust for Life,* 1956; John Nash in *A Beautiful Mind,* 2001; *Proof,* 2005). Mad scientists, individuals who lose themselves to the power of their own intellect without considering the repercussions of their actions, are extreme examples of the possessed model (*Frankenstein,* 1931; *Forbidden Planet,* 1956; *The Fly,* 1958). The workaholic model positions the genius as a sort of blue-collar worker whose genius is manifested through dedication and intensity. The success of the creator in this representation is not necessarily the result of genius but of industriousness. Kivy questions whether this mode really qualifies in our imaginings of genius. His best example, Johann Sebastian Bach, is a valuable argument for its inclusion though the lack of drama inherent in this model leads to relatively few filmic portrayals. This representation was more popular in early 20th-century depictions with films such as *The Story of Louis Pasteur* (1935) and *Madam Curie* (1943).

Throughout the 20th century, there seems to be a shifting pattern of these representations from a normalizing to a pathologizing of genius. The representation of genius in the classical Hollywood era of filmmaking (1917–1960) often stressed the notion that geniuses were no different from the vast majority of the public—these often conformed to Kivy's possessor or workaholic models. This process usually involved rearranging and substituting aspects of historical figures' lives to make their lives more exciting (George M. Cohan in *Yankee Doodle Dandy,* 1942; *The Story of Alexander Graham Bell,* 1939), the removal of bad habits, addictions, or sexual orientation (Cole Porter in *Night and Day,* 1946), as well as ethnic identities and elitist tendencies.

The representation of genius in post-1960 films often stressed how different geniuses were from the rest of the public. This differentiation frequently occurs through a concentration on the pathology of the genius. Geniuses in these films are often depicted as isolated from society, unique and bizarre, and creativity and superior intellect is even represented as a kind of disease or psychological aberration (*Silence of the Lambs,* 1991; *Pi,* 1998). The genius in these films is often portrayed as narcissistic, opportunistic (*21,* 2008), or troubled (*Good Will Hunting,* 1997). Traits that would have been removed in classical Hollywood films are featured in more recent films (examples include womanizing in *Surviving Picasso,* 1996; drug addiction in *Basquiat,* 1996; sexual orientation in *Before Night Falls,* 2000).

The exception to these diseased and troubled depictions are portrayals of child geniuses where there is often hope and potential juxtaposed with bizarreness and the carnivalesque. The representations of these children range from charming and intriguing (*Little Man Tate,* 1991; *Searching for Bobby Fisher,* 1993) to comedic and ridiculous (*Real Genius,* 1985; *Baby Geniuses,* 1999).

Intrinsic to these films is the visualization and dramatization of creative and intellectual processes such as writing, composing, or performing complex equations which are not inherently filmic. Rather than positioning the stimuli for creative and intellectual breakthroughs as having an interior source in the mind of the genius, filmmakers often represent the source of such a breakthrough by using an external source such as the genius' environment. For instance, Van Gogh's harassment by birds inspires his final painting in *Lust of Life* (1956) and the daily acquaintances of Shakespeare become the models for the characters in Romeo and Juliet in *Shakespeare in Love* (1998).

The White, male hegemony in Western culture is also reflected in the paucity of diverse ethnic and gender depictions in theatrically released films focusing on gifted and talented individuals. Rare and notable exceptions include Marie Curie (*Madame Curie,* 1943), Elizabeth Kenny (*Sister Kenny,* 1946), George Washington Carver (*George Washington Carver,* 1940), and Isadora Duncan (*Isadora,* 1968). Often these exceptional individuals receive more screen time on made-for-television projects (e.g., *Something the Lord Made,* 2004,

featuring the dramatization of Black heart-surgery pioneer Vivien Thomas).

Reviewing the history of the image of genius in film helps us to understand society's changing attitudes toward gifted people through time.

Michael Graves and Mark von Schlemmer

See also Attitudes Toward Gifted; Film and Film-Making Gifted

Further Readings

Custen, G. F. (1992). *Bio/pics: How Hollywood constructed public history.* New Brunswick, NJ: Rutgers University Press.

Kivy, P. (2001). *The possessor and the possessed: Handel, Mozart, Beethoven, and the idea of musical genius.* New Haven, CT: Yale University Press.

Pollock, G. (1980). Artists, mythologies and media—Genius, madness and art history. *Screen, 21*(3), 57–96.

Stevens, M. G. (2003). *Reel portrayals.* Jefferson, NC: McFarland.

Tibbetts, J. (2005). *Composers in the movies.* New Haven, CT: Yale University Press.

Weingart, P., Muhl, C., & Pansegrau, P. (2003). Of power maniacs and unethical geniuses: Science and scientists in fiction film. *Public Understanding of Science, 12,* 279–287.

IMAGINATION

Imagination is the ability to see things other than as they are—the capacity to transcend the actual and to construct the possible—and the impossible. It is a habit of mind that is marked by the joint conditions of the actual and the possible, the usual and the novel, the cognitive and the emotional, the logical and the extra-logical. It is a source of creativity and invention, which is a quality that is often highly desired. This entry describes constraints, problem solving, originality and creativity, invention, and cognition and emotion as they relate to imagination.

Constraints

To understand the imagination one needs to experience the imagination. Thus, this entry begins with a thought experiment. Ask a reader to imagine, for an instant, an animal that lives on a distant planet—a planet with an atmosphere, a day and a night, water, and vegetation. What does it look like? Is it unique? Is it unusual? Is it conceivable? Most likely, the creature of the reader's imagination is rooted in some experience the reader has had (a real animal or a movie creature) along with some standard modifications (fangs, extra limbs, etc.). Perhaps it is a giant winged lizard with horns and colorful stripes or a horse-like creature with a lion's mane and three tails. Regardless of the animal imagined, however, some things are likely true. Although it may be unique and unusual, it will likely have some even number of limbs, or wings, or both. It will propel itself by walking or flying or swimming. In essence, it will be recognizable as an animal. This is because when people imagine, they reach out from where they are, not blindly or randomly, but along conceivable trajectories. That is, the reader builds his or her animal from a repertoire of features and characteristics of things that are animal-like. The combinations and permutations of such features allows for endless possibilities of animals that one can conceive, but they will all be animal-like. Thus, although human imagination may be limitless, it is not unbounded.

This is not to say that the imagination can be reduced to a variation on a theme—a twisting of some recalled experience. What is explored in this thought experiment is meant to be a description of the imagination *in* action, rather than a prescription *for* action. When people imagine, they are constrained by what they can conceive. This constraint is real and undeniable. It limits and guides imagination, but the imagination is still free to seek unique and unusual possibilities within these bounds. To reduce this process to a prescription of intentionally making a slight variation to an old idea—a blue cow, a stripped giraffe, and so forth—is an oversimplification of the imagination, at best. The imagination is constrained by the conceivable, not controlled by it. To be otherwise reduces the imagination to the mundane and the predictable. Although there are constraints and intentionality exercised over it, the imagination still possesses a quality of autonomy to it. It is the mechanism that allows people to construct the unique and the unusual, as well as the implausible and the impossible.

Problem Solving

Thus, as a generative tool, the imagination has the unique capability of forging new ideas while staying within the confines of what is useful. This same quality is preserved when the imagination is used as a problem-solving tool.

In a general sense, *design* is defined as the algorithmic and deductive approach to solving a problem. The process begins with a clearly defined goal or objective from which point there is a great reliance on relevant past experience, referred to as repertoire, to produce possible options that will lead toward a solution of the problem. These options are then examined through a process of conscious evaluations to determine their suitability for advancing the problem toward the final goal. In simple terms, problem solving by design is the process of deducing the solution from that which is already known. This is similar to the imagination. In both cases, possible solutions are generated by reaching out from a repertoire of past experiences. There are three main differences, however.

The first is what is meant by experiences. In the case of design, a personal relevant experience refers to an actual similar situation that the solver has experienced. In the case of imagination, on the other hand, the experience need not be real; it need only be imagined. Thus, the repertoire of past experienced is expanded to include all things imagined. The second characteristic that distinguishes imagination from design lies in the nature of the possible solutions that are generated. In problem solving by design, possible solutions are reasonable extensions of existing ideas or experiences. The imagination, however, is not hampered by the need to be reasonable. As mentioned earlier, the imagination is constrained by the limits of conceivability, but not controlled by them. As such, the possible solutions that are generated through the imagination are not necessarily reasonable extensions of existing ideas. They may be unreasonable, unusual, or implausible. The final distinction between problem solving by design and the imagination is the mechanism by which plausibility is evaluated. In design, feasibility is evaluated at the conscious level, whereas in imagination, it is evaluated at the unconscious level. As such, the imagination is capable of evaluating plausibility much faster than is its more reasonable and ponderous counterpart. Together, these three distinctions increase the likelihood that a solution that is unusual, even seemingly implausible, may be found.

This is not to imply that the imagination is necessarily whimsical. Although the imagination does afford the problem solver the freedom to explore possible solutions that lay outside of the immediate vicinity of familiarity, it does not have to go on a willy-nilly sojourn. The problem solver can exercise a great deal of control over the imagination. However, if too much control is exercised, as is often the temptation, then the affordances of the imagination are lost and the problem solver is left to rely on the process of design to solve the problem. This is especially troublesome if the problem is one that cannot be solved by such a method, as many problems are apt to be.

Originality and Creativity

Most often, the term *imagination* is used vaguely to signify originality and creativity during instances of generativity and problem solving. But it is not to be confused with either originality or creativity. Originality of ideas or solutions has more to do with the relationship to the repertoire of past experiences, real or imagined, than to the mechanism by which that idea or solution came to be. Furthermore, when an idea or solution is judged to be imaginative, the judgment is often made by someone external to the generative process. Thus, the declaration of originality is based on the relationship of the idea to the external person's repertoire of past experiences—removing it even further from the generative process.

Creativity, however, is much more focused on the generative process. According to John Dewey, both the imagination and creativity lay outside of the logical forms—they are extra-logical processes. This is not to imply that they are to be cast in opposition to logic and reason, although some scholars have done just that. Rather, these processes are capable of producing ideas and solutions that lie beyond what could normally be produced by reason alone. This has already been discussed relative to the imagination's ability to generate unique, yet conceivable, ideas. Creativity is not constrained by the conceivable. It is capable of producing ideas and solutions that go beyond reason and the conceivable. This is because the creative process,

although relying on a repertoire of past experiences, is not bounded by this repertoire. Through creativity, ideas can be generated that are qualitatively different and not linearly attributable to any one prior notion.

The imagination is not to be viewed as the poor second cousin to creativity, however. The imagination is the source of creativity. Creativity takes off from the limits of the imagination—leaping over boundaries of conceivability to explore what lies beyond. Once there, however, the imagination is once again free to explore the bounds of the newly constructed possibility. It is as if creativity carries the imagination across these boundaries, these barriers of conceivability. This is why a creative experience is often referred to as a leap of the imagination.

Invention

Likewise, there is a strong relationship between invention and creativity and imagination. Both creativity and the imagination are generative sources for invention, but they are not synonymous with invention. Invention has an aspect of finish to it, a realization of ideas. That is, although imagination and creativity are concerned with the generation of new ideas and solutions, invention requires that these ideas and solutions be fully worked out and transformed into some concrete form. So, although the imagination and creativity are necessary aspects, precursors, of invention they are not sufficient aspect. Invention is not just about the finding of an idea, it is also the realization that the idea is significant and useful, and the unlocking of that significance and utility.

Cognition and Emotions

Given all that has been stated about the imagination thus far, it would be easy to conclude that the imagination is strictly a cognitive phenomenon. This would be an incorrect conclusion. Although the imagination is closely linked to the cognition, it is also strongly linked to the emotions. Within the imagination, cognition and emotion are inseparable and complementary domains. When people imagine, they reach out, with their thoughts and with their emotions. These emotions that engage people and inspire them to imagine and to keep imagining. The emotional engagement sustains the cognitive engagement. Without these, the imagination would be not much more than novel musings.

Peter Liljedahl

See also Creative Personality; Creative Process; Creativity, Definition; Imagery

Further Readings

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Dewey, J. (1938). *Logic: The theory of inquiry*. New York: Henry Holt.

Egan, K. (1992). *Imagination in teaching and learning: The middle school years*. Chicago: University of Chicago Press.

Greene, M. (2000). *Releasing the imagination: Essays on education, the arts, and social change*. San Francisco: Jossey-Bass.

Koestler, A. (1964). *The act of creation*. New York: Macmillan.

Resnick, L. B. (Ed.). (1976). *The nature of intelligence*. Hillsdale, NJ: Lawrence Erlbaum.

Root-Bernstein, R., & Root-Bernstein, M. (1999). *Sparks of genius: The 13 thinking tools of the world's most creative people*. Boston: Mariner Books.

White, A. R. (1990). *The language of the imagination*. Oxford, UK: Blackwell.

INCLUSION

Inclusion refers to the placement of children in heterogeneously grouped, regular education classrooms. Inclusion has an implicit philosophical commitment to promoting diversity in all of its forms and to the assertion that the best education occurs when children of all varieties are taught together. Placing children who have been identified as gifted and talented in a classroom with peers who have not been so identified and with peers who are disabled means they are in an inclusion-type classroom. Inclusion classrooms offer the typical general education curriculum in a regular education classroom. Sometimes *inclusion* is used to describe multiage, mixed-grade

classrooms. Such classrooms may or may not meet the definition.

Inclusion has its roots in the field of special education and the concept of least restrictive environment (LRE). The phrase defines the most appropriate placement for a child with a disability as when the child's educational needs can be met in a setting that is most like a regular education class. A placement becomes more restrictive as the setting diverges from a typical placement for nondisabled children and the needs of the child change. Within special education, full inclusionists argue that it is always the best placement to be in a regular education setting. Not all of their special education colleagues agree. Paradoxically, with children who are gifted, the opposite may be true. Placement of some gifted children in a typical regular education classroom may be more restrictive because their educational needs are less likely to be met. For example, the child's rate of learning is so much faster and his or her interest so much advanced that the regular education classroom cannot meet the child's educational needs. This entry describes core ideas about, opposition to, and research regarding inclusion.

Core Ideas

Gifted educators have an uneasy relationship with inclusion. The root of the uneasiness is the debate over the relative importance of equity and excellence. The fact that the two major professional organizations in the field, the Association for the Gifted of the Council for Exceptional Children and the National Association for Gifted Children, have published position statements on the topic is indicative of the importance of this issue.

A perusal of those statements reveals that the core ideas about inclusion in gifted education are the following:

> Special needs are present in children who are disabled and those who are gifted.
>
> One-size-fits-all educational programming is inappropriate.
>
> Special teaching methods are available.
>
> Diversity of all kinds is important.
>
> Excellence and equity is valued in a democratic pluralistic society.

Two of the five core ideas are widely accepted. That gifted and talented children have special needs is an article of faith among advocates. Not everyone agrees on what those needs are, but they are certain they exist.

The idea that there is a single best way of teaching and organizing programming for gifted children is not embraced by advocates of gifted education. The phrase *one-size-fits-all* is the negative term applied to that position. Advocates argue that poor education is the result of treating everyone the same way. The argument is that the variation among children requires being flexible. Over time, the differences among children expand and educators should adapt to those changes.

The core idea—special methods are known—has less unanimity. The entire field believes there are methods that work with gifted children. The phrase *gifted education pedagogy* has been coined to emphasize the point. Others contend that until methods can be shown to only advantage gifted children and not all children, the idea of special teaching methods for the gifted is premature. Although the concept of special methods may exaggerate the situation, the data are clear that many gifted children prefer some teaching methods to others. Those are discussion, project approach, complex themes, whereas drill and lecture are disparaged. Thus, some methods are better used with the gifted.

Diversity as a core idea in gifted education broadens the discussion of inclusion. Diversity is a common summary descriptor for combing ethic, racial, class, and gender differences. In gifted education, academic diversity is added to the list. The translation is that gifted children vary in significant ways from their non-gifted peers. These academic differences are rate of learning, depth of learning, advanced interests, and motivation to learn. Academic diversity should be honored in the classroom, too. Gifted education advocates of inclusion believe a classroom should include children with varying academic abilities and teaching should honor them all. Academic diversity is related to chronological age because some gifted advocates argue that gifted students learn best when grouped with intellectual peers rather than age peers. The typical regular education classroom is actually homogeneous in one respect—chronological age.

The value of excellence and equity is unquestioned. No one argues against them; yet, among gifted educators, the meanings and the relationship between these two terms are changeable. Advocates for inclusion and critics of inclusion emphasize different aspects of equity and excellence. Both proponents and critics argue from the standpoint of equity, or an emphasis on social justice concerns and community interests, or from the standpoint of excellence, or an emphasis on academic concerns and individual interests.

Proponents of inclusion for gifted students point to equity, and the importance of developing a classroom community where students of varied backgrounds and abilities are respected and play a valued role. The ideal classroom is sometimes described as one in which the whole class is working on a central theme or project, contributing to the project according to class members' respective interests and abilities. Resources such as teacher aides and multilevel books are available to help the regular education teacher create this classroom community. The inclusion proponents argue that creating pull-out programs for gifted students disrupts the sense of community because these students are both labeled as being superior in some way and are segregated from their classmates for a portion of the school day. Separating gifted students from their typically developing peers, these proponents believe, robs them of the opportunity to develop the social skills related to interacting with and caring for students who are different from them. These social skills are necessary when gifted students interact in the diverse real world.

Proponents of inclusion for gifted students also argue on the basis of academic excellence. According to this view, both children with disabilities and gifted children will benefit academically from inclusion. Children with disabilities and typically developing children will be able to have classroom models (gifted children) of academic excellence and intellectual behaviors. Gifted children will learn as much or more by teaching their fellow students and working in cooperative groups than they would learn in a separate classroom. Thus, in this view, all students would be better able to reach academic excellence.

Opposition

Critics of inclusion programs for gifted students refer to equity and excellence, too. The equity argument favors social justice concerns and underrepresentation. The social justice position is that years of racist practices in society and underfunding of compensatory programs means children of those groups are at a disadvantage for being placed in programs for children who are gifted. Those who have been affected need more opportunities and support than other children. The underrepresentation argument is that biased testing and identification procedures, which are insensitive to cultural differences, have sustained the situation. Taken together, until social and community interests are dealt with in an equitable manner, special provisions for the gifted are unjustifiable.

Those who favor an excellence position and dislike inclusion take advanced academic learning and pursuit of individual goals to be of most concern. The academic learning position is that some children are ready for more advanced work than are others of the same age and they should not have to wait for proper instruction until the equity issues are settled. The pursuit of individual goals position is that every individual should be able to follow his or her natural tendencies and not be made to wait for the group. Excellence only occurs when children can leap forward to more complex and creative endeavors as needed.

Inclusion is primarily an administrative term referring to placement. When the term is confused with instruction or tied to what goes on in classrooms, the discussion becomes messier. Opposition to inclusion is raised by those who say the rhetoric of inclusion does not meet the reality in classrooms. Rather, the ideals of inclusion are corrupted in practice by administrators to provide a cost-effective way to deal with both students with disabilities and students with gifts and talents. Teachers may not receive the support they need to reach students with disabilities; much slimmer is the chance that they will receive a teacher's aide to help the gifted students who may not have access to multilevel materials or professional development on the topic of differentiated curricula. Faced with the demands of bringing low achievers up to a basic-skills level, teachers are pushed to ignore the needs of gifted

students. Thus, for gifted students, the inclusion classroom becomes restrictive and discourages them from being themselves.

Some in the field of gifted education specifically argue for a pull-out or resource room option as an administrative solution. One reason given for this position, which is in direct opposition to inclusion, is that to be among intellectual peers is an emotional safe zone for gifted students, who can be teased and bullied for being smart. Another social reason for the resource room is that gifted students need the experience of interacting with other intelligent students, so that they do not become arrogant, thinking they are always the smartest person in the room. Proponents of resource rooms also argue that placing a group of gifted students together is intellectually stimulating. The students learn more from each other than they would learn in a typical cooperative group, where they might be limited to teaching others skills they have already mastered.

Research

Can equity and excellence be honored in general education classes and programs in the real world? The literature is replete with reports on implementation and its success or lack of success. Most commentaries are firsthand anecdotal reports. Few studies provide evidence on the effects of inclusion on gifted students. Studies attempting to provide such data have to consider the training of the personnel who deliver the program, the amount of resources (material and administrative) available, the fidelity of the implementation to the precepts of inclusion, and suitable measurement of outcomes relevant to the program. What outcomes would satisfy the question of whether inclusion works or not? Evidence on social emotional issues, attitudes toward school and learning, achievement or accomplishments in various school-related domains, after-program effects in different educational settings, and eventually, career contexts are important outcomes. Until these concerns and outcomes are addressed in studies, evidence-based judgments of inclusion cannot be made and the inclusion debate will persist.

Laurence J. Coleman and Jill Olthouse

See also Classroom Practices; Competencies for Teachers of Gifted; Poverty and Low-Income Gifted; Regular Classroom; Self-Contained Classroom

Further Readings

Bellamy, L. (2005). A critical analysis of how differentiation can promote the full inclusion of three gifted and talented students in a mixed ability, Year 9 class studying *Macbeth*. *English Teaching: Practice and Critique, 4,* 72–83.

Gallagher, J. (1997). Least restrictive environment and gifted students. *Peabody Journal of Education, 72,* 153–165.

Margolin, L. (1996). A pedagogy of privilege. *Journal for the Education of the Gifted, 19,* 164–180.

Sapon-Shevin, M. (1996). Beyond gifted education: Building a shared agenda for school reform. *Journal for the Education of the Gifted, 19,* 194–214.

Skrtic, T. (1991). The special education paradox: Equity as the way to excellence. *Harvard Educational Review, 61,* 148–206.

Westberg, K. L., Archambault, F. X., Jr., Dobyns, S. M., & Salvin, T. J. (1993). *An observational study of instructional and curricular practices used with gifted and talented students in regular classrooms*. Storrs, CT: National Research Center on the Gifted and Talented.

Independent Day and Boarding Schools

Independent day and boarding schools offer gifted children alternatives to local public schools. The National Association of Independent Schools (NAIS) defines *independent schools* as nonprofit schools that are governed by a board of trustees and supported by tuition, charitable contributions, and endowment income rather than by public or church funds. The Association of Boarding Schools (TABS) defines *boarding schools* as independent, college preparatory schools that provide residential facilities for students and faculty.

The wide array of educational and social options offered by independent day and boarding schools differ greatly from school to school, but can include advanced coursework, expanded art and music options, reduced class sizes, and increased

emphasis on community, particularly in boarding schools where students and faculty reside together.

Some independent schools designate themselves as schools for the gifted. Some of the oldest independent schools for the gifted, together with their state and year of founding, are the Roeper School (Michigan, 1941), the Mirman School (California, 1962), the Nueva School (California, 1967), Quest Academy (Illinois, 1982), Sycamore School (Indiana, 1985), and the Rocky Mountain School (Colorado, 1990). Some independent schools, although not designating themselves as schools for the gifted, attract and accept student bodies with large proportions of gifted students. For instance, the average SAT scores of students attending the Thomas Jefferson School (Missouri, 1946) rank that boarding school among the top 10 boarding schools nationwide. Bridges Academy (California, 1994) designates itself as a school for students who are both gifted and have learning differences.

Independent day and boarding schools, when chosen wisely with the needs of individual children and the characteristics of particular schools in mind, can provide excellent alternatives to local public school options for gifted children. Many resources exist for helping parents find the best school for a particular child. Parents should investigate the willingness and flexibility of a particular school to meet a particular child's needs. When determining whether a school meets a child's needs, parents should consider the school's financial and other resources, the school's willingness to adhere to National Association for Gifted Children (NAGC) policy recommendations, and the school's curricular flexibility.

This entry includes information about selecting and evaluating independent day and boarding schools. The entry also discusses the application process and what to expect once a child is enrolled.

Selection

Finding an appropriate school for a gifted student is an important task that should be performed with diligence. The mere fact that a school is highly regarded does not guarantee that the school will offer an appropriate education for gifted children. Families seeking to send a child to an independent day or boarding school should thoroughly investigate the school to determine if the school is a good fit for the particular child's needs and abilities.

Some of the resources that exist to help families with school selection include guidebooks, school search Web sites, gifted organizations, and independent educational consultants experienced in placing gifted students with special academic, social, emotional, or learning difference needs. The Independent Educational Consultants Association (IECA) helps families find consultants. NAIS and Web sites of regional organizations of independent schools list member schools by location, type of school, and offerings. One guidebook, *The Bunting and Lyon's Blue Book,* contains information about independent schools from nursery school programs through postgraduate year programs, and includes lists by location, by school type, and by students served. Once a family finds several schools that look promising, the family should thoroughly investigate and evaluate the schools on the list to determine which might best meet the needs of the child.

Curricula

Gifted students of all ages need flexible curricula. Most independent day and boarding schools offer small classes and easy access to teachers, but small classes alone are not enough to ensure that gifted students will be challenged academically. The more highly gifted the student is, the more flexibility the school needs.

Good curricula provide ample opportunity for students to explore subjects in depth at the level of their achievement rather than their age. Good individualized instruction, at all levels from prekindergarten through 12th grade, should include teaching directed to the student's abilities and appropriate to the student's speed of learning. Gifted students benefit from schools that allow curriculum compacting, subject or whole-grade acceleration, and educational opportunities beyond the school walls including mentoring, online courses, and dual enrollment in college courses.

Evaluation

Good independent schools try to recognize each student's unique needs, including needs relating to the student's ability and achievement levels; social

and emotional characteristics; and artistic, musical, athletic, and leadership interests. Some independent schools limit themselves to serving a particular type of student such as one with attention deficit/hyperactivity disorder (ADHD) or nonverbal learning differences (NLD); more typically, independent schools are committed to serving a broad range of students. A few schools, such as Nueva School, serve mainly highly gifted students. Although good independent schools want to address all students' needs, some schools may not be aware of the subtle and complex needs of their gifted students. A thorough examination of an independent day or boarding school will reveal how the school understands and accommodates the unique giftedness of individual children.

Visits to independent boarding and day schools give prospective students and their parents opportunities to discover the personality, climate, and commitment of the schools. Visiting students and parents can ask details about whether and how individual students' needs can be met by the school. If the visit includes time for prospective students to interact with current students, the prospective students can learn whether they share interests and values with current students. Families can ask school faculty members and admissions personnel for examples of accommodations they have made to meet individual gifted students' unique needs. Schools with an overall lackluster interest in discussing a student's special circumstances are likely to make a poor fit for a gifted student. Schools eager to support high ability students are likely to exhibit enthusiasm and flexibility when discussing how they meet the needs of individual gifted students.

Twice-Exceptional Students

The term *twice-exceptional* refers to students who are both gifted and have learning differences. All the learning differences that occur in non-gifted children can also occur in gifted children. Although the federal Individuals with Disabilities Education Act (IDEA) requires public schools to provide services to children with disabilities, including children placed by their parents in private schools, there is no individual right to services for parentally placed private school children under IDEA. Private schools need not enroll students who require IDEA services. Whether a private school student receives support for learning differences depends upon many factors, including the particular diagnosis, the private school's willingness to cooperate with the public education agency, and the expertise of the private school faculty.

Some independent day and boarding schools offer specialized academic and social environments to support twice-exceptional students that are beyond those services available in many public schools. These unique independent and boarding schools have an excellent understanding of the needs of twice-exceptional children. Some specialized day and boarding schools whose missions are to educate children with learning differences may not be familiar with the term *twice-exceptional*, but may have many twice-exceptional children as successful students. Those schools meet the needs of their twice-exceptional students by offering individualized attention, special curricula, and small student body size. When a twice-exceptional student can benefit from a special sensory environment—for example, a quiet environment created by the use of noise-canceling headphones during tests and quizzes—the school will readily agree to provide that special sensory environment to enable the student to learn at an optimal level.

Gifted Education Best Practices

Both the NAIS and the NAGC make educational practice recommendations. Some of their recommendations overlap. For example, NAIS recommends that elementary school educators teach to the learning styles and intelligences of individual students, that middle school educators thoroughly understand their students' patterns of intellectual growth, and that secondary school educators teach to the learning styles and abilities of their students. NAGC similarly recommends that educators provide appropriate quality educational experiences for all students, regardless of their individual ability, background, and achievement.

Some independent day and boarding school personnel might interpret NAGC policies about acceleration, grouping, or cooperative learning as conflicting with their school policies. To determine whether school policies conflict with NAGC policies, parents might ask schools which NAGC policies they follow, and which they might not be able to follow because of financial or other constraints.

The regional accrediting organizations associated with NAIS aim to give member schools freedom to practice their own educational philosophies, including perhaps philosophies in conflict with NAGC policies. Families bear the responsibility for ascertaining whether a particular independent day or boarding school will meet the needs of a particular child. In the case of gifted children, accreditation does not guarantee effectiveness.

Financial Considerations

By definition, independent day and boarding schools rely on tuition, charitable contributions, and endowment income rather than on public or church funds. Whether an independent day or boarding school can provide services needed by gifted children might depend to an extent on the financial health of the school.

Information about the financial health of independent day and boarding schools can be found by reading the schools' annual reports. Federal law requires most independent day and boarding schools to complete and file an IRS Form 990 each year. Because Form 990s are public record, parents investigating independent schools may obtain copies of completed 990 forms. Some nonprofit search engines, such as guidestar.org, post Form 990s online. Form 990s include a wealth of information on assets, liabilities, income, and expenses, as well as information on programs, personnel, and purposes.

A close reading of a school's Form 990 may reveal how much money the school spends on scholarships. Most independent schools grant scholarships, some based on financial need and some based on merit. Many independent schools require parents seeking need-based scholarships to submit a Parent Financial Statement form to the School and Student Services division of NAIS.

Admissions Process

Independent boarding and day schools require applications for admission. Typically schools have prospective students visit the school for part of a day. Visits give parents and students opportunities to experience the school environment and culture as well as see the school grounds and meet the school personnel.

Parents and students complete applications consisting of some or all of the following: a questionnaire about the student's interests and activities, essays, a current school transcript, previous standardized test scores, and teacher recommendations. Many independent schools will require an entrance test such as Independent School Entrance Examination (ISEE) and Secondary School Admissions Test (SSAT) for older students. Some schools may require intelligence testing for younger children. Gifted students may submit prior testing or portfolios showing exceptional ability or achievement.

Independent school admission officers seek a variety of students based on their particular school's mission and needs. Schools may look for qualities such as aptitude, curiosity, self-motivation, extracurricular interests, and age-appropriate social and emotional development. Some schools decline to admit students whose giftedness would require special accommodations from the school.

Wenda Sheard and Heidi Molbak

See also Governor's Schools; National Association for Gifted Children; Secondary Schools; Single-Sex Schooling; Specialized Secondary Schools

Further Readings

Association of Boarding Schools. (n.d.). The truth about boarding school. Retrieved February 12, 2008, from http://schools.com/theTruth/truth2.html

Bassett, P. F. (2007, Fall). Making strategy. *Independent School, 67*(1), 9–12.

Kumekwa, P. (n.d.). Considering independent boarding schools as an educational alternative. Center for Talent Development. Retrieved February 22, 2008, from http://www.ctd.northwestern.edu/resources/boarding/considerboarding.html

Shanker, A. (1993, January 1). Public vs. private schools. *National Forum: Phi Kappa Phi Journal, 73*(4), 14.

Witham, J. (1994, April 1). *Acceleration: Does it happen more frequently for gifted students in private or public schools?* (ERIC Document Reproduction Service No. ED406764). Retrieved November 3, 2007, from ERIC database.

Witham, J. (1997, January 1). Public or private schools: A dilemma for gifted students? *Roeper Review, 19*(3), 137.

Indiana Academy

The Indiana Academy for Science, Mathematics, and Humanities (Indiana Academy) was created in 1988 by the Indiana State Legislature to become the state's public residential school for intellectually gifted high school juniors and seniors. It was created to attend to increasing concerns about the future of the state by offering a special educational opportunity to some of Indiana's most able minds. The school was given two charges: (1) to provide a rigorous and appropriately challenging academic experience within a residential setting for 300 juniors and seniors, and (2) to serve as a statewide center for gifted education services. This entry describes those two charges and the development of the academy.

The Indiana Academy was born at a time when several states had already created residential schools for gifted students in one form or another. North Carolina created both the first residential art school in 1968 and the first residential science and math school in 1978. The North Carolina schools represent a specific model (public residential academy) that has its own faculty. The two schools differ in that the first emphasized the arts and the second math and science. This model has not proliferated partly because of the expense associated with the model. A third, newer model is growing in number. The new schools using the third model tend to emphasize math and science, but do not employ a faculty of their own. Rather, students are admitted into a college or university and students attend regular college courses. With these three options, Indiana state legislators chose the North Carolina math/science model that has its own faculty, but giving equal emphasis to math, science, and the humanities—a novel decision at the time.

The Indiana Academy is located on the campus of, and is administered by, Ball State University (BSU). The Indiana Academy includes 300 students (approximately half juniors and half seniors) who live in Wagoner Hall on the BSU campus. The academy draws its students from around the state and tries to represent the more than 300 schools in its student body. Currently, students are admitted on the basis of their meeting six criteria: (1) standardized achievement test scores, (2) standardized ability measures (SAT scores), (3) grades, (4) letters of recommendation from two teachers, school counselor, and school administrator, (5) a personal essay, and (6) parents' or guardians' statements. All applications are screened by at least two people, and those who are determined to meet the basic criteria and who are determined to be able to live in a residential community are screened by a minimum of four reviewers. All students are rated on the criteria and included on a list. Those who are rated as acceptable are admitted to the school on the basis of when they applied and their relative position on the list.

The school's curriculum comprises a core program, exploratory program, and an extended program. The core curriculum is based on a liberal arts model emphasizing a balance of the disciplines. Students are expected to thrive in all academic areas. For example, students complete four semesters of advanced English, social studies, science, and mathematics. Students can choose from more than 30 science courses. The mathematics division attempts to prepare all students for college-level courses. More than 80 courses are offered in the humanities division in the areas of English, history, social studies, foreign languages, and fine arts. All students are required to demonstrate proficiency in a foreign language such as Japanese, French, German, Russian, Chinese, Spanish, or Latin.

The exploratory curriculum includes several components: May Term courses, independent research, apprenticeships, directed studies, discussion seminars, and Indiana Academy and university elective courses. The exploratory curriculum was designed to allow students to inquire and discover. Independent research and directed study are encouraged so that the excitement generated by inquiry and discovery leading to new knowledge is included in each student's learning experience. Students may select a general research course or more specialized courses in science or the humanities.

The Office of Outreach Programs oversees the activities that fulfill the second mission of the school: to serve as a statewide center for gifted education. Although the actual programs and emphases have evolved over the years, there have traditionally been four components of the Indiana Academy's outreach program: (1) distance learning

program for students and faculty, (2) summer programs for teachers and students, (3) Outstanding Faculty Fellows Programs, (4) Electronic Field Trip Program.

For 18 years, students across Indiana, in numerous other states, and in a few foreign countries have taken Indiana Academy courses for high school credit via myriad technological platforms. To date, approximately 8,000 students have taken these courses. Teachers have also had opportunities to receive specialized training through the Indiana Academy. For example, during the past 5 years, short courses have been offered in modules focused on effective teaching of Advanced Placement courses. Hundreds of teachers participate in this program annually.

The summer is an active time for teacher training at the Indiana Academy. Several hundred teachers from across the Midwest and several foreign countries complete summer workshops in teaching courses for gifted adolescents, many aimed at Advanced Placement courses. Students are also offered numerous programs ranging from building Web pages to learning science through crime lab research. When funding has been available, students growing up in rural poverty have lived at the Indiana Academy for a week to build their skills in science and mathematics and to encourage them to pursue college after high school. Some of the students returned to the Indiana Academy for four consecutive summers.

For 14 years, the Indiana Academy ran the Faculty Fellows Program that brought teachers from across Indiana to live at the Indiana Academy for an academic year to learn how to more effectively teach gifted students. Fifty-six faculty fellows worked at the Indiana Academy and returned to their home schools with new curricula, new skills, and a wider repertoire for successfully teaching gifted students.

The fourth traditional program of the Indiana Academy was called the Electronic Field Trip program (EFTP). For several years, the EFTP attempted to take children from across the United States to places that they might not be able to see otherwise. An EFTP team would go to a site, such as a dinosaur archeological dig site, and electronically beam the visit to literally hundreds of schools across the United States. Over the years, thousands of students have participated in the program. As the EFTP grew, it became a part of the Teachers College at BSU, a move intended to provide the resources such a rapidly changing program needed beyond what the Indiana Academy could offer.

Tracy L. Cross and Jennifer Riedl Cross

See also Adolescent, Gifted; Governor's Schools; Independent Day and Boarding Schools; National Association for Gifted Children; Online Gifted Education; Secondary Schools; Single-Sex Schooling; Specialized Secondary Schools; Summer Programs; Teachers of Gifted

Individual Education Plan

Individual Education Plans (IEPs) were originally written for students with disabilities to ensure that they receive a free, appropriate public education. IEPs can be a useful tool and a motivating force in planning for and meeting the needs of gifted students. The IEP process is helpful in planning services for gifted students and assessing their progress or growth. This process aids schools in answering the question, "What will we do when they already know it (curriculum)?" This process guides educators to review assessed indicators on state and district assessments in which gifted students are more than proficient, and by comparing them with the identified needs of student on the IEP, to develop goals. These goals are driven by assessed indicators that align curriculum and instruction with the student's assessment scores, thus improving student performance and providing new learning opportunities for the gifted student.

This entry examines the IEP and considers the advantages and disadvantages of the IEP for gifted students. The relationship between the student's performance in general education and IEP goals is identified. Examples of IEP goals appropriate for gifted students are offered as best practices.

Overview

Only four states require IEPs under the Individuals with Disabilities Education Act (IDEA)—Kansas, Louisiana, New Mexico, and West Virginia. Alabama, Colorado, Florida, Kentucky, Oklahoma,

and Pennsylvania require IEPs for gifted students under each state's disability in education law. The IEP is a familiar document to most educators because of federal regulations for special education and the IDEA. Educators are accustomed to the IEP for disabled students but do not always view the IEP as applicable for gifted students.

Since 1980, gifted education in Kansas has operated under a state mandate that requires that all school districts identify and serve gifted students in kindergarten through 12 grades. This mandate places gifted education under the umbrella of special education, therefore requiring that gifted education in Kansas must follow all the guidelines and procedures required by IDEA. The reauthorization of IDEA in 1997, and the subsequent revision of the Kansas special education regulations in 1999 to reflect the language of IDEA, has greatly influenced changes in the methods by which almost 15,000 gifted students in Kansas are identified and in the document called the Individual Education Plan.

As the pressures of No Child Left Behind (NCLB) and adequate yearly progress (AYP) channel educational resources to students who are having difficulty learning, inclusion in special education forces the educational system in Kansas to pay attention to the needs of the population of gifted students in the state identified as "exceptional." Inclusion in special education also provides protection and due process rights for students and parents. Parents, and students, have the right to be a member of the IEP team and to have their concerns addressed. Parents have the right to receive regular reports of their child's progress on IEP goals. Parents have the right to confidentiality of information and access to their child's records, to seek an evaluation outside of the education system, to give or refuse consent for placement and services, and, in the event of a conflict, to have mediation and an impartial due process hearing. The right to due process provides parents and gifted students the opportunity to be heard and consequently, the right to free, appropriate public education as it applies to the needs of the gifted student. And because gifted education is mandated by the state, legislative action would be required to eliminate funding and services for gifted education.

The Special Education for Exceptional Children Act, K.S.A., embeds services for gifted students into IDEA with only five exceptions: (1) *Discipline:* Although other special education students are protected from suspension and expulsion because of their disability, gifted students are still disciplined under the rules of their school district. (2) *Early childhood education, ages 3 to 5:* Gifted education services are not available for students younger than the state required age for entrance into kindergarten. (3) *Least restrictive environment:* The most restrictive environment for gifted students is usually the general education classroom at grade level in the student's neighborhood school. A least restrictive environment is wherever and whenever the student receives gifted education services. (4) *Extended school year:* Education beyond the 9-month school year is not provided for gifted students. (5) *Modified state and district assessments:* Gifted students do not need the assessments modified. Following all the other requirements of IDEA, IEPs are written for students in gifted education.

Advantages and Disadvantages

Although IEPs were originally written for students with disabilities, the IEP can be a useful document and tool in planning services for gifted students and in assessing their progress. To many, the advantages of an IEP outweigh the disadvantages.

As stated before, parent and student rights afforded by inclusion in special education is an important advantage for the gifted student. An additional advantage is that the process of identifying a gifted student begins with the team problem-solving process and results in the collection of multiple data about the student. This is a positive. A problem solving team of general and special educators collaborate to identify the problem: Is the general education curriculum and instruction at the student's grade level adequate to provide for his or her academic and intellectual needs? The data collection can prove that either the general education curriculum can provide what the student needs, or it cannot, and the student needs "special" education.

Contrary to what one might think at first, the collecting of multiple data is an advantage that allows for more flexibility in identifying students and developing the IEP. Because of the requirement for multiple data, the IQ score is no longer the final arbitrator of the identification and placement of a student. Eligibility for gifted education services is

determined first by the student meeting the state criteria to be identified as a gifted student, and the multiple data documents that the student's academic and cognitive needs that cannot be met by the instruction and curriculum in general education at the student's current grade level. If these requirements are met, then an IEP will be written.

A possible disadvantage of the problem-solving process for parents, the student, and teachers is that the process can take several weeks. Parents and students are anxious for a decision. They do not always understand the requirement for general education to provide classroom interventions and to exhaust all possible methods for meeting the student's needs in the classroom before considering "special education." Also, teachers may be uncertain about what interventions are appropriate for gifted students or teachers may be unable to address interventions for a gifted student because of the time needed with students who are not meeting AYP. The availability of the gifted education staff at this time can provide guidance to teachers and help facilitate this process.

The emphasis upon high performance in the general education curriculum as a prerequisite for referral and identification can be a disadvantage when attempting to identify the underachieving student, the twice exceptional, those from low social or economic status, bilingual students, and minority or culturally different students. These students may be overlooked. A teacher must be astute enough to look beyond average or low daily performance for other evidence of giftedness. Students may score very high on the state and district assessments, which can bring them to the attention of the school. If teachers do not refer these students, often parents, or the students themselves, may do so. Once the problem-solving process is initiated, the collection of multiple data from many different sources and more flexibility in reviewing the data can make the needs of these students more obvious and be used to identify and serve these students.

Another disadvantage is that the IEP format was created as a deficit model for "disabled" students to address areas of "weakness" that require support before the student can progress in the general education curriculum. The gifted student demonstrates strengths that are beyond that of many of his or her age peers, and because of this, in an IEP for a gifted student, the focus is on student strengths rather than weaknesses. What looks like a weakness is often relative to the strengths demonstrated by the student. Therefore, IEP goals should focus upon the gifted student's needs in areas of strengths. An exception is a student who is twice exceptional and demonstrates a need for additional services from another area of special education, as well as gifted education. This requires an IEP that addresses both the gifted education needs and other areas of need such as those created by a learning disability or physical disability.

The amount of IEP paperwork that must be done to comply with state/IDEA guidelines and the time it requires is often viewed as another disadvantage. Several elements of the IEP document do not usually apply to gifted students. For example, vision, hearing, health, adaptive PE, Medicare, assistive technology, functional needs/curriculum, limited English proficiency do not usually apply to the gifted student unless the student is twice exceptional. Social and emotional issues, how the placement in gifted education affects the student's participation in general education, how the positive effects of placement out weigh negative, what courses will be taken to achieve desired future outcomes, what special services are provided and transition needs are all important to address or rule out when planning services for a gifted student. The details and paperwork is the trade-off for the advantages provided by inclusion in special education.

Depending on one's perception, the focus of the problem-solving process and the reliance of the IEP on progress in the general education curriculum seems to ignore other needs of the gifted student: affective needs, the need to follow a passion, the need for talent development, the need for peer interaction with other gifted students, the need to use creative and critical thinking skills, the need for authentic and independent inquiries. These are seldom addressed through the general education curriculum, and consequently, become important issues to be addressed on the IEP because it is an individual plan.

Also, the reality for the gifted student is that he or she spends most of the school day in general education. The IEP can document the level of the student's academic performance, and when that performance is beyond what is provided in general education at the student's grade level, which is usually the case, the IEP can be used to document the inappropriateness

of the general education curriculum and instruction for the student and address any and all identified academic, intellectual, and individual needs. Thus, the IEP opens the door for a discussion about testing-out, compacting, and grade acceleration. In addition, the general education teacher is obligated by the IEP document to modify curriculum and instruction in the classroom. The emphasis upon progress in general education curriculum might seem to be a disadvantage but realizing that the gifted student spends most of his or her time in the general education curriculum, it doesn't have to be. The general education curriculum and instruction is where changes need to occur.

The Individual Education Plan

This plan documents the student's present level of performance, identifies a need for services, and delineates what, how, and by whom the services will be provided to the student, including the location, duration, and frequency of the services. By the end of the problem-solving process, the team knows the student and his or her needs well and is more able to provide appropriate services though an IEP. The goals are planned with the input of the team—primarily the student, parents, the administrator, and general education teachers at the IEP meeting. The IEP also requires that teachers continue to modify curriculum and instruction in the general education classroom for gifted students. Because gifted education services are mandated by state law and documented on the IEP, teachers who might be reluctant to provide modifications (differentiation of instruction and curriculum) are more likely to follow through or provide support by release time from classes for gifted education support.

Present Levels of Educational Performance

Although the term *Present Levels of Academic Performance* (PLEP) has recently been revised in the Kansas State plan to read *Present Levels of Academic Achievement and Functional Performance,* for the purpose of this entry, *PLEP* is used to refer to information that describes and identifies the strengths, and sometimes "weaknesses" of the gifted student. Meaningful, individualized and measurable goals will be written from this information. The PLEP answers these questions: What does the student need in relation to instruction? What does the student need in relation to curriculum? How does the environment affect the student's learning? What are the unique learning characteristics of this learner? Standardized tests, surveys, characteristics, and behavioral checklists can be included here. The purpose of the PLEP is to diagnose how a student's giftedness affects his or her involvement or progress in the general education curriculum, and, consequently, how the student's giftedness affects his or her academic and intellectual needs.

Tips for Writing IEP Goals for Gifted Students

Every goal contains four elements: the *time frame* or the amount of time for the goal to be completed, the *conditions* under which the goal will take place and progress will be measured, the *behavior* exhibited by the student that can be observed and monitored during the leaning process, and the *criterion* by which the student's success or completion of the goal will be measured. The criterion states how much, how often, or what level of performance must occur to document that the goal has been completed. Following is an example.

Time:	From January 15, 2008, to March 30, 2008,… During the 1st semester of the 2008–2009 school year,… …at the end of the 4th quarter of the 2008–2009 school year.
Condition:	…given 50 math and logic problems of increasing difficulty at the 6th- to 8th-grade level, as a 5th grader, Sam will…
Behavior:	…apply skills of graphing, measuring, estimating, fundamental operations, sequential reasoning and spatial relations to correctly solve a minimum of 40 problems.
Criterion:	…for an average score of at least 90%… …scoring an average of 90% for a 9-week grading period. …at least a 4 on a 5-point rubric.

When using rubrics to measure progress, educators create the rubric and attach it with the IEP document. This clarifies for the parents and students the standards by which the students' performance on that goal will be evaluated.

Goals for gifted students fall into six categories:

1. Goals that extend/enrich the general education curriculum
2. Goals that accelerate the student through the general education curriculum such as testing-out or compacting curriculum
3. Goals that develop the process skills of problem solving, critical thinking, and creative thinking and research
4. Goals that deal with the affective needs of the gifted student
5. Goals that develop technology skills
6. Goals that are unique, individual, and specific to that particular student

Other areas of special education write annual goals; those students often have a need for a goal that will take a full year to accomplish. Students are expected to make progress on the goal throughout the year but not necessarily complete the goal during a full "year" of the IEP. Goals for gifted students may be completed in shorter periods—a month, 9 weeks, a semester grading period. As long as another goal continues when the previous one is completed, the IEP document is considered "active" and in compliance with state regulations.

These goals might be written on the IEP:

1. Extend/enrich the general education curriculum in math:

   From March 1 to April 15, 2008, given an understanding of how our society uses money in "real life" situations, and receiving a "salary" commensurate with her chosen career, the student will solve 35 to 40 simulated real-life problems involving establishing a budget, a savings account and a checking account, paying bills, earning and paying interest and paying taxes for an overall average of 90 percent on all assignments.

2. Acceleration:

   During the 2008–2009 school year, given the district's math curriculum for seventh-grade Transition Math with daily assignments and scheduled tests, as a sixth grader, the student will demonstrate mastery of the course outcomes by scoring an average of 90 to 100 percent for each 9-week grading period.

   At the end of the first semester of the 2008–2009 school year, given the district's curriculum for Spanish II, which is scheduled for two semesters, the student will compact the curriculum by completing all assignments and tests with an average score of at least 90 percent as evaluated by the criteria established for the course by the school district.

3. Process skills such as problem solving, creative thinking, critical thinking, research:

   By the end of the second semester of the 2008–2009 school year, after studying the lives of five famous artists and analyzing their creative and artistic styles, the student will select one artist to investigate in depth, write a two- to three-page biography about the life of the artist and create a product in the style of the artist with successful completion of the goal to be measured by at least a 4 on the 5-point rubric created by the student.

4. Affective needs

   Those who work with gifted students will agree that these students have affective needs that relate to their "giftedness." Writing an affective goal on an IEP for a gifted student is difficult because the goal may deal with needs and behaviors that are not concrete and cannot be easily measured. Such needs as developing an understanding or awareness of what "gifted" means and how that applies to the student, or dealing with traits of perfectionism or overexcitability, or negative peer interactions are real and need to be addressed. An option is to write a goal that requires concrete behaviors from the student, such as read *Gifted Kids Survival Guide* and write a reaction/response of two to three typed pages. Another goal might be to ask the student to step in the shoes of a gifted adult, study his or her life and compare that person's experiences to the student's own life experiences. A third option is having students solve authentic problems by working in a focus group of intellectual peers, thus arranging a situation in which the student can practice and

learn more positive social skills. Writing a plan designed to modify negative behaviors isn't always a workable solution either. Someone must be able to record data on a continuing basis to monitor improvements and progress.

5. Technology

   In 18 weeks, the student will demonstrate his knowledge of technology by selecting a topic, gathering information from at least five approved Web sites, recording the information on the forms provided by the teacher, analyzing the information and organizing it into a 10 to 15–frame PowerPoint document to present to an authentic audience for a score of at least a 4 on a 5-point rubric.

6. Unique, project, individual and specific to a student

   By the end of the 4th quarter of the 2008–2009 school year, after studying the characteristics and themes common to the genre of Native American mythology and the oral tradition of the Native American culture and reading at least 10 Native American myths, the student will analyze the elements found in each myth, write a three-paragraph analysis over each and create five story pyramids, five character webs, "an animal skin" petroglyph, and an original myth told to an audience for a minimum score of 4 on a 5-point rubric.

Conclusion

Whether required by law or not, the IEP can be an important tool for enhancing the education of the gifted child. It provides accountability as well as specificity. Because IEPs have been in use for several decades, many excellent models now exist that can be used by teachers and students to create goals, implementation procedures, and means of evaluation.

Judith C. Lacey

See also Acceleration/*A Nation Deceived;* Enrichment Triad Model; Giftedness, Definition; Identification; Inclusion; No Child Left Behind

Further Readings

Delisle, J., & Galbraith, J. (1996). *Gifted kids survival guide: A teen handbook*. Minneapolis, MN: Free Spirit Publishing.

Gifted Education Services: http://www.kansped.org/ksde/gifted/gifedindex.html

IEP Training, Student Support Services, Kansas State Department of Education, November 23, 2003. Retrieved from http://www.greenbush.org/spot/Gifted%20IEP/Participant's%20Guide%20-%20Gifted.doc

Kansas Association for Gifted, Talented, and Creative: htt[://www.kgtc.org

National Association for Gifted Children. (2007). *State of the states in gifted education, 2006–2007: A report by the Council of State Directors of Programs for the Gifted and the National Association for Gifted Children*. Retrieved from http://www.nagc.org/index.aspx?id=1051

Special Education Services: http://www.kansped.org

Individualized Instruction

The multiple definitions and interpretations of individualized instruction often make it difficult to construct a common meaning and validate the implementation of the concept. *Individualized instruction* can be defined as an accommodation or modification of the curriculum, a pedagogical strategy, or a programmatic structure provided to a student. Each of these references to individualized instruction requires a specific orientation. The curriculum reference to individualized instruction places emphasis on adjusting the curriculum to respond to the individual attributes of the learner. The pedagogical reference to individualized instruction places emphasis on selection of a pedagogical approach or set of strategies to match the learning styles and needs of a particular student. The programmatic reference to individualized instruction places emphasis on the organizational structure to provide both the curriculum and instruction to a single student. The many and varied forms of individualized instruction can be addressed under the single title of "individualization." This entry describes individualization of instruction and how it is used with gifted students.

Karen Rogers defines individualization for gifted learners as the teacher's ability to make individual decisions for a single child and to allow the members of a class to move at their own paces within a

curriculum. Decisions to individualize require that attention be paid to the relationship between what students already know and what they need to learn. Barbara Clark states that individualization is not necessarily one-to-one teaching. She notes that individualization depends on a needs assessment of the learner so that learning experiences can be adjusted in content, complexity of activities, and pacing. Joyce VanTassel-Baska defines the concept of individualization to include self-paced learning that requires a diagnostic prescriptive orientation and aligns learning rate with individual capacity or a means by which the ceiling for learning is removed.

Fundamental to individualization is a set of educational goals that underscore its purpose, definition, and implementation. The ideal of developing independent learners who are self-directed philosophically supports endeavors to individualize for students. In contemporary society, cultural, linguistic, economic, and academic diversity provide the rationale for individualization. Issues of equity and access reinforce the need to individualize curriculum and instruction. The contemporary stress on differentiation of curriculum and instruction is a means to formalize and implement individualization. One current trend involves organizing schools into small learning communities. Here, students can learn in cooperative and collaborative group structures where designated roles can be assigned to individuals to facilitate individualization. Problem-based learning or curriculum wherein students can be assigned an area of study according to specialized needs and interests are also contemporary indicators of educational efforts to recognize and accommodate individualization. George Betts and Maureen Neihart defined individualization for gifted students as self-directed learning, self-teaching, individualized learning, individualized education, and personalized learning. These definitions provide a common set of terms to describe the tenets of individualization and can be seen as integral to individualizing curriculum, instruction, and programs.

Beverly Parke suggested that individualization include enrichment, acceleration, and remediation, thus allowing for a multifaceted response to the curriculum definition of individualization. Joseph Renzulli designed the enrichment triad model to direct educators of gifted toward the importance of recognizing and responding to individual interests and needs of gifted learners through the Type III activity or independent study. Carol Tomlinson advocated individualization through tiered assignments and options for choice. Tiered assignments have become one of the curriculum structures used to design curricula that differentiate for individuals in content acquisition, skill mastery, and product development. Sandra Kaplan includes a layer labeled "individualized" in the layered approach to differentiated units of study to indicate how individualization is a consistent component of a comprehensive curriculum design.

Many types of organizational structures facilitate translating the concepts of individualization into classroom practices. Individualized learning plans, learning centers placed within the classroom structure for students to work on a task related to their needs, continuous progress curriculum, and access to informal and formal online learning opportunities are some of the forms of individualization in the classroom identified by Rogers. In addition, special projects, attendance at an academic setting during or after school to engage in learning experiences, mentorships, tutoring, and independent study are all possibilities for individualization outside of the classroom. Clark adds programmed learning, learning activity packages, and learning contracts to the list that represents techniques to satisfy individualization within the school day. Online instruction and online independent study have become valuable tools of individualization.

The use of Individualized Education Plans (IEPs) was established by law in 1975 (Public Law 94–142) to accommodate children with disabilities and to provide them with free and appropriate education. In states where gifted education is under the special education department, IEPs are developed to individualize for the gifted. Often IEPs are created for gifted students who are identified as twice exceptional.

Regardless of the curriculum and pedagogical or programmatic structure applied to individualization, certain features consistently appear to be associated with the concept. Primarily, individualization is recognition of the individuality of the gifted learner and is the response to the needs, interests, and abilities that signify the individual nature of the learner.

Sandra N. Kaplan

See also Acceleration Options; Enrichment Theories; Online Gifted Education

Further Readings

Betts, G., & Neihart, M. (1986). Implementing self-directed learning models for gifted and talented. *Gifted Child Quarterly, 30*(4), 174–177.

Clark, B. (2008). *Growing up gifted*. New York: Merrill Prentice Hall.

Kaplan, S. N. (2001). Layering differentiated curriculum for the gifted and talented. In F. A. Karnes & S. M. Bean (Eds.), *Methods and materials for teaching the gifted*. Waco, TX: Prufrock Press.

Parke, B. (1983). Use of self-instruction motivation with gifted primary aged students. *Gifted Child Quarterly, 27*(1), 29–34.

Renzulli, J. S. (1977). *The enrichment triad model: A guide for developing defensible programs for the gifted*. Wethersfield, CT: Creative Learning Press.

Rogers, K. B. (2002). *Re-forming gifted education: Helping parents and teachers to match the option to the child*. Scottsdale, AZ: Great Potential Press.

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

VanTassel-Baska, J. (2005). *Curriculum and instructional planning and design for gifted learners*. Denver, CO: Love Publishing.

Innovation

At the root of the development of our species from our primitive beginnings to the recent stunning advances in technology, communication, and social complexity, has been innovation—the development and implementation of improved processes, products, or procedures. Yet, despite the fascination with individual creativity, innovation is not a solitary activity that results from the vigorous championing of one idea by one individual. Innovation is more usually the result of concerted activities in groups of people, developing and implementing their ideas of a period, and then diffusing successful innovations throughout organizations or societies.

Without recourse to complex academic definitions, it seems simplest and most helpful to distinguish between creativity and innovation implementation. *Creativity* is the development of new ideas, whereas *innovation implementation* is the application of those new ideas in practice. Using this distinction between creativity and innovation implementation (in which creativity and innovation implementation are included under the heading of innovation), it then becomes clear that creativity is a characteristic of individuals, whereas innovation implementation is something that can be accomplished by individuals, groups, organizations, or even whole nations.

Innovation can be defined as those behavioral and social processes whereby individuals, groups, or organizations seek to achieve desired changes or to avoid the penalties of inaction. The term *innovation* is generally restricted to intentional attempts to bring about benefits from new changes. These changes might include economic benefits, personal growth, increased satisfaction, improved group cohesiveness, and productivity and economic gains. If a change occurs unintentionally, it is generally not considered an innovation.

Further, innovation implies both usefulness and novelty. An innovation must aim to produce benefits to the individual, group, organization, or wider society. Innovations can vary in relation to their novelty, from those that are relatively minor to those that are of great significance.

The most influential approaches in the study of creativity and innovation agree that it is important to consider the role of individual characteristics as well as to identify how other factors at different levels of social complexity such as the group context, the organization, and the larger society influence the unfolding of the innovation process. This entry focuses on the factors influencing innovation at the lower levels—the individual and the team.

Individual Creativity

Innovation starts with the generation of an idea by an individual, which has led scholars to focus on the characteristics of the creative individual. Meta-analytic studies have identified several personality characteristics that tend to distinguish between more and less creative people. Generally, creative people are more open to new experiences; less conventional and less conscientious; and more self-confident, self-accepting, driven, ambitious,

dominant, hostile, and impulsive. These traits tend to be relatively stable over the life span of an individual.

Cognitive factors have also been associated with displays of creative behavior. Cognitive flexibility; ideational fluency; and synthetic, analytic, and practical abilities seem to enhance creative behavior. Intelligence is not highly correlated with creativity, although most researchers agree that at least above-average intelligence is necessary for gaining domain expertise.

Dispositional characteristics, such as mood and intrinsic motivation, are also important factors in understanding why individuals are more or less prone to be creative and consequently initiate the innovation process. Teresa Amabile described creativity as the product of three factors: domain-relevant skills, which refers to factual knowledge and expertise in a certain domain; creativity-relevant skills, which refers to the strategies and cognitive styles that influence idea production; and intrinsic motivation, conceptualized as the individual's genuine interest in the task. Amabile attributes special relevance to intrinsic motivation because she considers this component to make the difference between what one can do (determined by domain-relevant skills and creativity-relevant skills) and what one will do. Intrinsic motivation determines the extent to which domain-relevant skills and creativity-relevant skills will be fully and appropriately applied toward successful creative performance.

Group or Team Innovation

The extent to which individuals are able to generate ideas and to which these ideas result in innovation depends highly on the surrounding environment, namely the group or team in which the individual is included. For instance, one individual might hold the relevant knowledge to conceptualize new ways of addressing a problem and might feel intrinsically motivated to do so. But if the surrounding environment is signaling that changing the status quo is not welcome, or in other words, if the climate for innovation is poor, these ideas will be suppressed and will not result in innovation. It is therefore relevant to understand which factors are associated with team innovation.

Group or team innovation occurs when a group with requisite internal diversity (in functional diversity and diversity of experience) experiences both high external demands, which signals that it is necessary to innovate to cope with the environment, and high levels of internal integration and psychosocial safety, which gives team members the necessary confidence to take risks. Groups will be innovative primarily when their task is sufficiently interesting, motivating, and challenging; when the group's internal environment or processes are experienced as safe; and when the group structure is appropriate. Hence, critical factors that influence team innovation are group structure, group task, and group processes such as psychological safety, reflexivity, and leadership. These are briefly discussed.

Structure

A team's structure—size, composition, tenure, characteristics of team members—is an important input for the innovation process. Team members should be appropriately integrated and hold among them the required task-relevant knowledge, skills, and abilities, including the ability to work in teams. Appropriate levels of team diversity, size, and tenure are also relevant. Research on the relationship between team size and innovation shows that larger teams tend to be less innovative as the difficulties of integration and interaction become more salient. However, evidence strongly indicates that for creative decision-making tasks, team diversity is important for innovation because heterogeneous teams benefit from having a broader range of perspectives. To a considerable degree in practice, the complexity of the task should dictate the composition of the team. Research also suggests that teams reach their innovative peak relatively early, after which the innovative output tends to decay. This tendency can be overcome by recruiting new members.

Task

Also critically important is the nature of the task, which must be sufficiently interesting, intrinsically motivating, attractive, and challenging to require and elicit creative responses. The *job characteristics model* developed by Greg Oldham and

Anne Cummings offers a useful framework to understand how task characteristics can influence innovation. Overall, to promote creativity and innovation, tasks should be structured in such a way that they provide teams with sufficient levels of autonomy to develop and implement their ideas. Tasks that require a diverse range of skills, represent a whole piece of work, and are perceived as being meaningful and having an impact on others are more likely to stimulate innovation.

Processes

Research on climates for innovation conducted by Michael West and colleagues has revealed the importance of several team processes, namely the relevance of shared objectives in teams, high levels of participation (information-sharing, shared influence over decision-making and interaction), commitment to excellence, and finally support for innovation.

Innovation is more likely to occur in groups where there is support for innovation and where innovative attempts are rewarded rather than punished. Support for innovation is the expectation, approval, and practical support of attempts to introduce new and improved ways of doing things in the work environment. Within groups, new ideas may be routinely rejected or ignored, or attract verbal and practical support. Such group processes powerfully shape individual and group behavior and will encourage or discourage team members to introduce innovations. In a longitudinal study of 27 hospital top management teams, support for innovation emerged as the most powerful group process predictor of team innovation.

Intragroup safety refers to the sense of psychological or psychosocial safety group members feel in the presence of their fellow group members and especially during whole group interactions. Intragroup safety includes the related concepts of group affective tone, safety climate and conflict acceptance, which are described later. Groups that consistently develop intragroup safety by encouraging positive group affect, constructive management of conflict, and creating a climate within which it is safe to learn, will be both more creative and more innovative.

Another key predictor of innovation in work groups is the capacity for reflexivity. Team reflexivity is the extent to which team members collectively reflect on the team's objectives, strategies, and processes, as well as their wider organizations, and adapt them accordingly. There are three central elements to the concept of reflexivity: reflection, planning, and action. Reflection consists of attention, awareness monitoring, and evaluation. Planning is one of the potential consequences of the indeterminacy of reflection because during this indeterminacy, courses of actions can be contemplated, intentions formed, plans developed in more or less detail. When reflection takes place, the potential for carrying out plans is built up. High reflexivity exists when team planning is characterized by greater detail, inclusiveness of potential problems, hierarchical order in the plans, long-range as well as short-range planning. The greater the details of implementation intentions or plans, the greater the likelihood that they will manifest in innovation. Action refers to goal-directed behaviors relevant to achieving the desired changes in team objectives, strategies, processes, organizations, or environments identified by the team during each stage of reflection. As a consequence of reflexivity, the team's reality is continually renegotiated during team interaction, fostering innovation.

Another critical process to consider is leadership. The work of researchers such as Michael Mumford has revealed the extent to which leaders can influence the innovation process. For instance, how the leader manages team meetings can influence group processes—directive chairs inhibit teams from achieving shared mental models and inhibit innovation by restricting the multiplicity of interactions in free flowing teams. Just having a clear leader also facilitates the innovation process. A recent study involving medical teams has shown that teams that did not have a clear leader were rated as being less innovative than were teams that had a clear leader. Recent theories of leadership depict two dominant styles: transformational and transactional. Transactional leaders focus on transactions, exchanges, and contingent rewards and punishments to change team members' behavior. This style reflects an emphasis on the relationship between task-oriented leader behavior and effective group member performance. Transformational leaders influence group members by encouraging them to transform their views of themselves and their work. These leaders rely on charisma and the ability to conjure inspiring visions of the future.

Such leaders use emotional or ideological appeals to change the behavior of the group, moving group members from self-interest in work values to consideration of the whole group and organization. Empirical evidence suggests that transformational leaders have the most influence on consensus decision-making processes, thereby innovation.

Future Research

Research on innovation is a flourishing field. Reflecting the relevance of this topic for today's society, scholars have devoted a growing level of attention to it during the last three decades. New research directions will likely involve conceptualizing innovation as a product and as a predictor of relevant outcomes such as individual's well-being and propensity to innovate in the future. Another stream of research that developed recently involves studying how factors at different levels of analysis interact with each other to influence innovation: for instance, how the relationship between individual motivation and creativity is influenced by group characteristics such as group size. Another pathway to be pursued involves understanding the extent to which the empirical findings recorded so far can be generalized to different cultures.

Claudia A. Sacramento and Michael A. West

See also Creative Organizational Climate; Creative Personality; Creativity in the Workplace; Group Dynamics

Further Readings

Amabile, T. M., & Khaire, M. (2008). Creativity and the role of the leader. *Harvard Business Review, 86*(10), 100–109, 142.

Anderson, N., De Dreu, C. K. W., & Nijstad, B. A. (2004). The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior, 25*(2), 147–173.

Janssen, O., van de Vliert, E., & West, M. A. (2004). The bright and dark sides of individual and group innovation: A special issue introduction. *Journal of Organizational Behavior, 25,* 129–145.

Mumford, M. D. (2006). *Pathways to outstanding leadership: A comparative analysis of charismatic, ideological, and pragmatic leadership*. Mahwah, NJ: Lawrence Erlbaum.

Oldham, G. R., & Cummings, A. (1996). Employee creativity: Personal and contextual factors at work. *Academy of Management Journal, 39,* 607–634.

West, M. A. (1990). The social psychology of innovation in groups. In M. A. West & J. L. Farr (Eds.), *Innovation and creativity at work: Psychological and organizational strategies* (pp. 309–333). Chichester, UK: Wiley.

West, M. A. (1997). *Developing creativity in organizations*. Leicester, UK: British Psychological Society.

West, M. A. (2002). Sparkling fountains or stagnant ponds: An integrative model of creativity and innovation implementation in work groups. *Applied Psychology (Psychologie Appliquee), 51*(3), 355–387.

West, M. A., & Farr, J. L. (1990). Innovation at work. In M. A. West & J. L. Farr (Eds.), *Innovation and creativity at work: Psychological and organizational strategies* (pp. 3–14). Chichester, UK: Wiley.

INQUIRY

Inquiry is a seeking for truth, information, or knowledge usually by questioning. Gifted students need to cultivate inquiry skills, such that they can think critically, evaluate, and identify concerns. Inquiry gives students the opportunities to think independently and to discern their own personal meaning of open-ended problems. It nurtures in gifted students, adept at mental competition and their abilities to "out-think" others, the critical thinking dispositions to be good reflective listeners, open to evidence, and respectful of other points of view.

Inquiry has its basis in Socratic inquiry, a technique of questioning used by the ancient Greek philosopher Socrates (470–399 BCE). As developed by Socrates, the inquiry process has two stages: the *ironic* or destructive phase, where by skillful questioning the student is brought from unconscious secondary ignorance to conscious ignorance and the *maieutic* or constructive phase where by further questioning the pupil is led from conscious ignorance to clear and rational truth.

Inquiry forms the basis of several programs that can be used with all students, including gifted students. They can be used as enrichment programs for the gifted, both in elementary and middle

school enrichment. This entry focuses on three programs, Matthew Lipman's Philosophy for Children Program, the Great Books Program, and Richard Paul's Socratic Questioning Program. These programs foster the inquiry spirit in the gifted through shared inquiry.

Lipman's Philosophy for Children Program

Matthew Lipman of Montclair State University developed the Philosophy for Children (P4C) program. He strongly believed that philosophy can cultivate inquiry and critical thinking in students. He redesigned college-level philosophy to the level of school students in narrative form as novels. The P4C program acquaints the gifted with philosophical issues through the discussion of passages from these specially written novels, such as *Pixie* and *Harry Stottlemeier's Discovery.* Gifted students can discuss basic philosophical concepts in great depth as members of a community of inquiry.

In a community of inquiry, dialogue plays a significant role; teachers of the gifted have to skillfully facilitate and guide students in the discussion of philosophical issues and concepts. Teachers need to use appropriate open-ended questions to spark discussions in class. This community of inquiry helps gifted students in their search for knowledge and understanding of everyday life, and fosters mutual cooperation, trust, tolerance, fair mindedness, and a heightened degree of sensitivity to fellow participants. This is good for gifted students who are extremely competitive. It is important that the gifted community of inquiry does not become reduced to a set of skills and dispositions; rather, it is a "form of life" in which thinking, speaking, and behaving are all interwoven.

Great Books Program

Another model that makes use of shared inquiry and discussion, the Great Books Program of the Great Books Foundation, was initiated by its founding directors, Robert Hutchins and Mortimer Adler of the University of Chicago. The goal of this program is to expose students to a variety of high-quality books and gradually stretch them beyond their previous awareness. Typically, gifted students read earlier, better, and longer; they also read a greater variety of literature. Successful Great Books programs require dedicated teachers to carry out shared inquiry and guide their gifted students to think analytically and to apply the text's ideas in concrete and personal ways.

Paul's Socratic Questioning Model

Richard Paul set up the Center for Critical Thinking at Sonoma State University to develop workshops and materials such as books and videotapes on how to foster inquiry, critical thinking, and Socratic questioning in the classroom. He considers six types of Socratic questions: to clarify, to probe assumptions, to probe reason and evidence, to consider viewpoints and perspectives, to probe implications /consequences, and about the question. Paul maintains that all thinking is driven by questions; the quality of thinking is determined by the quality of questions driving it. Questions allow the students to take thinking apart and reveal to students how the parts function together. For the gifted, thinking well about thinking requires teachers and students to ask questions that would raise intellectual standards.

In this program, Socratic questioning and discussion provide a unique opportunity for teachers to foster inquiry and critical thinking in gifted students. This helps establish an inner voice of reason to help students monitor, assess, and reconstitute in a rational direction thinking, feeling, and action.

Role of Teachers

All three programs emphasize inquiry and dialogue. The dialogue includes those between teacher(s) and students, those among students, as well as dialogue between students, books, and audiovisual materials they read, listen to, and view. All three programs provide training for teachers. To develop inquiry in the classroom, the teacher needs to establish the dialogue with the students and then bring about the dialogue between students. The teacher must be able to change his or her role from that of an expert and dispenser of information (traditional role) to that of questioner and facilitator (the not-so-traditional role). What makes it difficult in carrying out any of the programs is that inquiry is not something (e.g., a set of techniques) that a teacher can learn quickly. It must permeate the training and education of

teachers—teachers must be taught by methods of inquiry and dialogue and practice the methods extensively. Teachers have to be role models in the inquiry process, they cannot "tell" about inquiry; they must carry out the inquiry, that is, the teacher should, through modeling, establish an atmosphere in which students are encouraged to inquire and ask questions.

Tock Keng Lim

See also Classics/Great Books; Critical Thinking; Elementary Enrichment; Middle School Enrichment; Role Models; Teachers of Gifted; Teacher Training; Thinking Skills

Further Readings

Lipman, M., Sharp, A. M., & Oscanyon, F. S. (1980). *Philosophy in the classroom.* Philadelphia: Temple University Press.

National Great Books Curriculum (2006): http://www.nationalgreatbooks.com/cirriculum

Paul, R., & Elder, L. (2006). *The art of Socratic questioning.* Dillon Beach, CA: Foundation for Critical Thinking.

Institute for Research and Policy on Acceleration

The Institute for Research and Policy on Acceleration (IRPA), described in this entry, was established in 2006 at the Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development at the University of Iowa through the support of the John Templeton Foundation. IRPA is unique in that its sole focus is the study of curricular acceleration for academically talented children. Academic acceleration is an intervention that moves high-ability students through an educational program at a rate faster or at an age younger than typical. The goal of acceleration is to match the level, complexity, and pace of the curriculum with student's intellectual abilities.

The founding of IRPA is a direct outcome of the success of the two-volume report by Nicholas Colangelo, Susan Assouline, and Miraca Gross. The report, entitled *A Nation Deceived: How Schools Hold Back America's Brightest Students,* synthesizes 50 years of robust and consistent research on academic acceleration. Both grade-based (e.g., grade skipping) and content-based acceleration are effective interventions for high-ability students. Although grade-accelerated students generally academically outperform their chronologically older classmates, both groups show approximately equal levels of social and emotional adjustment.

Despite the favorable research evidence for acceleration, there is a reluctance to accelerate students, as seen in educational policies, practices, and attitudes. Given this disconnect between research and practice, IRPA aims to provide up-to-date information on all aspects of acceleration.

Specifically, the primary purposes of the Institute are to

- Provide educators, parents, and the general public with current information and advice on the many aspects of acceleration.
- Serve as an international clearinghouse for research and policy on acceleration.
- Conduct and support research on the factors that moderate success with different forms of acceleration.

The institute's Web site is primary source of this information for both practitioners and researchers. Here, parents and teachers can find answers to basic questions about acceleration (e.g., What is acceleration? What forms does it take? Why should students be accelerated?); obtain advice on the acceleration decision-making process (including information on the *Iowa Acceleration Scale,* second edition, a tool for making objective decisions about grade acceleration); read personal stories about acceleration submitted by students, parents, and teachers; download a free presentation about acceleration; and find links to other resources. Policymakers can also find information about state acceleration practices and policies. Researchers can find an annotated bibliography of research on acceleration.

Research conducted by IRPA has taken several forms. Survey research has focused on assessing the attitudes toward acceleration held by different constituencies (e.g., parents, teachers, school

administrators). These surveys have examined the changes in acceleration practices to see if more students are being allowed to participate in accelerative options and whether those options are grade based or subject based (e.g., increased Advanced Placement or International Baccalaureate offerings at a school? Increased opportunities for middle school students to take high school math?). Other IRPA surveys have focused on the knowledge of and attitudes toward acceleration held by school counselors, the education professionals who may be most directly involved with the student's transition to an advanced setting and the challenges associated with adjusting to more advanced content and settling in with a group of older peers. In addition to documenting changes in attitudes and practices, surveys can inform decisions about how best to disseminate information about acceleration to those who may feel tentative about it.

IRPA has also furthered the use of the National Center for Educational Statistics data sets to investigate questions about acceleration. These data sets provide an invaluable resource because they provide information on representative national samples of students, some of whom have been academically accelerated and many who have not been accelerated. These students are followed for many years, and so the long-term consequences of accelerative decisions made in grade school can be assessed at high school and beyond.

In addition to conducting research of its own, IRPA has sponsored and, in some cases, collaborated with researchers at other institutions. In 2007, the first year of the IRPA Grant Award, nine projects received funding. These projects include an updated meta-analysis and best evidence synthesis of acceleration research, a survey of acceleration practices in Canada, studies of students who are early entrants to college, and an examination of the factors that predict success in Advanced Placement classrooms.

Through its research, policy, and advocacy efforts, IRPA hopes to maintain interest in academic acceleration and to become a resource for anyone who has questions about acceleration.

David F. Lohman

See also Acceleration Options; Belin-Blank Center; Iowa Acceleration Scale

Further Readings

Colangelo, N., Assouline, S., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students: Vol. 1. The Templeton national report on acceleration.* Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Institute for Research and Policy on Acceleration: http://www.education.uiowa.edu/belinblank/acceleration

Southern, W. T., & Jones, E. D. (Eds.). (1991). *The academic acceleration of gifted children.* New York: Teachers College Press.

Institute of Personality Assessment and Research

The Institute of Personality Assessment and Research (IPAR) was where the study of personality characteristics related to creativity emerged as a major topic in the 1950s, samples of highly creative individuals were then intensively assessed, and many aspects of creative personality have been studied. This entry describes IPAR's origins and main contributions to creativity research.

Origins and Early Years

IPAR was founded at the University of California, Berkeley, in 1949 to study leadership, originality, soundness, and other kinds of effective functioning using empirical techniques of the relatively new field of personality psychology. The first director, Donald MacKinnon, had studied with Henry Murray at Harvard and headed one of the stations of the Office of Strategic Services in World War II. MacKinnon brought together a talented staff with diverse interests, all committed to assessing subjects by means of inventories, perceptual-cognitive tests, and interviews, and particularly by observing them in informal interaction, group discussions, and situational tests, and recording these observations by such means as ratings and adjective check lists. During the 1950s, many important tools for describing people were developed at IPAR, including Harrison Gough's California Psychological Inventory and Jack Block's Q Sort, still in use today.

Originality was one of the areas of effective functioning discussed at IPAR from the beginning, even before J. P. Guilford's 1950 American Psychological Association presidential address brought its empirical measurement to prominence in psychology. Frank Barron argued that originality was almost habitual with people who showed any markedly novel insight, whereas other people were virtually never original: thus, patterns of enduring personality characteristics must encourage or discourage original acts. In a sample of military officers studied at IPAR, Barron measured the consistency of original behavior across several tasks. Using measures that he and his colleagues had been developing, he supported hypotheses that originality was related to independence in judgment, complexity of outlook, forcefulness, and disinclination to use suppression to control impulse.

The Study of Highly Creative Persons

The emphasis at IPAR shifted from originality to the creative person after the Carnegie Corporation funded a proposal to study highly creative individuals. MacKinnon described the rationale for IPAR's approach: Because true creativity included the development of new ideas to the full, it should be studied after it had been realized in identifiable creative products, and the criterion measure of it should be ratings by qualified experts. Following this procedure, MacKinnon directed a study of architects, Barron of writers, Gough of research scientists, and Ravenna Helson and Richard Crutchfield of mathematicians. Without claiming that the creative personality was entirely the same across fields, MacKinnon reviewed consistent findings that emerged across these studies on many personality inventories and scales. Though the earlier work on originality and other creative traits continued to find support, motivational factors, such as values, interests, and affective involvement in work, now received emphasis. For example, MacKinnon studied architects at three levels of creativity, and applied to them Otto Rank's theory of creative, conflicted, and adapted types, based on how individuals dealt with the conflict between their own will and the will of parents and society.

Creativity in Women

In the 1950s, it was commonly thought that women were not creative because of innate deficiencies in male characteristics such as originality, abstract interests, and assertiveness. In a study of women mathematicians, Helson showed that creative women did exist, were highly original and deeply interested in mathematics, but less confident than were creative men mathematicians. Was the difference innate? Despite the creativity of their publications, only a few of the creative women had tenure-track jobs, and some had no regular position at all. Love of mathematics and lack of institutional support may have contributed to their distinctive work style: They described themselves not as highly ambitious, having active and well-organized minds, or enjoying collaboration, as creative men were likely to do, but as subordinating other things to research goals, being patient when progress was slow, and getting ideas from the unconscious. Evidence indicated that cultural stereotypes played an important part in the rarity and virtual invisibility of creative women mathematicians.

Changing Times—Longitudinal Studies

By the 1970s, support for assessment studies of creative personality had disappeared, partly because many people at this time believed that personality was less important than environment was in predicting behavior. In 1992, the name of the Institute was changed to the Institute of Personality and Social Research (IPSR). However, creativity research had continued, such as Crutchfield's program to encourage productive thinking in the schools; Gerald Mendelsohn's experimental studies of associative and attentional processes in problem solving; Helson's studies of creative product, process, and personality in writers of imaginative literature; Kenneth Craik's work on humor, and Greg Feist's on scientists.

Beginning in the 1980s, several longitudinal studies of creativity tracked earlier IPAR samples. For example, Helson, Brent Roberts, and Gail Agronick followed up a sample of creative undergraduate women and their classmates at age 52, Gough a sample of graduate students in psychology, and Stephanie Dudek and Wallace Hall followed up

MacKinnon's sample of architects 25 years later. Though these studies show the importance of factors such as heterogeneity in the sample and valid measures of creative achievement in the criterion, and though creative individuals did sometimes fall into difficult situations and change their self-concepts, evidence indicated that the combination of creative potential (e.g., symbolic interests, originality, and complexity) and motivation to create was a highly enduring personality pattern.

Ravenna Helson

See also Creative Personality; Creativity, Definition; Creativity Assessment; Eminence

Further Readings

Barron, F. (1968). *Creativity and personal freedom.* New York: Van Nostrand.

Gough, H. G. (1992). Assessment of creative potential in psychology and the development of a creative temperament scale for the CPI. In J. C. Rosen & P. McReynolds (Eds.), *Advances in psychological assessment* (Vol. 8, pp. 225–240). New York: Plenum Press.

Helson, R., Roberts, B. W., & Agronick, G. S. (1995). Enduringness and change in creative personality and the prediction of occupational creativity. *Journal of Personality and Social Psychology, 69,* 1173–1183.

MacKinnon, D. W. (1962). The nature and nurture of creative talent. *American Psychologist, 17,* 484–486

Instructional Management

Instructional management, described in this entry, deals with coordinating the flow of information in a school system, arranging the grouping and movement of students, organizing the processes of learning, and planning how the scope and sequence of the curriculum is implemented. Teachers manage these routine educational processes everyday. Providing education for gifted students puts special demands on normal instructional management and requires extra skills from the teacher. In particular, the needs of gifted, creative, and talented students require curriculum adaptations such as acceleration and differentiation.

Calls for accountability in education have increased dramatically in recent years, leading to an increased need to justify decision making, including determining the eligibility for special programs. Gifted and talented classes are often perceived as offering unique and desirable opportunities, and access to those services requires clear assessment and identification procedures. These identification processes prompt the flow of information through the school system's gifted and talented programming. Once students are placed in a gifted program, whether it involves cluster grouping, a gifted resource room, or a self-contained gifted class, their teachers must then do further preassessment to determine where each student is in regard to readiness for the curriculum, interests, and learning styles. One goal of the preassessment is to prevent re-teaching content that has already been learned. Another is to ensure that educational experiences match students' needs and interests as closely as possible. As students progress through a program, their accomplishments must be observed and translated into some kind of record, such as grades, portfolios, or rubrics. That feedback is used to guide educational planning for the next step in the classroom and conveyed to parents and school personnel as needed. For gifted students, records may also be important outside the district for admission to select programs or college.

There are a variety of options for grouping gifted students, depending on the size of the school district, goals of the curriculum, and availability of teachers who are trained in gifted education. Preferably, gifted students are grouped according to ability, interest, or stage in the curriculum rather than by age. Possible choices for grouping include cluster grouping (a few gifted students in each regular classroom), flexible grouping within a classroom or between classrooms (changing groupings of students based on ability, interests, and learning styles), part-time gifted education, and full-time gifted classes. Although there are advantages and disadvantage to each, there are some concerns about part-time gifted education because having instruction tailored to giftedness for a few hours a week does not help a gifted student during the rest of the week. It is important for teachers and districts to have the ability and willingness to adjust groupings as students advance or experience difficulties. It is common for gifted students to

progress through an assignment or class more quickly than expected and the student who does so needs other options upon completion of the work. If the curriculum is at a sufficiently high level, gifted students may encounter difficulties and need more time than expected to complete assignments, and this should be accommodated. Gifted students may take a class earlier than is usual or proceed through a class more quickly, leading to situations such as a fourth-grade student enrolled in calculus or a high school student who is enrolled in both high school and college classes (dual enrollment). Advanced Placement classes and International Baccalaureate programs allow students to finish high school with some credit earned for college classes. By capitalizing on these various grouping procedures, teachers allow appropriate pacing of instruction for gifted students.

Instructional management in classroom processes takes on special meaning in regards to gifted students. Numerous options differentiate the curriculum, meaning matching work to the needs and abilities of the students. In broad terms, educators can differentiate content, process, product, or the learning environment. Examples of content differentiation include assigning more difficult material (rather than simply more material), allowing acceleration (meaning students moving through the content more quickly), tiered assignments (preparing variations on the same assignment that use varying levels of complexity and difficulty to teach the same concepts), increasing subject abstractness or complexity, individual projects, or individual research. Process differentiation includes strategies such as using higher-order thinking skills, teaching and using creativity, inquiry models, or a variety of learning modalities (verbal, auditory, or kinesthetic). Product differentiation might involve having students identify and solve real problems, present their work to real audiences, or have choices about the format of the final product. Learning environment differentiation creates student-centered activities, independence, changeable settings, and richness of resources. Increasing the amount of quality resources that are available for gifted students is helpful. Technology can be helpful to gifted students because, when used appropriately, it can provide broad resources not otherwise available, especially in small or rural districts.

Teachers have considerable independence in how they implement the scope and sequence of the curriculum of their school district. *Scope* refers to what is covered in a curriculum, and *sequence* refers to the order that topics and skills are presented in the curriculum. Teachers of the gifted have responsibilities to meet the district and state standards but have flexibility regarding what materials they use and how they teach the curriculum. Although gifted students may progress through the sequence more quickly than do general education students, their curriculum must still provide an orderly progression of topics. Because of this, it is helpful for teachers of the gifted to know more about the district's curriculum than general education teachers need to know. It also becomes important to obtain information from a student's previous teachers and to pass on information to the next teachers. All of this involves the ability to analyze, evaluate, and synthesize data and concepts, skills that teachers of gifted students are likely to pass on to their students.

Karen E. Ray

See also Asynchrony; Curriculum Models; Differentiation; Domains of Talent; Learning Styles

Further Readings

Cukierkorn, J. R., Karnes, F. A., Manning, S. J., Houston, H., & Besnoy, K. (2007). Serving the preschool gifted child: Programming and resources. *Roeper Review, 4,* 271–276.

Dixon, F. A., & Moon, S. M. (Eds.). (2006). *The handbook of gifted secondary education.* Waco, TX: Prufrock Press.

Robinson, A., Shore, B. M., & Enersen, D. L. (2006). *Best practices in gifted education: An evidence-based guide.* Waco, TX: Prufrock Press.

VanTassel-Baska, J., & Brown, E. F. (2007). Toward best practice: An analysis of the efficacy of curriculum models in gifted education. *Gifted Child Quarterly, 51,* 342–359.

INTELLIGENCE

The major controversy in the study of intelligence has been whether intelligence represents multiple

abilities rather than being a single, general construct. However, understanding intelligence, at least its influence on Western thought, implies reviewing fundamental questions related to understanding intelligence. Much of the history of the field revolves around attempting to define the construct, establishing arguments about its nature, and formulating useful theories of intelligence. This entry presents the most influential paradigms and major theories are presented to explore historical and current interpretations of intelligence.

Early Contributions to the Field of Intelligence

Plato, Aristotle, René Descartes, John Locke, and Immanuel Kant were among those early philosophers who made major contributions to our understanding of intelligence. Plato interpreted intelligence as both the highest virtue of the soul and the supreme efficient cause of order in the cosmos. As an ethical virtue, intelligence appears to be identical or closely similar to wisdom. Aristotle distinguishes two kinds of virtue: moral (such as courage, temperance, and liberality) and intellectual. The key intellectual virtues are wisdom and understanding. Wisdom is inseparably connected with the moral virtues of the affective element of the soul. *Intelligence* refers to the ability to make accurate judgment of the circumstances when one makes a decision.

Intelligence, as a judgment of a person's value or quality, was a predominant thought among Plato and Aristotle's successors, such as Saint Augustine, Saint Thomas Aquinas, and Michel Montaigne. Intelligent people use their abilities to become better people, and to seek knowledge and truth.

Descartes believed that reason was the only reliable method of attaining knowledge. Within his system of dualism, the mind (soul) is a spiritual entity whose essence is thinking; the essence of matter is extension in space. Descartes (and the rationalists that followed him) believed that a mind has will and intelligence, and knowledge takes the form of ideas. Ideas, in their turn, do not come from experience, but the intellect finds them within itself. Contrary to Descartes's assumption of innate ideas, Locke (and the empiricists that followed him) conceived the mind as a "blank" slate—or a *tabula rasa*—that is filled later by experience, which is the base for knowledge. Moreover, the first impressions during childhood mark the tabula rasa, having important and lasting consequences for the self. According to Locke's doctrine of association of ideas, the mind is active and can combine simple ideas into complex ideas of a variety of kinds. Kant synthesized the rationalist and the empiricist divergent opinions, establishing that both "sensing" and "reason" are equally important in our conception of the world. Kant introduced the human mind as an active originator of experience rather than just a passive recipient of perception. He argued that we experience the world as a series of processes in time and space, which are two forms of intuition (i.e., conditions of perception), imposed by our own minds, that are not attributes of the physical world. Moreover, we perceive the world through 12 innate mental categories or mental facilities—such as cognition, feeling, causality, desire, understanding, judgment, and reason. Jean Piaget later explored these categories in his developmental theory.

Studying and Testing Intelligence

Charles Darwin made a great impact on the study and investigation of human intelligence. He believed that a human and a higher-order animal mentally differ only in degree. Like other characteristics, intelligence was inherited, although he could not foresee the precise way variation of intelligence would be transmitted.

Darwin's theory of evolution influenced his cousin, the English noble Sir Francis Galton, who attempted to demonstrate that mental abilities were transmitted in the same way as physical traits. Following the empiricist tradition, Galton believed that knowledge is acquired through one's senses. Consequently, differences in perceptual speed and acuity would also be related to intelligence, conditioned by natural selection and by the law of distribution of ability in the same family. In his anthropometric laboratory, Galton developed a battery of mental tests, which measured simple sensory processes such as physical strength, pitch and sight sensitivity, color and perceptual discrimination, steadiness of hand, and reaction time. For him, the more perceptive the senses are, the larger the field upon which judgment and intellect can act. Galton believed in a fixed intelligence, which

would remain intact from birth to the day the person died, regardless of the environmental influence. However, his ideas, broadly accepted at that time, locked society into a limited conception of intellectual development for more than a century, exerting marked influence today.

Galton's work also affected the concurrent studies conducted by Alfred Binet, although Binet had soon recognized that the most complex intellectual processes, like imagination and comprehension, could not be accessed by sensory tests. In 1904, the Ministry of Public Instruction in Paris invited Sir Francis Galton and Theodore Simon to develop tests to distinguish children with different levels of intellectual capacity. The test consisted of a 30-item scale, organized in order of difficulty, and standardized for children ages 3 through 11 in the Paris public schools. Test scores were reported by the comparison of the *mental age* of the student (age-equivalent of highest question answered correctly) to the student's chronological age. In 1911, William Stern proposed the use of the term *mental quotient* in which a child's mental age is divided by his chronological age. The intelligence quotient (IQ) is derived from this measure, and it is the mental quotient multiplied by 100.

The Binet-Simon scale showed good consistency with other indicators of intelligence, such as peer and teacher evaluations. Although Binet had not tried to define the construct, he recognized that intelligence increases during childhood, but still was a nebulous concept to be measured in absolute terms.

In 1916, Lewis Terman, at Stanford University, published a revision of the scale. The Stanford-Binet test, as it came to be known, became the standard by which all later intelligence tests have been judged. The publications that followed its application opened a continuing debate regarding heredity versus environment, the nature of intelligence, and the use of tests, that has propelled research for the last 90 years.

Evolution of the Concept of Intelligence

Charles E. Spearman, a disciple of Galton, proposed a two-factor theory of intelligence. He posited that all measures of intelligence were related to a common general intellectual function, and the scores on a measure of intelligence could be separated into two components—a general, or *g* component, and a specific, or *s* component. The *g* component is common to all intelligence tests, but the *s* component is unique to each different type of task. Spearman conceived intelligence as a construct and a single common theoretical entity that could not be identified with any particular measure or subset of measures, a supposition still debated in contemporary research.

Disagreeing with the existence of one single general factor, Louis Thurstone hypothesized that intelligence might consist of a small number of independent faculties, corresponding to different cognitive domains: verbal ability, general reasoning, numerical ability, rote memory, perceptual speed, word fluency, spatial ability, and deductive reasoning—elements still present in traditional measures of intelligence.

Building on both theories, Raymond Cattell suggested the existence of a hierarchical structure of ability. The *g* factor would be a general, common factor, presented in all measures of the ability, derivable from the relationships that exist among the more specialized factors postulated by Thurstone. Cattell proposed a crystallized ability (the accumulation of knowledge and skills through life span) and fluid ability (a measure of flexibility of thought and ability to reason abstractly).

One of the most important contributions to the study of intelligence emerged from the work of Piaget, who perceived intellectual development as a result of changes in the cognitive function. According to Piaget, the cognitive processes emerge as a result of the reorganization of psychological structures resulting from the dynamic interaction of the child with his or her environment. The Piagetian tests, unlike the traditional psychometric tests at the time, aimed to assess not *what* a person knows (the product), but rather *how* the person knows or thinks (the process), and how people obtain and use information to solve problems and acquire knowledge.

Piaget was also one of the first theorists to establish an interactive theory of intelligence. According to him, the cognitive development equally depends on the genetic contributions as well as the quality of the environment in which the child lives. The most recent researchers support the notion that genetic influences on behavior are multifactorial, equally comprising the hereditary transmission and

the environment. Although genetic factors, in general, account for no more than half of the variance of behavioral traits, they only denote probabilistic propensities. However, the pathways by which genes make their contributions to individual differences in intelligence and the exact way the environment contributes to those differences remain a mystery.

J. P. Guilford proposed a multidimensional view of intelligence. He initiated discussions about the role of distinctive cognitive abilities in the human intellect (e.g., divergent production), which was not assessed in traditional tests of intelligence, and like other aspects of intelligence, could be developed. He proposed a structure-of-intellect model, composed of 120 intellectual factors (later extended to 180), which described different types of cognitive capabilities (operations, content, and products). Guilford defined intelligence as a systematic collection of abilities or functions to process different kinds of information in different forms, with respect to the content (substance) and the product (mental construct) as well. Several standardized tests for measuring creativity (e.g., Torrance Tests of Creative Thinking, and Wallach and Kogan battery) were developed based on Guilford's model.

Contemporary Views

During the past 3,000 years, philosophers and psychologists have addressed the problem of defining intelligence from a variety of viewpoints. However, intelligence may be easier to measure than to understand or define, and diametrically opposed opinions have dominated the field of intelligence. Moreover, such a complex conception as intelligence cannot be totally explained by a single definition without incurring the risk of gross oversimplification. These were the conclusions reached by experts in the field in a symposium in 1921. At that time, attributes such as adaptation to the environment, basic mental processes, and higher-order thinking (reasoning, problem solving, decision making) and capacity to learn were emphasized. Lewis Terman, for example, defined intelligence as the ability to carry on abstract thinking; for Edward Thorndike, intelligence was the power of good responses from the point of view of truth or facts; Donald Haggerty highlighted sensation, perception, association, memory, imagination, discrimination, judgment, and reasoning; and Rudolph Pintner emphasized the ability to adapt oneself adequately to relatively new situations in life.

Seventy years later, a second symposium on the same theme explored the same questions that were posed to the experts at the beginning of the century. As already highlighted in the first symposium, the higher-level cognitive functions, such as abstract reasoning, representation, decision making, and problem solving were also the most frequently mentioned elements of intelligence, followed by attributes such as adaptation to the demands of the environment, ability to learn, and elementary processes (perception, sensation, attention).

Despite the similarities over the years, the panelists in the 1986 symposium placed greater emphasis on the role of knowledge, especially metacognition (conceived as knowledge about and control of cognition) and its interaction with mental processes. Emphasis was also placed on the role of culture, which was virtually absent from the first symposium.

For example, Anne Anastasi believes intelligence is a pluralistic concept, defined as a quality of behavior, a combination of cognitive skills and knowledge fostered and rewarded by the particular culture within which the individual becomes socialized. J. P. Das posits intelligence as the sum of all cognitive processes, involving planning, coding of information, and attention arousal. Planning is a broad, dynamic, and complex term that includes, among other things, the generation of plans and strategies, selection from among available plans, the execution of plans, and decision making.

Two of the most influential contemporary models were proposed by Howard Gardner and Robert Sternberg, following a cognitive-contextual model of intelligence. Gardner's theory of multiple intelligences establishes that the human cognitive competence can be described as a set of eight (or more) abilities, talents, or universal mental capabilities: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist. The intelligences are relatively independent, and the criteria used to select them were knowledge about development in normal and gifted individuals, including prodigies and autistic savants; information about the loss of skills from brain damage; cross-cultural estimates

of cognition; psychometric studies in different cultures; and studies of the training and generalization of particular skills.

According to Gardner, the autonomy of each intelligence means that the individual may have a high ability in one kind of intelligence, but not in another. Therefore, to access the broad extent of human potential, one must observe children's real-world performance in particular domains to learn more about their unique interests and cognitive styles.

Sternberg proposes a *triarchic* theory of intelligence, composed of three interrelated subtheories that combine to form an ample base for understanding intelligence and specifying the most appropriate measurement. The *componential* subtheory specifies the mental components responsible for the planning, execution, and evaluation of intelligent behavior. The *experiential* subtheory refers to the ability to deal with novelty and social demands and the ability to automatize information processing. The *contextual* subtheory specifies that intelligence depends on the sociocultural context; is purposive, that is, related to an objective; is adaptive, which implies shaping and modifying the environment, making it more adequate; and involves active selection of an environment.

Sternberg stresses that the triarchic theory emphasizes three aspects of intelligence: analytic, synthetic, and practical. *Analytic skills* involve being able to examine a problem and its parts, which involves high analytical reasoning. People skillful in analytical reasoning tend to do well on conventional tests of intelligence. *Synthetic skills* include persons who are insightful, creative, or just adept at coping with relatively novel situations. They may not have high IQs, but they are among people who made important contributions to the sciences, arts, and the like. *Practical intelligence* encompasses people who are capable of applying their analytic or synthetic abilities in everyday, pragmatic situations. The triarchic theory points out that intelligence is not a unitary, simple construct, and indicates which abilities might be learned, stimulated, or taught, especially in the school settings.

Finally, the Cattell theory of intelligence has emerged again in a much more complex and ongoing formulation called the *Cattell-Horn-Carroll theory of intelligence*. John Carroll's book on human cognitive abilities was a major milestone in the history of intelligence theories. It was the first empirically based taxonomy of human cognitive ability elements, based on the analysis (with a common method) of a century of intelligence literature that was presented in a single, coherent, organized, systematic framework.

Carroll proposed a three-tier model of human cognitive abilities that differentiated abilities as a function of breadth. At the broadest level (stratum III) is a *general* intelligence factor similar to Spearman's *g*. Linda Gottfredson summed up Carroll's theory of G neatly as, *Intelligence is the ability to catch on; to make sense of things; and to know what to do about it*. Next in breadth are eight *broad* abilities that represent basic long-standing characteristics of individuals that can govern or influence a great variety of behaviors in a given domain. Stratum level II includes the abilities of Fluid Intelligence (*Gf*), Crystallized Intelligence (*Gc*), General Memory and Learning (*Gy*), Broad Visual Perception (*Gv*), Broad Auditory Perception (*Ga*), Broad Retrieval Ability (*Glr*), Broad Cognitive Speediness (*Gs*), and Reaction Time/Decision Speed *(Gt*). Finally, stratum level I includes more than 69 *narrow* abilities that are subsumed by the stratum II abilities, which in turn are subsumed by the single stratum III *g* factor. The Cattell-Horn-Carroll theory is open-ended, with a long-term project at the Institute for Applied Psychometrics continually adding new analyses. The current edition of the Stanford-Binet intelligence test, SB5, is based on the Cattell-Horn-Carroll theory.

A great deal of progress has been made in conceptualizing intelligence over the years. The field has evolved from the psychometric viewpoint to encompass information processing, neuroscience findings, cultural context, and a broad of array of characteristics, such as emotional, motivational constructs, and personality. Many critical questions about intelligence remain unanswered. Only shared and sustained efforts as well the commitment of substantial scientific resources will enable theorists in the field to find the proper answers.

Angela M. Rodrigues Virgolim

See also Fluid and Crystallized Intelligence; Intelligence Testing; Intelligence Theories; Stanford-Binet

Further Readings

Anastasi, A. (1986). Intelligence as a quality of behavior. In R. J. Sternberg & D. K Detterman, *What is intelligence? Contemporary viewpoints on its nature and definition* (pp. 19–21). Norwood, NJ: Ablex.

Armstrong, J. M. (2004). After the ascent: Plato. On becoming like god. In D. Sedley (Ed.), *Oxford Studies in Ancient Philosophy* (Vol. 26, Summer, pp. viii, 380). Oxford, UK: Oxford University Press.

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor analytic studies.* New York: Cambridge University Press.

Carroll, J. B. (2003). The higher-stratum structure of cognitive abilities: Current evidence supports *g* and about ten broad factors. In H. Nyborg (Ed.), *The scientific study of general intelligence: Tribute to Arthur R. Jensen* (pp. 5–22). San Diego: Pergamon.

Das, J. P. (1986). On definition of intelligence. In R. J. Sternberg & D. K Detterman. *What is intelligence? Contemporary viewpoints on its nature and definition* (pp. 55–56). Norwood, NJ: Ablex.

Gardner, H., Kornhaber, M. L., & Wake, W. K. (1996). *Intelligence: Multiple perspectives.* Fort Worth, TX: Harcourt Brace.

Gottfredson, L. S. (2003). The science and politics of intelligence in gifted education. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 24–40*)*. Boston: Allyn & Bacon.

Guilford, J. P. (1950). Creativity. *American Psychologist, 5,* 444–454.

Institute for Applied Psychometrics: http://www.iapsych.com/IAPWEB/iapweb.html

Neisser, U., Boodoo, G., Bouchard, T. J., Jr., Boykin, A. W., Brody, N., Ceci, S. J., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist, 51(2),* 77–101.

Plomin, R. (1997). Genetics and intelligence. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 67–74). Needham Heights, MA: Allyn & Bacon.

Ramos-Ford, V., & Gardner, H. (1997). Giftedness from a multiple intelligences perspective. In N. Colangelo, & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 55–66). Needham Heights, MA: Allyn & Bacon.

Snyderman, M., & Rothman, S. (1988). *The IQ controversy: The media and public policy.* New Brunswick, NJ: Transaction.

Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence.* Cambridge, UK: Cambridge University Press.

Sternberg, R. J. (1990). *Metaphors of mind: Conceptions of the nature of intelligence.* New York: Cambridge University Press.

Sternberg, R. J., & Detterman, D. K. (1986). *What is intelligence? Contemporary viewpoints on its nature and definition.* Norwood, NJ: Ablex.

Weinberg, R. A. (1989). *Intelligence and IQ: Landmark issues and great debates. American Psychologist, 44,* 98–104.

Intelligence Testing

Intelligence testing is a method of assessing a person's intellectual abilities. It has been used within education since Alfred Binet and Theodore Simon developed the first broadly used test for the identification of students with mental retardation in France. Preceding this work, psychologists and statisticians pioneered the development of these tests, with significant and influential work done in the 19th century by scientists such as Francis Galton, Karl Pearson, and James McKeen Cattell. This work strongly influenced the work of intelligence researchers Charles Spearman, Henry Goddard, Robert Yerkes, and David Wechsler, among others, in the early 20th century. All of this work laid the foundations for modern testing, which is used extensively in the identification of giftedness. Intelligence tests are an important piece to the identification process of students for gifted and talented educational programs, and these tests are frequently included in formal systems for the identification of talent. Recent developments in testing have moved beyond psychometric conceptualizations of intelligence to tests based on theories influenced heavily by neurological research. Intelligence testing has been dynamic during the past 150 years and promises to continue its unique and rapid development, as described in this entry.

Importance

Intelligence testing has been used for a number of diverse purposes and in a wide range of clinical and educational settings, ranging from assistance with placements of military recruits in World War I to informing educational placements for students with special learning needs—including gifted students.

Several components combine to make intelligence tests important assessment measures. First, contemporary intelligence tests have been standardized in that the entire testing process for each individual is the same (i.e., same set of instructions, same items, same test administration, same scoring approaches) so that the only variable part of the test is the student's responses or answers to test questions. Second, intelligence tests are norm-referenced tests: They have been administered to multiple students at each age and grade level to create a representative sample of the population to whom the test is intended to be administered. Third, many intelligence tests have been thoroughly studied to document their reliability and validity and establish their utility, making them among the most psychometrically sound instruments in the social sciences, including education.

The validity of the scores is often debated. Questions include whether they can be valid predictors of the achievement of minority people, and whether a single score can be used to predict complex behaviors. Most intelligence tests have been carefully studied, and judged to provide a highly reliable assessment for most students referred for gifted and talented educational placements. For the many reasons that intelligence tests have withstood the test of time (as well as examination, analysis, and scrutiny), they remain a widely accepted form of assessment for students within educational and psychological settings. The research on intelligence tests has shown them to be valuable predictors of school-related abilities and achievement.

Classifications

During the past 100 years of intelligence test creation and refinement, numerous intelligence tests have been developed. Describing each of them is beyond the scope of this entry, but this section describes three distinct types of tests and provides examples of each.

Verbal Assessments

Orally administered assessments are the most commonly used types of individual intelligence tests. Examples of tests in this category include but are not limited to the Stanford-Binet Intelligence Scale—Fifth Edition (SB5), Woodcock-Johnson Tests of Cognitive Abilities—Third Edition (WJ-III), Cognitive Assessment System (CAS), Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV), and the Wechsler Preschool and Primary Scale of Intelligence—Third Edition (WPPSI-III). Although these tests include components that assess nonverbal abilities, a substantial portion of each test is based on either giving verbal responses or listening to verbal prompts and instructions to complete the task. In addition, these tests all measure distinct elements considered to represent intelligence such as verbal comprehension, fluid reasoning, working memory, perceptual reasoning, and processing speed. Students who have taken an intelligence test receive composite scores from each assessment category as well as a general intellectual ability or full-scale score to represent their overall intellectual ability.

Examples of "classic" intelligence tests are those created by Wechsler in the mid- to late 20th century. Wechsler viewed intelligence as an individual's global capacity to act purposefully, think rationally, and deal effectively with the environment. The WISC-IV yields a full-scale IQ score and four index scores: Verbal Comprehension, which includes similarities, vocabulary, and comprehension activities; Perceptual Reasoning, which includes matrix reasoning, block design, and picture concepts; Working Memory, which is letter-number sequencing and digit-span; and Processing Speed, which includes symbol search and coding.

A good example of a contemporary intelligence test is the Kaufman Assessment Battery for Children—Second Edition (KABC-II). The KABC-II is based on two models of intelligence. First, the Cattell-Horn-Carroll (CHC) model distinguishes between fluid and crystallized abilities. In the KABC-II, the CHC model is used because it is designed for children who speak English as a first language and would, therefore, not be disadvantaged by tests of language abilities and word knowledge. The second model, based on the neuropsychological work of the Russian scientist A. R. Luria, deemphasizes verbal processes by not including the assessments of language ability or word knowledge. This makes the Luria model more accessible to children who do not speak English as a first language, or who have an expressive or receptive language disorder.

Nonverbal Assessments

Nonverbal intelligence tests have played a role in testing for decades and are an alternative to the more traditional and commonly used verbal tests. Nonverbal intelligence tests are sometimes recommended as an assessment tool for special populations whose scores on the verbal tests mentioned previously may not accurately reflect their true intellectual abilities—for example, students with limited English proficiency or students with limited expressive or communicative abilities. Concerns about the validity and fairness of using verbal tests with these students have led to the growth in the number and use of nonverbal tests. Instructions for nonverbal intelligence tests are mainly given by providing printed sheets that show figures and puzzles to be solved, or pantomiming instructions during administration (some tests allow for oral directions, but this seems to allow for the bias these tests are designed to avoid). Examples of nonverbal tests of intelligence include but are not limited to the Comprehensive Test of Nonverbal Intelligence (CTONI), Leiter International Performance Scale—Revised (Leiter-R), Raven's Progressive Matrices, Universal Nonverbal Intelligence Test (UNIT), and the Test of Nonverbal Intelligence-3 (TONI-3).

However, the use of nonverbal tests is not without its problems and controversies. For example, the assessments are nonverbal but the cognitive processes required to answer specific questions may still involve language. In a related vein, creating "culture-free" assessments is a laudable goal but has proven difficult to achieve. Given these issues, some educators and psychologists recommend the use of verbal assessments, such as the KABC-II, that appear to minimize demographic differences.

One example of a nonverbal intelligence test is the Naglieri Nonverbal Ability Test (NNAT), which is based on the Planning-Attention-Simultaneous-Successive (PASS) model of human intelligence (also based on Luria's research). The NNAT is useful for any students who may benefit from a nonverbal assessment, including students who are learning disabled and hearing impaired. The assessment is administered by showing diagrams of progressive matrices, which requires no verbal instructions. This helps ensure that the assessment is completely nonverbal to decrease the chance of any confounding variables.

Performance-Based Assessments

Performance-based intelligence assessments are quite different from verbal and nonverbal tests. A performance-based assessment considers a student's overall academic accomplishments and performance within different domains. An example of such an assessment is the battery of performance-based assessments based on Howard Gardner's theory of multiple intelligences. Gardner does not view intelligence as a unitary construct but, rather, as a set of eight distinct intelligences: linguistic, musical, logical-mathematical, visual-spatial, bodily-kinesthetic, intrapersonal, interpersonal, and naturalist. Assessments using Gardner's theory suggest that to fully understand an individual's abilities within these domains, it may be necessary to spend multiple hours observing a student in classroom activities over several days or weeks in addition to student output and performance in school. Of the three categories of tests, performance-based measures tend to be associated with the weakest evidence of reliability and validity, but this is to be expected given the relatively short period during which performance-based assessments have been used to assess intelligence(s) compared with the much longer period during which verbal and nonverbal tests have been developed and refined, as well as their necessarily subjective nature.

Issues in Gifted Education

The role of intelligence testing has been widely debated during the last hundred years, but it is still the most common method for assessing an individual's intellectual abilities. That said, several issues are worth considering when examining the purpose, development, and use of these tests.

Flynn Effect

The sociologist James Flynn noted that intelligence test scores have shown a gradual rise in average performance during the past several decades. This phenomenon has been observed in almost every country and on almost every assessment. The increase is small (roughly 1–2 IQ points every 20 years) but appreciable over time. Causes of the Flynn Effect are widely debated and are beyond the scope of this entry, but its primary implication for psychologists is the need to ensure that scores

on intelligence tests are calculated and compared with updated norms. Flynn has documented several cases in which scores have been compared with outdated norms, leading to conclusions of superior IQ or large IQ gains when current norms would have led to more moderate conclusions.

Single Versus Multiple Criteria Systems

Traditionally, intelligence tests have been administered to students referred for potential placement into gifted or enrichment programs. Frequently, a predetermined cutoff score was used for this identification process by schools and districts; any student scoring higher than the cutoff score was eligible for admission to the programs. Many schools have used the intelligence test score as the primary criterion for admission to a gifted program, which explicitly gave test performance the major role in identifying giftedness. Conversely, and much more common in today's schools, several criteria are used in gifted identification procedures, including parent and teacher nominations, peer nominations, portfolios, teacher rating scales, and achievement test scores, all in addition to intelligence test results. However, even when multiple criteria systems are used, the heaviest emphasis is sometimes placed on the intelligence test scores, implicitly creating a single criterion system.

Additional Methods to Identify Gifted and Talented Students

In a related vein, educators have begun to develop supplementary methods to identify students for gifted and talented programs. The primary goal of these alternative methods is to broaden the pool of students who may be identified as gifted, with special attention to minority students and those living in poverty. Examples of additional identification methods that show promise for addressing issues of underrepresentation include teacher, parent, or occasionally student referrals; teacher and parent observations; parent and teacher checklists (e.g., the Scales for Rating the Behavioral Characteristics of Superior Students); and student interviews. Furthermore, schools have also begun to look at student accomplishments in terms of report cards, standardized assessments including state and national tests, portrayal of leadership skills within the school and surrounding community, as well as student academic portfolios. Some schools have begun to administer supplemental assessments within their gifted and talented identification process. Examples of such tests include tests of creativity (i.e., Torrance Tests of Creative Thinking) or tests of reasoning abilities. A wide range of assessment methods for the identification of students into gifted and talented programs are currently being used within schools and districts.

Although the identification of students into gifted and talented programs is not a new concept within the educational and psychological fields, there is great movement and discussion regarding the most reliable and accurate measures to use for this process. Even though multiple additional assessment measures are being employed by schools, the traditional intelligence test is still widely used and accepted because of its long history, abundant research-based evidence of usefulness, and high reliability. Additional research on other forms of validity and demographic differences remain to be addressed for many tests.

Jonathan A. Plucker and Stephanie Schmalensee

See also Identification; Intelligence Theories

Further Readings

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytical studies*. New York: Cambridge University Press.

Plucker, J. A. (Ed.). (2007). Human intelligence: Historical influences, current controversies, teaching resources. Retrieved from http://www.indiana.edu/~intell

Sattler, J. M. (2001). *Assessment of children cognitive applications (4th ed.)*. San Diego, CA: Jerome M. Sattler.

Intelligence Theories

Perhaps no idea or concept in psychology has been investigated as comprehensively—or so controversially—as human intelligence. This attention is long-standing: Theories of intelligence predate

the formal establishment of psychology as a science by millennia. Although perhaps more commonly associated with philosophy, the ideas of Aristotle, Socrates, and Plato all contribute to the foundation of our understanding of the nature of intelligence. Their ideas on topics as diverse as the origin of ability, the mind-body relationship, and general inquiry methods continue to inspire thinkers and helped shape the ideas of those who shape modern psychology and intelligence theory. Philosophers, psychologists, and educators have spent much of the past century and a half building on the foundations of the ancient thinkers, and a variety of theories and conceptions of intelligence have resulted, as described in this entry.

Historical Approaches

One of the earliest scientists to attempt to conceptualize and measure intelligence was Sir Francis Galton. Relying on an analysis of obituaries and biographical data, among other sources, Galton observed that blood relatives generally achieved similar levels of eminence. This pattern mirrored the already established hereditary pattern for certain physical traits (and also for plants), so Galton concluded that intellectual characteristics must also have a hereditary origin. Galton also advanced the methods of comparing individual differences across a variety of sensory tasks. By measuring a person's ability to perceive pitch or distinguish difference in mass, Galton believed he was measuring a person's ability to interpret and perceive the world. Galton also sought to apply these ideas to different areas of life, including the idea of improving the human condition through selective breeding, commonly referred to as *eugenics*. His eugenic ideas were not uncommon in his day and continued to receive fairly wide support throughout much of the early 20th century.

Contrasting with Galton's measurement of performance on sensory tasks, Alfred Binet's idea of intelligence centered on a person's ability to make judgments and reason. Working as a part of an attempt by the French government to better understand and help students with learning difficulties, Binet and his colleagues developed what became a highly influential series of measures to help children develop their cognitive abilities in school. Unlike Galton, Binet did not support a heredity perspective but, rather, thought both genetic and environmental factors were important to intellectual ability.

As evidenced by the vast legacy established by Binet's measurement scale of intelligence, intelligence theory and measurement have developed hand-in-hand. This coinciding but not coincidental mutual development is perhaps best exemplified in the psychometric view of intelligence. In this view, performance on standardized measurements of intellectual ability reveal how the underlying mental structure is organized.

While conducting his own investigation of child performance on various cognitive tasks, Charles Spearman used factor analysis to find that children who performed well on one task were likely to perform well on others as well. Through these insights, Spearman developed a two-factor theory to explain cognitive performance. These two factors were a general intelligence, which has become known as simply *g,* and specific intelligences. Spearman believed that *g* played a role in a person's ability to perform cognitive tasks. Spearman's specific factor explained differences in ability to perform specific acts. Although often forgotten in the shadow of *g* in current explanations of Spearman's theory, these specific abilities were unique factors that explained performance on unrelated tasks. Spearman's primary contribution was not in new explanations of intelligence but in showing how performance on different tasks could be grouped statistically.

Just as the development and advancement of various statistical techniques including correlation and factor analysis allowed Spearman to develop his theory of intelligence, it allowed numerous others to analyze the relationship of performance on different tasks. Using these advancements, Louis L. Thurstone initially calculated seven independent factors of intelligence or *primary mental abilities:* word fluency, verbal comprehension, spatial visualization, number facility, associative memory, reasoning, and perceptual speed. To support his theory, Thurstone cited individuals with similar IQ scores who have significantly different profiles of their primary abilities.

Modern Theories

The theorist who veered furthest from the parsimony of Spearman's *g* is J. P. Guilford with his

structure of intellect (SOI) model. Believing that intelligence was too complex an idea to simplify into a few different factors, Guilford instead organized intelligence factors along three dimensions: operations, content, and products. Operations were further broken down into cognition, memory, divergent production, convergent production, and evaluation. Content consisted of figural, symbolic, semantic, and behavioral, whereas products were broken down into units, classes, relations, systems, transformations, and implications. According to Guilford, each combination of operations, contents, and products can be combined to form 1 of 120 unique kinds of intelligence. Since the SOI model was developed in the middle of the 20th century, its research support has been mixed.

Numerous researchers in the mid-20th century also developed hierarchical models of intelligence that explicitly include *g* along with groups of other subordinate factor analysis groupings of ability. Philip Vernon proposed that verbal intelligence and the ability to mentally manipulate shapes were the two major groupings beneath *g*. According to Vernon, these major factors could then be split into minor factors and eventually to task-specific factors.

John Horn and Raymond Cattell also proposed a hierarchical theory of intelligence with two broad and three second-order factors. Fluid ability (g_f) and crystallized ability (g_c) are the broad factors and represent the ability to understand complex relations and acquired skills and knowledge, respectively. Horn and Cattell found that the two are related, but that fluid ability is a mostly biologically based ability whereas crystallized ability derives from experiences in a given environment. Often overlooked by other researchers, Horn and Cattell's second-order factors consist of general visualization (figure-based problem solving), general fluency (recognizing and recalling items within a cultural context), and general speediness (rate at which problems can be dealt with).

In the 1980s and 1990s, John Carroll reanalyzed numerous cognitive data sets and developed a three-stratum theory of cognitive abilities ranging from general to broad to narrow abilities. Although he includes a caveat that how abilities are structured and organized depends largely on a person's culture of origin, Carroll's analysis reveals a general intelligence (similar to *g*) at stratum III. Stratum II consists of eight factors: fluid intelligence, crystallized intelligence, general memory and learning, visual perception, auditory perception, retrieval ability, cognitive speediness, and processing speed. Stratum I consists of factors specific to each of the stratum II factors.

Contemporary Theories

Multiple Intelligences Theory

The two recent conceptions of intelligence that have received the most public attention come from Howard Gardner and Robert Sternberg. Gardner's *theory of multiple intelligences* follows the tradition of deviating away from *g* theory by proposing seven relatively autonomous different intelligences. Gardner developed his theory based on his work with individuals exhibiting extreme cognitive abilities (or deficits) in particular areas, such as music or math, but not general cognitive superiority. The seven intelligences initially proposed by Gardner are linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal, and intrapersonal.

Linguistic intelligence is related to a person's ability to read, write, and speak and, along with logical-mathematical intelligence, composes the traditional conception of intelligence. Musical intelligence is related to a person's ability to create, communicate, and understand sound, whereas spatial intelligence is revealed through perceiving, manipulating, and re-creating visual and spatial objects. Perhaps the most deviant from traditional conceptions of intelligence is Gardner's idea of bodily-kinesthetic intelligence, which refers to the use of the body to solve problems. Interpersonal and intrapersonal intelligence both involve social skills relating to understanding emotions regarding others and the self, respectively. Naturalist intelligence, or the ability to care for and nurture living things in nature, has since been added to Gardner's theory, but has yet to be as widely accepted as the original components of multiple intelligences theory.

Triarchic Theories

At about the same time as Gardner, Robert Sternberg developed his own multidimensional conception of intelligence, the *triarchic theory of intelligence*. According to this theory, intelligence is

the interplay between analytical, creative, and practical abilities in a given sociocultural environment. Analytical abilities are those most traditionally associated with intelligence and involve evaluating and analyzing information. Creative and practical abilities diverge from traditional conceptions of intelligence and are associated with generating new ideas and applying knowledge in a given context. Sternberg has since adapted his theory to become a theory of successful intelligence that focuses on how individuals can optimize their different strengths while compensating for their relative weaknesses. Successful intelligence shifts away from ability or aptitude measurement and relies on individualized assessments of achievement. From the lens of successful intelligence, intelligence is transformed into the development of expert performance in a given field and is measured by how a person develops her or his abilities by adapting, shaping, and selecting different environments.

Emotional Intelligence

Similar to Gardner's inter- and intrapersonal intelligences, the idea of emotional intelligence has received increasing attention in the last two decades. Although there has yet to be a universally accepted definition of emotional intelligence (a problem that continues to plague intelligence theory as a whole), John Mayer and Peter Salovey conceive emotional intelligence as involving the ability to monitor, discriminate, and guide the emotions of yourself and others. Daniel Goleman, on the other hand, defines *emotional intelligence* as something that allows individuals to harmonize with each other and focuses particularly on its importance in the work place.

PASS Theory

The *planning, attention-arousal, simultaneous, and successive (PASS) model* of processing, proposed by J. P. Das and Jack Naglieri, is based on neuropsychological evidence that the brain works as interdependent yet separate functional systems. According to the PASS theory, information first arrives at the senses from external and internal sources, at which point the four cognitive processes activate to analyze its meaning within the context of the individual's knowledge base. *Planning* is the ability to make decisions about how to solve problems and perform actions and involves setting goals, anticipating consequences, and using feedback. Planning also serves as an executive function in its use of the other three processing functions. *Attention-arousal* involves the ability to attend to stimuli while ignoring other distractions. *Simultaneous processing* entails the ability to integrate separate stimuli into a cohesive whole, and *successive processing* is the integration of stimuli into a sequential order. Das and Naglieri have developed several assessments based on PASS theory, such as the Cognitive Assessment System.

Implicit Theories of Intelligence

Although not a formal theory of intelligence, Carol Dweck and her colleagues have developed a sophisticated and informative theory about implicit beliefs of cognitive ability. According to Dweck, whether people believe cognitive ability is a fixed or malleable ability drastically influences how they perform on cognitive tasks and interact with their environment. For example, students who are praised for intelligence were more likely to consider intelligence a fixed trait than were children who had been praised for effort (they are more likely to consider intelligence as malleable). This is important because future performance is influenced by how the cause of performance is attributed. Those who believe intelligence is a fixed trait believe they fail because they are not (and cannot be) good at a task whereas those who believe it is malleable believe that their performance can improve.

Matthew C. Makel and Jonathan A. Plucker

See also Emotional Intelligence; Fluid and Crystallized Intelligence; Intelligence; Intelligence Testing; Mathematical Intelligence; Multiple Intelligences; Musical Intelligence; Neuroscience of Intelligence; Practical Intelligence; Triarchic Theory; Verbal Ability

Further Readings

Carroll, J. B. (1993). *Human cognitive abilities: A survey of factor-analytical studies*. New York: Cambridge University Press.

Esping, A., & Plucker, J. (2008). Theories of intelligence. In F. A. Karnes & K. R. Stephens (Eds.), *Achieving*

excellence: Educating the gifted and talented. Upper Saddle River, NJ: Prentice Hall.
Fancher, R. E. (Ed.). (1985). *The intelligence man: Makers of the IQ controversy.* New York: W. W. Norton.
Neisser, U., Boodoo, G., Bouchard, T. J., Jr., Boykin, A. W., Brody, N., Ceci, S. J., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist, 51*(2), 77–101.
Plucker, J. A. (Ed.). (2006). Human intelligence: Historical influences, current controversies, teaching resources. Retrieved from http://www.indiana.edu/~intell

International Baccalaureate

The International Baccalaureate (IB) organization is a nonprofit educational foundation that was established in Geneva, Switzerland, in 1968, by families whose professional lifestyles rendered them citizens of the world. The need to develop a plan of studies that would be universally accepted emerged as young people in these families began preparing to enter a university. The plan has now expanded to include students of all ages. The mission of the foundation is to develop well-rounded individuals who are intellectually curious, knowledgeable, caring, and prepared to build a better, more peaceful world working in collaboration with people from countries and cultures across the globe. This entry describes program models, core elements, and organization and governance of the IB.

Program Models

IB has developed three models that public or private institutions may implement individually or as a continuum to become IB World Schools. By September 2007, IB was serving 560,000 students in more than 2,100 schools in 125 countries.

Primary Years Programme

The Primary Years Programme (PYP) was initiated in 1997 for students ages 3 to 12 and is now offered by 388 IB World Schools. The curriculum is organized around six interdisciplinary themes that help children and youth define their own identities, examine concepts, make connections, work in teams, consider multiple perspectives, reflect on new meanings, and take action. A culminating activity requires students to examine real world issues and propose solutions based on what they have learned through their experiences in PYP.

Middle Years Programme

The Middle Years Programme (MYP) was established in 1994 for students aged 11 to 16 and is currently offered by 560 IB World Schools. The curriculum includes the core disciplines and allows flexibility to pursue national interests using an interdisciplinary approach. Content may be taught in any language, but support materials are available in English, French, Spanish, and Chinese. MYP recognizes that students in this age group are struggling to develop personal identities in view of social and cultural influences. Students are encouraged to think critically and independently and to develop communication, research, and team-building skills. Students are also expected to participate in community service activities at the local, national, or international level. During the final year, students select and present an original project such as a work of art, a piece of writing, or an invention.

Diploma Programme

The Diploma Programme (DP) is offered to students in the last 2 years of secondary school. Since the first examination to obtain a diploma was administered in 1970, more than 1,500 schools have been authorized to implement this model. The curriculum is available in English, French, and Spanish. Students examine content in six areas: the primary and a second language, individuals and societies, mathematics and computer science, the arts, and the experimental sciences. Students also take a course on the theory of knowledge, write an extended essay on a topic investigated, and complete projects that demonstrate creativity, action, and community service. Most leading universities throughout the world recognize the IB diploma, but students may work for individual certificates in one or more subjects.

Table 1 Sites of International Baccalaureate Administrative Offices

City	*Country*	*Region or Site of Operations*	*Abbreviation*	*Concentration of Programs in Percent*
		Headquarters	IBHQ	
Geneva	Switzerland	Office for Africa, Europe, and Middle East	IBAEME	27
New York	United States	Office for North America	IBNA	49
Vancouver	Canada	North America and the Caribbean	IBNA	
Cardiff	United Kingdom	Academic and Functional Committees		
Bath	United Kingdom	Research		
Buenos Aires	Argentina	Office for Latin America	IBLA	11
Yokohama	Japan	Representative for Japan		
Beijing	China	Representative for Mongolia and China		
Singapore	Singapore	Office for Asia Pacific	IBAP	13
Sydney	Australia	Representative for Australasia		
Mumbai	India	Representative for South Asia		

Source: From International Baccalaureate: 21 things you should know about the IB. (2007, June). Retrieved September 5, 2007, from http://www.ibo.org/fastfacts. Reprinted with permission of IBO.

Core Elements

Three common elements are central to each model: student assessment, professional development, and school evaluation. Each program has a committee responsible for supervising the quality and development of the curriculum. Schools worldwide are encouraged to complete surveys, test new materials, and send experienced teachers to ongoing curriculum review meetings. IB provides guides, support materials, sample lessons, exams, and assessed student work.

Student Assessment

PYP teachers design assessment methods to encourage students to begin lifelong learning, to reflect on content and how to teach it, and to help parents highlight their children's development in the process. MYP teachers evaluate student performance according to a set of standards within each subject group. Quantitative and qualitative feedback is provided on the thinking processes used and the finished products. Self-assessment and peer-evaluation are encouraged. Following the

same principles, DP students have the option to qualify for a full diploma by taking a final exam in each of the subject groups or obtain certificates in specific areas. The final exams require either 150 or 240 hours of study and are reviewed and scored by a team of internal and visiting examiners in the spring and fall each year.

Professional Development

Teacher training is ongoing. IB regions organize introductory and advanced workshops, and subject or curriculum discussion forums through the Online Curriculum Centre. Teachers also attend annual conferences, review materials published, and may apply to become workshop leaders and senior examiners. Teacher qualifications are currently being developed.

School Evaluation

Only schools authorized by the IB may implement any of the three models. Schools seeking to offer PYP or MYP follow a three-phase process. First, the school conducts an in-depth analysis of its capability to adopt the IB philosophy and curriculum. After teachers are trained and the program is implemented for a year under the guidance of a regional office, formal application is submitted. An IB delegation then visits the school and evaluates its capacity to deliver the program. If authorization is granted, the school is expected to conduct a self-study 3 or 4 years later. IB reviews the program again and henceforth every 5 years. Fees are charged to schools at each stage in the process. The authorization process and fees are similar for the DP, but teaching does not start until the school is granted the IB diploma status.

Organization and Governance

The IB organization is governed by the elected Council of Foundation that includes representatives from a complex network of stakeholders. Except for the director general, council members are volunteers and meet four times a year. The IB management structure consists of the director general and leadership team, regional directors, and heads of functional and academic committees. Although the IB is an independent entity, the political, social, economic, and technological environments in each country influence the growth and development of IB World Schools across continents. The IB regions, concentration of programs and sites of administrative offices appear in Table 1.

Rosina M. Gallagher

See also International Schools for Gifted; Middle School Enrichment; Secondary Schools

Further Readings

International Baccalaureate: http://www.ibo.org
International Baccalaureate. Research Reports and Resources: http://www.ibo.org/programmes/research/resources
University of Bath Centre for the study of Education in an International Context: http://www.bath.ac.uk/ceic/publications

International Schools for Gifted

An international school for gifted is an educational institution that caters principally to gifted or talented students who are not necessarily nationals of the host country in which the school is located and certified. In the United States, these schools generally incorporate children of parents or guardians who are employed in the United States though citizens of other countries. These parents are often employed as missionaries or foreign diplomats, or by international businesses, international organizations, and embassies, and their terms may vary from short-term appointments to longer-term assignments. Their children are enrolled in international schools because their parents want them to have an education that is sensitive to their situation as international students. In other countries, international schools may not be specifically oriented toward gifted students; nevertheless,

enrollment officers may seek the most talented of the domestic students as well as bright students from other countries. Schools for gifted students are chosen, as is true of more traditional institutions, for children who would benefit from the more advanced curriculum and extra level of challenge offered in a more specifically selected curriculum. Examples of international schools for gifted students in the United States include the International School of Tucson in Tucson, Arizona, and Matlock Preparatory, located in West Palm Beach, Florida. This entry describes faculty, advantages, and challenges of international schools for gifted.

Faculty

Faculty at international schools for gifted are frequently certified by their countries of origin, though they sometimes require a teacher trained specifically for an international curriculum or for teaching a foreign language that may be rare to the international school's country of origin. For the same sense of efficiency, hiring is commonly done at large international employment fairs where schools have the opportunity to interview and hire several teachers per fair. Different schools tend to network more frequently into certain countries and draw varying proportions of their staff from one country versus another, again often based on convenience or proliferation of a long-established network. It is not uncommon for family members or friends of currently employed faculty members to be actively recruited by these close personal connections.

Advantages

There are various motives for families to choose to enroll their students in international schools for gifted students. Many parents, particularly those from countries with lesser-recognized systems of primary or secondary education, choose to enroll their students in International Schools with a specific program for gifted students so that they might effectively learn the native language of the international school in a method and with timing more appropriate for more capable students. In the United States, this usually takes the form of an English as a Second Language (ESL) or accelerated ESL program.

Some families choose an international school so their children can obtain the necessary credentials for better employment opportunities or higher education in a foreign country. International schools usually use curricula that are at least fundamentally based on the school's country of origin. The most common international programs adopt curricula standards from the United Kingdom or the United States, though this is also not universal. The primary advantage of a U.S. curriculum is that it may offer the opportunity for gifted international students to become familiar with the U.S. test style and specific expectations of the U.S. school system. Some test styles that are familiar and common in U.S. schools, such as multiple-choice or true-or-false, are quite literally foreign concepts to international students and may require an adaptation of studying style, test-taking strategies, or information assimilation. Gifted students can be remarkably adaptable in their learning styles in many cases; however, there is no substitute for familiarity and practice, and time spent in an international school in the United States may help students become comfortable being evaluated and tested in a format that will remain somewhat consistent across curricula from primary to secondary schools, and eventually into higher education. More globally, students who have had time to assimilate and acculturate to the cultural norms and expectations of their host countries may experience less anxiety and greater general comfort in their daily lives outside the classroom as well, which would have additional benefits that might translate into their academic lives and their general sense of well-being. Preparation for U.S. colleges in each of these ways can be a priority for some families who see multipotentiality and unlimited capacities in their students.

Challenges

These schools have the dual challenges of meeting the needs of a diverse student population from varied backgrounds and cultures, speaking many languages, and holding many different spiritual beliefs and customs, while dealing with the varied intellectual capacities ranging from students who are simply above average (IQ > 110) to superior (IQ > 120) to very superior (IQ ≥ 130). This creates a variety of curriculum and programmatic

challenges, multiplying the complexities that must be addressed by schools that focus simply on either international students or on gifted students.

In addition to the logistic challenges of meeting the needs of such multipotentiality and multiculturalism, the emotional needs of the students must also be considered in cases where students are housed on campus, particularly for those students for whom families are not local. In some cases, students are not living with their families as they attend school. Some international students live with their families who have relocated temporarily or permanently with their students; some international students live with extended family members, friends of the family, or even assigned "host families" so that they may live close to an international school and attend classes there; and still others live on campus at schools offering a residential program, often overseen by deans or residential counselors or advisors who serve as guardians to the students as they attend classes and complete their degree programs.

There are advantages as well as disadvantages to living on campus in a residential or dormitory environment. One advantage is that students learn to become more independent and deal with issues of separation anxiety before they attend college. Although some gifted international students possess a high level of emotional intelligence, or EQ, intellect does not necessarily translate into a high emotional intelligence that would allow students to engage in the types of self-awareness and self-regulation that lead to adaptability in people with high EQs. Any difficulties with adjusting to the heightened level of responsibility or difficulties learning to deal with loneliness or isolation could potentially result in anxiety or depressive symptoms that may contribute to academic disinterest, learning difficulties, or worse, serious emotional crises. The rationale of many parents is that dealing with such struggles before it becomes a matter of permanent academic record may be strategically advantageous, particularly for families with aspirations for students enrolling in first-tier U.S. institutions of higher education.

Sean Boileau

See also College Gifted; Cultural Conceptions of Giftedness; Language Arts, Curriculum

Further Readings

Baldwin, A. (2004). *Culturally diverse and underserved populations of gifted students*. Thousand Oaks, CA: Corwin Press.

Garrod, A., & Davis, J. (1999). *Crossing customs: International students write on U.S. college life and culture*. New York: Falmer Press.

International Schools Review: http://www.internationalschoolsreview.com

International Schools Service: http://www.iss.edu/index.asp

INTERNSHIPS

Educators and parents have long recognized the need for gifted students to have program options available that match student interests with opportunities to gain in-depth knowledge through interactions with professionals in real-life settings. Through internships, described in this entry, students are able to work side by side with professionals in a field of interest. The purpose of an internship is to explore an area of interest as well as to gain experience in a field that might become a future career.

Internships during the junior or senior year in college have been quite common for many years. At the college level, internships are viewed as a way for students to see the knowledge gained in courses taken earlier in their college career translated into the world of work. College-level internships can be for the summer, a semester, or in some cases, an entire academic year. Some college majors require a student to do an internship as part of their degree plan. Many college-level internships pay the student a stipend while allowing the student to gain valuable work experience. The company offering the internship also has an opportunity to evaluate a potential future employee closely for 3 to 4 months and will often decide to hire the intern following graduation.

More recently, internships have found their way into high school gifted programs as academic electives. Internships at the high school level are aimed at highly motivated, advanced-level students who desire more knowledge and experience than the regular school curriculum is able to provide. Through internships, students can work with a

mentor to explore a possible future career or learn more about a field of interest. Though internships are often designed to explore future career opportunities, they can also be used to assist gifted students in gaining exposure to nonprofit and community avocations.

At the high school level, internships usually take one of three organizational designs: (1) the internship experience as an academic class. In this model, the student enrolls in an internship class for one semester of the school year. The student is expected to work 5 or more hours per week at the job site with a professional in the field. In addition, the student participates in a series of regularly scheduled seminars designed to bring the experiences of the internship into the future career decision-making process. (2) The internship is treated as a directed studies project. In this model, the gifted education specialist, the student, and an individual at the internship site collaborate on designing the experience. The plan for the internship will take the form of a contract with the student that includes specific goals for the internship, the work to be completed by the student, and the means for assessing the work and the experience. (3) The internship experience is built into a magnet program or is a specialized high school program. The best example of this would be the many executive high school internship programs developed from the initial program established in 1971 in New York City. The program is limited to high school seniors who show evidence of above-average academic performance, show the ability to be creative problem solvers, and demonstrate maturity and sensitivity. Each selected student spends 10 to 20 hours each week (depending on the program) at the internship site gaining insight into the qualities, skills, and knowledge that help the professionals in their selected field perform effectively. Back at the school site, the students are involved in seminars and classes focusing on self-directed learning, self-awareness, goal setting, creative problem solving, various aspects of leadership development, and cross-cultural sensitivity.

Internships within gifted programs are designed to play any or all of the following basic roles for gifted students: (1) Internships play a role in career counseling. Gifted students are often plagued with the problem (or gift) of multipotentiality, meaning they can be successful in a number of areas. This can play out as indecision ("What should I do with my life?") or diffused energy ("I want to do it all."). Gifted students may find themselves delaying the decision of which course of study to pursue and then changing their minds several times along the way. Internships assist by giving these students a firsthand experience in career fields that interest them. Sometimes students are able to find nuances within a career field such as ways to match their hobbies and their career interests in a way that is meaningful to them. Thus, students see specific careers instead of the general career field. For example, one can combine a love of law with a love of horses and become a lawyer within the horse race industry. Internships help reassure students about a career path as well as give them direction regarding a course of study in college. An effective internship also helps a student know which careers or courses of study they do *not* want to pursue. (2) Internships can have a mentorship component. Through an internship, a gifted student can build relationships with professionals who share their passions and are interested in pursuing answers to field-related questions. The contacts made through an internship can offer career coaching, assist in knowing which schools to attend and become part of a person's lifetime network. (3) Internships can provide learning that extends beyond the typical school curriculum. Internships provide a stimulating learning experience for students who have an intense desire to learn more and know more about a specific area of study.

Internships are one way to provide gifted students with structured opportunities that more fully develop their talents, abilities, and interests.

Joyce E. Juntune

See also Best Practices; Career Counseling; Mentoring Gifted and Talented Individuals; Out-of-School; Secondary Schools

Further Readings

Davenport, K. (2001, November 30). Career coaching: Internship program offers hands-on training. *Orlando Business Journal*. Retrieved March 25, 2008, from http://www.bizjournals.com/orlando/stories/2001/12/03/focus1.html

Executive High School Internship Program, Pinellas County, FL. Retrieved March 20, 2008, from http://it.pinellas.k12.fl.us/schools/eip

National School-to-Work Opportunities Office. (1998). *Gifted education/school-to-work models: Best practices and unique approaches.* Washington, DC: U.S. Department of Education. (ERIC Document Reproduction Service No. EC308 132–141)

Intrinsic Versus Extrinsic Motivation

Motivation is an internal process that involves initiating, maintaining, and governing self-oriented behavior. It is inextricably tied to one's expectations of success, and the ways in which one values a given task at hand. Motivation has a direct bearing on how individuals focus their attention, and on levels of persistence, and it is linked to personal perceptions of capabilities with respect to activities and learning. Motivation to learn relates to finding enjoyment in understanding and mastery. It may be associated with such triggers as curiosity, instinct, or need.

From an educational perspective, motivation is the desire to do something well (as may be gauged against certain performance-referenced criteria). It can affect students' participation in class, their task commitment, and the amount of pleasure they derive from learning. The literature on motivation for learning points to two key criteria before academic expectations be readily met and even exceeded. First, tasks and ability should match. This refers to both manageability and level of challenge. Second, learning opportunities should be meaningful so that students can experience the kind of motivation that results from personal engagement in learning. It is important to encourage individuals' expectations of success, to recognize their efforts, to facilitate understandings of the value of learning and the relevance of the tasks, and to help maintain and enhance self-esteem. This entry describes intrinsic versus extrinsic motivations, school-based applications, and motivation and views of intelligence.

Intrinsic and Extrinsic Motivators

Intrinsic motivation is a drive from within oneself that can spark a search for information, generate action, and stimulate further curiosity. Intrinsic motivators include feelings of competence, pride, and internalized values such as diligence and integrity. Factors that help propel this internal drive might be suspense, appropriate feedback, meaningful learning (e.g., bridging the unknown and the known, being current), controversy and contradiction, and a need for autonomy. Tasks that demand active problem solving or high-order or divergent thinking, and that require investigating, conjecture, or logistical thought may be more intrinsically motivating for gifted learners, who may be less interested in tasks that involve simple procedural responses, basic applications, or memorizing. Students will be more intrinsically motivated by challenging learning goals, those that will help them gain new skills and master knowledge—not too easy, not too difficult but, rather, those perceived as moderately difficult and realizable such that levels of competency can be developed and met. These levels, as well as internalized value systems and the appropriate degree of challenge, vary from one person to the next.

Extrinsic motivation refers to external factors or incentives (such as applause or praise) that can reinforce and stimulate efforts. Such motivators can help build self-esteem and intrinsic motivation. Striking an optimal arousal level for extrinsically motivating individuals depends on the complexity of the task, the goal, an individual's beliefs about his or her own abilities, and various external influences (such as past experiences, chance of success, and learning environment). At a basic level, extrinsic motivators might include rewards such as grades, candy, or gold stars. At a more sophisticated level, one might consider incorporating student interest, hands-on applications, targeted assistance, and fostering self-regulation. These kinds of opportunities to succeed can, in turn, facilitate intrinsic motivation. Reinforcing efforts and persistence, and helping students to cultivate a growth mind-set about the nature of intelligence—that is, understanding it as being incremental and not fixed—are other ways to increase intrinsic motivation.

School-Based Applications

Teachers can be instrumental in helping motivate their students. Additional means to instill motivation might include the following:

- Provide many and authentic learning opportunities.
- Encourage children to make choices about their learning, and provide time for independent, group, and extension activities.
- Show children *why* what is being taught is important, and *how* it will be useful to them.
- Help students develop action plans and means to accomplish their self-selected and other goals, involving them in the planning and assessment processes.
- Foster respect for rules, reasonable constraints, consequences, and a mastery orientation for learning.
- Recognize progress; learn from setbacks; understand the importance of being flexible and enabling students to stretch themselves and feel proud of their accomplishments.
- Provide positive reinforcement and constructive and honest feedback.
- Respect the unique qualities of the individual.
- Encourage thoughtfulness, inquiry, creativity, and responsibility.
- Help children maintain a positive sense of self, and health and well-being (all of which affect how they might feel about tackling something).
- Help with organizational aspects (e.g., time management skills, sensible rules, formative assessments, good communication methods, reasonable deadlines).
- Provide an accepting and appropriately structured learning environment, including a chance to be collaborative, and a supportive emotional climate ("You can do it! Hooray!").

Motivation and Views of Intelligence

Different people are motivated by different experiences, incentives, learning styles, and choices, as driven by their individuality. This individual diversity influences the amount of satisfaction associated with specific reinforcers and personal perceptions about whether someone can do something, and how well. People who believe that intelligence grows incrementally will be motivated to engage in challenges, and to persist, thereby increasing their skill levels and fostering their intellectual growth. The amount of effort one puts forth—the extent of the motivation and the ways in which one chooses to direct attention and performs—can be enhanced extrinsically and intrinsically. Past success or failure may affect motivation, and current efforts are likely to be more motivated when the goal-directed activity is deemed to be appropriately challenging. Therefore, to motivate, and create and sustain commitment, consider the importance of authenticity, reinforcement, suitable controls, realizable goals, fun, innovative and integrated subject matter, and pacing. Motivation supports self-determination and autonomy, and it should be encouraged in concert with assisting students to balance life's various demands and responsibilities.

Joanne F. Foster

See also Achievement Motivation; "Aha!" Experience; Autonomous Learner; Learning Styles; Optimal Development

Further Readings

Elliot, A. J., & Dweck, C. S. (Eds.). (2007). *Handbook of competence and motivation*. New York: Guilford Press.

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators*. Scottsdale, AZ: Great Potential Press.

Whitney, C. S., & Hirsch, G. (2007). *A love for learning: Motivation and the gifted child*. Scottsdale, AZ: Great Potential Press.

Winne, P. H. (2005). A perspective on state-of-the-art research on self-regulated learning. *Instructional Science, 33,* 559–565.

INVENTORS

When one thinks of inventors, one typically forms an image of a Thomas Edison or a Henry Ford: adults who made fame and fortune through their inventions. One may also have more ambiguous images of adults who had clever ideas but for one reason or another achieved neither fame nor fortune. These adults may get the label of tinkerer,

oddball, or "ahead of his time." Regardless of whether the adult was successful or not, the constant image is the adult (typically a male adult). It is rare that one's image of the inventor is a child. Yet children and adolescents do invent. Because inventiveness is a talent not usually identified and nourished in the traditional curriculum of schools, it is important to promote inventiveness programs, which are described in this entry.

Inventiveness Programs

Structured invention programs for children date back to the early 1980s when the U.S. Patent and Trademark Office committed to a comprehensive effort to introduce inventiveness thinking at all levels of school curricula (Project XL). Currently, a plethora of invention programs, camps, and contests are available through schools, companies, cities, and states (i.e., Invent Iowa). Although specific invention programs for school-age children do exist, inventiveness programs for children are often submerged under the more familiar school concepts of critical thinking and creativity.

Inventiveness (and invention curriculum) has not become a major part of school and school curriculum. When it does appear, it seems to be more justified by how it positively affects more typically used school concepts such as creativity. Thus, the emphasis on thinking skills and creativity makes inventiveness rather invisible.

Research

Inventiveness is not well researched among children and adolescents because it is not part of the tradition of school. Also, research about inventiveness has typically been focused on adult inventors. Much of what we know about young inventors has to do with whether they win an invention contest. Although the success in such competitions tells us something useful about the skills of the young inventor, it does not inform us about the psychological profile of the inventor, including his or her attitudes, feelings, interest, motivation, and so on.

Attitudes and Perceptions of Young Inventors

A study conducted by the University of Iowa's Connie Belin and Jacqueline N. Blank International Center for Gifted Education and Talent Development (Belin-Blank Center) reveals a few things about both the young inventor and his or her invention. For example, it is a stereotype that inventing is a "boy thing." A look at participation in elementary through high school level (Grades 3 through 12) state invention conventions reveals that boys and girls are comparably inventive and interested in the invention process.

Inventive boys are similar to inventive girls in their attitudes about school and inventiveness. In 1992, Nicholas Colangelo, Barbara Kerr, and colleagues developed the Iowa Inventiveness Inventory, which measures attitudes and perceptions of adult inventors (men only) who held one or more patents. A similar survey was used in the Belin-Blank Center study to elicit attitudes of young inventors regarding the inventive process. Generally, there was little difference between the responses of boy and girl inventors in their reflection on the inventiveness process and attitudes toward school. In contrast with well-established adult inventors, the young inventors (both boys and girls) showed an overwhelmingly positive attitude about school and their academic abilities.

The study also looked at how young inventors perceived the hierarchy of types of students in their school. The researchers wanted to know who the young inventors thought were the "cool" students in school. Young inventors were asked to rank the types of students that seem to be most attractive to the kids in school. Athletes were ranked highest (most attractive) by both men and women, and hard working (surprisingly) was ranked second. Class comedian and most popular were ranked next. Inventor was ranked low on the list. Interestingly, however, the girls ranked inventor higher than did the boys. Further investigation is needed to look at a possible trend regarding attractiveness of being an inventor by age and grade.

Types of Inventions

What do young inventors invent? The inventions of young inventors run the gamut of classifications of the U.S. Patent Office. A systematic analysis of the types of inventions that were displayed at the Invent Iowa 2001 State Invention Convention revealed that the three most popular categories of inventions were Tools, Kitchen/Bath, and

Organization. There were some gender differences in the classifications of types of inventions generated by young inventors. Categorized inventions by gender were fairly comparable except in the categories of Kitchen/Bath and Organization where the girls outnumbered the boys in these categories by approximately two to one. Proportionately, inventions in the category of Tools more often were submitted by boys.

Clar M. Baldus

See also "Aha!" Experience; Creativity, Definition; Imagination; Innovation

Further Readings

Casey, S. (2005). *Kids inventing!: A handbook for young inventors*. Hoboken, NJ: Wiley.

Colangelo, N., Assouline, S. G., Croft, L., Baldus, C., & Ihrig, D. (2003). Young inventors. In L. V. Shavinina (Ed.), *The international handbook on innovation* (pp. 281–292). Toronto: Elsevier Science.

Colangelo, N., Assouline, S. G., Kerr, B. A., Huesman, R., & Johnson, D. (1993). Mechanical inventiveness: A three-phase study. In G. R. Bock & K. A. Krill (Eds.), *The origins and development of high ability* (pp. 160–174). Chichester, UK: Wiley.

Colangelo, N., Kerr, B., Huesman, R., Hallowell, K., & Gaeth, J. (1992). The Iowa Inventiveness Inventory: Toward a measure of mechanical inventiveness. *Creativity Research Journal, 5*(2), 157–163.

Iowa Acceleration Scale

In the mid-1990s, Susan Assouline, Nicholas Colangelo, and Ann Lupkowski-Shoplik combined their professional expertise to develop a tool to guide educators and parents through the decision-making process for whole-grade acceleration. Assouline drew on her background as a regular classroom teacher and school psychologist, Colangelo called on his experiences as a regular classroom teacher and school counselor, and Lupkowski-Shoplik relied on her expertise in early childhood development and giftedness. Soon after the development of the form, Assouline, Colangelo, and Lupkowski-Shoplik invited two Belin-Blank Center doctoral students, Jonathan Lipscomb and Leslie Forstadt, to be a part of the team and coauthors of the Iowa Acceleration Scale (IAS), described in this entry.

Together, they developed a 20-item survey that is divided into 10 sections; 4 specific sections compose the core of the IAS: (1) Academic Ability, Aptitude, and Achievement; (2) School Information; (3) Interpersonal Skills; and (4) Attitude and Support of School Personnel. The items for each section should be completed by a child study team. Each item on the IAS has a categorical response that was assigned a weighted score based on the clinical experience of the authors; interviews with educational experts, students, and parents; and a review of the literature on acceleration. Items are scored in such a way that higher scores result in stronger recommendations for whole-grade acceleration as an educational intervention. The IAS is *not* a test; rather, it is a decision-making tool.

There are many advantages to using an instrument such as the IAS. First, the IAS Form is a 16-page document that addresses the important considerations for making an acceleration decision. Second, the four-page Summary and Planning Form allows each member of the team the opportunity to sign off on the decision and the plan for implementing the recommended intervention. Finally, the IAS is accompanied by a comprehensive manual, which includes case studies, vignettes highlighting some of the more difficult issues associated with academic whole-grade acceleration, and a comprehensive review of the literature.

The IAS was developed when it was common for school districts to have specific policies to not permit whole-grade acceleration. These policies were implemented with good intentions, primarily because educators and parents were concerned that whole-grade acceleration would negatively affect the student—especially from a social-emotional perspective. This negative attitude persisted despite abundant research suggesting that acceleration was the most appropriate intervention for some very able students.

Whole-grade acceleration breaks with the traditional system of age-based grade placement in a lockstep system, which is why some parents and educators worried that acceleration would result in social and emotional concerns; therefore, they believed (falsely) that the "risk-free" decision was to keep the student in the same grade with his or

her age-mates. These implicit theories regarding grade and age placement have been refuted by research that proves that (a) for very academically talented students, acceleration is the most effective intervention, and (b) the social and emotional impact of acceleration on a student is likely to be improved or—at worst—remain unchanged.

The educational milieu in which the IAS was developed was such that there were multiple ways in which a gifted student's needs for advanced academics could be addressed. Students' needs were thought to be met through enrichment-based pull-out programs, cooperative learning, curriculum compacting, and single-subject acceleration. The IAS recognizes that each of these strategies has a place within the educational system, although each type of intervention varies in effectiveness. Exceptionally talented students need a more radical form of curriculum modification, and for them, the most effective intervention is whole-grade acceleration.

Despite the evidence supporting whole-grade acceleration, there was little information available to help parents and educators make an appropriate decision regarding when and how to implement whole-grade acceleration. Also, parents and educators had important questions (e.g., When is the best time to skip a grade?) to be considered when making a decision about whole-grade acceleration.

Each edition of the IAS (first, 1998; second, 2003; third, 2009) addressed these issues in three distinct ways that follow the layout of the IAS manual. The first section of the manual presents several vignettes of individual cases about each of these questions including, but not limited to, best time to grade skip; early entrance to kindergarten; need for standardized measures of ability, aptitude, and achievement; concerns about "the athlete"; or implications for a student who qualifies for whole-grade acceleration, but is *not* accelerated.

The second section presents each of the items of the IAS, with directions for completing the IAS Form and Summary and Planning Form. Embedded in the directions are additional discussions about the factors under consideration. The third section is a review of the research related to acceleration. Each section is designed to stand on its own; however, the authors strongly urge that proper use of the IAS means that the child study team leader has a thorough understanding of the items and the underlying research; as well, the team leader should be committed to following the process as it is laid out, rather than trying to adapt it to a specific situation.

Since the IAS was first used, it has been described as invaluable to the decision-making process of whole-grade acceleration. It presents all of the issues in an unbiased manner and guides the team to an objectively based decision about whole-grade acceleration as an intervention for highly able students.

Susan G. Assouline and Nicholas Colangelo

See also Acceleration/*A Nation Deceived;* Giftedness, Definition; Identification

Further Readings

Colangelo, N., Assouline, S. G., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students* (Vols. 1 & 2). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Kulik, J. A. (2004). Meta-analytic studies of acceleration. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students* (Vol. 2, pp. 13–22). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Rogers, K. B. (2004). The academic effects of acceleration. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students* (Vol. 2, pp. 47–58). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

IQ

IQ stands for *intelligence quotient,* which is a type of test score obtained from certain intelligence tests. IQ is often used simply as a synonym for general intelligence. This entry describes the meaning and use of the intelligence quotient within the history of intelligence test development.

In France at the beginning of the 20th century, Alfred Binet and Theodore Simon were asked by the French government to identify French children with

mental retardation so that they could be given an appropriate education. Binet and Simon developed the first modern intelligence test, the 1905 Binet-Simon intelligence scale. This 30-item test was organized so that successive items were more difficult than previous items. By standardizing the scale on groups of children at each age, Binet and Simon derived normative scores for different ages. In this way, a child's mental ability could be compared with average performance for that age. Various degrees of mental retardation could be identified at each age level. Binet and Simon used the term *mental level* to describe performance on this scale, though the term *mental age* became more popular.

Binet-Simon test items were arranged according to an *age scale*. Different types of test items were grouped together by the age at which most children were successful with those items. Passing most or all of the items at an age level resulted in a score of that mental level. Children who answered items at higher age levels earned additional credit in months above the baseline mental age. Binet and Simon revised this scale in 1908 and 1911 by adding items and increasing the age range.

Lewis M. Terman, a professor at Stanford University, conducted a major revision of the Binet-Simon test in 1916, after Binet's death. Terman renamed it the Stanford Revision and Extension of the Binet-Simon Scale, which came to be known as the Stanford-Binet Intelligence Scale. Scoring was modified to incorporate the concept of the *mental quotient* as suggested by William Stern, a German psychologist, in 1912. The mental quotient equaled the mental age divided by the chronological age.

Terman expanded this concept by multiplying the mental quotient by 100 to obtain the intelligence quotient, or IQ. A child whose mental age and chronological age were the same had an IQ score of 100. The new ratio score transformed all intelligence test results to the same scale. Binet and Simon had been able to compare a single child to other children of the same age by comparing mental ages, but Terman's introduction of the IQ score allowed the comparison of children of different ages.

Technical difficulties in the use of the IQ score ratio soon emerged. The standard deviation, or the amount of variability, of IQ scores differed with age. This meant that any score other than 100 could mean different things at different ages. For example, the standard deviation for 6-year-old children might be larger than the standard deviation for 8-year-old children. Therefore, a 6-year-old child with an IQ score of 110 would be less advanced compared with same-age peers than would an 8-year-old child with an IQ score of 110. The 8-year-old with the identical IQ score would actually be more different from the average 8-year-old because of lower variability among 8-year-olds.

The *deviation quotient* was developed to solve this problem. Deviation quotient or deviation IQ scores are set to have a mean of 100 and the same standard deviation at all ages. The term *IQ* was retained for these scores even though they were no longer actual quotients or ratios.

In 1939, David Wechsler published the Wechsler-Bellevue Intelligence Scale, which was the first use of the *point scale*. In contrast to the age scale format of the Stanford-Binet, items in a point scale are grouped by type of item in order of difficulty. Children earn points for each item passed within each item type, or subtest. The raw score, or the sum of the points earned on each subtest, is transformed into a standard score. The Wechsler-Bellevue included 11 subtests, each consisting of tasks designed to measure different aspects of general intelligence. This test was the first to use a deviation IQ score and had mean of 100 and a standard deviation of 15 at all ages.

Revisions of the Stanford-Binet Intelligence Scale by Terman and Maud Merrill in 1937 and 1960 continued to use the age scale test item format and the IQ score. In 1972, the norms were revised, and a deviation IQ score took the place of the original IQ ratio. Stanford-Binet deviation IQ scores were standard scores set with a mean of 100 and a standard deviation of 16. Stanford-Binet IQ scores continued to have a standard deviation of 16 through the 1986 Stanford-Binet, Fourth Edition. The Stanford-Binet, Fifth Edition, published in 2003, uses a standard deviation of 15, which makes it consistent with other contemporary tests of intelligence.

Though IQ remains a common reference for overall general intelligence test scores, other well-known intelligence tests use different names for the summary score. For example, the Kaufman Assessment Battery for Children, Second Edition, offers two options for general intelligence scores based on two theories of intelligence. The Mental

Processing Index is the summary score when the test is used as a representation of the Luria processing model of intelligence. Fluid-Crystallized Index is the summary score for a Cattell-Horn-Carroll theoretical application of the test. The overall score on the Woodcock-Johnson Tests of Cognitive Ability, Third Edition, is named General Intellectual Ability. Only the Stanford-Binet and Wechsler scales still use the term IQ for overall intelligence scores.

All modern intelligence tests use sophisticated statistical methods for selecting test items and creating reliable and meaningful normative scores. The name of the overall intelligence score is a matter of theoretical orientation and choice by the test developers and publishers. Keeping IQ as part of the score name is now a historical reference to the early days of intelligence test development.

Julia Shaftel

See also Intelligence Testing; Stanford-Binet

Further Readings

Sattler, J. M. (2001). *Assessment of children: Cognitive applications* (4th ed.). San Diego, CA: Jerome M. Sattler.

Sherrod, C. C. (1923). The development of the idea of quotients in education. *Peabody Journal of Education, 1(1),* 44–49.

Islamic American, Gifted

Estimates of the total U.S. Muslim population are difficult to make, but rigorously controlled surveys place it somewhere between 1.9 to 2.8 million, with 36.8 percent between ages 5 and 15. Islamic population growth has accelerated establishment of private Islamic schools that foster Muslim children's religious and educational needs, with estimates indicating 250 to 300 such schools.

The acts of September 11, 2001, involved extremist Muslims, raising residual concern that Muslims constitute a threat to U.S. security. However, most students in Islamic schools are proud of their dual identity as Muslims and Americans. Muslim parents in the United States are often faced with the dilemma of wanting their children to be Americans involved fully in U.S. life, while maintaining their activity as good Muslims. Muslim students are expected to find balance between their rights and responsibilities, and Muslim schools are expected to find balance between social good and individual needs. Yet, efforts at integrated identity can seem futile in the face of continual academic and public discourse that opposes Islamic values with democratic ones.

It is generally accepted that giftedness at the highest levels can be found in every cultural group. Among students in Islamic schools, there may be some who will take the lead in providing a better understanding of Islamic values and norms in the context of greater U.S. society, to the benefit of both the Islamic community in the United States and of the nation in general.

Studies related to gifted education of Islamic Americans are fairly recent. They explore giftedness conceptually and practically, as described in this entry.

Islamic Conception of Giftedness

Fatma A. K. Al-Lawati posited an Islamic conception of giftedness emanating from the Qur'an, Hadith, and other sacred writings. In focusing on extraordinary ability and attainments, Al-Lawati proposes that Muslims would accept these four points: (1) Allah is the ultimate source of knowledge; (2) all knowledge is secular and religious, adding an ethical dimension to what is known; (3) the believer must act upon his or her knowledge; and (4) questioning should be used to resolve doubts and approach truth.

Programs for Gifted Learners

Al-Lawati's work also sought to determine the current state-of-the-art for gifted education in private Islamic schools in the United States. She reported that 59 percent of Islamic schools claim to have some sort of program for gifted students, either multiple programming options or a single program option.

Identification Services

Teachers identified one or more specific measures used in identifying gifted students in their

classrooms—most frequently achievement tests, student products/portfolios, and grades—with parent and peer nomination least frequently used. These findings are consistent with other work that has noted the most common identification measures used by teachers were achievement tests, grades, and teacher nomination.

Services for Gifted Learners

The most commonly applied program options offered in Islamic schools are enrichment, continuous progress, and early entrance. The least frequent options were part-time special classes and full-time special classes. Enrichment is usually offered 3 to 5 hours per week, usually in language arts, mathematics, Islamic studies, Arabic, science, and social studies.

As many schools reported not using continuous progress as did those that reported using it. Continuous progress is more likely to be practiced at the elementary grade level in math, language arts, Islamic studies, English, foreign language, and social studies, whereas it is least applied to arts and music. A teacher-made test is most likely to be used as a criterion for moving students to a higher level, followed by demonstrated competency and standardized tests. The use of grouping to achieve continuous progress is more common than is individual instruction.

Early entrance was more likely to be practiced at the kindergarten and first-grade levels with about twice as many kindergartners benefiting as did first graders. Early entrance decisions are more likely to be made based on the teacher's recommendation, ability testing, achievement tests, and parent request.

Differentiation in Islamic Schools

Instructional practices along two dimensions, classroom differentiation and religious integration, were surveyed in Islamic schools in the United States. Although 74 percent of the teachers believe they had gifted students in their classrooms, only 60 percent reported that they implemented any differentiation practices. The most common practices were assigning advanced reading material, using enrichment worksheets, repeating difficult concepts, and providing time for self-selected interests. Gifted students were more likely than were average students to experience integration of Islamic values into other curricular areas when teachers did such integration, which they usually did not.

Community Influences

Islamic women in the United States have demonstrated how gifted individuals can be a positive influence in their communities and challenged a prevailing notion that Islamic women are considered inferior in their culture. Drawing on social and spiritual motivation, Islamic women have promoted change in homes, communities, and society at large. Many Islamic women are oriented to study and learning and are able to overcome barriers to accomplishment, such as traditional views of Islam, hypocrisy, gender, bias against American Muslims, and language and cultural differences.

Gifted Education Issues in Islamic American Society

Islamic schools in the United States reflect the concerns extant in public schools relative to education for gifted and talented learners. Limited resources hinder Islamic schools from establishing broad programs. Parents who choose Islamic schools for their children to receive challenges in an appropriately religious context may be disappointed as far as challenge is concerned. Seminal efforts are occurring but not in a systematic fashion with strong conceptual bases from the point of view of Islamic theology or gifted education pedagogy.

Scott L. Hunsaker and Fatma A. K. Al-Lawati

See also Attitudes Toward Religion and Spirituality; Diversity in Gifted Education; Eminent Women; Global Issues; Spirituality

Further Readings

Abu El-Haj, T. R. (2002). Contesting the politics of culture, rewriting the boundaries of inclusion: Working for social justice with Muslim and Arab communities. *Anthropology & Education Quarterly, 33,* 308–316.

Al-Lawati, F. A. K. (2003). *Exploring gifted education programs, services, and practices in Islamic schools in the United States*. Unpublished doctoral dissertation, Utah State University, Logan.

Al-Lawati, F. A. K., & Hunsaker, S. L. (2002). Muhr and Mawhibah: A multicultural perspective on women's gifts. *Roeper Review, 25,* 22–26.

Al-Lawati, F. A. K., & Hunsaker, S. L. (2007). Differentiation for the gifted in American Islamic schools. *Journal for the Education of the Gifted, 30,* 500–518.

Archambault, F. X., Jr., Westberg, K. L., Brown, S. W., Hallmark, B. W., Emmons, C. L., & Zhang, W. (1993). *Regular classroom practices with gifted students: Results of a national survey of classroom teachers*. Storrs: National Research Center on the Gifted and Talented, University of Connecticut.

Ba-Yunus, I., & Siddiqui, M. (1998). *A report on Muslim population in the United States of America*. Richmond, NY: Center for American Muslim Research & Information.

Mairson, A. (2005, February). Muslims in America. *National Geographic, 207*(2), n.p.

Smith, T. (2002). The Muslim population of the United States: The methodology of estimates. *Public Opinion Quarterly, 66,* 404–417.

Ivy League Colleges

The Ivy League is made up of eight private colleges and universities in the Northeast United States: Brown, Columbia, Cornell, Dartmouth, Harvard, Princeton, the University of Pennsylvania, and Yale. Although the Ivy League is technically an athletic conference it is often more renowned for highly selective and competitive admissions criteria, high and traditional academic standards, and financial endowment. The Council of Ivy Group Presidents is the governing body and determines common procedures. All but Cornell were founded before the U.S. Revolution, are among the oldest higher education institutions in the United States, and provided most of the earliest academic infrastructure for the American Colonies, including school founders, boards, administrators, and distinguished faculty. This entry describes the history, the characteristics, and importance of Ivy League schools to talented students.

The term *Ivy League* was invented in 1933 by Caswell Adams, a sportswriter for the *New York Tribune* who used it as a disparaging reference to antiquated institutions that were typified by ivy plants covering their aged historic buildings. Specifically, Adams meant to dismiss the substandard football teams at Princeton and Columbia by referring to them as "only Ivy League." The term resonated with Stanley Woodward, a fellow sportswriter who used *ivy colleges* to describe the 1933 football season of the fictitious league of eastern colleges. Two years later, in 1935, Associated Press sports editor, Alan Gould, published the first printed form of the exact term *Ivy League,* and later that year, *New York Herald Tribune* sportswriter Jesse Abramson began to publish a regular report of standings for the nonexistent Ivy League. From there, sportswriters, journalists, and others picked up the term to refer to some of the oldest colleges and universities in the northeastern United States. The actual Ivy League was not formalized until 1954 when each of the eight presidents signed the Ivy Group Agreement that established athletic, academic, and financial standards for the intercollegiate teams and ensured that eligibility for sports would not cloud admission to the institution. The term *Public Ivies* was coined when, more recently, an administrator from Princeton published a list of 30 public colleges and universities comparable to the Ivy League in academic excellence but with lower price tags.

Ivy League schools attract students from around the world who desire a premium education grounded in European and U.S. traditions within a competitive environment, and have or can find the means to afford it. All told, about 10 percent of applicants are admitted and nearly 140,000 rejected, including some valedictorians with perfect 4.0 grade point averages and perfect scores on the SAT. The eight institutions compete fiercely for students, boast of rejection rates, keep large and sophisticated data banks, and finance aggressive marketing strategies to scoop up the top students.

Each year, the *U.S. News and World Report* ranks the best U.S. colleges on indicators of quality including selectivity and admission, class size, retention rates, number of full-time faculty, and alumni giving. Of more than 250 national institutions listed, the top 3 schools are consistently Ivy League. All 8 rank in the top 15. In addition, each school has its own influential alumni and Nobel

Laureates, pours millions into research, and makes notable advancements in a variety of fields.

Historically, earning a degree from an Ivy League school was assumed to have advantages including landing a prestigious and high-paying job following graduation. Conventional wisdom, however, was challenged when the National Bureau of Economic Research published a study showing no difference in income between graduates who were accepted by but did not attend an Ivy League school, and those who did. The study concluded that a better predictor of income was the confluence of traits that got applicants through the highly selective admissions procedures—commitment, work ethic, intelligence, and talent—rather than the Ivy League schools themselves. Graduates from Ivy League schools cite other indicators of success such as having a role in meaningful research, academic reputation, and belonging to networks of influential persons.

Ivy League stereotypes connote power, privilege, and wealth. On the one hand, the Ivy League is heralded as a gateway to educational opportunity and academic rigor. On the other hand, it is criticized for ensuring elitist networks that systematically discount those who are not wealthy or powerful enough to be accepted. All Ivy League schools rank in the top 1 percent of the world's academic institutions in financial endowment and, together, claim more than one-third of the total funds of the 62 wealthiest institutions in the United States. Harvard's $35 billion endowment is the largest in the world. The school with the smallest endowment—Brown at $2.5 billion—is still the 26th wealthiest college in the United States.

The Ivy League is accustomed to the charge of elitism. Despite diversity initiatives, it has come under increased criticism that its employees and students are stratified along lines of race and gender. Of the nearly 6,000 tenured faculty in 2007, just 2 percent are Black, 1 percent Hispanic, and 20 percent women. In all eight institutions, there are just six tenured professors who are Indian or Alaskan Native. People of color tend to be offered nontenure-track jobs and have difficulty attaining faculty positions. Increased attention has prompted institutional incentives to attract and retain faculty and students from diverse backgrounds. However, the pace of progress continues to be scrutinized and debated.

The Ivy League attracts high achievers motivated by many factors including rigorous academics, opportunity, competition, meritocracy, social prestige, recognition associated with the Ivy League, and being part of a legacy.

Jan B. Hansen

See also College Gifted; Elitism; Research, Qualitative; Research, Quantitative; SAT

Further Readings

Dale, S., & Krueger, A. (2002). Estimating the payoff of attending a more selective college. *Quarterly Journal of Economics, 107,* 1491–1527.

Greene, H., & Greene, M. (2001). *The Public Ivies: America's flagship public universities.* New York: HarperCollins.

Integrated Postsecondary Education Data Systems (2007). National Center for Educational Statistics. Retrieved from http://nces.ed.gov/IPEDS/

Zawel, M. (2005). *Untangling the Ivy League.* Pittsburgh, PA: College Prowler.

Japan, Gifted Education

The definition of the terms *gifted education* or *giftedness* in Japanese is not clear among Japanese equivalent terms. There is no official gifted and talented education in Japan. Because government-sponsored gifted education does not exist in Japan, gifted or talented students are not recognized. Most Japanese people strongly believe in equal educational opportunities; thus, they are generally against a special form of education for top learners. Many Japanese people feel that selecting special students would promote elite education instead of egalitarianism. Japanese culture emphasizes student effort and diligence rather than innate ability or intelligence. Japanese people in general believe that all students will become high achievers if they study hard. This entry describes the modern education system, the private education industry, and early admission to college in Japan.

The Modern Education System in Japan

The modern Japanese school system began in 1872. The framework of postwar educational system in Japan is based on the Fundamental Law of Education (*kyoiku kihon ho)* and the School Education Law (*gakko kyoiku ho)* enacted in 1947. Kindergartens are 1- to 3-year courses for 3- to 5-year-old students for their physical and mental development. Compulsory education is 6 years of elementary school plus 3 years of junior high school. The ages that children begin and end compulsory education are strict—all children begin their elementary school at the age of 6 and complete their junior high school at the age of 15.

High school (3 years) is not compulsory even though most students move to high school after junior high school graduation. The type of high school that students attend depends on the results of high school entrance examinations as well as their performance in junior high school. High schools include academic track and vocational areas. Higher education includes universities and colleges, junior colleges, colleges of technology, and professional training colleges.

The School Education Law mandated that teachers must use textbooks authorized by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). The Courses of Study document provides schools with the standards for courses. Students follow the same curriculum with national standards as others in the same age group nationwide until they complete junior high school. Teachers focus on all students rather than on students with gifted or lower abilities.

Private Education Industry

Although official schools do not offer gifted education, many parents seek supplemental opportunities for their children's education from the private-sector educational institutions after school or during holidays.

Students need to take entrance examinations to be admitted to high schools and universities. In

addition, students need to take entrance examinations to attend private elementary and junior high schools. Students' future success depends on the universities they attend. To pass top universities' entrance examinations, students need to go to top academic-track high schools. Because the entrance examination system has been criticized for a long time, many universities have various student selection systems instead of traditional styles of academic examinations. However, many students still need to take entrance examinations, and they prepare for these examinations within the private educational industry.

The *juku* is the supplementary school for study and preparing for entrance examinations. Some parents even send their children to *juku* at an early age to prepare for kindergarten or elementary school entrance examinations. Students can spend additional time based on their abilities at *juku*, preparing for entrance examinations. More than 50 percent of junior high school students attended *juku* three to four evenings per week, and approximately 30 percent of high school students attended *juku* in 2000. Many families invest a large amount of money for their children's education, but opinions regarding *juku* vary in Japan.

Yobiko or preparatory schools are private institutions for high school graduates to prepare for the next year's college entrance examination. Some parents hire private tutors to teach their children privately at home. Nonacademic, private lessons for arts, music, and sports are also popular in Japan.

Early Admission to College

After World War II, early admission to college or skipping grades was not allowed until recently. However, MEXT modified the Courses of Study in 1997 and allowed students, who complete 11th-grade education after 1998 and have exceptional abilities in science, mathematics, or physics, to begin college in some locations. The subject area is no longer limited to science since 2002. Only a few universities allow this early college admission system; most universities admit students from the age of 18. The number of students who begin their college education one year early is small. Similarly, some graduate schools begin admitting students who have completed their third year in college.

The early admission system is new, and its advantages have not been evaluated. Some people criticize early admission because it works against equal education opportunities.

Yuki Ozawa Waugh

See also Asia, Gifted Education; Attitudes Toward Gifted; Classroom Practices; Early Admission, College; Giftedness, Definition; Global Issues; Images of Gifted in Film; World Views

Further Readings

Foljanty-Jost, G. (2004). The end of a success story? Japanese education and education policy in the 1990s. In G. Foljanty-Jost (Ed.), *In Japan in the 1990s: Crisis as an impetus for change* (pp. 179–196). Piscataway, NJ: Transaction.

LeTendre, G. K., Baker, D. P., Akiba, M., Goesling, B., & Wiseman, A. (2002). Teachers' work: Institutional isomorphism and cultural variation in the U.S., Germany, and Japan. In P. Miller (Ed.), *(Inter)-culturing the gifted* [Special Issue, *Mensa Research Journal, 33*(1), 46–71]. Arlington, TX: Mensa Education and Research Foundation.

Matsumura, N. (2007). Giftedness in the culture of Japan. In S. N. Phillipson & M. McCann (Eds.), *Conceptions of giftedness: Sociocultural perspectives* (pp. 349–376). Mahwah, NJ: Lawrence Erlbaum.

Stevenson, H. W., Lee, S., Chen, C., Kato, K., & Londo, W. (1994). Education of gifted and talented students in China, Taiwan, and Japan. In P. O. Ross (Ed.), *National excellence: A case for developing America's talent* (pp. 27–60). Washington, DC: Office of Educational Research and Improvement.

Javits Program

The Javits program is a part of the 1988 Elementary and Secondary Education Act that was reauthorized in 2001. This provides the only federal funding apportioned specifically to address the needs of gifted and talented students. The core focus of the Javits Act is to fund a significant body of scientifically based research along with demonstration projects and exploration of innovative strategies to better serve gifted learners. An overt goal of the Javits program, described in this

entry, is to fundamentally change the field of gifted education through the recognition of gifts and talents in children from groups of children who have historically not been associated with giftedness. The program focuses on identifying youths who are talented and have a more difficult time accessing gifted programs and students who are disadvantaged because of their economic, ethnic, or language backgrounds. Through various grants and the work of the National Research Center, the Javits program identifies and meets the needs of underrepresented gifted and talented students by establishing programs of research, disseminating effective practices, and the continued development of an organized body of researchers and practitioners who advocate for gifted education services.

This program is named for Jacob K. Javits (1904–1986). Born in New York City, Javits supported himself through Columbia University working as a salesman before graduating from New York University Law School in 1926. During World War II, he suspended his law practice and served in Europe, attaining the rank of lieutenant general. Entering the political arena, Javits served in the U.S. House of Representatives and the Senate for 31 years. As the only Jewish senator at the time and having experienced prejudices in his early life, Javits was attuned to the disadvantages and challenges faced by a variety of minority groups. Senator Javits was a liberal Republican in disposition and supported social reform efforts, advocating for labor unions and the civil rights movements. He played a major role in legislative acts protecting the rights of pensioners, removing immigration quotas that favored Western Europe, and promoting the War Powers Act and the Javits-Wagner-O'Day Act, which championed the employment of thousands of blind and disabled employees.

The Javits program is unique in its emphasis. Through a coordinated mixture of scientifically based research and demonstration projects, the Javits program researches how to identify and foster underrepresented gifted students, and how to implement this research in elementary and secondary schools. These programs often take the form of providing professional development to teachers who provide the direct services to gifted children. Generally, the Javits program embraces in-depth research, demonstration projects, and school training to better serve the educational needs of gifted students.

An issue the Javits program faces is the serious achievement gap between certain groups of students at the highest levels of achievement. To close the achievement gap, the Javits programs bestows discretionary grants to schools and supports research centers. Discretionary grants are awarded to promising project proposals submitted to the Department of Education. Under the most recent funding opportunities, institutions of higher education, local educational agencies, nonprofit organizations, and state education agencies may all apply for Javits grants. The funding has been limited in recent years, however, leading to failure to fund new programs in FY 2006 and 2007 and with projects limited to extensions of previous projects and findings in FY 2008. These project proposals address a variety of subtopics, such as exploring the procedures and instruments that may be used to identify gifted students, enhancing teacher preparation programs, increasing attention on the attitudes of school personnel, and increasing the expectations concerning gifted students. Broader research topics examining the educational, psychological, and social experiences of gifted youth are also examined. Basic research findings from these programs support discovery of the general nature of giftedness, unique needs and challenges for the gifted, and promising pedagogical advances for instructing gifted learners.

The projects supported by the Javits program include a myriad of topics focused on meeting the needs of gifted learners in traditional school settings. Conferences and professional journals focused on disseminating successful strategies for meeting the needs of gifted learners repeatedly report the findings from Javits programs. The findings from these intensive research or demonstration grants have led to widespread changes in how gifted learners are viewed and educated. For instance, research through Mentoring Mathematical Minds (Project M^3) demonstrated the ability to tap previously unseen talent in children from a socially and economically diverse group of third through fifth graders from Connecticut and Kentucky. In the program, many of the target students were displaying average or below average performance and their abilities in math went unnoticed.

Involvement in Project M^3 proved successful in helping these traditionally underserved students unlock their math potential through interactive and personalized learning activities. One of the key elements seen in several other programs leading to the success of Project M^3 was the adapted selection process that considers more than just IQ or standardized achievement testing alone to draw upon teacher nominations and measures of nonverbal mathematics ability.

Another example program supported by the Javits program is Clustering Learners Unlocks Equity (Project CLUE). Project CLUE built on an earlier Javits program (Project GATE) that was designed to modify the selection procedures and programming for gifted education placement in a large urban school district. The unique aspect of Project CLUE was the reality that the identification procedures and gifted services model established based on empirical research from Project GATE set the stage for continued refinement of the instruction of gifted learners in an underprivileged urban setting. Project CLUE continued to focus on identification of gifted learners from diverse populations by using nonverbal measures of ability, teacher rating forms for identifying potential for talent in math and science, and standardized tests of achievement. The revised identification process identified some level of school resistance to newer methods of identification, which was resolved over time with targeted training on the purpose of gifted identification and programming. Another innovation of Project CLUE was the implementation of a gifted instruction model that targeted cluster grouping as a strategy for gathering gifted learners together for content-specific differentiated instruction while they remained in the students' standard classrooms. Findings from Project CLUE have demonstrated success for gifted students who were identified with new models of gifted identification and those who received differentiated instruction in a cluster group setting. The findings also revealed the importance of promoting gifted programming research that examined curriculum development because the findings also revealed that providing teachers with prepared curriculum activities that met the expectations for high-quality differentiated instruction was a fundamental requirement to academic excellence.

Project Breakthrough focused less on identifying gifted students in a certain topic. While implementing advanced curriculums in science and social studies, Project Breakthrough strongly advocates and endorses teacher training that helps teachers use approaches that challenge students and facilitates the shift in teacher's opinion about what abilities students have. Over 3 years, the students demonstrated increased achievement. Many students that had been categorized as low achieving made the most significant increase in cognitive abilities. Also, the teachers who participated in Project Breakthrough gained greater awareness that they had underestimated the abilities of many students.

In another funded project, Project SAIL endorsed the idea that mathematics depended on learning one concept before you could advance onto the next concept. As a result, the fastest learners in a classroom would not be taught new material until the slowest learners had understood the material as well. To correct this, Project SAIL allowed students to learn and proceed at a much more individualized and customized pace. Project SAIL worked with Grades 2 through 4 in an urban school with mostly underrepresented students. As a result of this project, most of the students demonstrated a two- or three-grade increase in their mathematics ability after one school year of instruction. Furthermore, these students performed better on standardized tests administered years after the program.

More than providing just grants to already established project ideas, the Javits program affords funds to support the National Research Center for the Gifted and Talented (NRC/GT) currently formed through a partnership between the University of Connecticut and the University of Virginia. As a way to use research and implement the education of underrepresented students, the Javits program established this research center to provide a forum where researchers, practitioners, policymakers, and educators may share information, and a place to compile the data that research has gleaned. In the current cycle of the NRC/GT, the focus is on establishing a greater understanding of "what works in gifted education" and developing a theoretical rationale for why those activities have proven successful.

The contributions of programs receiving funds through the Jacob K. Javits Gifted and Talented

Students Education Program have been undoubtedly pivotal in changing the framework of education and research for gifted populations. From fundamental research to classroom applications, the Javits program has provided a valued and necessary revenue stream to maintain quality innovations and exploration during the past 20 years. However, there is a need for constant vigilance because the funds have been cut from the federal budget repeatedly during the past 20 years. There has been widespread acknowledgment that the grassroots efforts toward advocacy for gifted programming and research has been essential to the continuation of funding.

Jerrell C. Cassady and Marjurie Ribeiro

See also American Psychological Association Center for Gifted Education Policy; Center for Gifted Education; Center for Talent Development; Diversity in Gifted Education; Gifted Education Resource Institute; Identification; National Research Center on the Gifted and Talented; Underrepresentation

Further Readings

Biographical directory of the United States Congress. (n.d.). *Javits, Jacob Koppel, (1904–1986)*. Retrieved May 11, 2008, from http://bioguide.congress.gov/scripts/biodisplay.pl?index=J000064

National Association for Gifted Children. (2008). *Jacob Javits gifted and talented students education act*. Retrieved May 11, 2008, from http://www.nagc.org/index.aspx?id=572

National Association for Gifted Children. (2008). *Javits program supports high-ability learners from underrepresented populations*. Retrieved May 11, 2008, from http://www.nagc.org/uploadedFiles/PDF/Advocacy_PDFs/Javits%20-%20underrep%20pops.pdf

O'Neil, J. (2006). Beautiful Minds. *NEA Today,* 34–36.

Pierce, R., Adams, C., Speirs Neumeister, K., Cassady, J. C., & Dixon, F. (2007). Development of an identification procedure for a large urban school corporation: Identifying culturally diverse and academically gifted elementary students. *Roeper Review, 29*(2), 113–116.

Speirs Neumeister, K., Adams, C., Pierce, R., Cassady, J., Dixon, F., & Cross, T. (2007). Fourth-grade teachers' perceptions of giftedness: Implications for identifying and serving diverse gifted students. *Journal for the Education of the Gifted, 30*(40), 479–499.

U.S. Department of Education. (n.d.). *Jacob K. Javits gifted and talented students education program*. Retrieved May 11, 2008, from http://www.ed.gov/programs/javits/index.html

Journal for the Education of the Gifted

The *Journal for the Education of the Gifted* (JEG) is the official journal of The Association for the Gifted (TAG), a division of the Council for Exceptional Children, the largest international organization focusing on people with exceptionalities. TAG began in 1958, and JEG is now in its 32nd volume. JEG is currently abstracted in Psychological Abstracts and PsychINFO, Current Index to Journals in Education, Exceptional Child Education Resources, Educational Administration Abstracts, Child Development Abstracts and Bibliography, Social Sciences Citation Index® (SSCI®), and Research Alert. The journal is a partnership between TAG and Prufrock Press.

Devoted to excellence in research, the journal acts as a forum for diverse ideas and points of view on all topics relating to the lives of students with gifts and talents. As an international journal committed to the analysis and communication of knowledge and research on gifted children, the journal acts as a highly respected voice for those involved with gifted and talented children. Many of the world's best-known authors have published in the journal and several of the field's most respected researchers have served as its editor (e.g., Carolyn Callahan, James Gallagher, Laurence Coleman, Tracy L. Cross).

To date, this quarterly journal has published more than 600 articles reporting the latest research findings on topics such as the characteristics of gifted children, the evaluation of effective schools for gifted children, gifted children with learning disabilities, the history of gifted education, and the creation and maintenance of successful gifted and talented programs. JEG also publishes original research with practical relevance to the education of the gifted and talented, theoretical position papers, descriptions of innovative programming and instructional practices for the gifted and talented based on existing or novel models of gifted education, reviews of the literature in

areas pertinent to the education of the gifted and talented, and historical perspectives.

Purpose

JEG's major purpose is to communicate information about the needs of gifted and talented children. The journal also serves as a forum for the exchange of diverse ideas and points of views on the education of gifted and talented students. Articles that demonstrate a high degree of critical analysis in their treatment of salient themes relating to gifted and talented individuals are given priority. The publication includes theoretical, descriptive, and research articles. Articles describing original research with practical relevance to the education for gifted and talented individuals, theoretical position papers, descriptions of innovative programming and instructional practices for gifted and talented individuals based on existing or novel models of gifted education, reviews of the literature in areas pertinent to the education of gifted and talented individuals, and historical perspectives are encouraged for publication.

Submission Guidelines

The *Journal for the Education of the Gifted* welcomes manuscripts for consideration for publication. The following guidelines are used to assist authors preparing manuscripts for submission. Manuscripts are evaluated by multiple referees. To permit anonymity, a cover page must be included giving authorship and institutional affiliation but with only the title as a running head. A location note of any tables must be inserted whenever possible. Abstracts are 100 to 150 words. For information regarding citations, authors use the *Publication Manual of the American Psychology Association,* Fifth Edition. Manuscripts are accepted subject to editing. Manuscripts are submitted to mschafstall@bsu.edu, in care of Tracy L. Cross, editor.

Tracy L. Cross

See also Council for Exceptional Children—The Association for the Gifted; *Creativity Research Journal; Gifted Child Quarterly; Roeper Review*

K

Kaufman ABC Tests

The original Kaufman Assessment Battery for Children (K-ABC), a standardized, individually administered test of processing and cognitive abilities, was first published in 1983. At the time of its development, the K-ABC was innovative because it was both theory based and empirically grounded. Yet, the revision of the K-ABC, the Kaufman Assessment Battery for Children—Second Edition (KABC-II), substantially improved the quality of the measure in both theory and structure. This entry describes the K-ABC in its new revision and approaches to interpretation of the scores.

Although the original K-ABC was based on a single theory, A. R. Luria's neuropsychological model, the KABC-II has dual theoretical foundations with the addition of the Cattell-Horn-Carroll (CHC) model. The dual theoretical approach offers flexibility in interpretation because a clinician can choose an interpretive approach (either Luria or CHC) that suits a child's background, the reason for referral, and the clinician's orientation. Luria's theory posits that there are three functional blocks of the brain: arousal and attention (block 1); the analysis, coding, and storage of information (block 2); and executive functions for formulating plans and programming behavior (block 3). The second theory, the CHC model, is a hierarchical theory composed of three strata: general intelligence (*g;* stratum III), broad abilities (stratum II), and narrow abilities (stratum I). The KABC-II measures six broad abilities—fluid intelligence (*Gf*), crystallized intelligence (*Gc*), short-term memory (*Gsm*), long-term retrieval (*Glr*), visual processing (*Gv*), and quantitative knowledge (*Gq*)—and provides a *g* score as an overall score. Because of the two sets of scores in the CHC approach, it is possible to identify gifted children both from a general ability perspective and a specific ability perspective.

The KABC-II provides two global scores for a child's overall cognitive level: the Mental Processing Index (MPI) for Luria's theory and the Fluid-Crystallized Index (FCI) for the CHC theory. The biggest difference between the two global scores is that the MPI excludes acquired knowledge or *Gc.* Kaufman and Kaufman recommend that the CHC model be preferred to the Luria model because knowledge is an important aspect of cognitive functioning. The CHC theory is particularly relevant to assessing children for giftedness, mental retardation, learning disabilities, and so forth. In relating the CHC factors measured by the KABC-II to giftedness, *Gc, Gf,* and *Gv* are associated with higher-order thinking abilities and *Gq* is often related to specific forms of academic giftedness (e.g., mathematics). The remaining CHC factors, *Glr* and *Gsm,* however, do not appear to have clear relevance to giftedness in isolation. However, the Luria approach is useful in situations where including measures of *Gc* compromises the validity of the FCI (e.g., assessing children from nonmainstream cultural backgrounds).

Another important aspect of the KABC-II is its cultural fairness in assessing children from diverse minority groups. Ethnically diverse children tend

to score lower relative to Caucasian children on traditional intelligence tests. However, the KABC-II as well as the K-ABC reduced the global score group differences by incorporating teaching items and conducting expert bias analyses, item response analyses, and cultural validity studies, including nationally proportionate representations of ethnic minorities in the norm sample, and eliminating *Gc* from the MPI.

Substantial changes were made from the K-ABC to the KABC-II with 8 of the 16 original subtests retained and 10 new subtests added. The KABC-II places emphasis on specific, rather than global, constructs and therefore allows for an understanding of children's learning abilities. In addition, the KABC-II expanded the age range of the K-ABC (ages 2 to 12) into ages 3 to 18. Along with the broader range of ages, the KABC-II strengthened floors and ceilings by adding the sufficient number of easy and difficult items, respectively. In the case of ceilings, the KABC-II yields high scores up to 160 (4 SDs above the mean) across age groups, which enhances the assessment of gifted children.

The age range of the KABC-II is divided into three levels (age 3, ages 4–6, ages 7–18). Depending on the age level of the child and the interpretive approach the clinician chooses, there are one to five scales. For age 3, only one scale, a global score, is offered. For ages 4 through 6, three scales for the Luria model and four scales for the CHC model are available. For ages 7 through 18, four and five scales are provided for the Luria and the CHC model, respectively. The scales in the Luria perspective correspond to learning ability, sequential processing, simultaneous processing, and planning ability. The scales in the CHC approach refer to broad abilities. Moreover, the KABC-II provides a Nonverbal Scale consisting of subtests administered and responded to in a nonverbal manner. The Nonverbal Scale allows for valid assessment of children with hearing impairment, speech or language impairment, limited English proficiency, and so on. Further, the KABC-II was standardized on a U.S. representative sample of 3,025 children using the 2001 U.S. Census data and has strong psychometric properties, as evidenced in reliability and validity studies in the manual.

The KABC-II is an effective clinical, psychoeducational measure that has dual theoretical foundations and strong empirical evidence. Some of the aspects of this instrument, such as the CHC theory and strong ceilings, make it relevant for the assessment of gifted children in conjunction with informal measures of creativity and talent.

Sangwon Kim

See also Intelligence; Intelligence Testing; Intelligence Theories

Further Readings

Kaufman, A. S., & Kaufman, N. L. (1983). *K-ABC interpretive manual.* Circle Pines, MN: American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (1983). *Kaufman Assessment Battery for Children (K-ABC) administration and scoring manual.* Circle Pines, MN: American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (2004). *Kaufman Assessment Battery for Children* (2nd ed.) (KABC-II). Circle Pines, MN: American Guidance Service.

Luria, A. R. (1970). The functional organization of the brain. *Scientific American, 222,* 66–78.

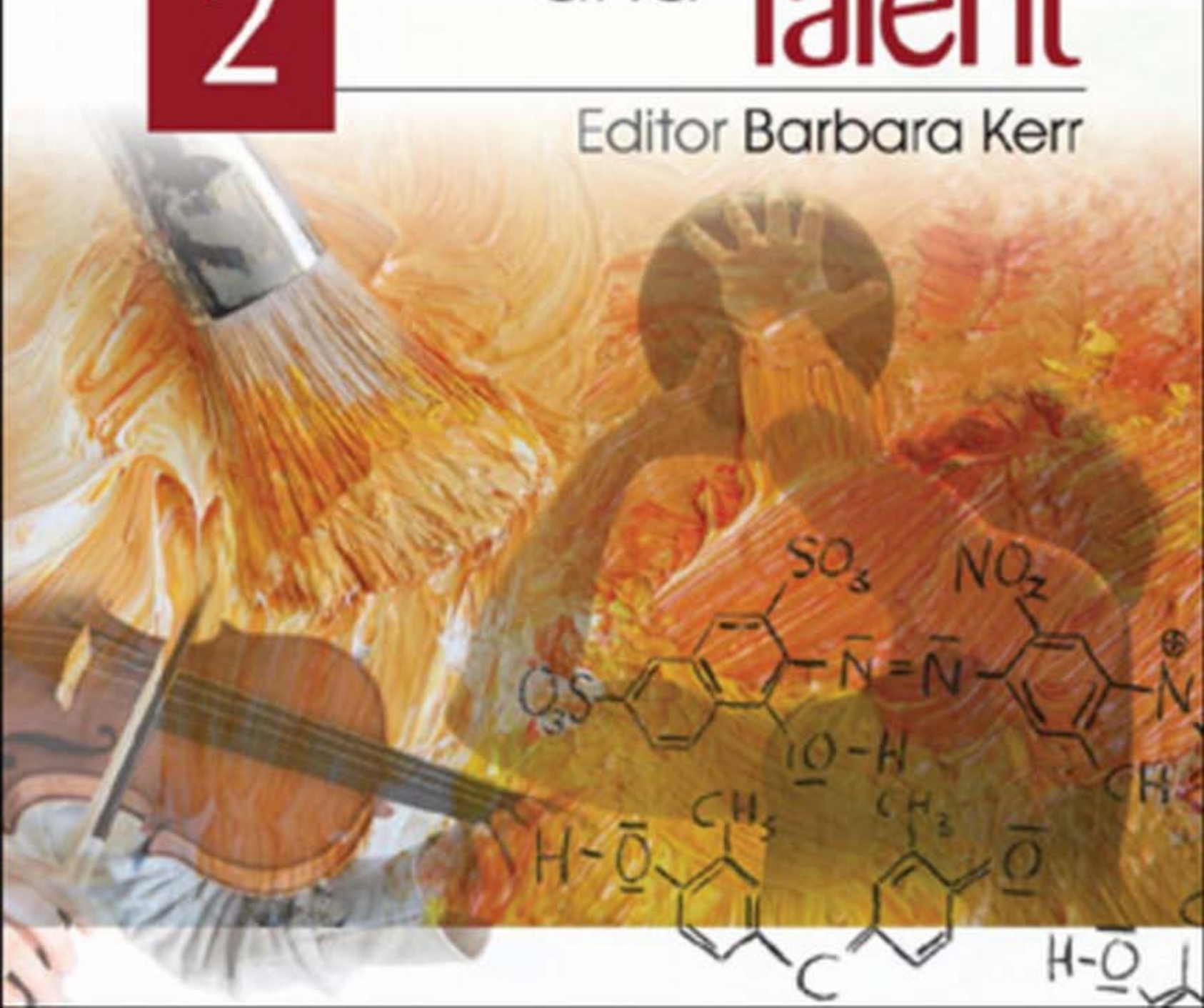
McGrew, K. S. (2005). The Cattell-Horn-Carroll theory of cognitive abilities: Past, present, and future. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests, and issues* (2nd ed., pp. 136–181). New York: Guilford Press.

Volker, M. A., Lopata, C., & Cook-Cottone, C. (2006). Assessment of children with intellectual giftedness and reading disabilities. *Psychology in the Schools, 43*(8), 855–867.

Encyclopedia of Giftedness, Creativity, and Talent

VOLUME 2

Editor Barbara Kerr



Encyclopedia of Giftedness, Creativity, and Talent

Editor Barbara Kerr
University of Kansas

VOLUME
2

SAGE
Los Angeles | London | New Delhi
Singapore | Washington DC

A SAGE Reference Publication

Language Arts, Curriculum

A typical language arts curriculum includes a wide range of receptive and expressive language skills, including reading, viewing, listening, thinking, writing, speaking, and performing. Topics taught within a language arts curriculum generally include grammar, vocabulary, rhetoric, literature, poetry, drama, criticism, research, and journalism. Standards promulgated by the National Council of Teachers of English mention even more language arts topics, including visual language, media techniques, databases, computer networks, and dialects across cultures.

This entry discusses language arts curricular constraints that hinder gifted children and discusses how teachers and parents can accelerate and enrich the language arts experiences of gifted children. The curricular and instructional strategies in this entry capitalize on various characteristics of gifted children, including strong curiosity, heightened concern with justice and fairness, advanced powers of reasoning, and tendencies to question authority. Although the strategies are listed under language arts areas, a reading strategy might include writing elements, and a grammar strategy might include reading elements. Many gifted children learn best when employing multiple aspects of language arts simultaneously.

Curricular Constraints

The language arts curriculum can be a source of frustration for gifted children. The spiral nature of the curriculum requires teachers to revisit language arts concepts introduced in prior years. A gifted child who learns how to use commas in first grade may have to listen to comma usage rules repeated in five or six subsequent grades. A gifted child who reads voraciously from an early age may find that spelling and vocabulary tests lack challenge. Novels assigned to an entire class are often below the reading level of gifted students.

Teachers' good intentions and school districts' textbook adoptions can add to the frustration felt by gifted language arts students. Teachers who lack knowledge about the needs of gifted children might believe that a basic enrichment section of a spelling book, which includes adding "er" suffixes to the regular spelling words, is sufficient differentiation. Long after a particular gifted child has mastered the art of writing organization, secondary teachers might insist that the child continue to follow a rigid five-paragraph essay template taught in the school's writing textbooks. A school system that adopts literature textbooks with abridged versions of novels and other writings might frustrate gifted children who crave entire works.

The key to meeting the language arts needs of gifted learners lies in departure from curricular constraints. The best teachers and schools recognize that gifted language arts learners need to explore the arts of language at their own learning levels and speeds. Gifted children should not be instructed on material they have already mastered. Gifted children should be offered language arts instruction with appropriately challenging and complex material that allows them to use their minds well.

The remainder of this entry includes language arts curriculum strategies for implementation with

gifted children. Some of the strategies involve differentiation or replacement of the curriculum and other strategies involve incorporation of typically extracurricular language arts learning into the language arts classroom. The purpose of these strategies is to extend the language arts learning of gifted children who have already mastered basic language arts skills typically taught to children their age. The teaching of these strategies can involve multiple disciplines, offer children choices, and give children opportunities for reflection. The strategies, when carefully implemented, can satisfy complexity, depth, and expressive needs of gifted children.

Strategies

Reading

Many gifted children learn to read at early ages. Indeed, early reading is one of the chief characteristics of gifted children. Gifted children who read extensively through the elementary school years typically excel in other language arts areas because advanced reading expands children's vocabularies, writing skills, and thinking skills.

Differentiating a reading curriculum for advanced readers presents little challenge for teachers in schools with good libraries and willing librarians. Librarians are generally adept at finding books appropriate for readers of all levels and interests. Advanced readers in elementary school benefit from being released from reading group instruction time to find appropriate books in the school library. Advanced readers in middle school and high school can sometimes benefit from having teachers learn their interests and feed those interests with appropriate books.

Reading lists, including lists of Newbery award winners for elementary school students and lists of books recommended for high school students by the College Board and by the American Library Association can provide fertile ground for extending the literature curriculum for gifted readers. Opportunities to interact with well-read adults, those who are able to draw on a vast knowledge of classic and current literature to interest gifted learners in reading and discussing the works, also can benefit gifted children. With careful adult guidance, gifted readers can find and enjoy advanced books on topics appropriate for their maturity levels.

Writing

Some gifted learners learn writing intuitively; they don't need to be taught how to use transitions, how to employ good voice, or how to vary their sentence structures. Some gifted learners automatically write in the style of their favorite authors, and some exude logic almost directly from their minds to their papers.

The best teachers recognize that writing curricula such as writing traits systems should be used sparingly with advanced learners, who might lose their writing fluency if forced to dissect their written works into traits such as ideas, content, organization, vocabulary, sentences, and conventions. Yes, gifted children can benefit from using writing traits rubrics, but teachers should think twice before giving children who have mastered one or more writing traits additional instruction and assignments on those traits.

One strategy for differentiating a school's writing curriculum and instruction to meet the needs of gifted children involves actually sharing the school's curriculum with the students and asking them to use their powers of abstraction, conceptualization, and synthesis to comment on what parts of the curriculum apply and what parts do not apply to their own learning about writing. Such metacognitive exercises extend beyond writing into critical thinking and evaluation.

Another writing strategy for use with gifted children is to encourage them to establish and build their own writing portfolios, with samples of a wide variety of writing forms and styles. When the portfolio assignments are relevant to their interests, students are more likely to feel responsibility and pride about their writing skills. Teachers can give each student an individualized checklist of the forms and styles to include in the student's portfolio. The teacher can customize each checklist to match the interests and abilities of the child. The writing assignments on the checklist can be blended with learning in other language arts areas including reading, grammar, and vocabulary development.

Grammar

Many teachers are reluctant to delve into the mechanics of grammar, perhaps because they themselves do not know grammar on a deep level. Few elementary and secondary teachers have backgrounds

in linguistics, or extensive experience diagramming sentences. Often, secondary language arts teachers leave the teaching of grammar concepts to the foreign language department.

Gifted learners fortunate enough to have language arts teachers with linguistics backgrounds or with advanced sentence diagramming skills often thrive when learning grammar on complex levels. Even teachers without appropriate grammar backgrounds can introduce gifted learners to the many good Web sites available for teaching Reed-Kellogg sentence diagramming and advanced principles of grammar. College writing center Web sites often contain advanced grammar information presented in interesting ways.

To combine grammar learning with critical thinking skills, teachers can interest gifted learners in analyzing language arts textbooks from various grade levels to analyze when and how those books present grammar concepts. Also, teachers can introduce advanced learners to grammar style guides used by professional writers, including style guides by the Modern Language Association, the American Psychological Association, and various journalism organizations. Students can then write reports and present their findings, thus blending skills in presenting, writing, using correct grammar, and critical thinking.

Vocabulary

Children learn vocabulary naturally at an astounding rate. By some estimates, average children learn 5,000 vocabulary words during 4 years in high school. Children who read extensively and take challenging courses learn even more words during their high school careers, sometimes 10,000 or more in 4 years. Vocabulary acquisition is rarely a problem for gifted children who read extensively.

One method for helping gifted children blend vocabulary development with thinking skills involves teaching word roots and word families. Inquisitive minds love learning stories behind word roots, such as the fact that the root "bell" as in *bellicose* and *belligerent* came from the goddess Bellona, the wife of Mars, the Roman god of war. The word *philosophy* includes "phil," which means love, and "osophy," which means knowledge; philosophers are lovers of knowledge. Gifted children often enjoy learning that most common English word roots are also common in Spanish and French. Teaching word roots gives gifted children critical thinking skills with which to unlock English as well as other languages.

In addition to enjoying word roots, gifted children may also enjoy categorizing new words into families and learning their etymology. Teachers with knowledge of the history of the English language can fascinate children by reciting the Middle English prologue to Chaucer's *Canterbury Tales* from 1300, by displaying the incomprehensible Old English of *Beowulf,* and by explaining the Norman Conquest and its effects upon the English language. Why do we use the Anglo-Saxon words *cow* and *pig* for the animals in the field, but the French-originated words *beef* and *pork* for the meat on our plates? Etymological mysteries abound, which can fascinate children sent on treasure hunts to discover the origins of words.

Research Skills

Because research skills serve as road maps for the natural curiosity of gifted children, these children benefit from the teaching of research skills at early ages. As soon as young children learn to use the library, they can learn the Dewey Decimal System and other cataloging systems adopted by the libraries they visit. As soon as children learn to use the Internet to find information, they can learn how to evaluate Internet sources for reliability. Because one of the characteristics of gifted children is an enhanced sense of justice, many love investigating the veracity of Internet sources and uncovering bias.

Some gifted children also enjoy learning to use computer programs for organizing their research findings, and some enjoy learning about the many citation formats used in research. Teachers need not understand the intricacies of computer programs; most gifted children enjoy figuring out computer programs themselves. Rather than teach just one citation format to gifted children, teachers can encourage gifted children to compare and contrast several citation formats and learn where and when those formats are used. The results of this compare-and-contrast work can be incorporated into a child's writing portfolio and can be presented to other students.

Challenges and Opportunities

The spiral nature of the language arts curriculum in most schools provides both challenges and opportunities for the teaching of gifted children. The

challenges exist because gifted children often master language arts concepts after one or two repetitions, yet the same concepts are repeated in the curriculum year after year, from introduction, to reinforcement, to mastery in time sequences intended for average children. The opportunities exist because the characteristics of gifted children and the purposes of the language arts curriculum match well. Complexity, challenge, and creativity can be added easily to the language arts curriculum.

Wenda Sheard

See also Classical Languages Curriculum, Gifted; Classics/Great Books; Secondary School, Writing Curriculum

Further Readings

Cramond, B. (1993). Key components of a complete language arts program for the gifted. *Roeper Review, 16*(1), 44–48.

Fehrenbach, C. R. (1994). Cognitive style of gifted and average readers. *Roeper Review, 16*(4), 290–292.

Johnson, D. T., Boyce, L. N., & VanTassel-Baska, J. (1995). Science curriculum review: Evaluating materials for high-ability learners. *Gifted Child Quarterly, 39,* 36–43.

VanTassel-Baska, J. (2002). Assessment of gifted student learning in the language arts. *Journal of Secondary Gifted Education, 13*(2), 67–72.

VanTassel-Baska, J. (2003). Differentiating the language arts for high ability learners, K–8. *ERIC Digest* E474306 2003–01–00.

VanTassel-Baska, J., Zuo, L., Avery, L. D., & Little, C. A. (2002). A curriculum study of gifted student learning in the language arts. *Gifted Child Quarterly, 46*(1), 30–44.

Latin America/South America, Gifted Education

The quest to identify and serve gifted students in Latin America and South America was initiated in the early 1970s. The most comprehensive resource available in this area is *La educación de niños con talento en Iberoamérica (The Education of Gifted Children in Ibero-America)*. This significant work was published in 2004 by the Regional Office of Education of UNESCO for Latin America and Caribbean Countries. The report concludes, as noted later, that Hispanic America has undergone a trajectory similar to that of the United States:

- Sharing a democratic philosophy, preference has been given to understanding and meeting the needs of students with disabilities, whereas there is reticence to accept that the gifted and talented, misconceived as a privileged elite, should be granted additional advantages.
- There is a tendency to believe that giftedness excludes the possibility of a concomitant disability.
- There is universal agreement that giftedness and talent must be identified through multiple means and developed throughout the school experience.
- The private institutions located in large, prosperous cities, rather than the public sector, have led the movement to consider this population.
- Certain countries, Spain in particular, have promulgated national legislation to meet the needs of the gifted and talented but little has occurred in practice largely because of lack of funding.
- A primary concern has been to find an appropriate curriculum design within the regular program or in self-contained magnet centers, schools, or academies.
- Some schools promote acceleration, others favor enrichment, but research is lacking to support either model.
- Research is needed to validate theoretical approaches.
- Finally, there is a paucity of teacher training to identify and develop the diverse aptitudes and talents among the gifted population.

In most gifted education programs in South America, talent or *talento* refers to extraordinary aptitude in a specific field such as music, theater, or athletics, whereas giftedness or *superdotación* refers to general intellectual ability. The consensus favors a multidimensional view of intelligence, an operational definition of talent and giftedness, the notion that intelligence assumes divergent thinking, and, finally, that giftedness includes intellectual prowess, personality attributes, and appropriate environmental opportunity to develop abilities. Thus, identification should be viewed as a process of discovery and continuous nurturance of talent and potential.

Argentina, Brazil, Chile, Colombia, Cuba, Mexico, Peru, Spain, and Venezuela each have legislation, programs and services, and documented research on gifted and talented. These are documented in Table 1.

Table 1 Gifted Education in Latin/South America[1]

Argentina

Legislation

1993	*Ley Federal de Educación,* Ministerio de Educación, Ciencia y Tecnología, Chpt VII, Article 33.
1991	*Asociación de Padres Apoyo a la Creatividad y el Talento (ACT)* nonprofit organization raises awareness and support for the gifted.
1992–2002	*Instituto Creatividad y Talento (ICT)* offers classes of 12 students using a flexible, interdisciplinary, spiral curriculum that increases in depth and complexity.
	Closes its doors due to lack of funding and support.
1993	*Ley Federal de Educación,* Ministerio de Educación, Ciencia y Tecnología, Chpt VII, Article 33.
1993	*Fundación Evaluación de Talento y Creatividad* partners with the *Universidad Centro de Altos Estudios de Ciencias Exactas (CAECE)* to identify gifted and provide programming, professional development, and parent support. First to offer graduate training in gifted education.
1993	Schools promote early university enrollment based on ability and interest: Colegio Norbridge, Colegio San Bernardo de Claraval en Mendoza, Colegio Vera Peñaloza, Colegio Everardo de Casa Tilly.
1998	Buenos Aires recognizes high-ability students and establishes the position *maestra integradora* or resource teacher to serve students with disabilities and the gifted.
2000	*Centro para el Desarrollo del Alto Potencial (CEDAP)* assists schools with identification, teacher training in enrichment and acceleration, distance learning, creativity development, and parent seminars.

Programs and Services

Acceleration:	Early entry must be approved by the LEA
	By exam in high school
	Grade skipping if child is intellectually and emotionally ready
Enrichment:	In regular education through resource teacher
	With age peers in regular education
	Thematic curriculum at greater depth and complexity

Brazil

Legislation

1960s	Helena Antipoff establishes a humanities center for gifted rural children, *Hacienda del Rosario,* Minas Gerais.
1973	*Centro Nacional de Educación Especial (CENESP).*
1978	Founding of Brazilian Association for the Gifted (private).

(Continued)

Table I (Continued)

1971	Federal law mandates attention be given to students with disabilities and to those with superior abilities. Law calls for (a) proper identification, (b) an organized system of instruction, (c) professional development of teachers, and (d) an operational definition of giftedness.
1995	Brazilian government adopts definition: the gifted are those who perform at high levels or exhibit high potential in general intellectual ability or specific aptitude in an academic or artistic area. Many argue that to give more attention to those who are privileged with superior abilities is elitist.

Identification

Generally carried out by private psychologists who have little training dealing with the gifted; therefore, few are identified. Exclusive use of tests of intellectual ability yields to inclusion of creativity measures and parent or peer nomination.

Programs and Services

Generally consist of extracurricular enrichment programs.

1972	*Proyecto Objetivo de Incentivo al Talento* challenges 500 students to move at their own pace and extend their creativity in the humanities and technological fields.
1975	*Programa para la Atención del Alumno Superdotado de la Secretaría de Educación del distrito federal* offers fine arts, literature, math, science, computers and chess to 600+ children/ adolescents from public and private schools.

Chile

Legislation

1990	Educators become aware that gifted/talented students need to be understood and supported.
1998	*Decreto de Educación 220 del Ministerio de Educación* mandates diversity in education, implying due attention must be given to students with superior abilities. No distinction is made between the intellectually gifted and those with specific talents.

Identification

Teachers identify the gifted/talented using the criteria established by *PENTA-UC, Programa Educacional para Niños con Talento Académico:*

1. Personality characteristics
2. High logical and mathematical reasoning
3. High oral and written communication skills
4. High competency in social studies

Achievement tests in content areas and the Ravens Progressive Matrices as well as history of special awards are considered.

Programs and Services

Renzulli's Enrichment Model[2] has been adopted.

1993 *Pontificia Universidad Católica de Chile* identifies low SES children 9–10 years of age for an accelerated program in mathematics through high school.

2001 *Programa Educacional para Niños con Talento Académico* offers an enriched, inter-disciplinary program in the sciences and humanities, along with professional development for teachers.

Colombia

Legislation

1994 *La Ley 115 dentro del Título III de la Ley General de Educación* explains how persons with limitations or exceptional intellectual abilities are to be identified and served.

1996 *Decreto 2082* mandates the establishment of programs and services to students in private or public schools with a planned curriculum and teacher training.

Talent defined as general academic ability or in specific areas: theoretical talent, ability to create objects and processes, aptitude in science and technology, and emotional intelligence. Based on two philosophical principles: (1) All human beings have talent but there are those with superior talent; (2) early identification is necessary to prevent serious maladjustment, underachievement and failure.

Identification

Use measures to predict academic achievement, task commitment and perseverance, and high creativity. Look for students with high competencies and sustained focus to create products of higher quality and originality than those of age peers.

Use psychometric instruments of aptitude and interest, interviews and autobiographies, and classroom performance. The process includes a period of observation and exploration to determine if there is potential in a specific field.

Programs and Services

1980 First institutes emerged: Alberto Merani en Santa Fe de Bogotá and Alejandro Von Humboldt in Barranquilla.

2000 Private *colegios* or academies emerged: Cristóbal Colón, Camilo Torres, Rafael Uribe, Nicolás Esguerra, Francisco José Caldas, La Merced, República de Colón, Jorge Eliécer Gaitán, Florentino González, San Bernardo.

There are few public institutions. Most schools are located in the capital district of Bogotá.

Programs focus on the development of four stages:

1. Early identification for high potential at the primary grades.
2. Exploration of areas of interest at intermediate grades.
3. Identification of strengths and weaknesses in specific talent during early adolescence.
4. Implementation of educational plan under supervision.

(Continued)

Table 1 (Continued)

Research

Instituto Alberto Merani studies how gifted (IQ 130–170) interact with families. Most important influence in the development of talent is parent level of education, suggesting giftedness is related to privileged socioeconomic classes.

A statewide project in Itagui promotes academic achievement to improve the education and socioeconomic development of communities.

In Soacha, teachers are being trained to identify talented children early and further their growth and development in collaboration with university networks.

In 2002, the Fourth Latin American Congress on Giftedness and Talent in Santa Fe de Bogota brought to light the paucity of knowledge in the field, and the lack of university programs to train teachers and psychologists to identify and support the gifted.

During the last few years, government policies and initiatives are allocating funds to support scholarships for low SES gifted students to access private schools.

Cuba

Legislation and Programs

1970	The Castro government decrees establishment of special schools for students talented in mathematics and science.
1998	Eileen Donoghue and Bruce Vogell[3] describe the Lenin school or the *Instituto Preuniversitario Vocacional Ciencias Exactas Vladimir I Lenin*. The central boarding school enrolls 2,700 gifted boys and girls and provides a curriculum in the fine arts, humanities, science, and mathematics. An additional 14 regional schools that focus on math and science enroll 5,000 boys and girls.
	Patterned after the Russian model, the curriculum requires 20 hours per week of mathematics instruction, compared with 8 in regular schools. These are residential facilities, so students participate in a variety of after-school academic clubs, computer courses, and special seminars that prepare them for national competitions. Classes are scheduled for 11-week periods, followed by 3-day weekends which 11 students are required to spend at home with family.
	Admission requires recommendations from teachers, outstanding academic records, and successful performance on an admissions exam in mathematics and Spanish. The teacher/student ratio is 57:1, but all are committed to maintaining high academic performance standards. Teaching positions in these schools are highly competitive.
	Graduates from the Lenin Schools unfortunately do not have access to challenging university programs. In the past, many enrolled in Eastern European universities with support from socialist governments. The change in political alignments has limited these opportunities.
	Because the Cuban economy cannot absorb the number of talented math and science graduates each year, other Latin American countries import these students as a valuable human commodity.

Mexico

Legislation

Declaración de Salamanca supports services for students with disabilities.

1982	Concern for the gifted is viewed under the special education initiative. The standardization of the Wechsler Intelligence Scale for Children (WISC) identified gifted elementary students but no results are published.

1985 Eleven states initiate the gifted education movement.

1989–1994 *Programa de Capacidades y Aptitudes Sobresalientes (CAS)* was initiated as part of educational reform. Talent, gifted, and superior intellectual ability are used synonymously. CAS proposes that every state will design a model to address the needs of gifted students.

Identification

CAS in 13 of 30 states employs the same methods: sociometric surveys, the Renzulli-Hartman Scale, school grades, family socioeconomic status, interest survey and self-referral. Scores are ranked from high to low for selection.

In Monterey, the *Asociación Mexicana para el apoyo a sobresalientes (AMEXPAS)* uses the interest-a-lyzer on Howard Gardner's eight intelligences and other questionnaires.

In Cuernavaca, Morelos, observation, the Stanford Binet, and the Wechsler Intelligence Scale for Children—Revised (WISC-R) are used. *AMEXPAS* proposes to standardize identification and intervention strategies.

La Universidad de Guadalajara, Jalisco, and the *Centro the Estudios e Investigación de Creatividad Aplicada (CEICREA)* use the following: (a) For pre-identification, child and parent interview, Raven Colored Progressive Matrices, creativity tests, peer nomination, teacher recommendation; (b) To determine eligibility, the Benton Visual Memory Test, WISC-R, interest survey a parent multiple intelligences questionnaire; (c) To determine emotional health, anxiety and depression surveys and self-evaluation instruments.

Programs and Services

Games are considered pivotal because these tend to:

- Develop imagination and nurture creativity, independence, and a personal view of the world.
- Build logical thinking, inferential learning, planning, and metacognition.
- Develop moral and social values, such as teamwork and consensus building for the common good.
- Encourage spontaneity to examine reality from different perspectives and enjoy the creative process.
- Activate latent ideas and feelings and permit students to look at home/school factors that help them internalize reality and thus develop their own personality.

1997 Program is established in Sinaloa, Monterrey, Chiapas, and the federal district. A summer program is included.

1998 *Proyecto Talentitos by Centro de Estudios e Investigacion de Creatividad Aplicada* by Dolores Valadez Sierra proposes to help parents and educators guide children to become actualized, confident adults who use their creativity to face a competitive world. Program has served 400 students ages 3 to 12 and trained more than 200 teachers in summer and enrichment classes during the year. A newsletter is published with children's work and parent essays on how to guide gifted children.

Research

2002 Valadez[5] et al. from the University of Guadalajara used WISC to identify a 3% gifted population from 519 fourth graders in seven schools in Guadalajara and evaluated identification measures:

- Teacher questionnaires miss gifted underachievers.
- The Renzulli SCRBSS (6) yields high numbers as children are keen observers of each other's talents and abilities.
- Raven Matrices is a good tool for initial pool, but not for final selection and should not be used to determine intellectual abilities.
- Creativity tests identify only 50% of the gifted. Creativity is not exclusive to the gifted.
- Recommend combined use of standardized tests and questionnaires.

(Continued)

Table 1 (Continued)

Peru

Legislation

1971	Special education legislation is instituted.
1983	Ley General de Educacion 23384, Art 68 mandates special attention to those with disabilities as well as the *niño talentoso* or *sobresaliente*. Up to now focus is on the masses rather than the individual.
2001	*La guía de organización y funcionamiento de los programas de intervención con niños con necesidades educativas especiales por superdotación y/o talento*. Peru provides a guide for instructional organization of gifted programs.
2002	*Jefatura de Educación Especial Ley 28044 Art 18* promotes programs for gifted/talented, provides scholarships for those with low SES to continue their education, and calls for provisions of challenging curriculum within regular education.

Identification

There is no single process.

First level criteria: academic achievement, perseverance, task commitment, and motivation to learn.

Second level criteria: WISC-R 130 IQ + Renzulli Scales for Rating the Behaviors of Superior Students (1997), high score on interest/motivation.

Spain

Legislation

1970	*Ley General de Educación y Financiamiento de la Reforma Educativa* first mentions that attention will be given to needs of the *superdotados* for their own welfare and the benefit of society. Later, Article 53 adds "they will be instructed in the regular classroom but will be given individual attention to actualize their potential."
1990	*Libro Blanco para la Reforma del Sistema Educativo* states, "utilize curriculum enrichment to meet their needs effectively . . . and necessary resources to enable them to reach their potencial."
1995	*Decreto 696* specifically mandates that the system identify and provide for the needs of the intellectually gifted. Counseling programs in secondary schools will have the services of "trained psychologists and educators to meet the needs of the gifted and their parents." This addresses the gifted underachievers who may also have low self-esteem.
2002	*La Ley Orgánica de la Calidad de la Enseñanza (LOCE)* stipulates the administration shall: (a) pay specific attention to the intellectually gifted; (b) promote the early identification of the needs of the intellectually gifted; (c) regulate a flexible attendance schedule in various grade levels, independent of age; (d) establish centers equipped to provide appropriate services to the intellectually gifted; (e) provide professional development for teachers and support services for parents. Despite this legislation, the current situation is disappointing because the needs of the intellectually gifted are still not part of teacher training programs. Andalucía has published a pamphlet and questionnaire for teachers and counselors delineating steps to support and follow-up the progress of these students.

In Galicia, departments and special teams have been created to monitor the progress of 300 students who are receiving enrichment services.

In Madrid, flexible scheduling allows the intellectually gifted to proceed at a pace commensurate with their abilities and increased student participation in extracurricular programs.

In the Basque country, laws have been created to regulate the identification and implementation of differentiated curriculum.

The *Comunidad Foral de Navarra,* follows the state norms for identification and service by specially trained teams to include the gifted in the regular program.

Identification

Practices include standard measures of intellectual ability, specific aptitude, achievement batteries, measures of creativity and divergent thinking, along with teacher/parent/peer and self-nomination questionnaires.

Yolanda Benito and colleagues propose a 3-month referral process: First, a thorough evaluation of student abilities, creativity, self-concept, learning styles, problem-solving approach, interests and favorite activities, task commitment, and goals; second, review the school characteristics, resources, and quality of relationships between students and teachers; third, consider family characteristics, cooperation, and expectations. Finally, the community environment is tapped for resources that further student growth and development. A protocol is available to track the process from identification to parent consent for evaluation and implementation of intervention plan.

Venezuela

Legislation

1950 Jesuit priest Carlos Guillermo Plaza founds the first school for children with high aptitude.

Psychologist Andres Bello, founder of the Universidad Católica de Caracas, advocates for the gifted with attention deficits.

1967 Emergence of first special education classrooms for the deaf and blind.

1970 CREÁTICA establishes movement for the study of intelligence and promotes a student-centered approach for educational reform.

1973 *Fundación CENAMEC Centro nacional para el mejoramiento de la enseñanza de la ciencia* seeks to train teachers to develop creative, investigatory, active attitudes and thus influence their students. Founds Scientific Olympics in math, chemistry, physics, biology and oil industry.

1975 *Conceptualización y Política de la educación especial en Venezuela*. Establishes basic principles:

- *Democratización:* All children have the right to equal opportunity to develop their abilities.
- *Modernización:* Early intervention will prevent deficiencies.
- *Normalización:* evaluation of abilities to promote strengths and provide service. Include families in process.

Integración: A dynamic process that opposes segregation into special schools or classrooms.

1986 *La Ley Orgánica de Educación, Art 30 & 32*. Promotes focus on talented children. Clarifies misconception that gifted students are frequently referred for counseling due to ADHD or behavior problems.

A UNESCO publication, *The Education of Gifted Children in Ibero-America,* offers an overview of the education situation of gifted students in seven Latin American countries and in Spain. The Ibero-American conference on gifted and talented provides an opportunity for edcators in Hispanic-speaking countries to come together to discuss research and training in gifted education.

Notes

1. Benavides, M., Maz, A., Castro, E., Blanco, R. (Eds.). (2004). *La educación de niños con talento en Iberoamérica*. Oficina Regional de Educación de la UNESCO para América Latina y el Caribe. Santiago, Chile: Editorial Trineo S.A.
2. Renzulli, J. S., Reis, S. M. Y., & Smith, L. M. (1981). *The revolving door identification model*. Mansfield Center, CT: Creative Learning Press.
3. Donoghue, E. F., & Vogeli, B. R. (1998). Cuba's Schools for the Mathematically and Scientifically Talented. *Gifted Child Today Magazine*, *21*(3), 32–35.
4. Renzulli, J. S. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness*. Cambridge, UK: Cambridge University Press.
5. Valadez, S. D.,Villegas, V., & Gutiérrez, S. (2002). Identificación de niños sobresalientes en escuelas públicas de la ciudad de Guadalajara. Ponencia presentada en el IV Congreso Iberoamericano de Superdotación y Talento, celebrado en Santa Fe de Bogotá, Colombia, del 9 al 11 de octubre.
6. Renzulli, J. S., et al. (1997). *Escalas de Renzulli (SCRBSS) para la valoración de las características de comportamiento de los estudiantes superiores*. Salamanca: Amarú Ediciones.

Rosina M. Gallagher

See also Cultural Conceptions of Giftedness; Giftedness, Definition

Further Readings

Alencar, E., & Blumen, S. (2001). Programs and practices for identifying and nurturing giftedness and talent in Central and South America. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 817–828). Oxford, UK: Pergamon.

Benavides, M., Maz, A., Castro, E., & Blanco, R. (Eds.). (2004). *La educación de niños con talento en Iberoamérica* [The education of gifted children in Ibero-America]. Oficina Regional de Educación de la UNESCO para América Latina y el Caribe. Santiago, Chile: Editorial Trineo S.A.

Donoghue, E. F., & Vogeli, B. R. (1998). Cuba's schools for the mathematically and scientifically talented. *Gifted Child Today Magazine, 21*(3), 32–35.

Renzulli, J. S. (1986). The three-ring conception of giftedness: A developmental model for creative productivity. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness*. Cambridge, UK: Cambridge University Press.

Renzulli, J. S., Reis, S. M. Y., & Smith, L. M. (1981). *The revolving door identification model*. Mansfield Center, CT: Creative Learning Press.

Tourón, J., Tourón, M., & Silvero, M. (2005). The Center for Talented Youth Spain: An initiative to serve highly able students. *High Ability Studies, 16*(1), 121–135.

LEADERSHIP

More than 7,000 books and articles have been written on leadership. A great deal is known about leadership, although considerably less about early precursors of leadership, how leadership develops in youth, and the relationship of leadership ability and intellectual giftedness. Several youth organizations have played important roles in creating early leadership opportunities for children and adolescents. For example, one of the most widely recognized youth organizations, the Boy Scouts of America, celebrates its 100th anniversary in 2010. In the United States today, more than 3.9 million youth are members of the Boy Scouts and Girl Scouts. Scouting is hugely popular internationally; membership in Indonesia exceeds 8 million; there are almost 2.7 million scouts in India, and more than 1 million scouts in the Philippines and Thailand.

Other youth organizations that are value-based and that emphasize group activities, character development, and civic engagement include the American Youth Foundation and 4-H. Along with the scouting movement, these youth organizations have played a significant role in early leadership development opportunities for youth. This entry provides a brief discussion about what researchers

know and don't know and likely future directions of youth leadership development.

What Is Leadership?

Leadership is persuasion; it involves influencing other people to pursue a common goal or mission that is considered important to the group. Leadership is *not* domination; leadership requires others to willingly adopt the goals or mission of the group as their own, even for a brief period of time. Leadership requires creating a shared vision, building trust and confidence, and enabling others to act toward a common goal. Fred Fiedler developed a contingency or situational theory of leadership. Fiedler proposed that three important situational dimensions influence the leader's effectiveness: leader-member relations, task complexity/structure, and the power inherent in the leadership position. Fiedler's contingency leadership model implied that leadership style is difficult to change. Paul Hersey and Kenneth Blanchard (coauthor of the *One Minute Manager*) extended and modified Fiedler's model and articulated a three-dimensional approach for assessing leadership effectiveness. Their situational leadership model suggested that successful leaders do adjust their styles. For Hersey and Blanchard, the key issue in making these leadership style adjustments is follower maturity; in other words, the group member's readiness to perform in a given situation. Hersey and Blanchard also recognize the importance of the leader's task and relationship behaviors, and how the individual's leadership style interfaces with the task situation. Hersey contends that successful leaders are those who can adapt their behavior to meet the demands of their own unique situations. Adaptability is central to this model; the leader must adapt a combination of directive behaviors and supportive behaviors appropriately to the readiness of others to perform specific tasks or functions.

It is beyond the scope of this entry to mention all of the leading theorists who have affected the leadership field. However, it would be remiss to not mention the significant work of Warren Bennis. Bennis is a popular guest speaker and regular presidential advisor whose writings and lectures introduced leadership to a mass audience. An early student of group dynamics in the 1950s, Bennis evolved into a futurist in the 1960s and 1970s. Bennis argues that leadership is not a rare skill or inborn trait; he posits that leaders are made rather than born, and that leaders need not be charismatic or brilliant individuals to be successful. He also contends that leadership is not about control, direction, or manipulation. Bennis believes that effective leaders create compelling visions; elicit trust, optimism, and hope in others; and translate their visions into actionable plans.

Characteristics of Effective Leaders

Several taxonomies of leadership behaviors have been proposed, both in the adult and youth leadership literatures. Hundreds of leader behaviors and characteristics have been written about in both the popular and academic leadership literatures. The following 10 categories of leader behaviors and characteristics have appeared most frequently:

1. Planning and organizing
2. Problem-solving and competence
3. Creative, innovative, and imaginative
4. Motivating and inspiring
5. Forward-looking
6. Supportive and caring
7. Managing conflict and team-building
8. Networking
9. Delegating
10. Courageous

A recent, large-scale, international study by James Kouzes and Barry Posner asked people what they lookfor and admire in their leaders. More than 75,000 people participated in the investigation. The top–four-ranked leadership characteristics were honesty, forward-looking, inspiring, and competent. These findings were corroborated in 10 countries. Honesty emerged as the single most important factor; leaders are expected to inspire trust, be principled, know right from wrong, and have integrity. The ability to look ahead and share a vision for the future was consistently recognized as a critical leadership skill. Leaders must also be enthusiastic, energetic, optimistic, and communicate a positive view for the future. Finally, leaders must bring relevant experience and sound judgment to the task—if they hope to inspire confidence they must have a track record of success and ability to get things done.

Recent breakthroughs in the study of the physiology of the brain provide intriguing insights into the neuroscience of leadership. Imaging technologies such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), in conjunction with brain wave analysis technologies such as quantitative electroencephalography (QEEG), have helped identify, for the first time, important linkages between the brain and the mind (how we perceive, think, feel, and act). These fascinating findings have implications for leadership. For example, brain research confirms that change is unexpectedly difficult because it provokes sensations of physiological discomfort. Trying to change any hardwired behavior requires considerable effort and will be resisted by the basal ganglia, the habit-center part of the brain that operates largely without conscious thought. Messages from effective leaders must be able to shift our focus from experiencing fear (what Daniel Goleman, in his popular book *Emotional Intelligence,* poetically describes as preventing "amygdale hijack"), to drawing our attention and metabolic energy to the prefrontal region of our brain. Leaders have the best chance of encouraging others to take risks and entertain change if their message connects with the prefrontal region of the brain rather than the more primitive and older parts of our mammalian brain, remnants of our evolutionary history.

Leadership, Giftedness, and Youth

As mentioned earlier, researchers know a lot about adult leadership. They know considerably less about precursors of early leadership, or how best to encourage or develop leadership skills and competencies in youth. More than 25 years ago, federal definitions of giftedness included leadership ability as one type of giftedness. And many gifted authorities, particularly Frances Karnes, have long contended that youth leadership training is important and worthwhile. Some in the gifted field have argued that adult leadership models are not applicable to leadership among youth; others see important conceptual parallels and practical similarities between youth and adult leadership. Youth leadership remains undertheorized and marked by few empirical studies. For example, many gifted authorities suggest that youth leadership requires creative problem-solving ability and at least moderately high intellectual ability. This is a reasonable assumption. However, it has not yet been empirically tested.

Steven Pfeiffer has developed a 72-item teacher-completed gifted rating scale for children ages 6.0 to 13.11. The *Gifted Rating Scale-School Form* (*GRS-S*) is based on a multidimensional model of giftedness and includes six scales: Intellectual Ability, Academic Ability, Creativity, Artistic Talent, Leadership Ability, and Motivation. Each of the *GRS-S* items is rated on a nine-point scale divided into three ranges: 1–3 = below average; 4–6 = average; and 7–9 = above average. The *GRS-S* classification system indicates the *likelihood* that children are gifted in leadership or one of the other areas, based on their *T* scores.

The *GRS-S* leadership scale consists of 12 items that reflect the child's ability to motivate others toward a common or shared goal. The leadership scale was developed based on a review of the youth leadership literature, on focus groups with experts in the gifted and leadership fields, and careful review of psychological literature of leadership. Four illustrative *GRS-S* leadership items are: *demonstrates good social judgment, recognizes the feelings of others, earns the respect and trust of others,* and *makes things happen.* Studies show it to be a reliable and valid measure of the leadership construct.

The *GRS-S* leadership scale has been used in youth leadership development programs to measure growth and progress as a result of participation in the program. An article by Pfeiffer and his colleagues in the summer 2006 issue of *The School Psychologist* provides a simple methodology for educators to use to measure change in leadership skills.

Pfeiffer contends that not every youth (or adult) can develop into a *gifted* leader. Almost any child or adolescent—gifted or not gifted—if provided appropriate opportunities and adequately motivated, can learn new, and refine existing, skills, attitudes, and values that are associated with effective leadership. For example, even young children can learn to demonstrate more advanced social judgment and become more adept at recognizing the feelings of others (two leadership items on Pfeiffer's *GRS*). Some children, because of a combination of aptitude, personality, temperament, interest, and good fortune, will develop into gifted leaders. Participation in community-based programs such as 4-H and Scouts, church youth groups, extracurricular school activities, and youth leadership development programs all provide

unique and valuable opportunities for early exposure to leadership roles and observing important skills associated with leadership.

Future Directions

The gifted field lacks even one large-scale, longitudinal study that has followed a large cohort of high-ability children and looked specifically at early precursors of evolving leadership competence. Researchers know a lot about leadership from the adult leadership literature. As mentioned earlier, for example, researchers know that almost all people, irrespective of which country they are from, consider honesty, forward-looking, inspiring, and competence as the four critical characteristics of effective adult leaders. Honesty emerges as the single most important factor; leaders are expected to inspire trust, demonstrate unwavering integrity, and know right from wrong. The ability to look ahead and create a shared vision for the future is also seen as a critical leadership skill. Effective leaders must be enthusiastic, energetic, and optimistic. Finally, effective leaders must bring relevant experience and have sound judgment. These are valuable insights to help guide those of us interested in understanding more about early precursors of leadership and the design of effective youth leadership development programs.

Much work remains to fill in the gaps in our understanding of precursors of leadership and how best to develop leadership skills and abilities for today's youth (and tomorrow's leaders). Recent breakthroughs in the neurosciences offer valuable insights to help researchers better understand the neural mechanisms underlying behavioral change and influence. New insights can be expected in the coming years as a growing number of researchers begin to investigate this fertile area.

Steven I. Pfeiffer

See also Academic Talent; Creative Leadership; Gifted Rating Scales; Group Dynamics; Neuroscience of Leadership

Further Readings

Bennis, W., & Biederman, P. W. (1997). *Organizing genius: The secrets of creative collaboration.* Cambridge, MA: Perseus Books.

Karnes, F. A., & Chauvin, J. C. (2000). *Leadership development program.* Scottsdale, AZ: Gifted Psychology Press.

Kouzes, J., & Posner, B. (2009). The leadership challenge. Retrieved January 24, 2009, from http://www.leadershipchallenge.com/WileyCDA

Matthews, M. S. (2004). Leadership education for gifted and talented youth: A review of the literature. *Journal for the Education of the Gifted, 28,* 77–113.

Pfeiffer, S. I. (Ed.). (2008). *Handbook of giftedness.* New York: Springer.

Pfeiffer, S. I., Kumtepe, A., & Rosado, J. (2006). Gifted identification: Measuring change in a student's profile of abilities using the *GRS. School Psychologist, 60,* 106–111.

World Scout Committee. (2008). *Triennial report 2005–2008.* Geneva: World Scout Bureau.

Learning

Learning is a broad term that refers to any response change as a result of experience (e.g., habituation or classic conditioning). When it comes to skill learning, such as learning to play an instrument, to solve mathematical problems, or to appreciate a Shakespearean play, the term *intentional learning* is typically used, rather than *incidental learning.* Learning in formal education settings can be best characterized as an active, motivated process of acquiring cognitive representations and structures (knowledge), skills (routines and procedures that serve specific functions), and dispositions (certain ways of thinking, modus operandi) relative to important aspects of the physical, social, and symbolic worlds. Historically, three broadly conceptualized metaphors have been used to guide learning theory and research: learning as forming stimulus-response associations (the behaviorist/empiricist view), as acquisition of cognitive structure and knowledge construction (the cognitive/rationalist view), and as becoming attuned to affordances and constraints through participation in a community of human practice (the situative/pragmatist-sociohistoric view). These general models are concerned with the underlying processes leading to learning and transfer. Sources of variations (individual differences) in learning may not be covered by the general process models. Ironically, none of the three models are intended to explain individual differences in learning. For example,

possible genetic influences on learning differences are not even mentioned as a relevant aspect of learning, nor is the extent to which the organism-environment interaction may significantly account for differential trajectories of individuals' learning histories. An adequate learning theory ought to be capable of describing characteristics of gifted learners as well as explaining underlying processes of advanced learning.

In school settings, gifted learners are often identified through their advanced mastery of certain content, or more behaviorally, the ease of learning. Although both the rate of learning and asymptotic performance (where additional learning efforts no longer produce performance gains) are used as markers of giftedness, in reality, the rate of learning (e.g., the fan-spread effect of achievement over time) is more easily observed than is asymptotic performance. There are two competing explanations for manifestations of exceptional learning in childhood. One explains the ease of mastery as a *learning advantage;* that is, gifted learners pick up the right information and get into the heart of the matter at a much faster rate than do most of their peers under instructional conditions or through self-directed explorations. The alternative explanation is that the ease of learning represents a developmental precocity; that is, the early maturation affords a distinct advantage, which may or may not dissipate over time. This entry describes cognitive, social and situative, and integrative perspectives of learning.

Cognitive Perspectives

Cognitive Efficiency or Sophistication?

A cognitive model of learning would trace individual differences in learning to cognitive process differences. There are two main hypotheses regarding the cognitive advantage enjoyed by some students in learning: cognitive efficiency and cognitive sophistication. The cognitive efficiency models typically use basic processing mechanisms such as processing speed or working memory capacity as underlying individual differences in learning. Sometimes, the researchers even try to pinpoint neurophysiological underpinnings of cognitive efficiency. In contrast, the cognitive sophistication models resort to higher-order constructs for explaining the learning advantage. They include strategy use, cognitive and metacognitive insights, and executive control of learning processes. Researchers in this tradition typically use complex learning and problem-solving tasks to elicit more complex cognitive behavior or action. The two kinds of models reveal epistemological differences regarding the locus of superior cognition underlying learning. The cognitive efficiency models view giftedness as a mental capacity directly supported by neural infrastructure, and the cognitive sophistication models view giftedness as resourcefulness supported by a repertoire of mental skills and knowledge. The cognitive efficiency perspective lends itself to a more reductionistic explanation of gifted behavior, and the cognitive sophistication perspective implies a self-organized, self-directed pattern of behavior emergent in the person-task interaction. Both arguments may be valid to some extent.

Domain-Specific or Domain-General?

General cognitive models of learning imply an all-purpose information processing architecture. The domain-generality of learning mechanisms is increasingly contended in the learning literature. Children appear to have intuitive grasps of domain-specific principles (e.g., about numbers, physical objects, living things, and intentions of others), which guide their learning in both instructional and noninstructional settings. Dedicated mechanisms process a particular type or class of information, in encoding mode (e.g., verbal vs. visual-spatial), as well as content representation (social vs. physical). Similarly, individuals have their privileged domains in which information uptake and organization seem particularly easy and "natural" to them, and the topics involved affectively appeal to them. The most distinct example of the domain-specificity of advanced learning is child prodigies who demonstrate the unusual ease of learning in certain domains (e.g., mathematics, music, chess) but are otherwise similar to age peers in their developmental profiles, suggesting a strong perceptual and intuitive basis for learning and understanding their favorite subjects that otherwise need to be mastered in an analytic fashion. However, the basic structure of domain knowledge and skills, which are culturally created symbol systems and meaning structures, are unlikely to be somehow genetically encrypted

or innately prescribed. In other words, learning in culturally created and defined domains still needs to be scaffolded through instruction and coaching, and domain-general learning abilities and skills are needed to construct domain-specific knowledge and skills.

A more eclectic scenario is that both domain-specific (i.e., dedicated mechanisms) and domain-relevant general processes are involved in learning, and the process of mastering a complex domain is less like acquiring fragmented pieces of knowledge and more like a developmental process that shows dynamic changes and phase transition to increasingly complex organization of cognitive landscapes and action schemes. Jerome Bruner identified sensitivity to constraints, organized persistence, and connectivity of ideas as three main tenets of successful buildup of knowledge. At a more practical level, David Lohman identified the initial fast rate of learning and achievement, coupled with the ability to reason specific symbol systems in the achievement domain, as evidence of exceptional or advanced learners. According to current understanding of intricate content-process relations, on the one hand, the reasoning ability cannot be completely dissociated from content knowledge; on the other hand, the underlying logic of content knowledge is not transparent and entails inference and abstraction based on rules not specified in the content knowledge. It is useful to evoke the Systems 1 and 2 classification of cognition to achieve a dialectic synthesis. According to this classification, System 1 processes are perceptual and intuitive in nature, characterized as effortless, fast, evocative (affective), rigid, impervious to conscious manipulation and voluntary control. System 2 processes are conceptual and analytic in nature, characterized as effortful, slow, enactive (conative), flexible, subject to conscious manipulation and voluntary control. Thus, System 1 processes tend to be dedicated to domain-specific information processing, and System 2 processes are more versatile and less specialized. David Yun Dai and Joseph S. Renzulli suggest a bottom-up and top-down iterative process whereby knowledge gain through System 1 processes are elevated or articulated to the System 2 level for reorganization and flexible use, and knowledge and skills constructed by System 2 intentional learning processes are relegated or mechanized to System 1 representations and routines to enhance the system's efficiency. Lannie Kanevsky's model of learning potential also contains both domain-general and domain-specific components.

Quantitatively or Qualitatively Different?

A question continually debated about the cognitive advantages of gifted learners is whether they differ quantitatively or qualitatively. In other words, is the advantage a matter of degree or kind? This is an important question because giftedness is seen as a condition of exceptionality, and thus implying a qualitative difference. When gifted students are compared with average students on major information processing parameters, the research findings typically do not support a strong argument for qualitative differences; that is, both groups use the same cognitive processes, but with different degrees. However, when intra-individual patterns or configurations of different abilities (i.e., strengths and weaknesses) are used to predict learning and developmental trajectories, qualitative differences even among gifted learners themselves emerge. Some theoretical speculations can be made based on the categories discussed earlier. First, when cognitive efficiency is concerned, the differences can be best described as quantitative (e.g., faster speed, quicker automatization of new learning, or more pieces of information held, processed, and manipulated per unit of time). When cognitive sophistication (e.g., use of different strategies and styles; metacognition and transfer) is concerned, qualitative differences are more likely to be observed; this may be true even among the identified "gifted." Second, when learning mechanisms are domain-general, one is more likely to observe quantitative differences; for example, correlations between general intelligence and targeted task performance tend to be higher when more complex cognitive tasks are involved. In contrast, when unique, domain-specific learning mechanisms are involved, we might observe qualitative differences because these mechanisms may be manifested in an all-or-none fashion (e.g., a domain-specific modular device is either present or absent; the notion of possessing a certain degree of a functional module does not make sense). Finally, we might consider learning processes (e.g., thinking and reasoning) to show quantitative differences, but long-term developmental and learning outcomes (cognitive structure or knowledge organization) can be qualitatively different.

Social and Situative Perspectives

Learning is situated in a specific functional context, involving other people, with expertise, resources, and tools distributed in that environment. Therefore, it is limiting to think of learning as a solo act of the learner, as if the learning process resides in the learner's head. From a situative perspective, learning means participating in specific kinds of culturally sanctioned human activity, and gradually moving from the periphery to the center. With experts serving as mentors and coaches, the learning process can be described as cognitive apprenticeship during which significant amounts of observational learning (vicarious experiencing, modeling, etc.) occur. This perspective emphasizes the important function of communities of learners, scholars, artists, and other professionals who are committed to perfecting their trades and who mutually stimulate one another to excel at a level humanly possible. Social and technical facilitation of advanced learning at an elite caliber is supported by evidence that some musical pieces deemed impossible to play a century ago are now part of the repertoire of student performance in music conservatories. However, the expertise research suggests the extent to which one can sustain this kind of participation is constrained by individuals' fit for extended deliberate practice, a form of practice that is focused and intensive, and is by nature not enjoyable. From this situative perspective, learning is not confined to any specific settings such as school, and it is often a by-product of pragmatic efforts to solve a problem or overcome an obstacle. Indeed, learning is more authentic and effective in work settings than in classrooms, according to this school of thought. Sustained efforts to understand and problem solve in a domain led to highly sophisticated knowledge and practical skills (i.e., expertise). Exceptionally advanced learning, from the cases of child prodigies to those of to-be Nobel Laureates, does not violate this social and situative principle of learning; substantial domain experience and efforts are invested to develop high-level expertise and creativity.

Integrative Perspectives

Reckoning with the complexity of skill learning and knowledge building naturally leads to the conclusion that learning should be best seen as fundamentally context-bound, involving purposes and structures of the learning activity, social contexts that support learning, and individuals' strengths and weaknesses relative to the learning task at hand (i.e., aptitudes and inaptitudes as Richard Snow defined them). Although cognitive strengths are clearly important in accounting for learning differences, motivational and emotional factors also play an important role. For example, when presented with a cognitively demanding task, gifted students reported feeling more challenged than did regular students, which is counterintuitive. However, the feeling of being challenged indicates a level of alertness conducive to achievement motivation. Gifted children also display a tendency to turn inward, presumably to think through a problem before taking specific steps, rather than relying on external helps or expertise. Gifted students have also been found to have a better calibration (i.e., more accurate estimate) of their ability to solve a given problem, a skill important for monitoring progress, setting up proper, realistic levels of self-efficacy, and allocating proper resources for learning.

The ability to learn and fashion complex thoughts about the world and self is an essential ingredient of human intelligence. David Perkins identifies three sources of intelligent cognition and behavior, hence individual differences in learning: neural, experiential, and reflective. *Neural intelligence* refers to the contribution of biological variations in neural efficiency, either globally or in modular forms, that supports cognitive functions. *Experiential intelligence* refers to the contribution of experience and knowledge to crystallized and fluid abilities, particularly domain-specific knowledge and skills that are highly tuned to particular types of information or environment. *Reflective intelligence* refers to the contribution of metacognition and reflective self-guidance to intelligent behavior. Although neural efficiency has been long argued as a biological advantage that distinguishes gifted children from their age peers, experiential and reflective aspects of intelligence have been increasingly recognized as bases for exceptional learning advantages. A learning theory that accounts for both individual differences (including the highly advanced learning and achievement) and underlying processes needs to integrate all

three sources of intelligence in conjunction with contextual and motivational factors.

David Yun Dai

See also Aptitudes; Cognition; Expertise; Intelligence; Intelligence Theories

Further Readings

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart context? Cognition, ability, and talent development in an age of situated approaches to knowing and learning. *Educational Psychologist, 37,* 165–182.

Bruner, J. S. (1962). *On knowing*. Cambridge, UK: Belknap Press.

Dai, D. Y., & Renzulli, J. S. (2008). Snowflakes, living systems, and the mystery of giftedness. *Gifted Child Quarterly, 52,* 114–130.

Dai, D. Y., & Sternberg, R. J. (2004). Beyond cognitivism: Toward an integrated understanding of intellectual functioning and development. In D. Y. Dai & R. J. Sternberg (Eds.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development* (pp. 3–38). Mahwah, NJ: Lawrence Erlbaum.

Kanevsky, L. (1995). Learning potentials of gifted students. *Roeper Review, 17,* 157–163.

Lohman, D. F. (2005). An aptitude perspective on talent identification: Implications for identification of academically gifted minority students. *Journal for the Education of the Gifted, 28,* 333–360.

Perkins, D. N. (1995). *Outsmarting IQ: The emerging science of learnable intelligence*. New York: Free Press.

Snow, R. E. (1992). Aptitude theory: Yesterday, today, and tomorrow. *Educational Psychologist, 27,* 5–32.

Learning Disabilities

Growing numbers of gifted students are challenged by a variety of learning disabilities that compromise their academic and social development. These disabilities may take the form of difficulties learning to read, write, or understand mathematics. Gifted students may experience cognitive processing issues such as remembering details, following directions, and organizing tasks. Other students may have difficulty focusing and sustaining attention or completing assignments. Finally, the deficits may involve understanding and coping with social and emotional demands placed on the students. Often these talented but challenged youngsters have difficulties in all three realms. Because of the duality of their characteristics—gifts and challenges—this special population of gifted students is often referred to as *twice exceptional*. This designation draws attention to the duality of their needs to accommodate the gift while addressing the learning challenge. This entry first presents samples of students who are gifted and learning disabled. A description of traits follows. The entry concludes with suggestions for meeting their needs.

Examples

Alan is a curious young man whose intense and adultlike interests often set him aside from his age-mates. His natural curiosity and passion for particular topics feed his desire for knowledge and inquiry. Indeed, his parents report, "Alan is never bored." Alan reads above grade level and comprehends information in the realm of nonfiction. His math skills far outweigh those of his peers, and his ability to remember both verbal and spatial information are extraordinary. These are the characteristics associated with students who are gifted and talented. But Alan has great difficulty completing his work and sitting still for long periods. He often has difficulty getting along with his peers and is often excluded from the group because of his impulsivity and emotional outbursts. Alan is a gifted child with attention deficits. His particular learning profile dictates that he needs intellectual challenge but environmental modifications that will help him complete assignments and develop appropriate coping behaviors.

Susan is a poet whose use of imagery in her writing is outstanding. Her sensitivity and understanding of the human condition shows her high levels of interpersonal intelligence. Susan has a severe disability in mathematics. She has no concept of time, money, or distance. She has severe anxiety attacks during math class and often becomes physically ill. Susan needs a dual placement—advanced writing opportunities and remedial math. She will also need counseling to help her cope with

Table 1 Deficit Behaviors

	Attention Deficit Disorder (ADHD)	*Specific Learning Disabilities (SLD)*
Academic difficulties	May have difficulty beginning or completing tasks	Speaks well but reads poorly Confuses similar letters and words
	May have difficulty with listening tasks	Dysgraphic Dyslexic Discalculia
	May have difficulty expressing ideas in writing	Problems with short-term memory
	Strengths in critical and creative thinking	Very knowledgeable in specific areas
	May prefer spatial tasks	May prefer spatial tasks
Attention issues	Fidgets; squirms; is restless	Short attention span
	Difficulty remaining seated	Is overactive or inactive, listless
	Easily distracted	Easily distracted
Organizational issues	Has difficulty following directions and finishing tasks	Has difficulty understanding or following directions
		Has difficulty in expressing or organizing thoughts verbally or in writing
		Has difficulty functioning when there is no structure or predictability (nonverbal learning disability)
Social issues	Cannot read the social context well	May have problems reading the social context (nonverbal learning disability)
Behavioral issues	Often interrupts or intrudes on others	Will become disruptive to avoid difficult tasks
Impulsivity	Often engages in physically dangerous activities without considering possible consequences	Is impulsive; cannot foresee consequences
	Blurts out answers to questions	

her depression resulting from the discrepancy between what she can and cannot do.

Christian can build anything with Lego® bricks. He excels in tasks that require engineering and design. His skills in science and math are also superior. But Christian experiences great difficulty listening in class and taking notes. He cannot express his ideas in writing and has difficulty reading. His

poor skills in both organization and attention provide evidence that Christian has attention deficits and dyslexia. To achieve to his potential, Christian will need opportunities to participate in engineering and design as well as be afforded specific accommodations that will allow him to access information other than by reading, unlimited use of technology for writing and researching, and perhaps more time on task completion.

Traits

All these students would be considered twice exceptional. They exhibit remarkable gifts and talents in specific areas. They may have outstanding vocabularies, in-depth interests, creative abilities, and extensive knowledge in one or more areas. These same youngsters simultaneously experience difficulties in learning, attending, or meeting social and emotional expectations. These learning challenges result in students being identified with learning and attention challenges. Table 1 outlines characteristics associated with these difficulties.

Effective Strategies

A comprehensive educational plan for these students should address both talent development and accommodations. Most individual educational plans focus on student deficits. Even parents may be reluctant to push talent development when students struggle with core subjects. However, selective attention to only one set of needs may compromise the effectiveness of programs designed to nurture individual development of twice-exceptional students.

Effective plans would consider creating the optimal learning environments (intellectual, emotional, and physical). Such environments offer students appropriate talent development opportunities and intellectual challenge such as acceleration in areas of strength, mentorships, and independent studies. To accommodate problematic weaknesses, classrooms should provide academic support. For example, students may be provided with books on tape, a quiet place to complete assignments, a choice of resources and projects, use of technology to learn and produce, more time to complete tasks, and a note taker. Finally, schools should provide counseling opportunities to assist students to advocate for themselves, develop strategies for coping with their challenges, and become aware of their gifts, talents, and career goals. Plans should be devised using a team approach consisting of the classroom teacher, learning support specialist, teacher of the gifted and talented, parents, and the student.

Susan Marcia Baum

See also Asperger's Syndrome; Attention Deficit Hyperactivity Disorder; Differentiation; Multiple Intelligences; Twice Exceptional

Further Readings

Baum, S. M., & Owen, S. V. (2004). *To be gifted and learning disabled: Strategies for helping bright students with LD, ADHD, and more.* Mansfield Center, CT: Creative Learning Press.

Levine, M. (2002). *A mind at a time.* New York: Simon & Schuster.

Learning Styles

Learning styles describe how students prefer to learn. Despite their intellectual gifts, not all highly able students are challenged and engaged in their classrooms. Creativity, for instance, may not be encouraged, accommodated, or commended by some teachers at any grade level, and yet creative expression may be needed in some individuals, as well as natural and instinctual. Expression through visual arts, music, poetry, and hands-on construction may be much more comfortable for some than is expression through traditional homework assignments and tests. Learning disabilities may also interfere with learning. Behavior may be a problem as well. Both problematic behavior and underachievement may reflect problems related to the fit of learning style in the classroom.

This entry first describes types of learning styles. Next, this entry discusses the Learning Styles Inventory as an assessment tool and Anthony Gregorc's categorization of learning styles. Last, the implications of identifying an individual's learning style(s) are considered.

Types

Visual learners probably have the easiest fit in typical classrooms and are the most common. They respond positively to written information, notes, diagrams, pictures, and written tests, for example, and their learning preference matches typical teachers' visual teaching style, as well as the format of commonly used standardized tests for measuring individual and school progress. Visual learners can translate written words into mental images and then into test answers. If they are motivated to perform in the classroom and in large-group testing situations, their academic performance is likely to match their measured intellectual ability. These learners, and their parents and teachers as well, may find it difficult to understand why other learners with high capability struggle in the classroom. Even the class binders and assignments of visual learners are likely to be orderly. They can perhaps stay focused on what the teacher is doing and may also have no trouble turning in assignments on time and planning ahead.

In contrast, about half as many students are likely to prefer to learn through their ears. Reading aloud may enhance their learning, and they are likely to be comfortable receiving information orally from teachers. Their inclination and preferences may lead them to choose seating so that they can hear the teacher easily. Their learning style probably has a fairly good fit with academic work in schools, though not as good as those with a visual preference. A third learning style is found in a small percentage of the general population. Students with a kinesthetic preference prefer hands-on experiences, learning through touch, movement, role plays, and project construction, for instance. These students may struggle academically in classrooms geared only to visual and auditory teaching styles.

These learning preferences should be viewed on a continuum. Some gifted students may have equal preferences among the three styles just described, or equal visual and auditory preferences, for example.

Learning Style Inventory

In the late 1970s, Joseph Renzulli developed the first learning-styles assessment for gifted and talented students, called the Learning Styles Inventory, to investigate the preferred learning modes of students. Students complete the inventory to identify the ways that they prefer to learn, for example, through learning modes such as independent study, programmed instruction, drill, discussion, or lecture. Renzulli conducted a number of research studies with this inventory, finding that gifted and talented students more often preferred independent study and simulations.

Gregorc's Categorization

In the 1980s, Gregorc introduced another conceptualization of learning styles, categorizing them as concrete, abstract, sequential, and random and offering explanations of various combinations of these. His categorization goes further than do categories commonly recognized by educators, who, for example, divide learners into global learners, who first develop a general framework and then fit specific information into it, and sequential or analytical learners, who focus first on details to gain overall understanding. Gregorc added the preferences of concrete (literal, actual, hands-on) or abstract (theoretical, conceptual, symbolic) content, leading to four combinations of preferred styles. Abstract (using reason and intuition) and concrete (using the senses) are *perceptional* preferences. Sequential (linear) and random (nonlinear) are *ordering* preferences.

The combinations of Gregorc's conceptualizations of preferences are explained as follows. *Concrete-sequential* learners like organized, sequential lessons, concrete materials, step-by-step instructions, experiential learning, demonstrations, computer-assisted instruction, and concrete examples. *Concrete-random* learners like trial and error, make intuitive leaps, and prefer independent study projects, discovery learning, constructivist teaching, and problem-solving activities. *Abstract-sequential* learners think in conceptual pictures, grasp ideas easily through reading and listening, and like reading, lectures, essay-writing, and concept mapping. *Abstract-random* learners prefer unstructured delivery of information, tend to enjoy group discussion and cooperative learning, and multisensory experiences. Although little research has been conducted on Gregorc's work on learning styles, his work has been popular with teachers of gifted and high-potential learners.

Gregorc also discussed receptivity in abstract- and concrete-random learners to information coming from multiple sources simultaneously and without an obvious goal, in contrast to strong preferences in sequential learners for information from one source at a time and in successive, connected parts. Such differences are important to consider when matching learning and teaching styles. Environmental stimulation is related to this concern. Highly stimulating, colorful posters, and other eye-catching products on classroom walls may actually interfere with learning for some students, much to the puzzlement of teachers who assume that all students appreciate such color and texture. Other students may prefer and even need that visual stimulation to feel comfortable.

Implications

Information about learning styles can be helpful for gifted students who wonder why they do not have as comfortable a fit academically as do others who are identified as gifted—or who simply are curious about individual teaching and learning differences. When gifted students successfully seek, perhaps on the Internet, or are given information by counselors and teachers about learning differences and preferences, these students can perhaps make adjustments when teachers' teaching styles do not match learning preferences. Such information can also provoke helpful self-reflection related to identity development, personality, personal strengths and limitations, level of comfort in various classrooms, preferences for teachers, and even future career options. Even young gifted students can benefit from information about learning styles, helping them make sense of their behaviors, struggles, and differential responses to various academic areas and teachers. Through their own insight about preferences or through assistance from school personnel, they may be able to figure out how to compensate for lack of fit with visual instruction, for instance. Special-education teachers with expertise in learning styles and disabilities may be appropriate consultants when learning is compromised and frustrating or a diagnosable learning disability is suspected.

When teachers take the time to identify students' learning-style preferences, they should make every effort to avoid stamping a child with a learning style in the manner that some children are labeled according to intelligence level or disability. In rare cases, certain students may prefer to pursue most of their studies through a single method such as independent study, but most learners vary their preferences for different instructional techniques based on their age and the subject matter. When teachers intentionally use a variety of teaching methods, not just one that reflects their own learning and teaching preference, they are likely to be more effective with a classroom of students with widely varying learning-style preferences, including those whose preferences are fairly balanced.

Jean Sunde Peterson

See also Academic Self-Concept; Disabilities, Gifted; Dropouts, Gifted; Learning Disabilities; Underachievement

Further Readings

Renzulli, J. S., Rizza, M. G., & Smith L. H. (2002). *Learning styles inventory—Version III: A measure of student preferences for instructional techniques.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Smith, L. H. (1978). *The learning styles inventory.* Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Smith, L. H. (1984). Learning style preferences: A practical approach for classroom teachers. *Theory Into Practice, 18,* 44–50.

Legal Issues for Gifted

Unlike students with disabilities, gifted students are not protected under federal law. As such, the methods by which gifted students are identified and served vary across states and depend on state legislation or state board of education rules and regulations. With many states having permissive legislation and others having no legislation, dispute resolution strategies are needed to help parents ensure their gifted child receives an appropriate education. However, with limited protection under the law, school systems often prevail when disputed issues reach the courts. This entry

describes dispute resolution strategies, seminal cases, the Office for Civil Rights, and implications of legal issues for gifted students.

Dispute Resolution Strategies

When issues regarding the education of a child cannot be resolved by parents and schools, dispute resolution strategies should be used. These strategies must begin at the lowest level. Negotiation, mediation, and due process are alternative avenues to litigation in resolving disputes.

Negotiation is an informed process by which both parties can discuss a problem to reach a compromise. Everyone involved should know the state laws and rules and regulations as well as local policies regarding gifted education. The process should begin at the level at which the dispute arose, which is usually with the classroom teacher. If negotiations are not successful at this level, then parents should meet with others up the administrative ladder—the principal, superintendent, and school board. Detailed notes should be kept of all correspondence and meetings. Mediation is the next step, if the issue(s) cannot be negotiated.

Mediation is a nonadversarial, voluntary process in which disputing parties can meet with an impartial, third-party facilitator. There are a number of advantages to mediation, which include reduced cost, expeditious processes, improved relationships, collaborative resolutions, confidentiality, empowerment of participants, and allowances for flexibility. A written mediation argument should be signed by both parties. If the issues can not be resolved through mediation, the next step is due process.

An aggrieved party has the opportunity to be heard by an impartial hearing officer during due process. There are several common requirements across the 16 states offering due process for the gifted:

- A notice to all parties that a hearing has been scheduled.
- Both parties can present evidence, have witnesses, and have oral arguments.
- Counsel may be present.
- Written and oral records of the proceedings are kept.
- The hearing officer writes a decision based on the arguments and evidence presented.

The last resort in dispute resolution is litigation, which is costly in time and money. Tuition reimbursement, early entrance, appropriate programming, twice exceptional, admissions, and personnel issues have all been addressed in court cases.

Seminal Cases

The federal courts become involved when issues pertaining to gifted education involve constitutional or statutory challenges. In *Student Doe v. Commonwealth of Pennsylvania* (1984) and *Student Roe v. Commonwealth of Pennsylvania* (1987), the use of minimum cutoff scores for admission into gifted programs was challenged. The courts in both cases found that minimum cutoff scores could be reasonably used for such purposes and did not violate the equal protection or due process clauses of the Fourteenth Amendment.

Broadley v. Board of Education of the City of New Meridian (1994) and *Centennial School District v. Department of Education* (1988) are two seminal cases regarding gifted students with contradictory outcomes that reached the state high courts of Connecticut and Pennsylvania, respectively. Subsequent courts have relied on the rulings from these two cases in reaching decisions.

In *Centennial,* the court found that regardless of an existing enrichment program, a school district was not relieved of the responsibility of providing a student with an appropriate academic education. In contrast, the *Broadley* court ruled that the state's guarantee of a constitutional right to a free public education does not afford gifted students the right to special education.

According to Perry A. Zirkel, a distinction should be made between "gifted alone" and "gifted plus" cases when reviewing case law. "Gifted alone" are those students eligible for gifted education without any other special legal protection, and "gifted plus" are those students who are gifted, but are also eligible for other federal, legal protections (e.g., students with disabilities under the Individuals with Disabilities Education Act, and minority gifted students under Title IV of Civil Rights Act). Because of lack of federal protection, there are far fewer gifted alone than gifted plus cases.

The Office for Civil Rights

In the U.S. Department of Education, the Office for Civil Rights (OCR) is charged with enforcing five federal civil-rights laws prohibiting discrimination on the basis of color, national origin, race, gender, and disability in activities and programs receiving federal funds. Investigating complaints, compliance reviews, and providing technical assistance to institutions to achieve voluntary compliance with OCR standards are the major responsibilities.

School districts must prove that their policies do not discriminate against gifted students. School districts should appoint a biracial committee to write guidelines for screening and identification that do not discriminate and inform parents, teachers, students, and the community. In-service training about gifted characteristics should be given on an annual basis to all school personnel. Validated instruments must be used with respect to the population for whom they are being used. Districts should monitor for discrimination and make changes when necessary.

Implications

The absence of a federal mandate; the lack of legal precedence; and permissive, if any, state legislation regarding the educational rights of gifted students have all hampered parents through the litigation process and have resulted in decisions that have mainly favored school districts. A review of national interest in gifted education indicates a reactive rather than proactive stance regarding policy development in gifted education.

Frances A. Karnes and Kristen R. Stephens

See also History of Gifted Education in the United States; Javits Program; No Child Left Behind; Parenting

Further Readings

Karnes, F. A., & Marquardt, R. G. (1991). *Gifted children and legal issues in education: Parents' stories of hope*. Scottsdale, AZ: Great Potential Press.

Karnes, F. A., & Marquardt, R. G. (1991). *Gifted children and the law: Meditation, due process, and court cases*. Scottsdale, AZ: Great Potential Press.

Karnes, F. A., & Marquardt, R. G. (2000). *Gifted children and legal issues: An update*. Scottsdale, AZ: Great Potential Press.

Karnes, F. A., Stephens, K. R., & McCard, E. (2008). Legal issues in gifted education. In F. A. Karnes & K. R. Stephens (Eds.), *Achieving excellence: Teaching the gifted and talented*. Columbus, OH: Pearson Merrill/Prentice Hall.

Levels of Gifted

Giftedness—high intellectual ability—is part of the overall continuum of intelligence within the human population. Just as there are degrees of slow learning—lower learning abilities—the range of abilities within the gifted population is considerable. Inborn abilities drive interests and are especially evident in young children whose environment is flexible and responsive to their needs. When one examines the early interests and behaviors of a child, insight is gained into both the level and the profile of intellectual gifts. This entry describes the levels of giftedness theory and implications for bright students.

Deborah L. Ruf developed *levels of giftedness theory* to explain the differences that she observed in children at different ability levels. Although research remains to be done to confirm the characteristics at each level, evidence from studies of prodigies, of talent search participants, of high achievers and perfect scorers on achievement tests, and of the general gifted population supports differences in characteristics and needs.

For ease of description, the range of giftedness can be divided into five levels and identified by early behaviors before intelligence testing. Level One is basically bright to moderately gifted, Level Two is highly gifted, Levels Three and Four are exceptionally gifted overall or profoundly gifted in one domain, and Level Five is profoundly gifted in all or almost all areas. What the students at different levels need for good friendships and adequate academic support varies greatly, and these early childhood milestones are easily observed before children start school.

Table 1 provides data for three of the five levels during five preschool-years age periods. All the behaviors listed in Table 1 are advanced compared

Table 1 Early Childhood Milestones by Level of Giftedness

Age Range	*LEVEL ONE*	*LEVEL THREE*	*LEVEL FIVE*
4 to 12 months		Almost all know what someone is talking about by 6 months; most look at and turn pages of books alone by 10 months, make their families know what they want, books, a favorite interest; some play with shape sorters by 11 months; many recognize some colors, shapes, numbers, and letters.	Half speak well by age 1; most independently look at and turn pages of books before 6 months, know and say some words by 5½ to 9 months, play with shape sorters before 11 months; all have large receptive vocabularies by 8 to 9 months, have favorite TV or videos by 6 to 8 months; many recognize and pick out specific numbers and letters by 10 to 14 months.
12 to 18 months	Most know and say many words before 18 months.	Many recognize and pick out specific numbers and letters by 12 to 15 months; most have large vocabularies, receptive and expressive, by 16 months, know many colors by 15 to 18 months; many "read" many sight words between 15 and 20 months.	Many read numerous sight words by 15 months, rote count to 10, many higher, by 13 to 20 months; most are good at puzzles before 12 months, 35+ piece puzzles by 15 months; all know colors, numbers, alphabet, and shapes by about 15 months, show musical aptitude before 18 months.
24 to 30 months	Most sit still and attend to TV-type activities by 18 to 30 months.	Many start to "read" words on stores and signs by 20 months, show interest in letter sounds and sound out short words.	
3 to 4 years	Recognize simple signs, own written name, and know alphabet and simple addition and subtraction.	Many question the reality of Santa Claus or Tooth Fairy–type figures at 3 to 5 years, have high interest in factual information, how things work, science; keyboard or type by 3 to 4½ years; memorize or read simple books by 3½ years; most "read" words on signs and stores, print letters, numbers, words, and their names, know many sight words by 3 to 3½ years; most grasp skip counting, backward, basic addition and subtraction by age 4 years.	All question the reality of Santa Claus or Tooth Fairy–type figure by 3 or 4 years, show interest in pure facts, almanacs, dictionaries, etc, by age 3½, play adult level games—ages 12 and up—by 3½ to 4 years, read children's chapter books by age 3½ to 4½ years, understand abstract math concepts and basic math functions by age 4.
5 to 6 years	All read simple signs; most read beginner books, are independent on computer and keyboard, grasp counting and basic number facts.	Many understand some multiplication, division, and some fractions by 5½ years; most read children's-level chapter books by 4½ to 5½ years and read for pleasure and information; all read 2 to 5 years beyond grade level.	All read 6 or more years beyond grade level by age 6.

Age Range	*LEVEL ONE*	*LEVEL THREE*	*LEVEL FIVE*
Other milestones	All read chapter books by age 7 to 7½ years; 2 to 3 years beyond grade level by age 7.	Most read for pleasure and information by 6 years; all read 2 to 5 years beyond grade level by age 6; all read youth and young adult chapter books independently by age 7 to 7½.	

Source: Ruf, D. L. (2005). *Losing our minds: Gifted children left behind.* Scottsdale, AZ: Great Potential Press.

with those of average young children. The earlier any of the behaviors occur, the more likely the child is highly to exceptionally gifted. Whatever the early learning trajectory, acquisition of skills can be expected to continue at a similar pace throughout the individual's life if the learning environment continues to respond in a timely manner to the individual's talents.

Deborah L. Ruf

See also Davidson Institute for Talent Development; Early Identification; Gifted Rating Scales; Highly Gifted; Very Young Gifted

Further Readings

Gottfried, A. W., Gottfried, A. E., Bathurst, K., & Guerin, D. W. (1994). *Gifted IQ: Early developmental aspects: The Fullerton longitudinal study.* New York: Plenum Press.

Gross, M. U. M. (1993). *Exceptionally gifted children.* New York: Routledge.

Hollingworth, L. S. (1942). *Children above 180 IQ Stanford-Binet.* Yonkers-on-Hudson, NY: World Book.

Osborne, J. B. (February, 2000). *Gifted children: Are their gifts being identified, encouraged, or ignored?* Retrieved August 23, 2008, from http://www.aboutourkids.com

Ruf, D. L. (2005). *Losing our minds: Gifted children left behind.* Scottsdale, AZ: Great Potential Press.

Life Satisfaction

Life satisfaction, subjective well-being, and happiness are psychological and everyday expressions of living the good life. The broad psychological category for these ideas is quality of life, which includes successful performance throughout the life, personal accomplishments and expectations, emotions, life experiences, physical activity and health, and the individual's reactions to these. Life satisfaction is stable over time, but does undergo some change with the changing circumstances of a person's life. The study of life satisfaction and the other expressions of quality of life for the gifted are undertaken to better understand and encourage the development of the gifted individual's strengths, development of friendships and relationships, positive responses to adversity, and social and emotional health for the person across his or her life time. This entry describes various approaches to understanding life satisfaction, and how appropriate gifted education enhances life satisfaction of gifted students.

Dimensions of well-being or satisfaction include finding one's meaning or purpose in life, the development of personal growth in talents though challenge and the overcoming of obstacles, creating and sustaining environments that facilitate personal thriving, learning to be autonomous (at least in Western cultures), and finding and maintaining positive relationships and friendships, which may be the most important dimension for well-being. Intelligence is a "protective factor" in that high intelligence can help a person cope with a variety of life stressors as well as provide the capacity to attain greater life satisfaction. Nevertheless, if gifted children are denied stimulation, challenge, and opportunities for positive peer relationships, caring guidance, the pursuit of a meaningful life, the benefits of intelligence may be neutralized.

A person's success in accomplishing and integrating his or her life in these areas results in more

productivity and enjoyment of the activities in which the person is involved. A person's overall outlook on life, with its periodic aggravations and pleasures, enhances or reduces an individual's life satisfaction. Positive and negative emotions also speed up or slow down the development of constructive outcomes in an individual's life. The work in which an individual engages must challenge the individual, or the activity will not develop into a lifelong passion. Human beings find satisfaction in developing their innate capacities into realized performances. The more an individual's capacity is realized or the greater the complexity of the task undertaken, the greater the satisfaction or enjoyment. Gifted individuals need intellectual, creative, emotional, and physical challenges to thrive and become passionate about their lives.

Gifted children often find tasks required at school to be too easy and success in them to be attainable with minimal effort. Although their efforts are minimal, their answers and work are often met with high praise, good grades, and rewards. Appearing to do well, but without sufficient challenge will not lead to life satisfaction as children or later as adults. In most classrooms, the gifted receive the same materials, instruction, questions, and homework as everyone else. Programs for the gifted are often short and may not have the time or permission of other teachers to delve deeply into specific content. These limited interventions tend not to produce the high levels of achievement or satisfaction in the gifted. Accelerative options often allow a closer match between the gifted child or adolescent's ability and his or her learning. This better matching facilitates talent development and satisfaction. Special programs for the gifted also provide a venue for the development of friendships and coming to understand more clearly personal goals and visions for life.

Parents, teachers, friends, mentors, coaches, and even strangers demand or provide direction in developing lifetime dispositions, habits, and behaviors. These ways of behaving or living, whether observed in others by the gifted or imposed on the gifted by others such as parents, teachers, or mentors can have a positive or negative effect on personal well-being, life satisfaction, and happiness during adolescence and their adult lives. Consistently lived habits define the individual's character. These habits or virtues are basic to the gifted individual's progress in finding personal individual satisfaction and happiness across the individual's life time.

Appropriate curricular differentiation for the gifted increases and enhances their life satisfaction, partly because it exposes them to advanced content and processes. This exposure allows the gifted to learn and do things earlier than other children do or to access opportunities usually available only to adults. The enthusiasm and fun a gifted child or adolescent enjoys while engaged in a challenging activity demonstrates satisfaction. Even when the individuals return to more mundane or less stimulating activities, they retain some of the motivation, the fondness for the content, materials, and the people involved in the experience, and they seek to return to similar kinds of experiences.

Appropriate education for the gifted must include both the development of talent and the development of relationships. Too much focus on one to the exclusion of the other leaves the person unidimensional in development, which ultimately leads toward unhappiness and dissatisfaction. A third dimension for developing life satisfaction is spirituality. Development in this area provides purpose, perspective, and understanding of their lives. It also guides and strengthens their autonomy and their resolve in dealing with difficult issues. When a gifted individual develops his or her talent, relationships, and spirituality, and this development is accentuated with the good flavors of other dimensions of development such as learning to be physically active, he or she finds greater happiness, better health, and deeper satisfaction with life.

Michael F. Sayler

See also Aspiration Development and Self-Fulfillment; Character and Moral Development; Differentiation; Emotional Development; Friendships; Meaning of Life; Resilience; Self-Actualization; Self-Efficacy/Self-Esteem

Further Readings

Adams-Byers, J., Moon, S. M., & Whitsell, S. S. (2004). Gifted students' perceptions of the academic and social/emotional effects of homogeneous and heterogeneous grouping. *Gifted Child Quarterly, 48,* 5–20.

Diener, E. (1984). Subjective well-being. *Psychological Bulletin, 95,* 542–575.
Fredrickson, B. L., & Losada, M. F. (2005). Positive affect and the complex dynamics of human flourishing. *American Psychologist, 60,* 678–686.
Gross, M. U. M., & van Vliet, H. (2005). Radical acceleration and early entry to college: A review of the research. *Gifted Child Quarterly, 49,* 154–171.
Peterson, C. (2006). *A primer in positive psychology.* New York: Oxford University Press.
Ryff, C. D., & Singer, B. (2003). Ironies of the human condition: Well-being and health on the way to mortality. In L. G. Aspinwall & U. M. Staudinger (Eds.), *A psychology of human strengths: Fundamental questions and future directions for a positive psychology* (pp. 271–287). Washington, DC: American Psychological Association.
Sayler, M. F. (2008). Gifted and thriving: A deeper understanding of the meaning of GT. In L. Shavinina (Ed.), *The handbook on giftedness.* New York: Springer Science.
Seligman, M. E. P. (2002). *Authentic happiness.* New York: Free Press.
Zaff, J., Smith, D., Rogers, M. F., Leavitt, C. H., Halle, T. G., & Bornstein, M. H. (2003). Holistic well-being and the developing child. In M. Bornstein, L. Davidson, C. Keys, & K. Moore (Eds.), *Well-being: Positive development across the life course* (pp. 23–34). Mahwah, NJ: Lawrence Erlbaum.

Literary Creativity

Literary creativity is the application of creative thought or action to the domain of written expression. Literature is one of the major domains where creativity can be observed and includes poetry, dramas and plays, prose such as fiction and essays, and oral literature, such as folktales or ballads. Literature is an important domain to consider in light of creative poets, playwrights, and novelists, and it is important to understand in terms of Howard Gardner's theory of multiple intelligences because linguistic intelligence is also concerned with the written word. This entry covers some of the theories about literary creativity, the characteristics of persons creative in the literary arts, and some of the challenges that individuals in the domain of literature face.

Theories of Literary Creativity

The theories and ideas about literary creativity center on why writers create literature, why literature is enjoyable and valued by readers, and how those writers function creatively within their domain. Sigmund Freud theorized about creative literature by drawing on his own theories of the ego, dreams, and neurosis and considered himself a writer as well. Frank Barron, in his study of creative writers at the Institute for Personality Assessment and Research, administered a wide variety of personality tests to assess the characteristics of writers. Mihaly Csikszentmihalyi, conversely, draws together his observations about creative individuals within the domain of literature by tying together several key concepts that seem to be shared among prominent writers. Both theories are concerned with intuition and the unconscious, with Freud and Barron focusing more on the psychological mechanisms that literary creativity serves and Csikszentmihalyi focusing more on how creative writers develop.

Freud's Theory

Freud theorized about literary creativity, drawing upon his own ideas about neuroses, dreams, and therapy. He postulated that literature was inherently autobiographical in nature. That is, writers egotistically portray themselves as the hero. Freud also thought writers are halfway between normal, psychologically healthy adults and neurotics. Although normally healthy adults are ashamed of their fantasies and suppress them, either because they are seen as childish or they are improper, immoral, or outside of societal norms, writers feel compelled to communicate these fantasies. Neurotics are compelled to confess their fantasies to their therapist to remove their symptoms, but writers do not exhibit neurotic symptoms. Freud saw writing as a defense mechanism that manifested itself through creativity, rather than through neurotic symptoms and pathologies. Writing, Freud thought, was a form of confession as seen in therapy, which is why he thought that writers could be thought of as borderline neurotics.

In addition, Freud speculated about why literature is so pleasurable for both the reader and the writer. He wondered why people enjoy the fantasies that writers give them, but not the fantasies

that they hear from other people. Freud thought that autobiographical character of literature is softened by the writers, which appeases the initial revulsion that people feel from hearing about the intimacies of others. This is similar to Freud's concept of the structure of dreams, where distortion suppresses our tendency to censor ourselves. Also like dreams, the hero of the stories is our own Ego, although the Ego may also be split into several different characters.

Freud believed that literature drew people in with its aesthetic form. Furthermore, Freud thought that writing was pleasurable to the writer and the reader because it was therapeutic. Through writing, we can live out wishes and ambitions without self-reproach or feeling ashamed. Moreover, we can live out dangerous situations through writing or reading without any actual threat. Whereas these situations would normally not be pleasurable in reality, they become pleasurable through literature because they hold no threat of harm. The situations that literature creates promote emotional release, which is why Freud felt that they were therapeutic.

Freud's theory of literary creativity is rooted deeply in his own ideas about psychology. Although creative writing functions as a form of therapy for both the writer and the reader, the fantasies themselves and the compulsion to communicate those fantasies are assumed to be neurotic in nature. His theory paints an almost romanticized view of writers, believing them to be borderline neurotics, a view that sets creative writing as both a blessing and a curse.

Barron's Theory

Barron extensively tested 66 professional creative writers on intelligence tests, projective tests, and objective personality tests. He found writers to be highly intelligent—scoring in the highest percentiles on the already extremely difficult Terman Concept Mastery test; to be fairly "unsocialized" in that they were nonconforming and had little interest in others' opinions of them; and to be highly intuitive, open to new experiences, and introverted. Barron found that the most extreme difference between creative writers and ordinary people was in their vivid fantasy life and original imagination. Like Freud, he discovered great inner conflict in his writer subjects. They had often suffered great hardship to pursue their work and had great internal struggles as well as external difficulties in life. Barron believed that writers wrote to create their own cosmology: to create a different, richer, more meaningful universe than the one in which they found themselves.

Csikszentmihalyi and Literary Creativity

Csikszentmihalyi drew his conclusions about literary creativity not from theory, but from observing eminent writers and poets within the field of literature. He observed that writers allow people to recognize their feelings and emotions and to analyze those emotions carefully. Although people may not be able to carefully think about their emotions in their daily lives, they are allowed the chance to slowly consider and evaluate those emotions at leisure while reading. Within this vein of thought, we are furthermore able to recognize the shared and enduring qualities of humankind. In this sense, Csikszentmihalyi's observations about literary creativity are similar to that of Freud's own theories—literature can foster insight, lead to a deeper understanding of ourselves, and serve as experiences that are almost therapeutic.

The concept of balancing intuition with reason and logic with illogical ideas is central to Csikszentmihalyi's thoughts about literary creativity. Listening to ideas that come suddenly, seemingly from nowhere, is only one aspect of creating literature. The other half is the ability to scrutinize these thoughts and ideas with reason and logic. An idea will go to waste if there is no way to understand how to reasonably implement it into the writing. It is important, he states, to balance passion with discipline and in this way, writers can produce creative pieces of literature. When examined carefully, an intuitive or irrational thought or feeling can be described and connected to other thoughts and feelings, thus making the act of writing a meaningful expression.

Characteristics of People Within the Literary Arts

Csikszentmihalyi found several common factors by observing prominent creative writers in the field of literature. First is that creative writers

become immersed in the domain of literature. They do this by becoming avid readers and memorizing the work of writers that they admire. Through memorization, they internalize the work of those they respect and integrate it into their own writing style. In addition, creative writers take the sides of other writers within the writing community. In these ways, the writers completely immerse themselves in their domain.

Creative writers typically have a domain they are knowledgeable about outside of literature itself. This could be knowledge of physics or biology, for instance. This domain-specific knowledge is integrated into the creative writer's work. Thus, having knowledge outside of the realm of literature gives writers the opportunity to blend their knowledge with writing to enhance their work.

For instance, Madeline L'Engle, a novelist of children's fantasy stories, used her knowledge of microbiology and quantum physics within her books. Anthony Hecht, a poet, used his knowledge of music and geometry in his work. This extra domain knowledge enhanced their writing, and the ability to weave dissimilar ideas together is in of itself a creative act and is another outlet for expression.

Another characteristic of creative writers prominent within literature is their integration within the field of literature. Writers work with other younger writers and become friends with older writers. They establish relationships and connections, thereby becoming enmeshed within the social network of that field. Creative writers also become attracted to innovative schools and journals, which helps further enmesh them into the social network of their field while allowing the opportunity for transmitting knowledge among their peers.

It seems important then, at least among writers who are eminent within their fields, to become totally immersed in their domains to improve and evolve their own writing, to have interests outside of literature that they can integrate into their writing, and to become involved with their peers and colleagues.

Literary Creativity and Mental Disorders

Some evidence shows that those who are creative within the domain of literature may be more sensitive to affect disorders, such as bipolar mood disorder. Bipolar consists of episodes of elevated mood—specifically mania—and sometimes, but not always, depressed mood. These moods are on a continuum from severely depressed, moderately depressed, normal mood, and hypomania (just below a manic state), to mania. The depressive states can cause fatigue, hopelessness, physical and mental sluggishness, and suicidal ideation, and the manic states can lead to an excessive amount of energy, sleeplessness, illusions of grandeur, and hallucinations or delusions. In bipolar disorder, moods can shift rapidly between two extremes, making it a particularly dangerous state to be in. However, the less severe mood states, particularly hypomania, do not produce delusions or hallucinations and may be characterized as an unusually good mood.

Specifically for literary creativity, Nancy Andreasen found high incidences of affect disorders among eminent writers, and Kay Redfield Jamison discovered that approximately 20 percent of the poets that appeared in the *New Oxford Book of American Verse* had symptoms of bipolar mood disorder. Among the writers that Jamison studied, a significant proportion of them experienced brief episodes of hypomania, which is a symptom of bipolar mood disorder. Eugene Fodor and Bobbi Laird established a connection between creative writing and bipolar symptoms. Children with inclinations toward bipolar disorder who experienced a significantly enhanced mood during play therapy wrote more creative poems than did children who did not experience an elevated mood.

These mood states might be conducive to the act of creative writing. Hypomania may contribute to an original and flexible way of thinking, while giving ample reserves of energy in which to be productive. Conversely, a mildly depressed state may be conducive to helping the writer become a good editor of his or her work. Therefore, sensitivity toward more elevated and more depressed mood states might contribute to the creative writer's ability to produce emotionally evocative pieces of literature.

The increased ability to experience a wide array of emotions might also help creative writers specifically with their abilities to stimulate emotion to their readers, as well as their complex abilities to

tie emotions to other states of being. So, even though bipolar mood disorder may be a debilitating mental disease, some of its features may be met with resiliency from the creative writers who become prominent and harnessed in ways that fuel their creativity.

Moreover, some evidence suggests that some writing may actually be therapeutic. When looking at writers separately rather than all together—that is, separating fiction writers, nonfiction writers, playwrights, and poets—writers of fiction and nonfiction and playwrights have lower incidences of mental illness than do poets. Specifically, poets have been shown to have the most risk factors throughout their lives, being at greater risk for mental illness, suicide, and early death. Looking even more closely at poets, we can see that suicidal poets are more likely to use more first-person singular pronouns, such as *I,* than plural pronouns, such as *us* or *we.* However, there is no evidence suggesting that the greater usage of positive or negative words affects the likelihood that a poet is suicidal. This suggests that poets who are more socially connected may be at a lower risk for committing suicide.

Despite the connections between literary creativity and mental illness, evidence suggests that creative writing produces positive effects. For example, expressive writing can help survivors of trauma, as well as providing general benefits to physical and mental health. Therefore, a narrative form of writing that encourages expression can have several positive benefits. This serves as an important point when considering the mental health of poets because poetry may not as easily carry the same narrative structure as other writing does.

There is a relationship between literary creativity and mental health; however, it is important to look at this within the context of specific writing structures. Creative writing holds many benefits, as long as the writer is using talents to structure narrative pieces that are also emotionally evocative and that establish social connections with others.

Amber Larson

See also Creativity, Definition; Creativity Theories; Multiple Intelligences; Optimal Development; Playwrights; Poets Laureate; Talented Readers; Writers

Further Readings

Andreasen, N. C., & Canter, A. (1974). The creative writer: Psychiatric symptoms and family history. *Comprehensive psychiatry, 15,* 123–131.

Barron, F. X. (1992). Creative writers. In R. S. Albert (Ed), *Genius and eminence.* London: Pergamon.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention.* New York: Harper Perennial.

Fodor, E. M., & Laird, B. A. (2004). Therapeutic intervention, bipolar inclination, and literary creativity. *Creativity Research Journal, 16,* 149–146.

Freud, S. (1908). Creative writers and day-dreaming. In J. Strachey (Ed.), *The standard edition of the complete psychological works of Sigmund Freud* (pp. 143–153). London: Hogarth Press.

Jamison, K. R. (1989). Mood disorders and patterns of creativity in British writers and artists. *Psychiatry, 52,* 125–134.

Kaufman, J. C., & Sexton, J. D. (2006). Why doesn't the writing cure help poets? *Review of General Psychology, 10,* 268–282.

Locus of Control

Locus of control is a person's interpretation of what causes and controls the events in his or her life. Julian Rotter proposed the construct of locus of control in the 1960s as *locus of control of reinforcement* combining elements of cognitive and behavioral psychology. This is the belief that either the person or something outside of the person is in control of his or her life. In normal development, an individual progresses from an external orientation as an infant to a more internal orientation as an adult. This developmental shift occurs as the child grows and feels increasingly competent and independent in responding and controlling the various circumstances and events of his or her life. The belief that one is in control of the controllable aspects of one's life is psychologically and developmentally healthy. Locus of control is an important aspect of personal attributions of success and failure. Attributions profoundly affect success of the gifted in school and life. The gifted can be helped in developing a positive and internal locus of control that will facilitate their success and happiness, as discussed in this entry.

Internal locus of control and external locus of control are two ends of a continuum rather than an either-or dichotomy. A person is not entirely internal or external in his or her beliefs, but falls somewhere along a continuum between these two extremes. The specific position on the continuum is somewhat context specific and amenable to interventions and change. Although locus of control is often discussed as though it were a stable personality construct, the theory and research suggest that it is a learned and changeable disposition.

Locus of control is closely linked to personal attributions of success and failure. Bernard Weiner's attribution theory has three dimensions: the person's locus of control, the stability of the causal element (e.g., personal ability, task difficulty), and whether the causal element is controllable (e.g., personal effort, luck). Gifted students may develop dysfunctional explanations of their success when school tasks are too easy. These explanations include a belief they will always learn things quickly and easily, get all questions correct, and never make mistakes. Success in challenging academic tasks is more likely to develop appropriate attributions and increased internal orientations. Internality of control increases in gifted children or adolescents when they perceive their success in a challenging activity as dependent on their effort, that their abilities are sufficient to be successful, and that the task though difficult is doable. In challenging accelerated educational programs, the gifted have to work hard and struggle more to be successful and competitive with the others in the program. An internal orientation supports the efforts this takes better than does an external one.

Gifted children with an internal locus of control are more likely to take responsibility for their actions and inactions. They are not easily swayed by the negative or overly positive opinions of others. They do better at tasks when they can work at their own paces. The gifted generally develop a healthy internal locus of control, and those gifted who are deeply challenged academically such as those experiencing grade acceleration even more likely to have an internal control orientation.

Developing an internal locus of control among the gifted is encouraged when they are helped to identify those areas in life and in school where they can exercise control. Internality is also enhanced when the gifted are helped to know which areas of their lives are not within their control and therefore may not be worth struggling to change. Assuming control over the various important things in their lives facilitates academic achievement and encourages healthy psychological development among the gifted in related areas such as self-efficacy, resilience, personal goal setting, and decision making. A healthy locus of control helps avoid dysfunctional perfectionism, hiding or denying their giftedness, and underachievement.

Not all gifted have or maintain an internal orientation. An overly external orientation is associated with dysfunctional perfectionism. Providing external rewards for tasks that gifted children already like to do reduces their enjoyment of the activity; in this case, the locus of control shifts from internal to the child to external and with the teacher. Gifted children with an external locus may feel helpless without the concrete direction of others. They may also blame their teachers, parents, other students, or events and circumstances outside of themselves for their poor performances. Externally oriented gifted students attribute success to luck, good teaching, or chance factors rather than to their own efforts.

A related effect is the relationship between a gifted child's locus of control and his or her delay of gratification (to put off a pleasant, but less important effect to accomplish a substantial goal that may take more time and effort right now). Willingness to accept and embrace this delay is supported by an internal locus of control. An internal orientation facilitates the development of self-efficacy, hopefulness about future successes, and a more self-ordered and disciplined task orientation.

Michael F. Sayler

See also Emotional Development; Intrinsic Versus Extrinsic Motivation; Perfectionism; Resilience; School Attitudes; Self-Efficacy/Self-Esteem

Further Readings

Ford, D. Y., & Harris, J. J. (1992). The American achievement ideology and achievement differentials

among preadolescent gifted and nongifted African American males and females. *Journal of Negro Education, 61,* 45–64.

Fournier, G., & Jeanrie, C. (2003). Locus of control: Back to basics. In S. J. Lopez & C. R. Snyder (Eds.), *Positive psychological assessment: A handbook of models and measures* (pp. 139–154). Washington, DC: American Psychological Association.

Heller, K. A., & Ziegler, A. (1996). Gender differences in mathematics and the sciences: Can attributional retraining improve the performance of gifted females? *Gifted Child Quarterly, 40,* 200–210.

Hoekman, K., McCormick, J., & Gross, M. U. M. (1999). The optimal context for gifted students: A preliminary exploration of motivational and affective considerations. *Gifted Child Quarterly, 43,* 170–193.

Rotter, J. B. (1990). Internal versus external control of reinforcement: A case history of a variable. *American Psychologist, 45,* 489–493.

Sayler, M. F., & Brookshire, W. K. (1993). Social, emotional, and behavioral adjustment of accelerated students, students in gifted classes, and regular students in eighth grade. *Gifted Child Quarterly, 37*(4), 150–154.

Schunk, D. H. (1987). Peer models and children's behavioral change. *Review of Educational Research, 57,* 149–174.

Siegle, D., & Reis, S. M. (1995, Winter). Gender differences between student and teacher perceptions of ability and effort. *National Research Center on the Gifted and Talented Newsletter,* 6–7.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer.

M

Mathematical Creativity

Mathematics is often viewed as a field where the ability to apply theorems and algorithms is essential to the development of a deep conceptual understanding. Overlooked is the fact that the theorems and algorithms taught are the creative products of the application of mathematics. All students need insight into the creative process as well as the product of mathematics, but for gifted students, neglecting the creative side of mathematics often results in boredom and loss of interest. A conceptual understanding of mathematical creativity, the difference between academic and creative talent, and ways to develop creativity are all necessary to meet the needs of the gifted.

Defining Mathematical Creativity

Attempts to define mathematical creativity have yielded a multitude of definitions. Some apply the concepts of fluency, flexibility, and creativity to the way students approach problem solving. Others consider the manner in which students formulate problems, or find new relationships, and test their theories. Mathematical creativity can also be viewed in terms of an individual's ability to elaborate on what is known by extending or improving problem-solving methods. An aspect of sensitivity is involved as well; the ability to see beauty or efficiency in the mathematics employed, a level of conceptual understanding necessary to assess cause and effect within a mathematical context, and the ability to offer constructive criticism of standard mathematical problem-solving methods. Regardless of the definition accepted, creativity in mathematics is essential for the advancement of the discipline and in solving problems encountered in the real world.

Academic Ability and Creativity

Although debate exists concerning whether the elements of mathematical creativity are general in nature, domain specific, or some combination, scholars agree that some mathematical knowledge is required for mathematical creativity to emerge. Yet, simply possessing mathematical knowledge does not imply creativity. Students may be able to apply a variety of problem-solving strategies to converge on the same solution, yet never evaluate the appropriateness of these strategies or explore alternate methods. An unwillingness to take risks or the attitude that there is one right way to solve a problem often causes students to fixate on rules and procedures rather than the nature of the problem. When mathematics is approached in this way, creativity is limited; students develop fixed dispositions in their responses to and interpretations of problems.

Henri Poincaré described the work of mathematicians not as the simple application of rules, but rather as the selective choice of ideas to create useful new ways to solve problems. He viewed the process as a period of hard work followed by a period of rest in which the idea incubates within the subconscious. The incubation period is followed by

illumination during which the mathematician solves the problem and confirmatory work in which he or she seeks to extend the methods developed to a wider set of problems. The use of standardized test scores as the only means to identify mathematical giftedness runs counter to Poincaré's process, reducing the concept of mathematical ability to simply accuracy of computation and speed of response. Such tests neglect the value of sustained effort and time needed for reflection that provides the fertile environment necessary for creativity to flourish.

Poincaré's process of mathematical creativity can be found in contemporary writings. Edward Silver suggested that creativity is closely related to deep, flexible knowledge in the domain; associated with long periods of work and reflection rather than rapid, exceptional insight; and influenced by experience. In a comparative study of academically and creatively gifted high school mathematics students, Eunsook Hong and Yvette Aqui found the creatively gifted group to be significantly more resourceful cognitively. Robert Sternberg believes that creative mathematical thinking is essential for an individual to extend the learned mathematics to problems encountered outside the classroom. Although strong analytical skills are often sufficient for high levels of academic performance through lower-level graduate courses, he concluded that creativity is the better predictor of success as a mathematician.

Developing Mathematical Creativity

Creativity needs time to develop and thrives on experience. Too often mathematics is taught as if it is simply a manner of recognizing the correct path for solving a problem and assessed by the correctness of the solution. A meaningful and accurate solution remains the objective; however, students need to learn and value the cognitive processes as well. Inquiry, inference, and reflection are essential skills in the development of creative mathematical thinking. Teaching mathematics for creativity involves making explicit the implicit actions used to solve problems. Students need to struggle with ill-formed problems, as well as explore and experiment with their ideas on how to solve problems. They need opportunities to refine and generalize their methodologies and solutions. In the 1965 film, *Let Us Teach Guessing,* George Pólya presented a class of undergraduate students a deceptively simple problem statement. He guided his students in reformulating the problem into more manageable elements, tailored his instruction to focus his students' guesses on possible solutions, sought to generate and test rules for the patterns observed, and then challenged his students to extend the rules they developed to other cases. Using a holistic approach to problem solving, he modeled the processes mathematicians undertake in the context of new content knowledge for his students. In this way, his students constructed their own understanding of mathematics and began to build the habits of the mind necessary for creative mathematical work.

Eric L. Mann

See also Academic Talent; Creativity, Definition; Mathematical Intelligence; Mathematical Talent; Study of Mathematically Precocious Youth

Further Readings

Hadamard, J. (1945). *The psychology of invention in the mathematical field*. Mineola, NY: Dover Publications.

Hong, E., & Aqui, Y. (2004). Cognitive and motivational characteristics of adolescents gifted in mathematics: Comparisons among students with different types of giftedness. *Gifted Child Quarterly, 48*(3) 191–201.

König, G. (Ed.). (1997). Fostering of mathematical creativity [Special Issue]. *Zentralblatt für Didaktik der Mathematik* [International Reviews on Mathematical Education], *29*(3). Retrieved September 11, 2007, from http://www.emis.de/journals/ZDM/zdm973i.html

Sternberg, R. J., & Ben-Zeev, T. (Eds.). (1996). *The nature of mathematical thinking*. Mahwah, NJ: Lawrence Erlbaum.

Mathematical Intelligence

Mathematical intelligence is considered a strong indicator of general intelligence, and items requiring numerical and spatial reasoning have historically been a component of what constitutes an IQ or "*g*" score. The traditional view of mathematical intelligence as a construct measurable by a

standardized battery leaves little room for the role of imaginative thinking and does not take into consideration the extracognitive and sociocultural factors that influence a person's mathematical creativity. Because mathematical intelligence is often associated with mathematical giftedness and mathematical creativity, a differentiation of the various terms is necessary and explained in this entry. Mathematical intelligence is described from the point of view of extant research findings in the domains of mathematical cognition, psychology, sociocultural research, and gifted education.

Mathematical Giftedness

The construct of intelligence in general and mathematical intelligence in particular have been topics of great controversy since the advent of psychometric testing. For example, most modern-day intelligence tests, which have evolved out of the original Binet-Simon test and the Stanford-Binet test developed by Lewis Terman, consist of subtests that measure numerical reasoning, digit memory, letter–number sequencing, digit symbol-coding, picture completion, block design, matrix reasoning, symbols, and object assembly. In other words, logical, quantitative, and visual-spatial reasoning play a significant role in IQ tests. This view of intelligence has been criticized as being problematic, however, because the items do not take into consideration sociocultural and environmental variables that can influence performance, particularly among minorities and non-native English speakers. High scores on the Stanford-Binet have been traditionally used as an indicator of giftedness and a predictor of academic success in school and beyond. Similarly, psychometric batteries such as the SAT, ACT, and GRE (Graduate Record Examination) consist of a mathematics portion that claims to predict academic success in college.

In the studies conducted in the domain of cognition, mathematical intelligence in an individual can be defined in terms of the following: (a) the ability to abstract, generalize, and discern mathematical structures; (b) the ability to employ data management techniques; (c) the ability to master principles of logical thinking and inference; (d) analogical, heuristic thinking and posing related problems; (e) flexibility and reversibility of mathematical operations; (f) an intuitive awareness of mathematical proof; (g) the ability to independently discover mathematical principles; (h) the ability to apply decision-making abilities in problem-solving situations; (i) the ability to visualize problems and/or relations; and (j) the ability to distinguish between empirical and theoretical principles.

Mathematical intelligence in the general population has been classified by numerous theorists using a hierarchical model. For instance, Zalman Usiskin, a mathematics educator at the University of Chicago, proposed an eight-tiered hierarchy to classify mathematical talent, which he ranges from Level 0 to Level 7. In this hierarchy Level 0 (No Talent) represents adults who know very little mathematics; Level 1 (Culture level) represents adults who have rudimentary number sense as a function of cultural usage, and their mathematical knowledge is comparable to those of students in Grades 6–9. It is obvious that a very large proportion of the general population would fall into the first two levels. The remaining population is thinly spread out into Levels 2 through 7 on the basis of mathematical talent. Level 2 represents honors high school students who are capable of majoring in mathematics as well as those who eventually become secondary math teachers. Level 3 (the "terrific" student) represents students who score in the 750–800 range on the SATs or 4 or 5 in the Calculus AP exams. These students have the potential to do beginning graduate-level work in mathematics. Level 4 (the "exceptional" student) represents students who excel in math competitions and receive admission into math/science summer camps and/or academies because of their talent. These students are capable of constructing mathematical proofs and able to "converse" with mathematicians about mathematics. Level 5 represents the productive mathematician. This level represents students who have successfully completed a Ph.D. in mathematics or a related mathematical science and are capable of publishing in the field. Level 6 is the rarified territory of the exceptional mathematician; it represents mathematicians who have made significant contributions to their particular domains and been conferred recognition for their work. Finally, at Level 7 are the all-time greats, including the Fields Medal winners in mathematics. The Fields Medal was established by John Charles Fields (1863–1932) and is the equivalent of the Nobel Prize for the field of mathematics. This level

is the exclusive territory of giants or exemplary geniuses like Leonard Euler, Karl Friedrich Gauss, Bernhard Riemmann, Srinivasa Ramanujan, David Hilbert, and Henri Poincaré, among others. The hierarchical model of Usiskin has been extended by Bharath Sriraman by taking into consideration the need to differentiate between the constructs of mathematical giftedness and mathematical creativity implicitly assumed in the model.

In the former Soviet Union in the time period from 1950 to 1970, numerous experiments were conducted with mathematically capable students in order to discern their specific mathematical abilities. This research characterized the mathematical abilities of gifted children holistically as comprising analytic, geometric, and harmonic components and argued that gifted children usually have a preference for one component over the others. The analytic type has a mathematically abstract cast of mind, the geometric type has a mathematically pictorial cast of mind, and a harmonic type is a combination of analytic and geometric types. For instance, given the same problem, one gifted child might pursue an analytic approach, whereas another would pursue a geometric approach. Another classification of styles of mathematical giftedness suggests the empirical type and the conceptual type. In this classification the empirical type would have a preference for applied situations, immediately observable relations, and induction, whereas the conceptual type would have a preference for theoretical situations and deduction. The Soviet psychologist V. A. Krutetskii observed that one of the attributes of mathematically gifted students was the ability to switch from a direct to a reverse train of thought (reversibility), which gifted students performed with relative ease. The mathematical context in which this reversibility was observed was in transitions from usual proof to proof via contradiction (*reductio ad absurdum*), or when moving from a theorem to its converse.

Mathematical Creativity

Another aspect of mathematical intelligence is that of mathematical creativity. Most extant definitions of mathematical creativity found in the mathematics and mathematics education literature is vague or elusive. This may be because of the difficulty of describing this complex construct. For instance, mathematical creativity has been defined by mathematicians like Poincaré via the use of various metaphors such as the ability to discern, choose; to distinguish between acceptable and unacceptable patterns; and nonalgorithmic decision making. The literature on students who are mathematically creative at the pre-university level (K–12) is also vague. Exceptional mathematical ability has been associated with the Einstein syndrome and Asperger's syndrome. The Einstein syndrome is characterized by exceptional mathematical ability but delayed speech development, whereas Asperger's syndrome is a mild form of autism. At the K–12 level, one normally does not expect works of extraordinary creativity; however, it is certainly feasible for students to offer new insights into a math problem or a new interpretation or commentary on a literary or historical work. The psychologist Robert Sternberg defines creativity as the ability to produce unexpected original work that is useful and adaptive. Other definitions, such as those formulated by Paul Torrance, usually impose the requirement of novelty, innovation, or unusualness of a response to a given problem. Confluence theories of creativity define creativity as a convergence of knowledge, ability, thinking style, motivational, and environmental variables. A synthesis of the numerous definitions of creativity leads to a generally accepted definition of mathematical creativity as the ability to produce original work that significantly extends the body of knowledge, and/or opens up avenues of new questions for others.

The existing research also indicates that mathematically creative individuals are prone to reformulating the problem or finding analogous problems. They are also different from their peers in that they are fiercely independent thinkers, tend to persevere, and tend to reflect a great deal. Although some of the cognitive and affective aspects of mathematical creativity are now known, some theorists claim that numerous extracognitive factors play an important role in the manifestation of mathematical intelligence in creative acts. These factors include beliefs, aesthetics, intuitions, intellectual values, self-imposed subjective norms and standards, and chance as contributing to astonishing acts and products of creative endeavors.

Some theorists contend that although the field of psychology has an established body of research that

has examined factors such as the influence of personality and sociocultural influences contributing to creative behavior, the study of beliefs, aesthetics, intuitions, values, and chance is necessary to complement and convey a complete picture of creativity. In sociocultural frameworks for mathematics such as that proposed by Alan Bishop, mathematical intelligence is viewed as being engaged in and aware of the six pancultural human activities, which are (1) playing, (2) designing, (3) locating, (4) explaining, (5) counting, and (6) measuring.

Implications

One important implication for teachers of mathematics is that many of the traits of highly able individuals are in fact cultivatable in the classroom. For instance, the role of analogical reasoning is highlighted as a trait of exceptional creativity, yet the use of analogies and metaphors vanishes in the school curricula as imagination is replaced by conformity as students progress through Grades K–12, particularly in science and mathematics. Research in the 1980s on problem solving focused partly on analogical behaviors engaged in by expert and novice problem solvers. This research revealed that expert problem solvers in mathematics and science engaged in metaphorical processes as they constructed problem representations, and they looked for analogies between the problem at hand and other familiar situations. A recent longitudinal cross-cultural study conducted with young children in Australia and the United States reported that spontaneous analogies employed by children in everyday language in natural settings were by and large absent when children employed the language of mathematics, that is, engaged in mathematical reasoning, which suggests that practitioners need to encourage this natural facility in mathematics classrooms.

Real-world problems are full of uncertainty and ambiguity. Creating, as opposed to learning, requires that students be exposed to the uncertainty as well as the difficulty of creating original ideas in mathematics, science, and other disciplines. This ability requires the teacher to provide affective support to students who experience frustration over being unable to solve a difficult problem. Students should periodically be exposed to ideas from the history of mathematics and science that evolved over centuries and took the efforts of generations of mathematicians to finally solve. Cultivating this trait will ultimately serve mathematically gifted students to make the transition to the professional realm. The Hamburg Model in Germany, which is focused on allowing gifted students to engage in problem-posing activities, followed by time for exploring viable and nonviable strategies to solve the posed problems, captures an essence of the nature of professional mathematics, where the most difficult task is often to formulate the problem (theorem) correctly.

Bharath Sriraman

See also Cognition; Intelligence Testing; Mathematical Creativity; Mathematically Precocious; Mathematics, Curriculum

Further Readings

Bishop, A. J. (1988). *Mathematical enculturation: A cultural perspective on mathematics education.* Dordrecht, the Netherlands: Kluwer Academic.

Bredo, R. (2006). Conceptual confusion and educational psychology. In P. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 43–58). Mahwah, NJ: Lawrence Erlbaum.

English, L. (Ed.). (2004). *Mathematical and analogical reasoning of young learners*. Mahwah, NJ: Lawrence Erlbaum.

Shavinina, L. V., & Ferrari, M. (Eds.). (2004). *Beyond knowledge: Extra cognitive aspects of developing high ability.* Mahwah, NJ: Lawrence Erlbaum.

Sriraman, B. (2005). Are mathematical giftedness and mathematical creativity synonyms? A theoretical analysis of constructs. *Journal of Secondary Gifted Education, 17*(1), 20–36.

Sriraman, B., & Dahl, B. (2007). On bringing interdisciplinary ideas to gifted education. In L. V. Shavinina (Ed.), *The international handbook of giftedness*. New York: Springer Science.

Sternberg, R., & Ben-Zeev, T. (Eds.). (1996). *The nature of mathematical thinking*. Mahwah, NJ: Lawrence Erlbaum.

Mathematically Precocious

Precocity in mathematical ability is a well-documented phenomenon in the history of science

and mathematics. The history of mathematics and the literature in gifted education indicates that mathematical precocity is a relatively rare trait in the general population and one that typically manifests at a young age. Fortunately, it can be identified via above-level testing. Such individuals' abilities develop and thrive when they are mentored early in their lives and provided affective support in addition to curricular programming appropriate for their abilities.

Mathematically Precocious Individuals

Mathematical precocity is typically found in anecdotes of child prodigies such as Blaise Pascal (1623–1666), Carl Friedrich Gauss (1777–1855), Rowan Hamilton (1805–1865), Srinivasa Ramanujan (1887–1920), Shakuntala Devi (1939–), and Terrence Tao (1975–), among others. Many of these prodigies were known for their phenomenal computing abilities that involve complex arithmetic and number theoretic operations on large numbers.

Some well-documented and historically accurate anecdotes indicate the profound nature of such an individual's precocity. At the age of 11, Pascal had composed a treatise on the sounds of vibrating bodies in spite of his father forbidding him to study mathematics lest it interfere with Pascal's schooling in the classical languages. At the age of 12, Pascal constructed an independent proof that the sums of the angles of a Euclidean triangle are invariant and equal two right angles, with a piece of coal on a wall. Pascal was then allowed the luxury of sitting in on meetings held in the monastery housing Marin Mersenne, where mathematical geniuses like Descartes, Desargues, and Gassendi often gathered.

Hamilton displayed unusual precocity in the realm of languages and by the age of 13, under the tutelage of his uncle, learned most classical and modern European languages in addition to Hindustani, Persian, Sanskrit, and Arabic. His genius in mathematics manifested only after his entry into Trinity College in Dublin, culminating in his discovery of the mathematical structure of quaternions in 1843.

Ramanujan, called one of the greatest mathematical geniuses of the 20th century, was self-taught and found his love and astonishing ability for mathematics at the age of 13 by mastering an advanced trigonometry book by S. L. Loney, and the nearly 5,000 theorems found in *A Synopsis of Elementary Results in Pure and Applied Mathematics,* by George S. Carr. Later, with the help of G. H. Hardy at Cambridge, who recognized his brilliance, Ramanujan made profound contributions to analytic number theory, analysis, series, and continued fractions. During his lifetime, Ramanujan is said to have discovered nearly 4,000 mathematical theorems in the forms of identities and equations.

Devi, the daughter of a trapeze artist, was a calculating prodigy who demonstrated her unusual counting talents in card games at the age of 3. She had the ability to perform mathematical computations faster than computers, an ability that did not wane in adulthood. She mentally extracted the 23rd root of a 201 digit number in 1977, and in 1980 demonstrated her abilities to the computer science department at Imperial College in London by correctly multiplying two randomly selected 13-digit numbers in 28 seconds.

Finally, Tao, whose early mathematical precocity is well documented in the current gifted education literature, was already attending high school–level courses at the age of 8, and scored a 760 on the SAT—Mathematics. He was awarded the Fields Medal in Mathematics, the highest honor given to mathematicians under the age of 40 who have made seminal contributions to the development of the field.

Even though mathematical precocity is most frequently found among child prodigies, the literature contains eminent examples of precocious individuals who were relatively late bloomers in their seminal contributions to mathematics, such as Abraham DeMoivre (1667–1754), Karl Weierstrass (1815–1857), Emmy Noether (1882–1935), and Abraham Robinson (1918–1974).

Testing and Programming

Julian Stanley's landmark Study of Mathematically Precocious Youth (SMPY), started at Johns Hopkins University in 1971, introduced the idea of above-level testing for the identification of highly gifted youth. From 1980 to 1983, in SMPY, 292 mathematically precocious youth were identified on the basis of the SAT. These students scored

at least 700 on SAT—Mathematics before the age of 13. SMPY also generated a vast amount of empirical data gathered over the past 30 years, and resulted in many findings about the types of curricular and affective interventions that foster the pursuit of advanced coursework in mathematics.

Given the profound abilities of mathematically precocious students, programming can be delivered for these students via acceleration, curriculum compacting, and differentiation. There exists compelling evidence from longitudinal studies conducted in the former Soviet Union by V. A. Krutetskii that highly mathematically gifted students are able to abstract and generalize mathematical concepts at higher levels of complexity and more easily than their peers in the context of arithmetic and algebra. These results were recently extended for the domains of problem solving, combinatorics, and number theory by Bharath Sriraman. The literature indicates that acceleration is perhaps the most effective way of meeting precociously gifted student programming needs. Mathematics, unlike any other discipline, lends itself to acceleration because of the sequential developmental nature of many elementary concepts. The very nature of acceleration suggests that the principles of curriculum compacting are applied to trim out an excessive amount of repetitive tasks. In addition, the effectiveness of radical acceleration and exclusive ability grouping, as extensively reported by Miraca Gross in her longitudinal study of exceptionally and profoundly gifted students in Australia, indicates that the benefits far outweigh the risks of such an approach. Most of the students in Gross's studies reported high levels of academic success in addition to normal social lives. Simply put, the purpose of curricular modifications such as acceleration, compacting, and differentiation for mathematically precocious students is to tailor materials that introduce new topics at a faster pace that allows for high-level thinking and independence reminiscent of research in the field of mathematics.

Besides the use of curriculum compacting, differentiating, and acceleration techniques, many school programs offer *all* students opportunities to participate in math clubs and in local, regional, and statewide math contests. Typically, the exceptionally talented students benefit the most from such opportunities. In many countries (such as Hungary, Romania, Russia, and the United States), the objective of such contests is typically to select the best students to eventually move on to the national and international rounds of such competitions. The pinnacle of math contests is the prestigious International Math Olympiads (IMO), where teams of students from different countries work together to solve challenging math problems. At the local and regional levels, problems typically require mastery of concepts covered by a traditional high school curriculum with the ability to employ or connect methods and concepts flexibly. At the Olympiad levels, however, students in many countries are trained in the use of undergraduate-level algebraic, analytic, combinatorial, graph theoretic, number theoretic, and geometric principles.

Models for Indentifying and Developing Mathematical Precocity

Whereas most extant models within the United States, such as those used in the Center for Talented Youth (CTY) at Johns Hopkins University, tend to focus on accelerating the learning of concepts and processes from the regular curriculum, thus preparing students for advanced coursework within mathematics, other models such as the Hamburg Model in Germany, are more focused on allowing gifted students to engage in problem-posing activities, followed by time for exploring viable and nonviable strategies to solve the posed problems. This approach in a sense captures an essence of the nature of professional mathematics, where the most difficult task is often to formulate the problem correctly and to pose related problems.

Another successful model for identifying and developing mathematical precocity is found in historical case studies of mathematics gifted education in the former USSR. The Russian mathematician and pedagogue B. V. Gnedenko claimed that personal traits of creativity can appear in different ways in different people. One person could be interested in generalizing and in a more profound examination of already obtained results. Others show the ability to find new objects for study and to look for new methods in order to discover their unknown properties. The third type of person can focus on logical development of theories, demonstrating an extraordinary sense of awareness of logical fallacies and flaws. A fourth group of gifted

individuals would be attracted to hidden links between seemingly unrelated branches of mathematics. The fifth would study historical processes of the growth of mathematical knowledge. The sixth would focus on the study of philosophical aspects of mathematics. The seventh would search for ingenious solutions to practical problems and look for new applications of mathematics. Finally, someone could be extremely creative in the popularization of science and in teaching.

The history of Soviet mathematics provides an example of the coexistence of two different approaches to mathematics education, one embedded into the general lay public educational system implementing the blueprint based on the European concepts of the late 19th century, and the other focusing mainly on gifted children and having flourished starting from the 1950s onward. The latter took the form of a complex network of activities, including mathematics clubs for advanced children (Russian "кружки" [*kruzhki*], literally "circles" or "rings," usually affiliated with schools and universities but some were also home based), Olympiads, team mathematics competitions (*matboi,* literally "mathematical fight"), extracurricular winter or summer schools for gifted children, publication of magazines on physics and mathematics for children (the most famous being *Kvant,* literally "Quantum"), among others. All these activities were free for all participating children and were based solely on the enthusiasm of mathematics teachers or university professors. This process led to the creation of a system of formation of mathematical elite in the former USSR focused first and foremost on extremely gifted children, which was in sharp contrast to the egalitarian, regular state-run schools targeting average students. The young Andrey Kolmogorov (1903–1987), a highly precocious child who went on to become one of the most eminent mathematicians of the 20th century, was able to benefit from the unique extracurricular pedagogical environment provided by this system.

Research Findings

Recently, David Lubinski and Camilla Benbow compiled a comprehensive account of 35 years of longitudinal data obtained from the Study of Mathematically Precocious Youth (SMPY). They reported the findings from 20-year follow-ups on various cohort groups that participated in SMPY. These researchers found that the success of SMPY in uncovering antecedents such as spatial ability, tendency to independently investigate, and research oriented values, were indicative of potential for pursuing lifelong careers related to mathematics and science. The special programming opportunities provided to the cohort groups played a major role in shaping their interest and potential in mathematics, and ultimately resulted in "happy" choices and satisfaction with the career paths chosen. Another finding was that significantly more mathematically precocious males entered into math-oriented careers as opposed to females, which Lubinski and Benbow argue is not a loss of talent per se, since the females did obtain advanced degrees and chose careers more oriented to their multidimensional interests, such as administration, law, medicine, and the social sciences. Programs such as SMPY serve as a beacon for other gifted and talented programs around the world, and provide ample evidence of the benefits of early identification and nurturing the interests of mathematically precocious individuals.

Bharath Sriraman

See also Eminence; Genius; Mathematical Creativity; Mathematical Talent; Prodigies; Study of Mathematically Precocious Youth; Very Young Gifted

Further Readings

Benbow, C. P., Lubinski, D., & Sushy, B. (1996). The impact of SMPY's educational programs from the perspective of the participant. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 266–300). Baltimore: Johns Hopkins University Press.

Davidson, H. M. (1983). *Blaise Pascal.* Boston: Twayne Publishers.

Feldman, D. H. (1993). Child prodigies: A distinctive form of giftedness. *Gifted Children Quarterly, 37*(4), 188–193.

Freiman, V., & Volkov, A. (2004). Early mathematical giftedness and its social context: The cases of Imperial China and Soviet Russia. *Journal of Korea Society of Mathematical Education Series D: Research in Mathematical Education, 8*(3), 157–173.

Genkin, S., Fomin, D., & Itenberg, I. (1996). *Mathematical circles: Russian experience.* Providence, RI: American Mathematical Society.

Gnedenko, B. V. (1991). *Введение в специальность: математика* [Introduction in specialization: Mathematics]. Moscow: Nauka.

Gross, M. U. M. (1986). Radical acceleration in Australia: Terence Tao. *Gifted Child Today.* Retrieved December 17, 2008, from http://www.gt-cybersource.org/Record.aspx?NavID=2_0&rid=11273

Gross, M. U. M. (1993). Nurturing the talents of exceptionally gifted children. In K. A. Heller, F. J. Monks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 473–490). Oxford, UK: Pergamon.

Kiesswetter, K. (1992). Mathematische Begabung. Über die Komplexität der Phänomene und die Unzulänglichkeiten von Punktbewertungen. *Mathematik-Unterricht, 38,* 5–18.

Krutetskii, V. A. (1976). *The psychology of mathematical abilities in school children* (J. Teller, Trans., J. Kilpatrick & I. Wirszup, Eds.). Chicago: University of Chicago Press.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years: Uncovering antecedents for the development of math-science expertise. *Perspectives on Psychological Science, 1,* 316–345.

Sriraman, B. (2002). How do mathematically gifted students abstract and generalize mathematical concepts. *NAGC 2002 Research Briefs, 16,* 83–87.

Sriraman, B. (2004). Gifted ninth graders' notions of proof. Investigating parallels in approaches of mathematically gifted students and professional mathematicians. *Journal for the Education of the Gifted, 27*(4), 267–292.

Mathematical Talent

Mathematical talent is a resource much in demand in our increasingly technological world. In many ways, however, it is elusive—hard to define in a single sentence. Because it is inextricably connected to human beings, it is as complicated as the human experience itself. In this entry, the definition of mathematical talent is discussed, and then links from this definition to the identification process and programming for talented math students are explored.

An introduction to the definition of mathematical talent is probably best done by stating what it is not. It is not a single construct nor is this talent the same for every student. Thus, it follows that it cannot be measured by a single instrument. Rather, mathematical talent is multidimensional, just as the discipline of mathematics itself is multidimensional.

Definition

In our society, the definition of mathematical talent is confounded because of students' different levels of experience with mathematics due to their varying backgrounds and schooling. For example, just because a student has never had exposure to prime numbers does not mean that he or she cannot understand them or solve interesting, complex problems with prime numbers. This student might have difficulty in a testing situation, however, until the initial exposure has taken place. The National Council of Teachers of Mathematics (NCTM) established a task force in 1994 to look at issues surrounding mathematically talented students and to make recommendations regarding identification and programming. The definition of the task force talks about mathematical promise as comprised of ability, motivation, belief, and experience or opportunity. The task force emphasized that students who are mathematically promising have a wide range of abilities and a whole continuum of needs based on those abilities.

Characteristics

As noted above, there are different types of mathematical talent. Some students are abstract thinkers. They tend to be very strong algebraically in looking for patterns and making generalizations. Others have talents that are more spatial and can visualize problems pictorially. They can move objects around in their mind to view them from different angles and positions. Still others have a combination of both skills. Speed in doing problems, computational facility, and ease of memorizing number facts and formulas are often associated with mathematical talent. In fact, sometimes these are the criteria by which students are identified as having talent. However, researchers have found these characteristics are not a requirement for someone to have mathematical talent. Talented students may possess some or all of these characteristics, but they are not evident in all talented students.

Rather, characteristics that define mathematical talent are more related to posing and solving complex mathematical problems. These characteristics include eagerness to solve challenging math problems, using creative and unusual ways to solve math problems, persistence in problem solving, looking at the world from a mathematical perspective, switching strategies easily when solving problems, solving problems abstractly without the need for concrete materials, organizing data and information to discover mathematical patterns, and enjoying challenging math puzzles and logic problems. This is not an exhaustive list of characteristics nor does every student with mathematical talent display all of these characteristics. However, students who are curious about mathematics and have a talent for solving interesting, complex problems and creating new problems are students who deserve special nurturing in the area of mathematics.

Identification

Because mathematical talent is varied and displayed in different ways and at different times, identification needs to include a variety of measures. It should be a process that is flexible and ongoing. This is especially true in identifying students who lack mathematical experiences, yet have talent potential. Because standardized tests such as IQ tests and achievement tests have statistical backing, they are often used to identify students for programming. However, these tests usually concentrate on low-level tasks that do not require the unique problem-solving skills of talented students. Students with language differences and other learning differences are often missed as well. NCTM cautions against using these tests as the *sole* means of identification. If using standardized tests that are not specifically designed for talented students, out-of-level testing should be used to prevent a ceiling effect. This technique, pioneered at Johns Hopkins University by Julian Stanley and studied through the present by Camilla Benbow and David Lubinski's Study of Mathematically Precocious Youth (SMPY), has been found to identify even the most extraordinarily gifted students.

Rating scales that ask teachers to comment on student behaviors can also help with the identification process. Research-based scales rather than teacher-invented checklists are more valid and reliable. These scales often help teachers look at students from a different perspective, focusing on creative and critical thinking rather than computational speed and accuracy. Performance-based tasks in which students are involved in problem solving can provide additional insight. Teacher observation during tasks and/or student written work can provide new information about student thinking. Student grades, interviews, and parent- and self-nomination are other ways to uncover mathematical talent. In conclusion, researchers and NCTM recommend using multiple measures of identification to ensure a more inclusive talent pool of students.

It is also important to recognize that students who are talented in mathematics may not be talented in other areas and vice versa. Gardner's *theory of multiple intelligences* speaks to this. When part of the brain is damaged, as in people who experience strokes, people may lose their mathematical abilities but still speak, and some people who lose their linguistic abilities are still able to do mathematics. It is possible, according to this theory, for students to have mathematical giftedness in relative isolation from other abilities. This has implications for gifted mathematics education. Some teachers have been surprised to learn that a student who has reading and writing difficulties may have very strong mathematical reasoning ability.

Programming

The primary goal in determining programming is finding an optimal match between student ability and curriculum instruction. Options include acceleration, enrichment activities, and a combination of both. Within these options there are a variety of instructional approaches such as pull-out programs, ability grouping, cluster grouping, curriculum compacting, differentiation, special programs and schools for mathematically talented students, and individual mentoring. Selecting the appropriate curriculum is critical. Because of the linear nature of mathematics, Stanley and his colleagues have argued that mathematics is the best candidate for an accelerated curriculum, and results of accelerated instruction for mathematically talented students have produced impressive gains in achievement in short periods of time. Whether

enrichment, differentiation, or acceleration is used, it must be a rigorous curriculum that is able to challenge and engage students. A good goal to keep in mind is a very simple one: Every student should learn something new and meaningful in mathematics every day.

M. Katherine Gavin

See also Mathematical Creativity; Mathematical Intelligence; Mathematically Precocious; Talented Girls, Mathematics

Further Readings

Assouline, S., & Lupkowski-Shoplik, A. (2005). *Developing math talent: A guide for educating gifted and advanced learners in math*. Waco, TX: Prufrock Press.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gavin, M. K. (2005). Are we missing anyone? Identifying mathematically promising students. *Gifted Education Communicator, 36*(3 & 4), 24–29.

Sheffield, L. J. (Ed.). (1999). *Developing mathematically promising students*. Reston, VA: National Council of Teachers of Mathematics.

Mathematics, Curriculum

Mathematics curriculum has been the center of continued debate in the public arena since the launch of *Sputnik* more than 50 years ago. There is ongoing controversy about what mathematics content should be included in the school curricula, as evidenced in the so-called Math Wars (in the United States) and similar differences of curricular opinion elsewhere. There are major differences in the mathematical abilities between the mathematically gifted and talented students and their age-mates, and these differences can be addressed both in the mixed ability and exclusive ability classroom via the use of appropriate programming techniques such as curriculum acceleration, compacting, and differentiating. In certain instances, radical acceleration offers the best intellectual opportunities for the profoundly gifted students. The curriculum at the secondary level is typically enriched with Honors and/or Advanced Placement (AP) courses. However, many believe this one-size-fits-all approach leaves much to be desired in terms of meeting the needs of mathematically gifted students with cognitive and affective traits different from the general group.

Curriculum Terms and Techniques

Some terms used within the existing research literature on curriculum relevant for this entry are (1) contest problem training, (2) curriculum compacting, (3) curriculum differentiation, (4) heterogeneous and/or homogeneous grouping, (5) radical acceleration, and (6) summer programs.

1. *Contest problem training* is used to refer to specific mathematical techniques from the areas of algebra, analysis, combinatorics, geometry, number theory, and so on, which are useful to solve a wide variety of contest problems.

2. *Curriculum compacting* simply means eliminating previously mastered work (typically involving routine computations and procedures) to condense the regular curriculum for gifted learners.

3. *Curriculum differentiation*, as defined by various theorists, means tailoring the curriculum to meet the specific needs of learners of varied abilities. Although this term was initially used to refer to the varied needs of gifted learners, it has mutated into meaning tailoring the curriculum and the classroom environment to create different learning experiences for all students.

4. *Homogeneous grouping* refers to the grouping of learners at the same ability level; whereas *heterogeneous grouping* allows for learners of mixed ability levels to work together on ongoing class activities, projects, and the like. Sometimes the term *exclusive grouping* is used to refer to homogeneous or same-ability grouping.

5. *Radical acceleration* refers to the practice of grade skipping and early university entrance for profoundly gifted learners. These learners typically have IQs over 180.

6. *Summer programs* are typically 1– to 4–week courses held on university campuses in which mathematically gifted students are exposed to new topics in mathematics as well as mathematics' far-reaching applicability and relevance to the everyday world.

Given the differences in mathematical abilities between mathematically gifted students and their peers, curriculum compacting, differentiation, and acceleration can be applied effectively to the mathematics curriculum to meet the needs of mathematically gifted students. Numerous studies have shown that acceleration is perhaps the most effective way of meeting gifted student programming needs. Mathematics, unlike any other discipline, lends itself to acceleration because of the sequential developmental nature of many elementary concepts. The very nature of acceleration suggests that the principles of curriculum compacting are applied to trim out the excessive amount of repetitive tasks. Differentiation occurs naturally because acceleration allows gifted students with the opportunity to get through the "typical" traditional high school curriculum of geometry–algebra2–precalculus–calculus much faster than the norm of 4 years.

Julian Stanley's landmark Study of Mathematically Precocious Youth (SMPY) and the more than 250 papers produced in its wake provide excellent empirical support for the effectiveness of curriculum acceleration and compaction in mathematics. This study, started by Julian Stanley at Johns Hopkins University in 1971, generated a vast amount of empirical data gathered over the past 30 years, and has resulted in many findings about the types of curricular (acceleration, compacting, etc.) and affective interventions that foster the pursuit of advanced coursework in mathematics. Simply put, the purpose of curricular modifications such as acceleration, compacting, and differentiation for mathematically gifted students is to tailor materials that introduce new topics at a faster pace that allows for high-level thinking and independence reminiscent of research in the field of mathematics.

Besides in-school modifications, many schools offer students opportunities to participate in math clubs and math contests. Many countries have national contests that allow the most talented students to progress to international math contests. The International Math Olympiads (IMO), where teams of students from different countries work together to solve challenging math problems, are the contests in which the brightest math students in the world have an opportunity to display their talents. Local contests require the expert use of high school mathematics; at national and international levels, however, students are expected to master undergraduate level algebraic, analytic, combinatorial, graph theoretic, number theoretic, and geometric principles. The rationale for the increasing use of discrete mathematics in contest problems is that discrete mathematics, unlike continuous mathematics, is accessible to students, starting at the elementary levels, because it builds from simple enumerative techniques. In an often-quoted survey article in the literature, arguments for the inclusion of combinatorial mathematics in the school curriculum are based on the following reasons: (a) its independence from calculus; (b) its usefulness to teach concepts of enumeration, making conjectures and generalizations; (c) numerous applications to the physical, natural, and computing sciences, probability, number theory, and topology; (d) the opportunities created for using computing tools, but also illustrating the limitations of such tools. Last but not least, discrete mathematics and their applications illustrate recent developments in mathematics, thereby allowing students to develop a feeling for how mathematics grows. A synthesis of the body of studies on combinatorial thinking and discrete mathematics in general supports the successful use of such problems within the mathematics curriculum, with significant benefits for the abstraction and generalization capabilities of mathematically gifted students.

Integrated Curricula

In fact, *all* of the NSF-funded reform-based mathematics curriculum projects in the 1990s that resulted in the writing of integrated mathematics curricula include a heavy dose of discrete mathematics. High school curricula such as the Core Plus Mathematics Project (CPMP) developed at Western Michigan University and the Systemic Initiative for Montana Mathematics and Science (SIMMS) developed at the University of Montana

are based on the premise of situating mathematics in authentic real-world contexts that require the modeling of a given situation, which in turn motivates or creates the need for the use of mathematical techniques and concepts. Unlike the traditional high school curricula with calculus at its pinnacle, these two authentic integrated mathematics curricula introduce students to discrete mathematics, combinatorics, transformational geometry, matrix algebra, statistics, modeling techniques, and informatics.

Secondary mathematics is usually the gateway to an exposure to both breadth and depth of mathematical topics. However, most traditional mathematics curricula are still anchored in the traditional treatment of mathematics, as opposed to an interdisciplinary and modeling based approach of mathematics used in the real world. Barbara Kerr points out that high school mathematics also serves as the gatekeeper for many areas of advanced study, and the traditional treatment of mathematics with little or no emphasis on modeling based activities that require team work and communication have historically discouraged gifted girls from pursuing 4 years of high school mathematics. This deficit is difficult to remediate at the undergraduate level and results in the effect of low numbers of students capable of graduate-level work in emerging interdisciplinary fields. This suggests curricular initiatives that involve the study of the modeling of complex systems that occur in real-life situations from the very early grades.

Advanced Placement and the International Baccalaureate Program

AP mathematics courses were never explicitly designated as courses for mathematically gifted students, with adequate programming considerations for the needs of gifted students. Instead they were historically meant to be college courses offered at the high school level available to seniors motivated to take such courses. The International Baccalaureate Program (IBP), on the other hand, was specifically designed as a pre-university preparatory program for academically gifted students; it includes six areas of study (including mathematics), a capstone course on epistemology, and a senior thesis (essay). As previously stated, AP courses have unfortunately become a convenient one-size-fits-all approach to meeting the needs of mathematically gifted students without any attention to research on programming techniques for these students. The same is unfortunately true for IBPs. There is a lack of research on the long-term effectiveness of AP/IBPs for the curricular needs of mathematically gifted students. The National Research Council report of 2002 assessed the effectiveness of AP/IBPs currently in place in the United States and found the following: (a) Conceptual understanding is often not emphasized; (b) Collaborative projects are not emphasized; (c) There were contextual shortcomings; and (d) There were questions surrounding the validity of assessment instruments.

Changing Nature of Mathematics

The literature also shows that the nature of mathematics itself has changed over time. The experiential world of the 21st-century student and teacher is characterized by complex systems such as the Internet, various multimedia, sophisticated computing tools, global markets, virtual realities, access to online educational environments, and more, and emerging fields such as bioinformatics and mathematical genetics, cryptography, mathematical biology, and others that call for different mathematical skills such as the ability to model complex systems and problem solving. Authentic integrated mathematics curricula such as those reported in this entry offer all students opportunities to experience the relevance and applicability of mathematics to the world around them. Contests offer the more able students opportunities to learn and apply mathematical principles to both pure and applied math problems and create a sound foundational base for advanced coursework in mathematics at the university level. The free availability of resources and access to researchers via the Internet offers a multitude of possibilities for the classroom practitioner both to enrich and to adapt traditional mathematics curricula to make them relevant for today's world. It is hoped that practitioners, with the help of researchers, can effectively transform the extant research into effective classroom and curricular practice, with students ultimately benefiting from such a symbiosis.

Future Research

One of the underaddressed areas of gifted and talented education is empirical studies that examine the effectiveness of reform-based mathematics curricula, particularly with mathematically gifted students. Although numerous claims are made for the benefits of modeling-based mathematics curricula for increasing achievement, there is scant empirical evidence presented on the changes of achievement levels of mathematically gifted students. Another fruitful area of research would be to follow the career trajectories of mathematically gifted students through college and qualitatively investigate the impact of mathematics school curricula on their choices of and success in majors involving a heavy use of mathematics.

Bharath Sriraman

See also Mathematical Creativity; Mathematical Intelligence; Mathematically Precocious; Mathematical Talent

Further Readings

Benbow, C. P., Lubinski, D., & Sushy, B. (1996). The impact of SMPY's educational programs from the perspective of the participant. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 266–300). Baltimore: Johns Hopkins University Press.

Kerr, B. A. (1997). Developing talents in girls and young women. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 483–497). Boston: Allyn & Bacon.

Lesh, R., & Sriraman, B. (2005). John Dewey revisited—Pragmatism and the models-modeling perspective on mathematical learning. In A. Beckmann, C. Michelsen, & B. Sriraman (Eds.), *Proceedings of the 1st International Symposium on Mathematics and Its Connections to the Arts and Sciences* (pp. 32–51). Berlin: Franzbecker Verlag.

Sriraman, B. (2002). How do mathematically gifted students abstract and generalize mathematical concepts. *NAGC 2002 Research Briefs, 16,* 83–87.

Sriraman, B. (2005). Are mathematical giftedness and mathematical creativity synonyms? A theoretical analysis of constructs. *Journal of Secondary Gifted Education, 17*(1), 20–36.

Sriraman, B., & Dahl, B. (2008). On bringing interdisciplinary ideas to gifted education. In L. V. Shavinina (Ed.), *The international handbook on giftedness.* London: Springer.

Sriraman, B., & Steinthorsdottir, O. (2007). Secondary mathematics. In J. Plucker & C. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says* (pp. 355–367). Waco, TX: Prufrock Press.

Meaning of Life

What is the meaning of life? This question has been asked by billions of people for thousands of years. The question is usually first asked by individuals during their teenage years. Because of their advanced knowledge and intense curiosity, gifted individuals may begin to ask these questions as children. The question tends to resurface at many times—often during times of crisis and often around the issue of death.

People are interested in the meaning of life, in part, because human beings are aware of their mortality and the shortness of life. Many people care whether their lives matter beyond their small circles of life and after their deaths. These feelings prompt individuals to seek a transcendent meaning for their lives. Religion and psychotherapy offer two different approaches for finding meaning. Generally, religion offers guidance through scripture and the reliance on faith, whereas psychotherapy encourages individuals to ask themselves the difficult questions and to seek truths about what matters most to them. Meanwhile, social scientists continue to employ the scientific method in order to develop more precise conceptual frameworks and to learn more about processes, correlates, and outcomes of the search for the meaning of life.

In this discussion is an overview of the speculations about the meaning of life from the various spheres of inquiry. First, the entry discusses a view from the religious sphere, then from the secular spheres of philosophy and psychotherapy. Finally, the entry summarizes how the scientific method has been used to study the topic and what has been learned thus far and the implications for gifted and creative students.

A Religious View

Irving Yalom distinguished between the "cosmic" and "terrestrial" meaning of life. Cosmic meaning

refers to the existence of a grand design or an all-encompassing interconnectedness of life. Cosmic meaning usually implies the existence of God and spirituality. Terrestrial meaning refers to whatever is deemed by an individual to be meaningful in his or her life. Religions tend to embrace the cosmic view. Judeo-Christian doctrine, for example, teaches that God has a plan for humanity but that humans are incapable of understanding the complexity of the plan. As such, the ultimate meaning of life remains an incomprehensible mystery to humans. Religious doctrine offers guidance for how to live and prescribes faith in God's will in response to perplexing and troubling questions like: Why does God allow humans to suffer and allow horrific injustices to occur?

Views From Philosophy and Psychotherapy

Secular scholars and philosophers formulate their views of the meaning of life from their personal observations of life and subsequent contemplation. Ever since the European Enlightenment, some of the greatest minds have thoughtfully considered the question and then categorically rejected the idea of a cosmic meaning. As an atheist, Sigmund Freud viewed faith and trust in God as a sort of regression in which people childishly cling to a wish for a supreme parent in God. Arthur Schopenhauer, generally considered the most pessimistic of philosophers, not only argued that life was meaningless, but extolled the act of suicide and cursed romantic love because it was responsible for the continuance of "the pitiful human race."

Albert Camus, the French existentialist, put forth a perspective on the meaning of life in his retelling of "The Myth of Sisyphus." The myth describes a man who is condemned in Hades to roll a boulder up a hill repeatedly, only to see it roll down again. Camus suggested that our efforts in life may be similarly futile and meaningless. And yet, in Camus's version of the myth, Sisyphus has a joyful demeanor, suggesting that he has found meaning in his task by maintaining an inner dignity and defiance.

In the field of psychotherapy, Viktor Frankl has had a considerable impact in regard to the topic of the meaning of life. Inspired by his experience in a concentration camp during the Second World War, he concluded that even in the most dire circumstances, individuals are free to choose and are responsible for their choices. For him, the meaning of life can be found in one's actions in and appreciations of the world and, if those possibilities are unavailable in the circumstances, in the free acceptance of one's fate. Frankl created a therapy called *logotherapy,* the focus of which is to facilitate one's search for meaning in life.

Empirical Research

Only recently has the scientific method been applied to the topic of the meaning of life. Researchers do not directly ask what the cosmic meaning of life may be, because that is not an empirical question. Rather they ask questions such as, Is the search for meaning a universal characteristic of human beings? What do individuals believe regarding the meaning of life and how are those beliefs related to other psychological variables? The theoretical underpinnings of most of this research include existentialism, constructivism, and phenomenology. Both qualitative and quantitative methodologies are used. Among some of the major findings are the following: The need for meaning seems to be virtually universal, and many people struggle with the specter of meaninglessness in their lives. Meaninglessness is associated with psychological symptoms like low self-esteem, substance abuse, and depression. Individuals most often find meaning in love, work, self-actualization, service to others, and in God or spirituality.

Implications for Gifted and Creative Students

Because gifted students are often advanced in reading abilities, they may grapple with meaning of life issues at an earlier age. Teachers and counselors of gifted students need to be prepared to discuss these issues in developmentally appropriate ways. In addition, the research on meaning of life shows that meaning does not simply arise out of one aspect of life, but from many paths, and guidance must include exploration ranging from relationships, work, existential and spiritual issues, and service to others and the world. In addition, creative students, being more open to experience, may investigate meaning of life from unorthodox sources, from

far-ranging literature such as science fiction to unusual psychological and social experiences, such as altered states of consciousness and experimental social and religious groups. Although these attempts to find meaning may be disturbing to parents and community, mentors of gifted students need to be prepared to discuss and provide wise guidance to the young person in search of his or her truth.

Richard T. Kinnier, Tyler M. Barratt, and Sarah K. Dixon

See also Life Satisfaction; Optimal Development; Spiritual Intelligence; Spirituality

Further Readings

Camus, A. (1955). *The myth of Sisyphus*. New York: Knopf.

Durant, W. (1932). *On the meaning of life*. New York: Ray Long & Richard R. Smith.

Frankl, V. (2000). *Man's ultimate search for meaning* (4th ed.). Cambridge, MA: Perseus Press.

Kinnier, R. T., Kernes, J. L., Tribbensee, N., & VanPuymbroeck, T. (2006). *The meaning of life according to the great and the good*. Bath, UK: Palazzo Editions.

Men, Gifted

Although research studies of gifted boys are limited in number, studies of gifted men are even more scarce. Since the 1920s, when Lewis Terman sought to change the lens through which society viewed giftedness, few researchers have examined the life experiences of gifted males beyond their secondary school and collegiate years. This group deserves greater attention in order to better understand the intellectual and emotional needs of this population. A review of literature uncovered only two recent studies, described below.

A 2001 study examined the adult experiences of 13 men who were enrolled in a gifted program in the early 1960s. They were selected for the program in the fourth grade because their scores on a variety of instruments indicated very high academic potential. At the time of the study, the men were approaching 50 years old. Among the 13 interviewed were four businessmen, two accountants, two engineers, one freelance archaeological consultant, two lawyers, one physician, and one social activist. Following a structured interview protocol, the researchers conducted telephone interviews lasting approximately one hour. The interviews incorporated questions about childhood, adolescence, marital and family life, career history, and life satisfaction.

The participants reported feeling socially isolated from their peers as young children. This social isolation, combined with guilt resulting from the preferential treatment they received as gifted students in an exclusive program, contributed to a strong desire to act and be viewed by others as normal. They struggled with whether to accept the label of giftedness and appear "intellectual" or reject it in order to prove they were "just one of the guys." Many of the men had a strong need to fulfill the expectations of parents and teachers; they intuitively understood parental expectations and in an effort to gain their parents' approval, used their gifts and talents to meet or exceed those expectations. The researchers found that although these men grew up in the context of rebellion and the social movement of the 1960s and 1970s, they did not see this significant social upheaval as relevant to their lives. Instead, they conducted themselves in accordance with the more traditional cultural expectations and tried to fulfill the expectations of the adults in their lives.

The participants who had skipped a grade during their schooling highlighted how intellectual differences from their age-mates often led to social difficulties. At the same time, age differences with their older classmates often led to embarrassment or social awkwardness, and they were left to figure out for themselves how to mange social relationships appropriately. These men were ambivalent about their giftedness and determined to preserve a masculine identity. The most critical concern about masculinity revolved around difficulties with emotional expressivity and relationships with women. Several of them believed that their quiet stoicism had removed them emotionally from the women they cared for the most.

Despite their preparation for leadership, the outstanding education these men received as boys, and the high expectations of their teachers and parents, these men were not at all concerned about

achieving eminence. They focused on pursuing contentment rather than high achievement or recognition. Furthermore, the researchers maintained that these men lacked a sense of vocation or calling. Multipotentiality and professional disappointments led to indecision and career compromise for the gifted men, while passion for their work or a sense of vocation seemed largely lacking.

The life stories of these men were characterized by one of two significant relationship patterns. Four of the men married their first serious partner and enjoyed long-term stable marriages. The others appeared to have troubled relationships with women, with more than half having divorced at least once. Acknowledging their marital failures as their greatest, and sometimes only, failure, most of the men attributed their marital problems to their difficulty with emotional expression.

The researchers noted that these men lived according to the values and standards of their communities. They were all hard-working providers who expressed satisfaction with the financial security they had acquired, and even greater happiness if their profession provided an intellectually stimulating environment. They appeared to be successful, yet few found the courage to pursue their dreams and several spoke of unfulfilled dreams of service or creative work. Many hoped to make greater social contributions later in their careers or in retirement.

A second study examined paternal influences on prominent, gifted American men. A team of researchers conducted a comprehensive analysis of biographical materials to identify factors in the father–son relationships that influenced talent development in high-achieving gifted males. The 10 subjects included in the study represented the baby boom generation and included prominent gifted men from a variety of talent domains.

Each participant benefited from a father–son relationship characterized by his father's unconditional belief in him. The strong encouragement and helpful guidance these fathers provided throughout their sons' lives were evident in a variety of ways. Several of the fathers were attentive listeners, while others offered helpful advice. Some fathers taught their sons skills necessary to achieve within their chosen profession, while others contributed to their sons' success through coaching or other forms of support.

The researchers found that these fathers maintained high expectations for their sons but did not pressure them to follow a particular path in life. They did not insist that their sons follow in their footsteps, nor did they impose any particular goals or aspirations. Rather, they simply expected their sons to strive always to do their best in whatever domain they chose. These high expectations, which included doing well in school, were conveyed to their sons throughout childhood and adolescence and were reinforced during their early career years.

These fathers were industrious men with a strong work ethic. Though several were not well educated, all worked very hard to provide for their families, instilling in their sons their philosophical view of hard work. This strong belief in the value of hard work provided a model of inspiration for their sons.

The researchers also found evidence that these men expressed pride in their sons' accomplishments, which naturally encouraged their sons to continue their pattern of achievement. Though the fathers took great pride in their sons' achievements, both fathers and sons held each other in high esteem and respected each other as men. These fathers appreciated and respected their sons for becoming the industrious, high-achieving men they were. The sons, in turn, expressed admiration for their fathers' approach to life in general: their resilience, their dedication to their families, and the ways in which they supported their children's development. These gifted men looked to their fathers as models of success, followed their example, and listened to their encouragement and advice.

Thomas P. Hébert

See also Boys, Gifted; Eminence; Sex Differences in Creativity

Further Readings

Hébert, T. P., Pagnani, A. R., & Hammond, D. R. (in press). Paternal influence on high achieving gifted males. *Journal for the Education of the Gifted.*

Kerr, B. A., & Cohn, S. J. (2001). *Smart boys: Talent, manhood, and the search for meaning.* Scottsdale, AZ: Great Potential Press.

Mensa

Mensa International is an organization whose published goals are "to identify and foster human intelligence for the benefit of humanity, to encourage research in the nature, characteristics and uses of intelligence, and to promote intellectual and social opportunities for its members." Founded in England in 1946 by attorney Roland Berrill and scientist Lance Ware, the name Mensa, from the Latin meaning "mind, table, or month," was chosen to suggest the regular meeting of great minds to discuss topics of interest around a table. Mensa invites membership from individuals worldwide, children, youth, and adults alike, who have been identified as possessing superior intellectual ability.

Mensa members come from a diverse group of people who have intense, varied interests and like to voice their opinion. They generally range between 20 and 60 years of age, and in education from high school dropouts to those holding multiple graduate degrees. Some are on welfare and others have acquired great wealth. Their occupations vary from professionals, educators, scientists, computer programmers, artists, musicians, athletes, clergy, police officers, firefighters, and members of the armed forces, to homemakers, farmers, clerks, laborers, truck drivers, and entrepreneurs. Some are well-known, award-winning personalities, many are ordinary citizens who lead interesting private lives. To become a Mensan, the only qualification is to formally report a score at the 98th percentile (meaning a score that is greater than or equal to that achieved by 98 percent of the general population taking the test) on an approved intelligence test that has been administered and supervised by a qualified examiner. High intellectual ability should not be equated with "genius," an elusive category that most researchers agree cannot be defined solely through psychological testing.

The benefits of membership include opportunities to participate in discussion groups, social events, and annual meetings, and to subscribe to several publications. International Mensa offers more than 200 Special Interest Groups (SIG) to address passions in popular fields such as economics, astronomy, biochemistry, criminology, or space science. But there are also groups interested in chess, poker, scuba diving, UFOs, and witchcraft. Sports include the classics and others such as ballooning, skydiving, motorcycling, and skeet shooting. And members are free to start a SIG of their choice. Mensa chapters organize local and regional workshops and special events, publish national newsletters and magazines, and conduct annual conferences that feature notable international speakers.

American Mensa was founded in 1960 by Peter and Ines Sturgeon. As of March 2007, it serves 54,000 members at 134 local chapters throughout the nation, the District of Columbia, and all the U.S. protectorates; its national office is in Arlington, Texas. The largest chapters are in greater New York and Chicago. About 41 percent of its members are between ages 44 and 61, but many new members are under 18. American SIGs include popular fields such as philosophy, astronomy, computers and sci-fi movies, arts and crafts, games and sports like chess, golf, motorcycling, and scuba diving, and special groups for teens and military members and veterans. More than half its members have a college degree, and many speak at least two languages besides English. Local chapters are recognized for community service efforts to raise money for scholarships and charitable causes, and for educational activities such as judging and granting awards at science fairs.

Persons interested in applying for membership have several options. They may take any of 200+ approved standardized aptitude tests administered and supervised by a certified examiner, or they may apply to take the standard Mensa Admission or Culture Fair test batteries. To qualify, scores must be at the 98th percentile. A previous test score administered by a school or private psychologist or agency can also be used if prepared according to Mensa guidelines. American Mensa offers a sample mini quiz online with answers and scoring directions for individuals who wish to practice their reasoning skills.

The Mensa Education & Research Foundation (MERF) was established to promote Mensa's mission: the nurturing of human intelligence, the world's most important resource. MERF is a philanthropic, nonprofit organization, governed by a volunteer Board of Trustees and the American Mensa Executive Committee. As noted in its annual report, the foundation sponsors several

major activities with assets that exceeded $2 million in 2006. An annual *Colloquium* examines contemporary issues and new directions with international authorities. The *Mensa Research Journal* publishes scholarly articles that expand learning, research, and intelligence. Subscription is open to the general public. *Mensa for Kids* is a Web site that provides challenging activities for children and youth, as well as resources for parents and teachers of the gifted.

The foundation also grants awards and scholarships. MERF recognizes individual creativity, exceptional teaching, excellence in writing and research, and lifetime achievement. Scholarships for students are based totally on written essays. Grades, academic programs, or financial need are not considered.

Rosina M. Gallagher

See also Genius; Intelligence; Intelligence Testing

Further Readings

American Mensa Web Site: http://www.mensa.org; email address, info@americanmensa.org
Mensa CultureQuest®-ion of the Day: http://www.us.mensa.org/culturequestion
Mensa for Kids Web Site: http://www.mensaforkids.org
Mensa International Web Site: http://www.mensa.org

Mentoring Gifted and Talented Individuals

Eminent individuals tend to attribute their success to expert mentoring. For example, 48 of the 92 American Nobel Laureates cited previous Nobel Laureates as their mentors. A distinguishing feature of a mentoring relationship as compared to a teacher–student relationship is the expectation that the relationship will extend beyond specific learning goals or courses. For example, expert mentors not only share content and skills with their mentees, but also provide tacit or insider knowledge about finding a professional niche, making connections, and enhancing both creative potential and self-confidence.

Mentor–Student Matching

Although talented students and their families may choose mentors based on a mentor's ability to set challenging standards and high expectations, they must also keep in mind that effective mentoring relationships can involve emotional bonds between students and their mentors. Mentors may have to guide their mentees through setbacks and discouragement, and like most significant human relations, mentor–mentee relationships may involve conflicts and compromises. Healthy bonds are more likely to develop when mentors and mentees share similar attitudes, values, and lifestyles.

Role Models

Effective mentorships look different at different stages in the talent development process. In the more advanced stages mentors generally serve as role models, leading as much by example as by instruction. Interviews with young scientists (who became future laureates) indicated that higher standards put forth by their mentors were internalized through (a) the mentors' own exemplary behavior and work, thus providing a model to be emulated; (b) the insistence that high standards be met by the mentees; and (c) the mentors' critical evaluation of their mentee's work.

Socialization of Mentors' Students

Mentors provide their mentees with the knowledge needed to actively engage in and excel in the chosen domain, demonstrating how to deal gracefully with both success and failure. In essence, mentors prepare protégées for a position at the top of their field. Mentees not only further their exploration and interest in a field, but also learn about the lifestyles, values, roles, and activities associated with the elite experts in their specific careers. They also learn the criteria for determining a good research or artistic question, and the appropriate times and ways in which to take creative risks. Thus, through the mentor's behavior, the student learns how to develop a reputation in his or her field as an elite professional. A mentee benefits from his or her relationship with the mentor not just by acquiring specific knowledge but also by learning work methodologies and styles of thought.

In order to socialize their students into a domain or field, mentors may also suggest that their mentees have a variety of experiences outside of formal instruction. For example, participation in competitions can serve as a stimulus for further interest and exploration of the field as well as introducing mentees to other interested young people who can provide peer stimulation. In addition, having a leading expert in the field as a mentor helps the mentee gain individual recognition in the field.

Mentoring Across Stages of Talent Development

At each stage of the talent development process, the goals of mentoring are different, the relationship is more or less intense, and the method by which mentors are selected changes. The process can be described in a number of ways. In terms of content and skills, mentors develop their mentees' abilities into competencies. These competencies are then transformed into expertise through a series of challenges involving high-level knowledge and skills. Through this experience, mentors encourage seizing rather than dreading difficult challenges, such as overcoming disenchantment and failure.

The relationship between the mentee and the mentor grows and develops through many different stages: (a) introduction—the recognition of exceptional talent in a mentee; (b) initiation—whereupon both mentee and mentor build a trustful relationship; (c) cultivation—sharing professional skills, setting performance and behavior standards, and encouraging risk taking; (d) separation—when mentors urge their mentees to explore their own unique direction; and (e) redefinition—the establishment of an increasingly collegial and equal-status relationship.

The initial mentors of young, talented students should serve as guides and sources of encouragement, making the exploration of the field playful and engaging. Once the talented individual is committed to the field, mentors (often different from the initial mentor) need to target the skills, knowledge, and attitudes to be mastered by the mentee. Once the talented individual has developed sufficient expertise in a domain, mentors are less likely to be selected by the mentee himself or herself. Instead, at this third stage, the protégée is sought out by mentors seeking a particular type of protégée who can help express and implement the mentor's ideas. Thus, a gifted individual may have different mentors, each mentor possessing distinctive resources that can meet the cognitive, psychosocial, and instructional needs of the mentee at different stages of talent development.

Rena F. Subotnik and Maya M. Bassford

See also Aspiration Development and Self-Fulfillment; Eminence; Guidance

Further Readings

Bloom, B. S. (1985). *Developing talent in young people.* New York: Ballantine Books.

Subotnik, R., & Jarvin, L. (2005). Beyond expertise: Conceptions of giftedness as great performance. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 343–357). New York: Cambridge University Press.

Zorman, R. (1993). Mentoring and role modeling programs for the gifted. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 727–741). New York: Pergamon.

Zuckerman, H. (1996). *Scientific elite.* New Brunswick, NJ: Transaction Publishers.

Meta-Analyses of Gifted Education

Meta-analysis is a quantitative method of summarizing research results on a given topic. General steps in a meta-analysis include stipulating methodological criteria that studies must meet to be included; using replicable criteria to locate as many qualifying studies of the topic as possible; and quantifying the results of the studies, using a common metric so that the direction and magnitude of findings across studies can be statistically determined. This metric is an *effect size,* which expresses differences between groups in standard deviation units. The range of possible values is approximately +3.00 to –3.00. Commonly used guidelines indicate that effect sizes are negligible below 0.2, small from 0.2 to 0.5, medium from 0.5 to 0.8,

and large at or above 0.8. Meta-analyses have been used in an effort to better understand various approaches to educating gifted students, including ability grouping, acceleration, and cooperative learning. By far the most common focus of meta-analytic research has been ability grouping.

Ability Grouping

The practice of ability grouping, in which students are placed in learning groups with others of similar aptitude, has generated extensive controversy in the field of education. Arguments in favor of the practice include statements that such grouping helps teachers more effectively meet students' needs by narrowing the focus necessary in delivering material, and that it helps facilitate curricular modifications appropriate to the type of student being taught. Arguments against the practice include concerns that grouping reduces the performance of students in lower-ability groups by reducing the expectations their teachers have of them, that it discriminates against minority students by disproportionately placing them in lower-ability groups, and that it promotes inequity through unfair allocation of resources (e.g., assigning the best teachers to the highest-ability groups).

Part of the reason why controversy persists is that research results vary across studies. Meta-analyses have been used in an attempt to zero in on well-designed studies and then quantify their results to seek a scientific answer to questions about ability grouping. Typically, these meta-analyses focus on studies that measure outcomes using scores on standardized achievement tests. Some also include studies of social and emotional outcomes, such as general self-concept or self-esteem, attitudes toward the specific subject matter taught, or attitudes toward school in general. Unfortunately, even the results of meta-analyses have been controversial, with some authors concluding that ability grouping is ill advised, and others concluding that it is a well-supported educational strategy.

To some extent, differences in conclusions are related to differences in the criteria used to qualify studies for inclusion in a meta-analysis. For instance, some researchers prioritize or even restrict studies to those that use random assignment of students to grouped versus ungrouped classes. Random assignment of participants to research conditions is a basic requirement of experimental design, and is a key element in allowing conclusions about cause and effect. For some types of ability grouping, however, random assignment does not accurately reflect the way in which students are selected for participation in groups. For example, some meta-analyses include studies of accelerative groups for gifted learners. In practice, students selected for acceleration are identified by more than just their ability level. Factors such as personality style, motivation, friendship patterns, and age (to name just a few) often are considered as well. Therefore, randomly assigning high-ability students to accelerated versus unaccelerated classes for the purpose of research may not reflect the reality of the practice as it is used in school settings.

In some meta-analyses, findings favoring grouping are discounted if the conditions using grouping also modify the curriculum for the various groups. The logic is that research must isolate the practice of grouping from other potential influences on student learning to truly study the effectiveness of grouping itself. Again, this criticism is based on basic research principles. When more than one factor varies at the same time, a *confound* is created. Confounds obscure the results of research because outcomes cannot be attributed clearly to any one factor. In the case of ability grouping, however, one of the key arguments supporting the practice rests on its facilitation of curricular modifications that better meet the needs of students at particular ability levels.

Despite the points of contention described above, a review of some of the key meta-analyses of ability grouping yields several common conclusions.

Ability Grouping Is More Effective Than Tracking

Although some authors have used the terms *ability grouping* and *tracking* synonymously, their meanings are different. Tracking typically involves assignment of students to one group for all academic subjects, based on a measure of general ability, such as IQ. In contrast, ability grouping often is implemented for one academic subject at a time, using performance in that subject area to determine placement. In some cases, ability grouping also facilitates student movement among groups to a greater extent than does tracking, which tends to involve long-term student placement. Meta-analytic

studies have indicated that tracking has little to no effect on academic performance, but ability grouping has been associated with increased academic performance.

Curriculum Modification Is Necessary to Effective Ability Grouping

In some cases, students are grouped according to ability but all groups are presented with the same curriculum. In other cases, the curriculum is adjusted to suit the ability level of the students being taught. Meta-analyses that consider this aspect of grouping practices indicate that the effectiveness of ability grouping corresponds to the extent to which the curriculum is modified to meet the needs of the group.

Gifted Students Benefit From Ability Grouping

Many meta-analytic studies of ability grouping calculate results separately for high-, average-, and low-ability students. Those studies that do so find that gifted/high-ability students achieve better when they are placed in ability groups and presented with appropriately modified curricula than when they are placed in mixed-ability settings.

Low-Ability Students Do Not Suffer From Ability Grouping

A common argument against ability grouping is that it is harmful to lower-ability students. Meta-analyses have not supported this argument. When ability levels are considered separately, meta-analyses find that low-ability students' academic achievement in ability-grouped settings is equal to or better than their achievement in heterogeneous settings. Where average effect sizes across studies are provided, they range from –0.02 to 0.29. Further, as noted below, low-ability students may tend to have higher self-esteem when they are ability grouped than when they are educated in heterogeneous settings.

Ability Grouping Has Few Clear Effects on Social/Emotional Adjustment

Some of the studies on which meta-analyses of gifted education are based consider only academic outcomes. Those that consider social/emotional variables are not consistent in which variables they include or how those variables are measured. Because of the relatively small amount of data available in this area, they sometimes cannot be subjected to meta-analytic procedures. Meta-analyses that do attempt to explore social/emotional variables typically find negligible effects of ability grouping, but some exceptions exist. One meta-analysis reported that students in general (not only gifted students) reported more positive attitudes toward the subject being taught when it was taught with ability grouping (effect size [ES] = 0.37). One reported that gifted students taught in heterogeneous settings had better attitudes toward their peers than those taught in ability groups (ES = –0.456). Two meta-analyses reported small effects of grouping on self-esteem that were consistent with social comparison theory—that is, low-ability students had slightly higher self-esteem in ability groups than in heterogeneous settings, and high-ability students had slightly lower self-esteem in ability groups than in heterogeneous settings. All effect sizes were less than 0.20, however, except for one finding that low-ability students had higher self-esteem in remedial than in heterogeneous classes (ES = approximately 0.35, based on three studies).

Other Topics

Acceleration

A meta-analysis of 26 studies investigating the effects of whole-grade academic acceleration considered two main types of studies: those comparing students who accelerated with students of the same age and ability who did not, and those comparing students who accelerated with IQ-matched students in their new class, who are one year older than they (13 studies each). Results indicated that gifted students achieve more in accelerated than unaccelerated classes, with an effect size of 0.88. Also, gifted students who accelerate achieve at levels comparable to those of equally intelligent, older students in their new classes; the average effect size in such studies was 0.05, indicating no difference between accelerated students and their older, unaccelerated classmates. No consistent effects were found for nonacademic outcome variables, such as

attitudes toward school, participation in school activities, or popularity with peers.

Cooperative Learning

A meta-analysis of eight studies considered the effectiveness of teaching high-achieving (not necessarily gifted) students along with lower-achieving students using cooperative learning versus individual learning. The eight studies focused only on short-term mathematics and science interventions requiring the acquisition of elementary knowledge, and only at grade levels prior to high school. Also, the classes used different cooperative learning strategies across studies, and the cooperative nature of student interaction was not confirmed. Results indicated that the high-achieving students achieved more with heterogeneous cooperative grouping than with individual learning, with an effect size of 0.26. Further, five studies considered the learning of high-achieving students in homogeneous versus heterogeneous cooperative groups; these studies showed an advantage for homogeneous groups, with an average effect size of 0.22.

Pull-Out Programs

A meta-analysis of studies focusing on pull-out programs for gifted students supported the effectiveness of such programs. Nine studies included measures of achievement, creativity, and/or critical thinking as outcome variables, with specific choices depending on the type of pull-out program studied. Positive effects of pull-out programs were found in all three of these areas (0.65 for achievement, 0.44 for critical thinking, and 0.32 for creative thinking measures).

Four studies included self-concept as an outcome variable, but one was excluded from the meta-analysis because it produced an effect size significantly different from those in the other three studies, showed pre-intervention differences in self-concept between groups, and suffered from attrition of participants. It should be noted, however, that this study produced an effect size of –0.76, indicating that students who participated in a pull-out program had lower self-concepts than those who did not. The other three studies, analyzed together, showed no significant relationship between pull-out program participation and self-concept.

Common Results

The technique of meta-analysis has been applied to several aspects of gifted education, but none more so than ability grouping. Despite some disagreement among authors regarding the overall implications of these meta-analyses, common results can be identified. These findings indicate that relatively flexible ability groups are more effective than rigid tracks, but that ability grouping does not significantly benefit either high- or low-ability learners unless curricula are modified according to the needs of the group. With appropriate curricular modifications, gifted students achieve more with ability grouping than without it, and low-ability students achieve at least as well as they do in heterogeneous settings. Meta-analytic research on ability grouping and social/emotional adjustment has found no consistent effects, but such work is difficult because relatively few studies consider such outcomes, and those that do involve many different dependent variables. Meta-analyses of other forms of gifted education suggest that both acceleration and pull-out programs are effective for gifted students. Also, cooperative learning has been found to be more effective than individual learning, especially when the cooperative groups are homogeneous. Overall, most types of special educational interventions for gifted students have been found to be at least somewhat effective, but the greatest effects tend to be found for approaches that group gifted students homogeneously and then modify the curriculum to fit their needs.

Mary Ann Swiatek

See also Controversies in Gifted Education; Instructional Management; Self-Contained Classroom; Specialized Secondary Schools

Further Readings

Goldring, E. B. (1990). Assessing the status of information on classroom organizational frameworks for gifted students. *Journal of Educational Research, 83*(6), 313–326.

Hoge, R. D., & Renzulli, J. S. (1993). Exploring the link between giftedness and self-concept. *Review of Educational Research, 63*(4), 449–465.

Kulik, C.-L. C. (1985, August). *Effects of inter-class ability grouping on achievement and self-esteem.* Paper presented at the annual meeting of the American Psychological Association, Los Angeles, CA. (ERIC Document Reproduction Service No. ED 263492)

Kulik, C.-L. C., & Kulik, J. A. (1982). Effects of ability grouping on secondary school students: A meta-analysis of evaluation findings. *American Educational Research Journal, 19*(3), 415–428.

Kulik, C.-L. C., & Kulik, J. A. (1984, August). *Effects of ability grouping on elementary school pupils: A meta-analysis.* Paper presented at the annual meeting of the American Psychological Association, Toronto, Ontario, Canada. (ERIC Document Reproduction Service No. ED 255329)

Kulik, J. A. (2003). Grouping and tracking. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 268–281). Boston: Allyn & Bacon.

Kulik, J. A., & Kulik, C.-L. C. (1984). Effects of accelerated instruction on students. *Review of Educational Research, 54*(3), 409–425.

Neber, H., Finsterwald, M., & Urban, N. (2001). Cooperative learning with gifted and high-achieving students: A review and meta-analyses of 12 studies. *High Ability Studies, 12*(2), 199–214.

Slavin, R. E. (1987). Ability grouping and student achievement in elementary schools: A best-evidence synthesis. *Review of Educational Research, 57*(3), 293–336.

Slavin, R. E. (1990). Achievement effects of ability grouping in secondary schools: A best-evidence synthesis. *Review of Educational Research, 60*(3), 471–499.

Vaughn, V. L. (1991). Meta-analyses and review of research on pull-out programs in gifted education. *Gifted Child Quarterly, 35*(2), 92–98.

Middle School, Literature Curriculum

Middle school literature curriculum refers to the content, organization, and materials that comprise the course of study in Grades 6–8 English, language arts, or reading classes. Specific to gifted education, it describes the attributes and types of curricula that can develop advanced literary skills and understanding for talented readers, both in programs or courses for students with formally identified verbal talents, and in the general education setting.

Literature Curriculum Content

A number of characteristics define high-quality middle school literature curriculum for all readers, including those who are talented. In general, curriculum should be rooted in concepts, principles, ideas, and skills most essential to the disciplines related to literature (e.g., literary criticism, journalism, history); be relevant to the experience of young adolescents; facilitate the development of students' identities as readers; and move students toward greater expertise as critical readers and thinkers in ways and at a pace commensurate with their readiness needs.

Middle school literature curriculum also supports the development of advanced literary skills. According to the National Assessment of Educational Progress 2007 Reading Report Card, eighth graders who respond to selected texts at an advanced level are able to explain abstract themes and ideas in the text, make and support analytical interpretations, make self-to-text connections and text-to-world-event connections, and respond to what they read thoroughly and thoughtfully. Specific to fiction texts, students performing at an advanced level can use their understanding of characters to interpret an author's purpose, explain the importance of setting to plot using textual support, retrieve explanatory text from dense text, and explain how narrative devices function in a story. High-quality middle school literature curriculum equips talented readers with these and other processes indicative of a progressively expanding capacity as a reader such as comparatively analyzing texts, synthesizing texts at a conceptual level, and forming unique literary interpretations.

Literature Curriculum Organization

Approaches for organizing middle school literature curriculum content include conceptual or thematic organization, genre study, and integration with other subjects, such as social studies. In recent years, middle school education has emphasized personal connections to text through methods such as reader response, student-led discussions

(e.g., literature circles, book clubs), and journaling. Critics of this approach suggest that it may encourage the idea that reading is an individual and isolated event. Still, most experts agree that middle school literature curriculum should provide numerous opportunities for students to self-select reading material in both structured and unstructured ways.

The s*choolwide enrichment model—reading* (SEM—R), recently developed by Sally Reis and her colleagues, is one framework for organizing literature curriculum. The model employs three phases designed to increase student exposure to and interest in high-quality texts, strengthen students' reading and thinking skills, engage in independent reading with appropriately challenging texts, and respond to texts in authentic ways. Although it has been implemented primarily at the elementary school level, some research on the model has included sixth-grade classrooms. Results document the model's positive impact on students' reading enjoyment, habits, and achievement.

The *integrated curriculum model* (ICM) is another framework for literature curriculum. The Center for Gifted Education at The College of William and Mary has designed language arts and novel units according to the model, primarily with high-ability learners in mind. Above-grade-level literature representing various genres, cultures, and time periods—and connected to the concept of change—forms the core of the units. Unit activities are focused on literary analysis and interpretation through discussion, persuasive writing, research, and personal connections. Research on the effectiveness of the language arts units—some of which include some sixth-grade classrooms—reports gains in literary interpretations and analysis skills for students in treatment classrooms.

Selecting Reading Materials for Literature Curriculum

Selecting books and other reading material for middle school literature curriculum involves several considerations. Collectively, readings should be increasingly complex, represent a range of viewpoints and cultures, and push readers to expand and hone their reading repertoire and skills. By definition, talented readers in the middle grades can read and understand above-grade-level texts, typically two grade levels or higher. Because these readers might be able to decode and comprehend a novel (for example) written for a more mature audience but lack the context or experience to integrate the novel's themes or implications, selections must be challenging to ensure growth as well as be developmentally appropriate. This highlights a potential dilemma in selecting literature for talented readers: how and whether to balance young adult fiction, adult fiction, and "classic" literary selections, as well as what form the sources for these genres should take (e.g., trade book, basal series). One program often cited as a high-quality approach to exposing students to challenging, influential literature is the Junior Great Books program. The program emphasizes multiple literary interpretations through a process called *shared inquiry* and offers unabridged and abridged materials in anthology form.

The rich and varied interests and experiences of middle school readers is another criterion to consider in selecting literature. There is no research that indicates that talented readers have reading interests that are qualitatively different from those of their grade-level peers. The talented reader may have a wide range of reading interests, or have interests more intensely focused on certain genres, authors, and text types. In general, early adolescents are interested in reading texts to which they can relate. This might include reading stories in which young adults play prominent roles that are set in school, extracurricular, or family contexts, or that address issues common to early adolescent experiences, such as relationships, or identity development. Serial fiction, science fiction, mystery, and fantasy are genres that appeal to many readers in the middle grades.

Equally important in choosing texts for middle school literature curriculum is the use of texts in which students might *not* be interested independent of a teacher's encouragement. This includes selections that give readers access to a wide range of diverse experiences, cultures, and views; promote self-discovery; facilitate the development of deficient skills; and allow students to explore unfamiliar ideas.

Clearly a key goal of reading and literature in the middle grades is to encourage young readers to find increasing satisfaction in reading. Because middle-grade students read at varying levels of

sophistication, in pursuit of different interests, and exhibiting different reading patterns, instruction in reading and literature during these grades will necessarily be responsive to these differences in order to ensure that each learner becomes a more skilled and enthusiastic reader.

Carol Ann Tomlinson and Jessica Hockett

See also Classics/Great Books; Curriculum Models; Gifted Readers; Middle School, Writing Curriculum; Secondary School, Literature Curriculum

Further Readings

Beane, J. (1997). *Curriculum integration: Designing the core of democratic education*. New York: Teachers College Press.

Reis, S. M., Eckert, R. D., Schrieber, F. J., Jacobs, J. K., Briggs, C., Gubbins, et al. (2005). *The schoolwide enrichment reading mode: Technical report* [RM05214]. Storrs, CT: National Research Center on the Gifted and Talented.

VanTassel-Baska, J., & Little, C. (2003). *Content-based curriculum for high-ability learners*. Waco, TX: Prufrock Press.

Middle School, Mathematics Curriculum

Mathematics is an intellectually demanding, challenging, and exciting content area and, for some students, a content area upon which a future career can be built. The child's informal mathematical future begins with the parent but formally begins the moment she or he walks through the schoolhouse door. Teachers of mathematics at every grade level, starting at kindergarten, must understand mathematics conceptually in addition to the algorithms that they learned in their formal schooling. This conceptual understanding is developed through multiple representations, such as physical objects, drawings, charts, graphs, and symbols. At the middle school level, the primary challenge is to continue the conceptual understanding through multiple representations when offering advanced content to the mathematically talented student. A secondary challenge is to allow that student the opportunity to explore mathematical concepts and ideas beyond the standard curriculum and textbook through differentiation.

Curriculum Implementation

Teachers of mathematically talented students need to have confidence in their own mathematical knowledge and teaching abilities in order to understand and accept the divergent and sometimes creative thinking abilities of their gifted students. More often than not, untrained or inexperienced teachers provide the mathematically gifted and talented students with what is available, such as enrichment worksheets, but it is important to realize that extra quantity does not indicate mathematical quality.

For many mathematics teachers, the textbook is a primary guide to implementing the curriculum. Late in 1997, the Carnegie Corporation of New York agreed to fund the first of a series of evaluations of textbooks in mathematics and science, and work began in early 1998 on middle school math curriculum materials. Project 2061, as it was named, found that most of the textbooks are inconsistent and weak in coverage of conceptual benchmarks in mathematics, weak in their instructional support for students and teachers, and provide little development in sophistication of mathematical ideas from Grades 6 to 8. The evaluation also found that a majority of textbooks are particularly unsatisfactory in providing a purpose for learning mathematics, taking account of student ideas, and promoting student thinking. This research highlights the finding that middle school students experience repetitious and nonchallenging mathematics programs. As a result, their achievement and interest in mathematics stalls, and they may not be able to take advantage of the full range of academic and career options in the future. Mathematically talented middle school students need a curriculum that can be differentiated by level, complexity, depth, and breadth. This type of curriculum, however, cannot be supported by the textbooks being used in the typical mathematics classroom.

Since most researchers would agree that talented young mathematicians would benefit from appropriate levels of challenge, it is unfortunate that current research indicates they seldom receive it. In research conducted on differentiated instruction,

most middle school teachers struggle with how to differentiate math instruction effectively for their most talented math students. In one in-depth observation study of 46 American classrooms by researchers at the National Research Center on the Gifted and Talented, little differentiation in instructional and curricular practices was implemented by classroom teachers for gifted and talented students in the regular classroom. Karen Westberg found that across five subject areas and 92 observation days, gifted and talented or high-ability students experienced no instructional or curricular differentiation in 84 percent of the instructional activities in which they participated, including mathematics.

Instructional Strategies

Many talented middle school students do not profit from conventional instruction in mathematics, so their teachers need to seek alternative methods to motivate these students to become internally driven learners by teaching them to self-analyze, self-reference, self-evaluate, and self-correct. Mathematically talented students need the opportunity to pursue open-ended investigations of increasing complexity to develop their mathematical skills and reasoning techniques. These students need a differentiated and compacted curriculum, as well as enrichment activities that involve "self-selected" mathematical areas for advanced content learning, self-paced instruction supplemented with enrichment activities, and acceleration combined with enrichment. Each of these strategies is supported by research.

Methods for differentiating curriculum and instruction for talented young adolescent mathematicians do exist, and some research supports the effectiveness of specific instructional and curricular strategies for use with these students. For example, the use of instructional level grouping has been successful with talented math students, resulting in increased understanding in mathematics. In general, grouping academically talented students together for instruction has been found to produce positive achievement outcomes when the curriculum provided to students in different groups is appropriately differentiated. In other words, it is the instruction that occurs within groups that makes grouping an appropriate instructional strategy.

Another strategy that can be successful with talented middle school math students is curriculum compacting. In this process, assessment procedures are used to learn what students already know, documenting that knowledge and replacing what is known with more challenging material, some of which is based on students' interests.

For teachers who can compact curriculum, differentiation in mathematics instruction can provide less tedious review work and more challenging mathematics problem-based work that reflects the students' ability level in math rather than their age. This type of differentiated instruction should gear instruction toward the students' strengths and interests, provide the students with advanced content that enables them to interact with depth and complexity, and focus on developing higher-level and more concept-based skills. Acceleration, another research-based strategy, also challenges and engages mathematically talented middle school students, resulting in higher levels of achievement. Because mathematics is one of the most linear of domains, with clear benchmarks and progression, it is as an area well suited to acceleration approaches. Any approach that allows mathematically talented students to learn at their own rate and with appropriate complexity will prepare them for one milestone in the lives of many gifted students: the early administration of the SAT for the Talent Search Programs. Seventh graders may sit for this college entrance examination, and those who perform well on these out-of-level tests will be invited to special out-of-school and summer programs that will further extend their education in mathematics and related fields.

What also makes a difference in more challenging mathematics instruction at the middle school level, according to Kristie Jones and James Byrnes, is conceptual thinking, learning, and understanding; active participation; and authentic and meaningful tasks. The use of higher-level questioning and opportunities to incorporate prior knowledge into mathematical experiences also enables talented readers to build upon previous strengths. Discussing conceptual math problems in groups, for example, gives talented math students in middle school the opportunity to interact with intellectual peers and discuss their ideas and solutions in greater depth when a teacher facilitates these discussions. Teachers should focus on themes and

ideas, rather than on simple math facts. A one-size-fits-all approach will not enable teachers to meet the needs of mathematically gifted students at all grade levels. Having talented students understand conceptual mathematics is more powerful for developing problem-solving skills rather than just applying algorithms. This applies for both the teacher and the students. It is important to remember that speed in mathematics is secondary to insight, so simply giving more work in a class period will not make a difference.

Encouraging mathematically talented students to maintain a math portfolio is another way to motivate learners to be self-directed. The portfolio should include a collection of work that illustrates the learner's accomplishments and growth in mathematical thinking over a given length of time. In addition, the portfolio offers insights into the student's understanding, attitude, writing, and problem-solving skills, and presents a picture of the student's progress in mathematics. In conjunction with the portfolio, applying the *enrichment triad model* developed by Joseph Renzulli can ensure that mathematically talented students become accountable for their own learning. Using the Type III phase of the triad model can encourage students to view themselves as mathematicians while progress in the portfolio can be observed and assessed by the student, teacher, parent, college admissions officer, and eventually a future employer.

Rachel R. McAnallen

See also Adolescent, Gifted; Elementary School, Mathematics Curriculum; Mathematical Creativity; Mathematically Precocious; Mathematical Talent

Further Readings

Assouline, S., & Lupkowski-Shoplik, A. (2006). *Developing mathematical talent*. Waco, TX: Prufrock Press.

Johnsen, S. K., & Kendrick, J. (2005). *Math education for gifted students*. Waco, TX: Prufrock Press.

National Council of Teachers of Mathematics (NCTM). (2000). *Principles and standards for school mathematics*. Reston, VA: National Council of Teachers of Mathematics.

Renzulli, J. S. (1977). *The enrichment triad model*. Wethersfield, CT: Creative Learning Press.

Stigler, J., & Hiebert, J. (1999). *The teaching gap*. New York: Free Press.

Westberg, K. L., Archambault, F. X., Jr., Dobyns, S. M., & Salvin, T. J. (1993). *An observational study of instructional and curricular practices used with gifted and talented students in regular classrooms* (RM93104). Storrs, CT: University of Connecticut, National Research Center on the Gifted and Talented.

Middle School, Science Curriculum

It is during the middle school years that young adolescents form attitudes about education, particularly a subject like science, and its relevance to their future. Middle school (usually Grades 6–8) is a school between elementary school (usually Grades 1–5) and high school (usually Grades 9–12); the local school district determines what grades are in a given middle school.

In most middle schools, students change teachers after each period, which can range from 50 to 90 minutes. Students usually enroll in five or six courses, including science, that are taught by different teachers. Students often have the opportunity to take elective courses, including advanced courses in science. Middle school can be thought of as a transitional time between elementary school and high school.

Every middle school classroom represents a wide array of abilities. Given the typical variation in middle school populations of students, it is important that all students' needs be met, ranging from those who are struggling to those who have high abilities—the gifted, talented, and creative students. High-ability students may differ from other students in cognitive abilities, motivation, and styles of learning. As a result, high-ability students may also differ from other students in terms of their educational needs in a content area such as science.

Nature of the Middle School Student

Early adolescence, between ages 10 and 15, is a time of great change. The changes in students can be fast and unpredictable. The students are

experiencing changes associated with moving from elementary schools to middle schools. The students are also experiencing rapid physical, cognitive, social, and personality changes associated with moving from childhood into adolescence.

Due to a variety of social transformations, such as changes in the family structure and a world dominated by the media, the sociocultural context young adolescents are growing up in today is significantly different from that of only a few years ago. There is great diversity among students in terms of their interests, prior experiences, and home environments.

Gifted, Talented, and Creative Middle School Students

With respect to high-ability students, the joint position advocated by the National Association for Gifted Children and the National Middle School Association is that middle school teachers should "develop increasing awareness of and skills necessary to address the full range of learner needs—including needs of those who already demonstrate advanced academic abilities and those who have the potential to work at advanced levels." The implication is that middle school teachers should attend to both equity and excellence when working with their students in science and other content areas. Historically, that has been easier said than done.

There have always been controversies over how the middle school curriculum should meet the needs of high-ability students in science, as well as other areas. One controversy is over equity: For some teachers, equity implies that all students should have an equal opportunity to achieve in areas such as science, whereas for other teachers, equity implies that all students should have an opportunity to reach their potential, and some students may have a higher potential than others. A second controversy has been over ability grouping: A heterogeneous grouping of students may be consistent with democratic values, but a homogeneous grouping may increase the likelihood that high-ability students will achieve their potential. A third controversy is labeling: Identifying some students as gifted, creative, or talented benefits them, but may hinder others by creating a feeling of elitism. A fourth controversy is over cooperative learning in heterogeneous ability groups: High-ability students may not benefit as much as the other students in the groups.

These controversial issues must be resolved in each middle school, according to Susan Rakow, author of the book *Educating Gifted Students in Middle School.* Teachers, administrators, and parents should resolve the issues, she says, by defining the role of teachers of high-ability students, developing and implementing effective programs, and applying curriculum practices that have been validated through research and classroom practice.

Middle School Science Curriculum

In the National Science Education Standards developed by the National Research Council, there are four fundamental principles that underlie effective middle school science curricula: (1) All students can learn science, and all students should have the opportunity to become scientifically literate; (2) Learning science is an active process; (3) School science reflects the intellectual and cultural traditions that characterize the practice of contemporary science; and (4) Improving science education is part of systemic education reform. These principles are intended to help students learn science as inquiry and to master concepts in physical science, life science, earth and space science, science and technology, science in personal and social perspectives, and the history and nature of science. However, the National Science Education Standards do not address the National Middle School Association and the National Association for Gifted Children joint recommendation to address the needs of students "who already demonstrate advanced academic abilities and those who have the potential to work at advanced levels."

Middle school science curricula may let not only high-ability students down in science, but all students as well. Based on reports over recent years, it is clear that students have not been achieving well in science. Advanced courses—when they exist at all—have had relatively low enrollment, and girls and minority students continue to be underrepresented in such courses. Often, middle school teachers are inadequately prepared to teach science, even when they have a certification in science, and the curriculum time allocated to science has been

cut relative to the time allotted to other content areas. Economics also play a role in the problem with tight school budgets because science is more equipment-intensive than mathematics or social studies. As a result, science learning is often passive, relying mainly on a textbook, rather than active, emphasizing activities and experiments.

Project 2061 of the American Association for the Advancement of Science has published benchmarks of scientific literacy goals that concentrate on a common core of learning in science. Recently, Project 2061 conducted a curriculum review—"How Well Do Middle School Science Programs Measure Up?"—to see how well middle school programs attained the key scientific goals specified in national science standards. Using research-based criteria, nine widely used programs were examined by teams of curriculum experts who found that key ideas were generally present in the programs but were typically buried in layers of detailed or unrelated ideas. The findings of the Project 2061 curriculum review suggest that middle school science curricula merit immediate revision in order to better serve the needs of students at all levels of ability.

In the present climate of science education reform, the middle school science curriculum has taken center stage. What role the instruction of high-ability students plays in this curriculum is controversial and continues to be debated by all stakeholders—students, parents, teachers, counselors, administrators, and educational policymakers.

High-Ability Students and the Science Curriculum

It is essential that middle school science curricula support the learning of all students, including high-ability students. This goal is consistent with current calls for national scientific excellence by organizations such as the National Science Foundation, the National Academy of Sciences, and the American Association for the Advancement of Science. The continued economic prosperity of the United States, which depends heavily on scientific innovation, requires at a minimum that all students be scientifically literate. In addition, it requires that a significant number of students excel at the highest levels in science.

A common complaint of high-ability students (and their parents) is that the students are being held back by an educational system that teaches at an average pace and promotes average content of science courses. There is a need to offer more advanced science courses in the middle school, as well as the opportunity for students to take high-school science courses when that can be arranged. But a successful middle school science curriculum for high-ability students depends upon more than courses with advanced content in physical science, life science, earth and space science, and science and technology. It depends upon steps carried out by all stakeholders working together as partners, to ensure that the curriculum is successful.

Successful Science Curricula for High-Ability Students

The joint position statement of the National Association for Gifted Children and the National Middle School Association implies the following steps should be taken when designing a science curriculum for high-ability students. First, students with high ability should be identified to provide them with the science-learning experiences they need. Teachers should regularly use formal and informal assessment strategies to identify students' strengths and needs in science. When doing this, teachers should be guided by a specific plan that emphasizes the use of multiple approaches to identify high potential in students from minority and low economic groups. Students, parents, teachers, counselors, and administrators are stakeholders in this plan: All should have input into it and work to make it successful.

Second, in addition to identifying high-ability students, ongoing assessment should inform teachers' classroom practice in the area of science. Teachers should use pre-assessments, in-process assessments, and postassessments to give students continuous opportunities to demonstrate both their current level and their potential level of knowledge and skill in science. In addition to knowledge and skill, the emerging interests and learning styles of high-ability students should be assessed. The outcomes of these assessments should be used by teachers to adapt curricula to ensure that high-ability students have opportunities to realize their potential.

Third, teachers should ensure that the science curriculum genuinely challenges high-ability students.

The science curriculum should be restructured to help high-ability students learn at deeper levels the ideas that are essential to doing science in the real world. High-ability students, in particular, require regular opportunities to work at advanced levels that challenge them to make significant gains in their science knowledge and skills. Problem-based learning in teaching science is particularly advantageous to high-ability students, in terms of both motivation and achievement. Emphasis on a differentiated curriculum allows advanced students to develop independent and self-directed study skills. High-ability students should have the opportunity to pursue interests, design their own projects and experiments, and compete in science fairs at local, state, national, and international levels.

Fourth, technology should play an important role in science curricula for high-ability students. For example, by means of the Internet, high-ability students can access scientific journals and databases to extend their learning in science. High-ability students can also take advantage of sophisticated demonstrations, simulations, and interactive experiments on the Internet. By means of e-mail, collaboration with scientists, science teachers, and students anywhere in the world can occur.

Fifth, high-ability students will benefit from middle school science curricula when partnerships are formed among the students, their parents, teachers, counselors, and school administrators—all of whom will serve as advocates for high-ability students. These partnerships will help ensure equity and excellence for the students in learning science. Teachers and administrators should help parents to identify, understand, and support the science learning of their high-ability students. Constant communication among members of the partnership is essential for high-ability students to reach their potential in the area of science. These partnerships can help create a middle school climate that supports excellence in science.

Sixth, a successful middle school science curriculum for high-ability students takes advantage of community resources for contextual learning. Scientists working in area industries, hospitals, and colleges can participate in mentoring programs that provide science enrichment experiences beyond those normally available in courses or school lab experiences. These investigations help high-ability students to understand the connections between science and society and facilitate their thinking critically and creatively about important problems.

A curriculum model for problem-based learning in science that meets many of these criteria has been developed by the Center for Gifted Education at William and Mary. The *Guide to Teaching a Problem-Based Science Curriculum* is an implementation supplement to the College of William and Mary's seven problem-based science curricular units. It describes this curriculum and problem-based learning, discusses teachers' education through the William and Mary professional development workshops, and includes research evidence for the effectiveness of the curriculum based on a quantitative nationwide evaluation of one of its units (Acid, Acid Everywhere). There is a table that compares the William and Mary units to both the National Science Education Standards and Project 2061's Benchmarks for Science Literacy. Although these units are modeled on national education standards, they introduce higher-level concepts earlier, and cover fewer topics with more depth.

Future Directions

The middle school science curriculum—and its implications for high-ability students—will likely continue to evolve as a result of ongoing reform initiatives by concerned organizations such as the National Association for Gifted Children and the National Middle School Association. In these reform initiatives, it is important to ensure that both equity and excellence are achieved. These are not mutually exclusive goals. On the contrary, they are inextricably linked. A middle school science curriculum that achieves these goals is one that addresses the full range of students' needs—including the needs of those who have already demonstrated advanced academic abilities and those who have the potential to work at advanced levels.

Shawn M. Glynn, K. Denise Muth, and Patricia Doney

See also Children, Middle School; National Association for Gifted Children; Science, Curriculum

Further Readings

Kesidou, S., & Roseman, J. E. (2002). How well do middle school science programs measure up? Findings from Project 2061's curriculum review. *Journal of Research in Science Teaching, 39*(6), 522–549.

Meeting the needs of high-ability and high-potential learners in the middle grades: A joint position statement of the National Middle School Association and the National Association for Gifted Children (2005). Available from http://www.nmsa.org/AboutNMSA/PositionStatements/GiftedChildren/tabid/119/Default.aspx

Rakow, S. (2005). *Educating gifted students in middle school.* Waco, TX: Prufrock Press.

Rakow, S. (Ed.). (2000). *NSTA pathways to the science standards: Guidelines for moving the vision into practice, middle school edition* (2nd ed.). Arlington, VA: National Science Teachers Association.

VanTassel-Baska, J., & Little, C. A. (Eds.). (2003). *Content-based curriculum for high-ability learners.* Waco, TX: Prufrock Press.

Middle School, Social Studies Curriculum

Thomas Jefferson suggested that the American education system should prepare students to become knowledgeable U.S. citizens who could actively participate in a democratic form of government. Toward a similar end, the National Council for the Social Studies suggests that students participate in an integrated study of the social sciences and humanities to promote civic competence, drawing upon such disciplines as anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion, and sociology, as well as appropriate content from the humanities, mathematics, and natural sciences. Such experiences should be designed to help young people develop the ability to make informed and reasoned decisions for the public good as citizens of a culturally diverse, democratic society in an interdependent world. It is particularly critical that, as potential leaders, gifted, talented, and creative students be guided to an understanding of their place in society and the world.

In order to adequately address such goals for social studies education in middle school classrooms, it is imperative that teachers use high-quality social studies curriculum and teach it in a way that engages students with the essential ideas of history, government, economics, and geography—allowing middle school learners to see themselves as contributors to their own world and to the broader world they will increasingly impact over time. Following is an examination of what constitutes sound curriculum for the middle grades, for social studies classrooms, and for middle school social studies classrooms.

Quality Curriculum for Middle Grades

Turning Points 2000: A Design for Improving Middle Grades Education, a seminal reform document for middle-level education, makes several recommendations for developing and implementing curriculum for middle school students. Five key assertions made by this report are that curriculum must (1) be grounded in academic standards for what students should know and be able to do, (2) be made relevant to the issues that adolescents deal with, (3) be based on how middle school students best learn, (4) incorporate various assessments to allow students to best demonstrate their knowledge of the content, and (5) use a backward design process in developing curriculum—that is, identification of content standards, planning assessment tightly aligned with the designated content standards, and then determining how best to prepare students to succeed with the assessments that reflect an understanding of the content standards.

Content Standards

Currently, content standards for social studies are designated at the state level for public schools in most states. In some cases, the standards are presented in ways that guide teachers in helping students see important aspects of social studies and in ensuring that students can apply and transfer what they learn. In other instances, standards are presented as a sort of grocery list of information and skills that lacks coherence and often lacks meaning as well. In the latter instances, it is important for teachers—perhaps working with content

specialists—to craft the lists of standards into a curriculum that helps students understand the concepts and principles that provide structure and meaning for social studies; connect the various aspects of social studies; connect the events, the people, and link ideas from social studies to their own experiences; and develop the habits of thought and mind that will ultimately allow them to be informed and contributing citizens. The National Council for the Social Studies suggests that standards-based social studies curriculum K–12 be developed around the following concepts, which they call thematic strands: Culture; Time, Continuity, and Change; People, Places, and Environment; Individual Development and Identity; Individuals, Groups, and Institutions; Power, Authority, and Governance; Production, Distribution, and Consumption; Science, Technology, and Society; Global Connections; and Civic Ideals and Practices. A brief examination of these concepts or thematic strands suggests that they are particularly applicable for middle grades social studies during a developmental period when young adolescents are eager to understand their world better and to develop a clearer sense of their possible roles in that world.

Strand I: Culture

The study of cultures should include diverse societies so that students are exposed to multiple perspectives. Not only will this widen their view of the world, but it can also help students to gain a greater understanding of themselves in relation to their own culture(s).

Strand II: Time, Continuity, and Change

The world is constantly changing, and students should be given opportunities to explore questions that deal with these changes. For instance, students might investigate how the world has changed in the past decade and what this might mean for the future. Providing students with expertlike learning activities through which they take on the role of historian to explore continuity and change over time will help them make connections with the present and future, both in their own society and across various cultures. Again, students should have opportunities to envision how past events have shaped their own lives.

Strand III: People, Places, and Environments

Students should also investigate how environments both shape and are shaped by the people who inhabit them. For instance, why did certain cultures settle in particular areas? What impact have these groups had on the areas where they settled? Students should come to understand interdependent relationships between the people and the places and environments where they live. Exploring this reciprocal association can help students think more critically about their surroundings.

Strand IV: Individual Development and Identity

The big question explored in this strand is how culture and elements of culture shape individual experiences, beliefs, values, and more—asking how a person's identity is influenced by his or her culture. As students progress from youth to adulthood, the perspectives they have on this strand will change, moving from a more concrete focus, for instance, on older family members, role models, and the like, to a better understanding of their own identity and development.

Strand V: Individuals, Groups, and Institutions

Governmental and societal organizations such as churches and schools have a profound impact on people's lives. Students should be permitted to explore how these organizations both create and reflect societal values, as well as how they are formed and change over time, including the impacts of these institutions on their own lives.

Strand VI: Power, Authority, and Governance

The middle school years are a time of great exploration for students. One of the issues with which young adolescents grapple is the role of authority and governance in their lives, and the power that institutions have over them. Further, these students need to develop an increasing sense of civic understanding and responsibility, and how individual rights and responsibilities relate to and affect them. Middle school students should build on the more concrete understandings developed in elementary school and apply them to increasingly more complex issues.

Strand VII: Production, Distribution, and Consumption

From an economics perspective, it is important for middle school students to explore the concept of how limited resources are distributed, including the geographic distribution and consumption of resources. Again, increasing levels of depth and complexity in examination of issues and application of understandings are necessary for student growth.

Strand VIII: Science, Technology, and Society

Middle school students are ready to examine the role science and technology play in society, how lives are affected by technological changes, and the conditions under which such changes work for the betterment or detriment of society.

Strand IX: Global Connections

As the world becomes more and more interconnected, it is imperative that students learn about topics that relate to their increasingly globalized society. Issues might include the following: military operations, economic resources, humanitarian responsibilities, energy consumption, and world religions. In middle school, students are increasingly capable of postulating and investigating solutions to these issues, as well as thoroughly analyzing the issues surrounding these topics.

Strand X: Civic Ideals and Practices

In order to participate fully in any society, it is essential that students are prepared to assume this role. Learning the roles and responsibilities of citizens is an excellent place to start. Students can also examine their lives and how they might be able to make a difference in society. Middle school students benefit from looking at their own ideals and the actual practice of citizenship.

Relevant Curriculum

Not only does concept- and principle-based curriculum make standards more meaningful, but it also provides a framework for students to relate the curriculum to the world outside of school as well as their own lives. Middle schoolers have a storehouse of knowledge when they enter the middle grades, with much of the knowledge framed by their social and personal concerns. Thus, finding ways to connect curriculum to students' current mental schema can lead to more meaningful and lasting learning. Further, given the increasing academic diversity among school populations, personal and cultural relevance is a vehicle for optimizing learning. Social studies curriculum that is relevant to middle-grade learners will likely help them sustain interest and concentration while it helps them answer questions they find compelling.

Addressing a Diversity of Talents and Interests

Social studies curriculum and instruction can be designed as though all middle school students were essentially alike, but academic outcomes are improved when teachers address the very wide array of developmental needs that are a hallmark of the middle grades. The National Middle School Association (NMSA) notes the need for teaching approaches to accommodate the varying skills, knowledge levels, abilities, cultures, interests, and learning preferences of middle school students. Effective teaching for young adolescents, NMSA advises, will involve some direct instruction, but will be characterized by more student-centered strategies such as experiments, demonstrations, surveys, opinion polls, simulations, inquiry-based tasks, group projects, and independent studies. Student choice is an important element for middle schoolers as they move toward increasing autonomy as learners. Using a variety of strategies helps to ensure that gifted and talented students will have many ways of challenging themselves and expressing their growing interests.

Assessing to Support Student Growth

In order to understand the varied needs of middle schoolers and to address them effectively in the social studies classroom, it is essential for teachers to utilize ongoing and varied assessments of students' knowledge, understanding, skills, interests, and learning preferences. Assessment should include pre-assessment or diagnostic assessment, ongoing or formative assessment, and final or summative assessment. Pre-assessments may include checklists, surveys, inventories, and the like. Formative assessments may include teacher questioning, teacher observations, journal entries, homework, exit cards, and more. Summative assessments may include traditional tests and quizzes, projects, and other

authentic applications of student knowledge, understanding, and skill. Effective assessment will assist teachers both in charting student growth and in modifying instructional plans to ensure consistent student growth. Effective assessments are also responsive to students' varying needs for level of challenge and mode of expressing learning.

Backward Design of Curriculum

When designing curriculum "backward," teachers start with the learning goals clearly in mind and work backward from those goals to ensure alignment of outcomes, assessments, and curriculum. That is, instead of planning instruction around topics first and later creating assessments, teachers first identify content goals based on what students should know, understand, and be able to do. They then decide on effective means of assessing those outcomes. From that point, they then develop instruction designed to ensure that students achieve the learning goals and have maximum opportunity for success on assessments used to determine student proficiencies.

Elements of Effective Curriculum

Effective middle-grades social studies curriculum is responsive to the needs of young adolescents to understand themselves and their potential roles in the world. It supports their increasing ability to think critically and abstractly, and it enables them to become increasingly autonomous as learners. It responds to their varied backgrounds, readiness levels, interests, and modes of learning. To that end, effective middle-level social studies curriculum helps students develop conceptual frameworks of understanding, acquire essential knowledge and skill, attach what they learn to their own experiences, apply what they learn to issues in the world around them, develop habits of mind and work that support academic success, and develop personal interests and strengths.

Carol Ann Tomlinson and Eric M. Carbaugh

See also Middle School, Literature Curriculum; Middle School, Science Curriculum; Middle School, Writing Curriculum; Middle School Movement

Further Readings

Manning, M. (1993). *Developmentally appropriate middle level schools*. Wheaton, MD: Association for Childhood Education International.

National Council for the Social Studies. (1994). *Curriculum standards for social studies: Expectations for Excellence*. Silver Spring, MD: Author.

National Middle School Association. (1995). *This we believe: Developmentally responsive middle level schools*. Columbus, OH: Author.

Middle School, Writing Curriculum

The development of effective skills of written communication is a core academic enterprise in the middle school. Writing is generally not, however, considered an academic discipline or subject area in itself, but rather a set of skills developed and applied across all disciplines in the service of multiple purposes. Although writing is essential to all subject areas, the teaching of writing in middle school is most explicitly incorporated into an English or language arts curriculum.

Several levels of opportunity exist for developing writing talent in the context of the middle school curriculum. These range from differentiated instruction in the core curriculum, to the exploration of potential interests and talents related to writing through short-term elective and enrichment opportunities, to more intensive, individualized learning options. Though potential in the area of writing is related to an individual's general and specific linguistic skills, the development of accomplished writing is a function of the dynamic interplay between—at the very least—linguistic skills, other cognitive skills, interests, motivation, habits of mind, and learning experiences.

Gifted and Talented Writers in the Middle School

Young adolescent writers vary greatly in their facility with both the basic building blocks and the more complex components of narrative, expository, and other forms of writing. Even in exceptional students in this age range, the

process and products of writing typically represent a combination of elements characteristic of both novice and more expert writers. The broad goal of curriculum and instruction is to advance each student as far as practicable toward more expert writing.

In considering exceptional writing in young adolescents, it is necessary to distinguish between the advanced use of language, and the sophisticated understanding and application of structural elements and narrative structures in writing. The relatively limited research into the work of exceptional writers in the middle school years suggests that linguistic skills, such as appropriate use of figurative language; use of unusual and mature vocabulary in writing; poetic rhythm; and sophisticated syntax, phrase structure, and/or punctuation, can distinguish work that is identified as exceptional from that considered more typical or "average." In their levels of mastery in these areas, similar to those described by Jane Piirto in her studies of younger prodigious writers, some students may be significantly advanced compared to age peers. Yet even students who demonstrate advanced use of language and content in writing do not necessarily exhibit corresponding advancement in conceptual understanding and application of components such as complex narrative forms, goals for writing, genre, and an appreciation of the intended audience. In addition, even students with highly advanced language might not have highly developed skills of planning, accessing, and evaluating relevant information, revising, and editing, which are characteristic of more developed writers.

Although students with advanced knowledge and skills in language might show potential for exceptional writing, others with exceptional talent arrive in middle school without prerequisite language skills for more advanced levels of written accomplishment. Still others present with specific learning disabilities, such as dyslexia, that affect the acquisition of some language-related skills (e.g., spelling) but leave intact the capacity to comprehend, manipulate, and generate complex, abstract ideas. As is the case with any curricular area and any group of students, teachers must be simultaneously conscious of both group and individual differences in planning opportunities for talent development.

Differentiation of the Core Writing Curriculum

A joint statement issued by the National Association for Gifted Children (NAGC) and the National Middle School Association (NMSA) on meeting the needs of high-ability and high-potential learners in the middle grades emphasizes the need for curriculum responsive to differences in cognitive skills, interests, motivation, and preferred modes of learning potentially occurring in gifted individuals. For all middle school students, effective curriculum enables the acquisition of essential disciplinary knowledge; the development of key skills; the nurturance of understanding of meaningful concepts, principles, and ideas within and across disciplines; the opportunity to learn about oneself and others through curriculum; and the opportunity to frame and address authentic, real-world problems.

It is within this framework of quality curriculum for all students that the development of writing talent can be optimized through modifications that address student differences, regardless of whether students are served within the general education classroom or through distinct classes for identified gifted students. Students' current and developing levels of readiness for advanced writing can be addressed through modifications that seek to: (a) challenge students with advanced language knowledge and skills to develop further in this area through access to advanced resources (e.g., advanced vocabulary lists) and learning activities; (b) bolster the language knowledge and skills of students with potential who lack prerequisites for advanced writing; (c) expose students to increasingly complex texts (i.e., those with more sophisticated narrative structures and use of literary devices) that might serve as models for their own efforts; and (d) guide students explicitly through the process of establishing a purpose for writing, developing ideas for writing, developing drafts, revising, and editing, at a level of complexity commensurate with students' readiness.

Curriculum can be differentiated in response to student interest to support the development of writing talent by (a) encouraging students to experiment with different writing styles and genres; (b) allowing students to pursue an interest

in the work of particular authors, and to investigate those authors' work habits, inspirations, and writing processes; (c) allowing students to mimic the style of favorite authors as they come to understand how elements interact to produce style; (d) allowing opportunities for student choice of topics for writing, including topics drawn from multiple disciplines; (e) providing opportunities for students to explore their own lives and emerging identities through writing (e.g., through reflective journal writing, or by explicitly linking literary concepts, such as writer's voice, to students' own experience, such as their own emerging "voice"); and (f) providing opportunities for prolonged, independent or group writing projects in areas of interest.

Differentiation in response to student learning profiles can support talent development in writing by (a) providing options for students' expression of understanding of a particular concept or text (e.g., analytical criticism vs. creative writing); (b) encouraging different ways of working through the prewriting process (e.g., enabling students to use audiovisual recordings, sketches, mind-maps, or diagrams to record and develop ideas for writing); (c) assisting students to use comfortable modes of expression to support writing (e.g., helping students incorporate visual metaphors into their written work, develop photographic essays supported by poetry or prose, or create audiovisual presentations of ideas also expressed in more formal writing).

Effectively differentiated middle school writing curriculum both challenges students whose writing is already advanced beyond grade-level expectations and alerts teachers to writing potential in students who have yet to demonstrate advanced performance. Ongoing assessment of students' current levels of readiness, developing interests, and learning preferences is essential in determining ongoing instructional needs in various aspects of writing. Curriculum that is differentiated to meet the needs of high-potential and high-ability students is supported by several components of the middle school philosophy, including flexible grouping and use of time, attendance to affective development, a focus on developing interests through exploration, and collaboration between interdisciplinary teams of teachers and specialists.

Opportunities for Exploration Through Elective Study

Middle-level education values young adolescence as a period of great exploration and developing awareness. All middle school students benefit from exploring areas of interest that have the potential to become passions, and from developing their emerging talents. For those with advanced writing skills or significant potential as writers, exposure to and experimentation with different forms, genres, and outlets for writing; writing for different audiences; and reflecting on the match between their own work preferences and those of practicing writers are important components of talent development.

Some enrichment opportunities in writing are suitable for all students. For example, seeing practicing writers talk about and share their work or taking field trips to see poetry readings, drama performances, or museum exhibits pertaining to writers and writing are likely to engage most students. Other opportunities require greater investment of interest and time, such as short-term elective courses offered in many middle schools and designed to expose students to areas of potential interest in a more concentrated way. In writing, electives might be offered in scriptwriting, poetry, scientific writing, or speechwriting. Many schools also offer "clubs" that bring together students with similar interests, and writing talent might be developed in this context. The goal of these enrichment opportunities is for students to "try on" potential long-term interests, including those that might intersect with domains of particular talent.

Individualized Opportunities for Development of Writing Talent

At a more intensive level, students may be guided individually to develop specific writing abilities. Personalized curriculum plans can take a variety of forms, and can occur outside both the core and exploratory layers of curriculum. At this level, a student's motivation and interest are central, because more independent curriculum requires sustained effort and commitment on the part of the student. Opportunities at this level are negotiated between teachers and individual

students, and are designed to foster knowledge and skills in specialized areas of interest and/or talent not ordinarily targeted in middle school curriculum.

In writing, individualized or personalized plans can be designed to develop advanced and increasingly professional written products. For example, a student with advanced expository writing skills might be guided to write an essay exploring a topic of interest, such as the ethics of stem cell research, for entry in a national or international essay competition. Another student might create an extended anthology of original poetry, organized around a central theme, with the long-term goal of submitting the work for publication. These representative cases, reminiscent of Type III enrichment opportunities described in Renzulli's schoolwide enrichment model, exemplify the significant time commitment and skill level that can be involved in extended individual projects for talent development; a commitment that not all students would elect to undertake. In many cases, the teacher negotiating the parameters of the project with a student will not possess the specialized knowledge necessary to guide the project to its conclusion, and will therefore arrange for the student to work with another teacher, or arrange a suitable mentor (e.g., through a high school, university, or professional association) to work with the student.

Talented writers might also be supported in accessing extended out-of-school opportunities in order to meet their need for challenge. For example, a particularly talented middle school writer might benefit from participation in a high school or college credit course in writing, one of many online writing courses taught by professional writers, or a summer program designed to develop the talents of young writers. As with all curricular options, these courses are selected to meet the individual's specific needs at a particular stage of talent development.

Carol Ann Tomlinson and Jane Jarvis

See also Elementary School, Writing Curriculum; Mentoring Gifted and Talented Individuals; Middle School, Literature Curriculum; Middle School Enrichment; Secondary School, Writing Curriculum

Further Readings

Council for Exceptional Children. (1996). *Gifted education and middle schools*. Reston, VA: Author.

McKeough, A., Generaux, R., & Jeary, J. (2006). Structure, content, and language usage: How do exceptional and average storywriters differ? *High Ability Studies, 17*(2), 203–223.

Piirto, J. (1989). Does writing prodigy exist? *Creativity Research Journal, 2,* 134–135.

Tomlinson, C. A. (2003). *Fulfilling the promise of the differentiated classroom: Strategies and tools for responsive teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tomlinson, C. A., & Eidson, C. C. (2003). *Differentiation in practice: A resource guide for differentiating curriculum, grades 5–9*. Alexandria, VA: Association for Supervision and Curriculum Development.

VanTassel-Baska, J., Johnson, D., & Boyce, L. N. (Eds.). (1996). *Developing verbal talent: Ideas and strategies for teachers of elementary and middle school students*. Boston: Allyn & Bacon.

VanTassel-Baska, J., Zuo, L., & Avery, L. D. (2002). A curriculum study of gifted-student learning in the language arts. *Gifted Child Quarterly, 46*(1), 30–44.

Middle School Enrichment

Enrichment is the most commonly reported school provision for students identified as gifted. Despite this, enrichment remains a concept that is hard to define clearly. The term *enrichment* has been used to refer to curriculum as well as program delivery services. In the middle grades, enrichment is also defined and implemented in many ways. For some middle school settings, enrichment can take the form of extracurricular activities or school clubs; for other settings, enrichment might take the form of a pull-out class in which students work on individual projects; in still others, enrichment may inappropriately mean expanded assignments when a student demonstrates proficiency with designated goals or when the student completes assigned work. For purposes of this entry, middle school enrichment is defined as in-class, cocurricular, or extracurricular options designed to meet the

academic and developmental needs of young adolescents through a variety of approaches.

Meeting the Learning Needs of High-Ability and High-Potential Learners

In 2005, the National Middle School Association (NMSA) and the National Association for Gifted Children (NAGC) crafted a joint position statement describing their shared commitment to developing schools and classrooms in which both equity and excellence are persistent goals for each learner. The statement includes specific calls to action for middle school leaders and educators, including the following:

- Ensure that teachers have meaningful knowledge and understanding about the needs of gifted adolescents, including training in differentiated instruction so that the needs of all students—including those with advanced performance or potential—are appropriately addressed.
- Ensure a continuum of services including options such as differentiation, advanced classes, acceleration, short-term seminars, independent studies, mentorships and other learning opportunities matched to the varied needs of high-potential and high-ability learners.
- Use a variety of developmentally appropriate instructional practices to enable each student to experience a high degree of personal excellence. (National Middle School Association & National Association for Gifted Children, 2005)

These guidelines provide a foundation for effective curriculum for high-ability and high-potential middle school students and indicate the need to develop curriculum and instruction that is responsive to the needs of high-ability and high-potential young adolescents.

Neuroscience research has suggested that the young adolescent brain is in a promising state of flux, signaling the most transformational period of development in a young person's life other than infancy. This span of development is a use-it-or-lose-it time for the brain. Brain synapses are developing rapidly and those pathways that are rarely used are being "pruned" in order to strengthen the developing paths. With this in mind, teachers of young adolescents should persistently call upon students to reason, think abstractly, and exercise critical analysis in their learning experiences. Effective enrichment can provide an opportunity to infuse these critical attributes into the middle school environment. An examination of enrichment in the middle school context illustrates ways in which enrichment can be part of a continuum of services designed to meet the needs of middle schoolers, including those with advanced performance or potential.

The concept of enrichment in gifted education is perhaps most closely connected with the work of Joseph Renzulli and his colleagues. Renzulli's *schoolwide enrichment model* explicitly defines enrichment as those activities that respond to student interest and learning style and that are geared toward providing advanced-level activities and is well aligned with the NMSA/NAGC guidelines for teaching highly able middle school students—including the belief that enrichment is valuable for all students, not just high-ability and high-potential learners, as long as it addresses the needs of the particular learner, is an extension of high-quality curriculum, and is supported in ways that strengthen the student intellectually and affectively. Ideally, all students will be challenged, and even the brightest students will have special opportunities to reach for greater knowledge and skills.

Enrichment Options

Enrichment can be an integral part of the school within a classroom or within cocurricular or extracurricular settings. The following explanations delineate enrichment options that can be found in a variety of middle school settings.

Exploratory Programs

Enrichment in the middle grades is often found in the form of exploratory programs such as short-term classes or workshops in which students can try out career, recreational, life-skill, or arts-related activities. Exploratory classes and workshops that use integrated curricular studies culminating in student-produced, real-world projects can also provide sources of high-quality enrichment that increase student motivation and extend challenge in school.

Exploratory curriculum allows students with wide-ranging interests and academic needs more opportunity for personal development. Because the middle years are a time in which students actively formulate their identities, middle school learners are inevitably interested in investigating a broad range of topics and ideas. Having the opportunity to do so is critical in establishing new passions and extending existing ones, as well as supporting a positive attitude toward self and achievement during adolescence. Learning opportunities that support middle school students in reaching beyond their academic comfort levels can add depth and breadth to the learning experiences of young adolescents.

Middle schools can provide content-oriented enrichment opportunities through short, exploratory courses such as foreign language, technology, art, music, broadcasting, and the like. Exploratory options such as these may be a part of the class time (curricular), outside of class time but within the school day (cocurricular), or provided outside of regular classroom hours (extracurricular).

During class time, teachers can provide exploratory, interest-based short courses that are related to classroom content as well as providing interest-based options in the form of independent studies, enrichment centers, interest groups, and so on. Further, middle schools may offer a range of cocurricular enrichment options that extend course content, such as Mathletics or MATHCOUNTS that extend the middle school math curriculum. Finally, extracurricular exploratory activities, such as computer, genealogy, gaming, or photography clubs, may introduce students to new interests or extend existing ones. Whatever the format, enrichment offered through exploratory options should be rooted in principles of high-quality curriculum and instruction.

Mentoring

Another option for middle school enrichment is mentoring—or a structured, ongoing relationship in which someone more skilled in a domain supports the development and growth of someone less skilled in that domain. Middle school students are curious about questions and topics of importance to them. They also often feel both pulled and repelled by key adults in their lives. Adult mentors who can help students develop new competencies or extend existing interests can thus meet the dual need of young adolescents to extend their horizons and have positive adult relationships.

Middle schools can support mentoring in a variety of settings. After-school and weekend mentoring opportunities can benefit a wide variety of students. Such extracurricular settings are ideal for mentors who may be unable to meet students during regular school hours and for settings that are not available to students and mentors during the school day. Some schools use mentors in classroom and cocurricular contexts to enhance or extend a topic of study. Technology offers one vehicle for classroom and cocurricular mentorships. For instance, middle school science students might regularly contact university science students by e-mail to discuss experiments they are designing and carrying out. When planning mentoring programs, it is prudent to consider the following:

- *Developmental needs of the students.* At a given time, some middle school students are ready for mentor relationships, whereas others may not be.
- *Clear expectations for students and mentors.* Carefully designed mentorships with guidelines for mentors provided by the school are critical. Clear school and parental expectations for students are also essential to success.
- *Support systems within the school.* It is important to recognize that although the mentors may be experts in their fields, they may not have a clear understanding of the developmental needs of adolescents. It is important to provide training and guidance to support new and evolving mentor–mentee relationships.

In-Class Extension Activities

Middle schools can also use in-class extension activities as an important source of meaningful enrichment for young adolescents. Teachers can develop or provide extension activities to ensure that students have the following: (a) meaningful work to do when they finish required tasks, (b) appropriately challenging work to do in lieu of required work on which they demonstrate mastery, or (c) opportunities to engage in extended learning about topics, ideas, or events they are studying in class. In a middle school language arts class, for example, a teacher might provide an

extension opportunity during a novel study of Lois Lowry's *The Giver* by developing interest centers on eugenics and future studies, both of which are topics related to this science fiction novel about a "perfect society."

Extension activities, as in all enrichment opportunities, need to be (a) carefully planned; (b) based on explicit expectations for student knowledge, understanding, skill, and working arrangements; (c) guided by ongoing assessments to address student interests, learning profiles, and readiness needs; and (d) actively supported by teachers who ensure that students develop the knowledge, understanding, skills, and habits of mind necessary to function as increasingly independent inquirers.

Promoting Equity and Excellence in Enrichment

Enrichment can provide high-ability and high-potential middle school students with opportunities for challenge and motivation. When planned with student needs in mind, enrichment can raise ceilings of expectation and performance for highly able students, thus contributing to personal excellence for these students and lifting ceilings of excellence in the middle grades. Yet, enrichment should not be limited to students identified as gifted. It is likely to be beneficial for all students at some times and in some subjects in the middle school years. It is also likely that enrichment will be inappropriate for many advanced learners at some times and in some subjects during the middle grades. Opening up enrichment opportunities for a broad range of students ensures equity of access to rich learning opportunities and can also serve as a catalyst for talent identification and nurturance in students whose abilities might otherwise be overlooked and underdeveloped.

Carol Ann Tomlinson and Jennifer G. Beasley

See also Middle School, Literature Curriculum; Middle School, Social Studies Curriculum; Middle School, Writing Curriculum; Middle School Movement

Further Readings

Clark, B. (1983). *Growing up gifted: Developing the potential of children at home and at school* (2nd ed.). Columbus, OH: Merrill.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. Cambridge, UK: Cambridge University Press.

Erb, T. O. (Ed.). (1997). *Dilemmas in talent development in the middle grades: Two views*. Columbus, OH: National Middle School Association.

Renzulli, J. S. (1977). *The enrichment triad model: A guide for developing defensible programs for the gifted and talented*. Mansfield Center, CT: Creative Learning Press.

Tomlinson, C. A., & Doubet, K. J. (2006). *Smart in the middle grades: Classrooms that work for bright middle schoolers*. Westerville, OH: National Middle School Association.

Middle School Movement

The middle school movement began in the 1960s and gained impetus in the 1970s as a reaction to junior high schools that were typically, as the name suggests, junior versions of a high school. Operating in a highly teacher-centered and often factorylike manner, junior high schools gave ample evidence of being poorly suited to address the needs of young adolescents.

Founders and proponents of what came to be known as middle schools emphasized the need to establish a kind of school centered on and responsive to the needs of students from approximately 10 to 14 years of age. Students in this age group are highly variable in physical, emotional, intellectual, social, and moral development. Students in this age span may go through periods of time where they are self-absorbed, focused on friends, moody, argumentative, impulsive, and/or volatile. They also are increasingly able to deal with abstractions, developing good logic and problem-solving skills, increasingly able to work independently, passionate about issues such as fairness and justice, and able to examine ideas from varied perspectives. These students, suggest proponents of middle schools, need settings in which they are understood, feel safe, can actively grapple with ideas, work in a variety of social contexts, find reason to believe in themselves and their current and future prospects, have freedom to move about, and engage in work that they see as important and relevant. This entry discusses the fit of gifted education within the

middle school movement and the differing perspectives of advocates for the middle school movement and advocates for gifted education.

Early Divides

During the 1990s, there was overt tension between advocates for gifted education and advocates for the middle school movement. Certainly some of the divide between the two groups stemmed from an equity emphasis in the middle school movement and an excellence emphasis in gifted education. That is, many middle school leaders stressed the importance of middle schools as the last, best opportunity for students from low-income backgrounds and students of color to be supported in achieving underpinnings necessary for continued academic success. To that end, middle school proponents emphasized the inherent dangers of tracking and ability grouping, which, when done without concern for equity and diversity, can be disadvantageous for students who struggle in school for a variety of reasons. By contrast, many proponents of gifted education supported ability grouping based on research suggesting it was a viable means of increasing academic challenge—or academic excellence—for highly able learners. Related to the different perspectives regarding ability grouping were the two groups' perspectives on cooperative learning. Middle school advocates strongly supported cooperative learning as a means of ensuring educational equity, and advocates of gifted education decried the approach as ineffective in providing academic challenge for advanced learners. A third source of tension likely stemmed from an early failure of middle school advocates to delineate what constitutes an appropriate middle level curriculum, leaving proponents of gifted education to perceive middle schools as institutions largely devoid of an academic emphasis.

More Recent Perspectives

Beginning in the 1980s and moving forward, proponents of middle level education and gifted education have worked to find common ground in their perspectives. In addition to shared initiatives and joint position statements by the National Middle School Association and the National Association for Gifted Children, an examination of current literature on the middle school movement is more specific in its statements about addressing the needs of advanced learners in the middle grades as well as in its statements about the nature of effective middle grades curriculum. The latter descriptions support development of personal excellence and align easily with much of the literature in gifted education about what constitutes effective curriculum and instruction for highly able learners. In addition, many in the field of gifted education have increasingly emphasized the need for that field to play a leadership role in identifying and developing abilities in students from low-income and culturally/economically diverse backgrounds, which suggests a commitment to equity and implies a willingness to play a role in talent development in more heterogeneous settings as a way to identify and extend capacity in groups traditionally underserved in programs for gifted learners. Thus, in recent years, both groups share, at least to some degree, a stated intent to support both equity and excellence in the middle grades.

Common Ground

Although there are lingering tensions between some advocates for gifted education and some advocates of the middle school movement based largely on different preferences regarding instructional grouping of young adolescents, there are many aspects of current middle school language that provide ample ground for collaboration between middle school advocates and advocates for students identified as gifted. Contemporary middle level writing suggests many areas of shared belief, including goals of responding to individual differences; having adult advocates for every student to support each student's intellectual and personal development; ensuring continuous progress for each student; establishing high expectations in the classroom; creating a climate of intellectual development; developing curriculum that is grounded in rigorous, public academic standards; fostering critical thinking; using a variety of instructional practices to address varied student needs; employing organizational flexibility; and using assessment that promotes learning for each student.

It is likely that current lack of middle school fit for gifted learners exists not because of a vision of

middle level education that is inappropriate for the needs of highly able middle schoolers, but rather because of the difficulty in implementing an appropriate vision. That difficulty is pervasive in the history of reform initiatives in American education. The challenge of translating the vision into reality, however, leaves ample room for contributions by those in the field of gifted education who also advocate many aspects of the vision as necessary for effective public education.

Carol Ann Tomlinson

See also Middle School, Literature Curriculum; Middle School, Science Curriculum; Middle School, Social Studies Curriculum; Middle School, Writing Curriculum; Middle School Enrichment

Further Readings

Jackson, A., & Davis, G. (2000). *Turning points 2000: Educating adolescents in the 21st century.* New York: Teachers College Press.

National Middle School Association. (1995). *This we believe: Developmentally responsive middle level schools.* Columbus, OH: Author.

National Middle School Association. (2003). *This we believe: Successful schools for young adolescents.* Westerville, OH: Author.

National Middle School Association & National Association for Gifted Children. (2005, January). *Meeting the needs of high-ability and high-potential learners in the middle grades: A joint position statement.* Retrieved December 22, 2005, from http://www.nmsa.org/AboutNMSA/PositionStatement/GiftedChildren/tabid/119/Default.aspx

Stevenson, C. (1998). *Teaching ten to fourteen year olds* (3rd ed.). Boston: Allyn & Bacon.

Tomlinson, C., & Doubet, K. (2006). *Smart in the middle grades: Classrooms that work for bright middle schoolers.* Westerville, OH: National Middle School Association.

Midwest Academic Talent Search

The Midwest Academic Talent Search (MATS) is one of several talent search programs in the United States that uses off-level testing to assess the abilities of academically gifted children. Talent search programs like MATS have a history of 25 years or more and have become a prominent service delivery model in the United States for both assessment and educational programming for gifted children.

MATS is conducted by the Center for Talent Development of the School of Education and Social Policy of Northwestern University in Evanston, Illinois. MATS is an annual program that involves assessment of children in Grades 4 through 9 via above-grade-level tests, including the Explore test, the ACT (American College Test), and the SAT (Scholastic Aptitude Test).

Underlying Rationale

Underlying the MATS program is the belief that the typical tests used to assess achievement within schools are not appropriate for gifted children. Because these tests are designed for heterogeneous groups of students, they suffer from ceiling effects due to the lack of sufficiently difficult items. As a result, on-grade-level tests are too easy for gifted learners and do not provide adequate measurement of their abilities. The use of on-grade-level tests to assess the abilities of gifted learners is akin to using a yardstick to measure height. The measuring instrument cannot discern differences in height beyond that of 3 feet. Similarly, on-grade-level tests can determine students' mastery only of grade-level material but not what students know and understand beyond that. Many gifted students can reason and think beyond what is expected on the basis of their age or grade. MATS uses tests designed for older students with younger students, thereby providing more accurate measurement of their abilities in key areas. Through the use of tests such as the ACT, SAT, and Explore, gifted students' level of ability (e.g., moderately gifted, highly gifted) in several key domains (math, verbal, science reasoning, and English) can be determined. Use of these tests with children of these ages is also appropriate because differentiation of cognitive abilities (e.g., relative strengths and weaknesses in different areas) is known to occur in early adolescence. The MATS program assists students in Grades 3 through 9 who are already scoring well on on-grade-level tests (e.g., at the 95th percentile or higher) to register for and take an appropriate above-grade-level test.

Students in Grades 3 through 6 take the Explore tests, typically given to eighth graders. Students in Grades 6 through 9 take the SAT or ACT, typically given to high school juniors and seniors. MATS participants take these tests on Saturdays at national test centers located near their homes.

Services to Families and Schools

The MATS program is more than just testing. Subsequent to testing, MATS participants receive information that helps them to interpret and understand their scores on the above-grade-level tests. For example, in the MATS program, they receive percentile rankings for their scores based on students their own age who took the test, that is, other gifted students. They are given recommendations for out-of-school programs such as contests and competitions, summer programs, and distance learning programs that they are eligible for based on their scores and that will further develop their abilities. They receive information directly from the Center for Talent Development on its educational offerings for gifted students as well as brochures and information from other gifted centers and institutions that offer special programs for gifted learners. Students and families receive academic advising regarding sequences of courses to take in Grades 4 through 12, depending on a student's abilities and areas of strength. Families of MATS participants also receive information about giftedness, talent development, and parenting via print materials including magazines, newsletters, and the like, as well as access to experts in gifted education through conferences and seminars. Students who participate in MATS continue to receive information about special programs until the end of high school.

In addition to serving students and families, MATS reports students' scores back to their school so that their school administrators can make appropriate adjustments and accommodations for them based on their tested abilities. MATS also provides information to school officials that enables them to do this, such as recommendations for in-school programs that are matched to different scoring levels. For example, some students need enrichment and acceleration of 1 year only and others need acceleration of 2 or more years in an area of strength. Thus, participation in MATS opens up many opportunities for growth and talent development to gifted students.

Research Support

The model of above-grade-level testing that underlies the MATS program was begun by Julian Stanley at Johns Hopkins University. Currently, more than 30,000 students, primarily from the Midwest, participate annually in MATS, and more than 150,000 students participate annually in testing nationwide through other similar programs at Duke University, Johns Hopkins University, and the University of Denver. Many of the components of the Midwest Academic Talent Search, including the efficacy of criteria to participate, the scoring levels of students compared to older students who typically take the tests, and the predictive validity of scores for later educational achievement, have been well researched by researchers at Northwestern University and the other talent search centers. On average, students who take these tests score as well or better than the older students who typically take them. SAT scores can predict students' college majors and career choices. Further, students' SAT, ACT, and Explore scores can be used to place students in educational programs that are appropriate for them in pacing and level, and specifically, can be used to determine which students can profit from and succeed in accelerated learning experiences. Students who participate in talent search in middle school are much more likely to pursue rigorous courses of study in high school and college.

Paula Olszewski-Kubilius

See also Identification; Mathematically Precocious; Middle School, Literature Curriculum; Middle School, Mathematics Curriculum; Talent Searches; Verbal Ability

Further Readings

Olszewski-Kubilius, P. (1998, Spring). Research evidence regarding the validity and effects of talent search educational programs. *Journal of Secondary Gifted Education,* 9(3), 134–138.

Olszewski-Kubilius, P. (1998, Spring). Talent search: Purposes, rationale and role in gifted education. *Journal of Secondary Gifted Education,* 9(3), 106–114.

Montessori Schools

In the current educational era, with the advent of the No Child Left Behind act and its emphasis on educational standards, funding for gifted children often runs dry. It may therefore be important for parents to examine alternative educational options for their gifted children, who tend to be independent learners, who often struggle in classrooms where repetition and conformity are stressed and individual expression is shunned. Montessori schools were founded on the basis that children have the innate capacity to teach themselves, and that schools should allow students to direct their own learning. For this reason, Montessori schools may be an excellent alternative for gifted students.

Montessori Education

Montessori schools were founded and developed by the Italian educator Maria Montessori in the early 20th century and are based on the philosophy that children have an innate tendency and ability to learn culturally appropriate tasks. In her book *The Absorbent Mind,* Montessori describes with fascination the incredible cognitive development in the first 3 years of a child's life: "The child grows up speaking his parents' tongue yet to grown-ups the learning of a language is a very great intellectual achievement. No one teaches the child, yet he comes to use nouns, verbs and adjectives to perfection" (p. 6).

One of Montessori's core beliefs was that all children have a natural desire and ability to learn, and therefore that the basic task of teachers should not be to impart knowledge but rather to provide students with stimulating environments in which to explore and learn. The onus of learning is thus put on the child, and instead of directly instructing, the teacher's primary job is to expose the child to a wide array of subjects that are chosen to be optimally challenging to each student. Unlike traditional public schools where schedules are rigid, students in Montessori schools can choose to work on an activity for as long as they like.

Montessori schools also foster a democratic system for creating order in the classroom; students have direct input into creating and enforcing school rules, and teachers try to encourage students to resolve conflicts on their own, and intervene only when necessary.

Gifted Students and the Montessori Method

Gifted students have a number of characteristics that make Montessori schools particularly amenable to their needs. First, they tend to enjoy independent work, which is the essence of the Montessori method. In order to supplement their students' independent work, Montessori teachers work to match the challenge of a given activity to each individual student's skill level. This allows gifted students, who are often bored by the slow pace in a traditional public school setting, not only to progress at their own pace, but also to work on material that is both stimulating and challenging.

Gifted students also tend to become intensely immersed in activities that they find interesting, challenging, and rewarding. Montessori schools, unlike traditional schools, which often employ rigid scheduling, encourage students to engage in activities for as long as they like, and therefore allow them to maximize learning during these highly creative interludes. Montessori felt that children were, in fact, the best judges of their own educational needs, and that just as an infant attends to the stimuli needed to learn language, older children too have an innate capacity to choose exactly what they need in order to learn.

Gifted students often seek the opportunity to integrate knowledge from a variety of disciplines. They are interested in cause-and-effect relationships, and in transferring concepts outside a particular discipline. Montessori schools are particularly effective in this area, constantly striving to relate a student's work in one area to projects in other disciplines. The Montessori method will therefore allow gifted students to make connections between what they learn and the world in which they live, and to alleviate the frustration caused by the strict segregation of subject matter that takes place in traditional public school settings.

Gifted students also often struggle socially in mainstream public schools, likely because their advanced cognitive capacities make it difficult for them to relate to less gifted students their own age. Moreover, gifted students often possess a capacity for moral reasoning, or a sense of justice

and fairness, that is more advanced than that of their peers. This often makes it hard for them to understand the behavior of children their own age and can lead to social isolation that in turn may contribute to high levels of depression, anxiety, and suicidal ideation among the gifted.

Another area in which Montessori schools serve the interests of the gifted is in their adoption of an egalitarian system of class management. Students not only play a role in designing class rules, they also help to maintain and enforce those rules. Classrooms are multi-age, which allows older students to take on leadership roles and younger ones to learn by example. Montessori teachers encourage students to sort out their own problems before intervening. Within this system, students are encouraged to perform routine classroom tasks such as watering the plants and sweeping the floors, and are encouraged to help their teacher whenever help is needed. Students also have more freedom within the school day. They are allowed to take bathroom breaks or eat snacks at their leisure and to talk quietly to friends and move around the classroom as they please. This loose egalitarian system suits the needs of the self-motivated, cognitively gifted student, who may feel bogged down by traditional, rule-driven classrooms.

Montessori schools, with their emphasis on independence, individuality, integrative interdisciplinary curriculum, and a democratic system of class management, would seem to be the perfect setting for the gifted to excel, providing a welcoming place for students who often feel strange in a public school setting and who may even go so far as masking their talents in order to fit in with their classmates.

The benefits of Montessori education for the gifted is merely speculative, at this point, as there is not yet empirical evidence to support it, but based on the school's theory and the specific needs of gifted students, there seems to be a logical connection. Because of the diversity of their gifts, there may not be one perfect educational setting for all talented students, and parents should be encouraged to explore all academic options.

David Martin

See also Boys, Gifted; Giftedness, Definition; Girls, Gifted; Highly Gifted; Very Young Gifted

Further Readings

Gitter, L. L. 1970). *The Montessori way.* Seattle, WA: Special Child Publications.

Lillard, P. P. (1996). *Montessori today: A comprehensive approach to education from birth to adulthood.* New York: Schocken Books.

Loeffler, M. H. (1992). *Montessori in contemporary American culture.* Portsmouth, NH: Heinemann Educational.

Montessori, M. (1912). *The Montessori method.* New York: Frederick A. Stokes.

Montessori, M. (1948). *The discovery of the child.* Adyar, Madras 20, India: Theosophical Society.

Montessori, M. (1964). *The absorbent mind.* Wheaton, IL: Theosophical Publishing House.

Montessori, M. (1965). *The advanced Montessori method: Spontaneous activity in education.* Cambridge, MA: Robert Bentley.

Montessori, M. (1966). *The secret of childhood.* Notre Dame, IN: Fides Publishers.

Tittle, B. M. (1984). Why Montessori for the gifted? *Gifted Child Today, 33,* 3–7.

Moral Development

Moral development and moral education are increasingly being discussed by educators, psychologists, counselors, and parents. Incidents of school violence in public and private schools have focused awareness on these issues. In addition, the lack of high levels of moral development is reflected in headlines concerning fraud and dishonesty in corporate settings, legal proceedings, politics, sports, and entertainment. The role that schools could and should play in moral development is still a subject of controversy; yet, systematic research has been conducted throughout the 20th century by educational scholars, notably by Jean Piaget, Lawrence Kohlberg, Carol Gilligan, Kazimierz Dabrowski, John Coles, Rushworth Kidder, and E. Paul Torrance and Dorothy Sisk.

Jean Piaget

According to Piaget, all development emerges from action, and children construct and reconstruct their knowledge of the world as they interact with the environment. Piaget observed children

at play, and noted that their adherence or nonadherence to rules in games indicated a developmental process of morality. He concluded that all children begin in a *heteronomous* stage of moral reasoning characterized by strict adherence to rules, duties, and obedience to authority. The powerlessness of children and their egocentrism reinforce their heteronomous moral orientation. Later, in interaction with other children, the child develops toward an *autonomous* stage of moral reasoning. Piaget concluded from his work that schools should concentrate on cooperative decision making and problem solving to nurture moral development.

Lawrence Kohlberg

Kohlberg modified and elaborated on Piaget's work, and he proposed that children form ways of thinking through experiences that include understandings of moral concepts, such as justice, rights, equality, and human welfare. Kohlberg identified six stages of reasoning grouped into three major levels. At the first level, the Pre-Conventional level, moral judgment is characterized by a concrete, individual perspective. Within this level, Stage 1 consists of a heteronomous orientation in which the child avoids breaking rules to avoid physical consequences. Similar to Piaget's framework, the reasoning in Stage 1 is egocentric. In Stage 2, there is an emergence of moral reciprocity, and the child follows rules only when it is in someone's immediate interest. At the Conventional level, in Stage 3, the individual is aware of shared feelings, agreements, and expectations, and defines what is right in terms of what is expected by people close to the child. Being good involves trust, loyalty, respect, and gratitude in maintaining mutual relationships. In Stage 4, the individual is moving away from local norms and role expectations and defining what is right in terms of the laws and norms of the larger social system. At the Post-Conventional level, in Stage 5, the individual reasons using ethical fairness principles and understands that elements of morality such as regard for life and human welfare transcend particular cultures and societies. Stage 6 remains a theoretical endpoint following the five stages of creation of personal moral principles based on transcendence of cultures.

The goal of moral education according to Kohlberg is to encourage individuals to move to the next stage of moral development. Kohlberg's theory is grounded in Piagetian assumptions of cognitive development in that individuals interacting with the environment and with others will experience information and ideas that are different from their view, and through the process of equilibration, development to the next stage occurs. Kohlberg used moral dilemmas in which individuals discuss contradictions presented in scenarios and consider a course of actions. Kohlberg demonstrated his concept of moral education in schools-within-schools in which students participated as community members and sought consensual rather than majority rules. The role of teachers is crucial in the "just community" schools in that they promote rules and norms that reflect a concern for justice and rights in the community, and ultimately enforce the rules.

Carol Gilligan

Gilligan questioned Kohlberg's exclusive use of males in his work, and suggested that a morality of care could serve in the place of the morality of justice and rights suggested by Kohlberg. Gilligan said a morality of caring and responsibility is premised in nonviolence, whereas a morality of justice and rights is based on equality. In the five Kohlberg stages, one does not treat others unfairly (justice); and in the work of Gilligan, one does not turn away from someone in need of care. The morality of care emphasizes interconnectedness, and according to Gilligan emerges to a greater degree in girls owing to their early connection in identifying with their mothers. This gender debate is unsettled, but Gilligan's work has contributed to an increased awareness that care is an important component of moral reasoning and moral development.

Kazimierz Dabrowski

The Dabrowski *theory of positive disintegration* can be considered a theory of moral development. It consists of five levels ranging from total self-interest to a primary concern for others. In Level I, Primary Integration, the individual is egocentric and competitive, and there is no empathy

for others, and when things go wrong it is the fault of someone else. In Level II, Unilevel Disintegration, individuals are motivated by what others think, a need for approval, and fear of punishment. In this level, conflicts may occur between the values of the family and the social group. In Level III, Spontaneous Multilevel Disintegration, individuals begin to develop an inner core of values, and intense inner conflicts occur when they become dissatisfied with how they are measuring up to their ideal, or personal standards. Dabrowski considered Level III a level of positive maladjustment in that individuals are reaching toward a higher level of development. In Level IV, Organized Multilevel Disintegration, individuals have learned to adjust to their ideal and are able to accept themselves and others with a strong sense of responsibility, and are becoming committed to serving others. They demonstrate empathy, compassion, and self-awareness. In Level V, Secondary Integration, individuals' lives are characterized by service to humanity, and they live according to the highest universal principles and values.

Rushworth Kidder

Kidder defined moral courage as being driven by principle, and he identified three strands in moral courage: (1) a commitment to moral principles, (2) an awareness of the danger involved in supporting these principles, and (3) a willingness to endure the danger and its consequences. He stressed that acts of moral courage have risks of humiliation, ridicule, and contempt, which is similar to the disintegration that Dabrowski described when an individual in Level III breaks from the group to reach toward a higher level of development. Kidder and Mikhail Gorbachev convened a meeting in San Francisco to engage 272 global thinkers to identify core values; they identified compassion, honesty, fairness, responsibility, and respect. The group concluded that these values were at the heart of humanity's search for shared values.

Robert Coles

Coles stated that children's moral character is greatly influenced by their social environment, upbringing, and examples from their parents. He said that the moral character of a child is often developed in the early years, sometimes as young as one year of age. He stressed the internal struggle in the adolescent years as individuals are involved in testing and challenging the value system that they were brought up with, and the formation of their own personal moral system. He defined moral intelligence as learning how to be with others, and how to behave in the world. Coles stressed that children look to parents and teachers for clues on how to behave, as they go about their lives demonstrating in action their assumptions, desires, and values.

E. Paul Torrance and Dorothy Sisk

Torrance and Sisk noted that many great teachers and leaders speak and act in accordance with perceptions and values reflecting a larger perspective, and as a result their words and actions awaken within others the recognition of universal truths. Through lives of service and inquiry, these individuals employ what Torrance and Sisk called spiritual intelligence, living at a level of moral development that includes a sense of purpose and a kind of otherworldliness, being in the world but not of it. Their theory of spiritual intelligence is based on an examination of psychology, science, the ancient wisdom and traditions of Eastern mysticism, the wisdom of Native American traditions, and indigenous peoples. They defined the core capacities of spiritual intelligence as concern with cosmic/existential issues and the skills of meditation, intuition, and visualization. The core values are connectedness, unity of all, compassion, and a sense of balance, responsibility, and service. The core experiences are awareness of ultimate values and their meaning, peak experiences, feelings of transcendence, and heightened awareness. The key virtues of spiritual intelligence are truth, justice, compassion, and caring. The symbolic systems include poetry, music, dance, metaphor, and stories. The brain state of spiritual intelligence is rapture as described by Michael Persinger and V. S. Ramachandran. Taking just the theme of connectedness, the disciplines of history, physics, psychology, and literature can be taught using connectedness as an organizing theme.

Unique Perception of Gifted Children

Gifted children and adults seem to have a unique perception of themselves and the world that includes heightened idealism and a sense of justice that appear at an early age. They have emotional intensity and advanced levels of moral judgment, and these two characteristics coupled with their advanced cognitive ability enables them to understand social and moral issues. However, they lack the ability to cope with the issues emotionally, and they may feel frustration over not being able to address them. In addition, their advanced level of moral judgment makes them highly critical of injustice and the lack of integrity in individuals and society, which can cause them to become overwhelmed by their knowledge of societal issues and problems, and their inability because of their youth to address them in a meaningful manner.

The suggestions of Piaget to involve children in cooperative decision making and problem solving to nurture their moral development; and the exploration of moral dilemmas advocated by Kohlberg focusing on *justice and right;* and on *care* as suggested by Gilligan, can help foster the moral development of gifted students. Kidder said moral courage can be developed using his three principles: being committed to moral principles, being aware of the danger involved in supporting these principles, and being willing to endure the danger. Sisk and Torrance advocated helping gifted students to develop a sense of responsibility and awareness of their gifts, and ways to give those gifts back to society to live at a level of moral development that includes a sense of purpose. Educating for moral development has within it the hope of developing the capacity of gifted students to discover what is essential in life; particularly, in their own lives, and in the words of E. Paul Torrance, "to nourish the world."

Dorothy Sisk

See also Character and Moral Development; Cognitive Development; Emotional Development; Social Development; Spiritual Intelligence; Spirituality

Further Readings

Coles, R. (1997). *The moral intelligence of children.* Singapore: Bloomsbury Press.

Dabrowski, K., & Piechowski, M. (1977). *Theory of levels of emotional development* (Vols. 1 & 2). Oceanside, NY: Dabor Science.

Gilligan, C. (1982). *In a different voice: Psychological theory and women's development.* Cambridge, MA: Harvard University Press.

Kidder, R. (2001). *Moral courage.* New York: HarperCollins.

Kohlberg, L., & Turiel, E. (1971). Moral development and moral education. In G. Lesser (Ed.), *Psychology and educational practice.* New York: Scott, Foresman.

Piaget, J. (1965). *The moral judgment of the child.* New York: Free Press.

Sisk, D., & Torrance, E. P. (2001). *Spiritual intelligence: Developing higher consciousness.* Buffalo, NY: Creative Education Foundation Press.

Motivating Gifted Students

Understanding achievement motivation is relevant to giftedness because it plays an essential role in enabling intellectually gifted students to fulfill the promise of their exceptional abilities and in preventing their underachievement. Achievement motivation may be defined as the initiation, persistence, and direction of personal effort toward achievement goals. Contrary to popular opinion, not all gifted students are motivated to achieve in school. There is wide variation in the achievement motivation of gifted students. Furthermore, it is often taken for granted that gifted students will automatically do well in school because they learn quickly. Hence, lack of achievement motivation may go undetected because their academic work is acceptable, but closer inspection reveals they are underachieving for motivational reasons. Gifted underachievers may include those who are merely "coasting" through academic subjects because they are preoccupied with achieving in areas more meaningful to them; those who avoid rigorous courses because they fear failing to make "A" grades and blemishing a perfect grade-point average; and those who drop out of a gifted program because they do not perceive the personal or cultural relevance of school learning. All are gifted but underachieving because they lack the achievement motivation necessary for academic success matching their abilities.

The next two sections explain, illustrate, and provide educational recommendations for two complementary motivational beliefs that promote the achievement of gifted students: self-efficacy beliefs that influence achievement challenges, and value beliefs that influence achievement choices. The final section summarizes how these motivational beliefs may work together to promote optimal achievement motivation for gifted students.

Self-Efficacy Beliefs

Self-efficacy is one's self-confidence to perform a specific achievement task based on a personal evaluation of past performance. For example, a student may have developed low self-efficacy for solving acceleration problems in physics because she or he struggled and performed poorly when first attempting them. A frustrating history of poor performances will likely deflate confidence and make students reluctant to continue working on these problems unless they are taught to reevaluate initial mistakes as an opportunity to learn and try again. In general, students with low self-efficacy may experience anxiety, select easier assignments or courses, stop trying, or perform poorly, not because they lack capacity but because they lack confidence in their capacity.

The research on gifted students' self-efficacy is limited but revealing. Their beliefs about math skills are both higher and more accurate than regular students. Gender differences in self-efficacy for gifted students mirror the pattern of regular students; gifted girls perform math as well as gifted boys, but beginning in high school their self-efficacy drops. Cultural expectations during middle and high school appear to play a detrimental role by socializing girls' lower self-efficacy beliefs for math. The development of gifted boys' higher self-efficacy for math during high school appears to give them a significant motivational advantage; they exhibit greater confidence for solving difficult math problems, learning from mistakes, selecting advanced math courses, and preparing for math-related careers.

Fortunately, external influences such as cultural expectations and past performances do not completely determine self-efficacy beliefs. Applying the following recommendations, educators can help gifted students to reevaluate negative external influences and strengthen their intellectual confidence: Use an authoritative teaching style to encourage and support students' challenging achievement goals; provide mastery-related feedback to assist students to achieve their goals; model effective learning strategies that demonstrate how students can achieve their goals; and offer verbal encouragement when needed. An authoritative teacher could provide both high intellectual challenge and high instructional and emotional support, especially for gifted students who lack confidence. Initially, for the class, the teacher could model and verbally highlight how to make complex acceleration problems more manageable by breaking them into smaller parts and prioritizing steps. Next, the teacher could teach students to use an effective strategy such as visually representing the key parts of the problems with a diagram. After modeling how to apply the steps and diagram, the teacher could provide individual guided practice by circulating around the room, observing students, and giving individual feedback as students work on sample problems. If the teacher observes a student making mistakes, it is possible to reassuringly attribute the student's mistakes to the need for more effort and effective strategies over which the student has internal control: "Please redo this problem again and remember to use the diagram to identify the key parts." When the teacher observes the student correctly solving a problem, it then becomes possible to attribute this success to effort and effective strategies to build confidence: "Excellent work; I see that you correctly reworked this problem by diagramming the key parts." If the student needs additional support, the teacher may pair him or her with another student at a slightly higher level of confidence and competence who can share personal self-efficacy stories of overcoming mistakes and using effective strategies.

In contrast to an authoritative approach, an authoritarian teacher or parent who demands high challenge without adequate support will likely compound students' frustration and further weaken their self-efficacy. This demanding style causes students to become superficially preoccupied with avoiding mistakes instead of learning from them. Conversely, the permissive teacher or parent who provides high support but inadequate challenge may make students feel comfortable but will not

press them to take the necessary risks to develop intellectual confidence. Least helpful, the neglectful teacher or parent fails to provide adequate challenge and support necessary for the development of intellectual confidence.

Merely providing opportunities for successful learning is not sufficient to build self-efficacy, especially for gifted students who are so bored with easy academic courses that they turn to advanced computer games, reading extracurricular material, or engaging in self-directed creative projects to provide genuine challenge. If gifted students think success is due merely to simple routine assignments, they will not attribute it to their advanced thinking skills but to easy tasks. They will not have an opportunity to develop confidence in their advanced skills unless genuinely challenged to use them. Some teachers and parents equate successful challenges with memorizing massive amounts of factual information for tests and making high grades, but this is not the kind of meaningful challenge necessary to build gifted students' confidence in their advanced thinking skills. To be meaningfully challenged, they need opportunities to explore topics in depth by doing creative assignments, conducting independent studies, performing original research, working with professional mentors, and taking university classes. They also need opportunities to accelerate learning by working at their own pace, studying with students grouped by skill level, using compacted curricula to eliminate redundancy and routine work, and skipping grade levels when needed.

Value Beliefs

Self-efficacy beliefs are one's confidence to take on and attain challenging achievement goals. Complementing self-efficacy, value beliefs are the subjective reasons and benefits for choosing and continuing to achieve. Researchers have identified different values, including interest, usefulness, and importance. Interest is the personal enjoyment of an achievement task. Usefulness is the practical benefit of an achievement task. Importance is the personal significance of doing well on an achievement task.

In general, research shows that students with high value for learning a subject tend to pay attention more, persist longer, use deeper learning strategies, and elect to continue learning. Although students with high self-efficacy are more able to take on and complete challenging achievement tasks, students with high values are more willing to choose and to continue pursuing achievement tasks in the future.

Consistent research findings show that gifted students of all ages are more intrinsically interested in academic achievement than regular students. Yet, gifted students who are interested in academics may also have conflicting interests in social areas such as peer relations and nonacademic subjects such as music and sports. Gifted girls may experience value conflicts between academics and social needs that cause them to hide their achievements or minimize them by using self-handicapping strategies. Also, minority students may experience value conflicts between academics and cultural values that cause them to minimize or reject academic achievement values.

Gifted students who are the most committed to their talent development generally perceive talent-related academics as both highly interesting in the present and highly important for career goals. Students who perceive their talent as merely a momentary interest that lacks future importance are not likely to stay committed. Conversely, students who perceive their talent as important for the future but not interesting in the present are also not likely to remain committed.

Teachers and parents can motivate gifted students by using a value-based learning approach: Determine students' learning values, create learning activities related to their values, and allow students' choice in what and how they learn and how they are evaluated. To determine students' learning values ask, listen, observe, and survey to discover their interests, what is important to them, and what is useful to them. Find out about their heroes, hobbies, use of leisure time, and extracurricular activities. To create learning activities related to their values, teachers might include opportunities for exploratory classes, interest groups, minicourses, science or social studies projects, clubs, or internships. To allow choice, teachers might offer options to study a variety of subtopics within a general topic; allow students to learn by using different learning styles and multiple intelligences; and allow students to demonstrate and share what they have learned using multiple methods such as essays, oral reports, exhibits, PowerPoint presentations, or creative performances.

Complementary Influences

Self-efficacy and value beliefs are complementary motivational influences on academic achievement. They compensate and mutually reinforce each other. Consider gifted students who are intellectually confident about a particular subject but do not value it. This lack of value will lessen their achievement motivation unless compensated by high confidence. On the other hand, consider gifted students who highly value a subject but lack intellectual confidence. This lack of confidence will lessen their achievement motivation unless compensated by high value. As self-efficacy and value increase, they begin to mutually reinforce each other. Teachers and parents may optimize achievement motivation by enhancing both students' self-efficacy for and value of academic learning.

Dan Rea

See also Dropouts, Gifted; Locus of Control; Perfectionism; Underachievement

Further Readings

Csikszentmihalyi, M., Rathunde, R., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. New York: Cambridge University Press.

Ford, D., Alber, S., & Heward, W. (1998). Setting "motivational traps" for underachieving gifted students. *Gifted Child Today, 21*(2), 28–33.

Parke, B. (1992). *Challenging gifted students in the regular classroom*. Reston, VA: Clearinghouse on Handicapped and Gifted Children. (ERIC Digest No. E513)

Patrick, H., Gentry, M., & Owen, S. V. (2006). Motivation and gifted adolescents. In F. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education*. Waco, TX: Prufrock Press.

Phillips, N., & Lindsay, G. (2006). Motivation in gifted students. *High Ability Studies, 17*(1) 57–73.

Multicultural Assessment

The purpose of gifted education is to select able learners and educate those children appropriately, with the view of producing gifted young adults who actually make creative contributions to a profession or recognized field of endeavor, be it music or math, physics or painting, computer science or costume design, or devising winning strategies tailored to the talents of a particular basketball team. Traditional definitions of giftedness are norm referenced, usually with some combination of tests, but with IQ being the key factor in admissions identification. The result has been that too many children selected on IQ alone have been (or should have been) furloughed from the program for lack of achievement. Yet a very high IQ is, according to the traditional model, the essence of giftedness. School, however, relies on achievement.

Most programs for the gifted admit a few children who are marginally qualified in order to "round out" a public school's minimal enrollment requirements or to meet a private school's financial obligations. To change this condition and achieve greater diversity and equity of students at the same time, Ernesto Bernal has developed a selection procedure that admits only the qualified but does so in a way that disaggregates the data before making the admissions decision, thereby giving a new meaning to the term *qualified*.

Generalists and Specialists

Although most adult gifted learners have become specialists, early specialization is especially true of children who live in poverty, who have neither the resources nor, frankly, the time or the interest to cultivate general academic achievement. Disaggregated achievement data will show each applicant's strong points, and these speak directly to his or her academic abilities. High achievement in any core area, after all, involves both motivation and ability.

The "generalist" model is the one that gifted programs in public education have been using generally. Gifted and talented programs believe that generalists have learned to succeed in all aspects of schooling and that school usually produces generalists, even if these students were specialists at the start.

In one study of two middle school magnet programs and one high school magnet, 10 percent of the children who applied for admission were specialists. Everyone with an interest in attending a magnet was told that they might qualify by making

"commended" passing scores (a cutoff above the passing score) on the state-mandated examinations and by getting good teachers' recommendations. A number of these students made only passing marks on one or two tests, yet had very high scores on some of the other tests. These students, however, were not often selected in order to "make" the classes in the enrollment sense, but the weaker generalists were. The application of the generalist model leads to the use of composite scores on IQ and achievement tests. It not only misses many able learners in particular fields but also frequently relegates the institution to having to select the least qualified of the generalists in order to fill out their classes.

By selecting specialists as well as generalists in the prescribed way and by selecting from each disaggregated list of variables or tests, the schools could get the very best or at least the very highest scoring. The down side is that some of the specialists would probably not initially be motivated to do well in courses in which they had little interest, preferring to devote more time to activities of their own choosing, much as gifted adults do. Teachers may really have to *teach* to them.

No one would deny that the brightest mathematician needs exposure to the best teachers of social studies or literature. Schools might even come to allow that it is acceptable for some students *not* to pursue an A in every subject, much like the universities that appeal to specialized students do. In fact, many middle school and high school teachers who teach advanced classes were themselves specialists in school and "got by" in college studies with Cs and Bs while making most of their As in their major and minor subjects.

Gifted generalists often need more advanced vocational counseling than gifted specialists, else they may make repeated false starts in their choice of majors and take too many years to complete a bachelor's degree. Specialists, on the other hand, need to be certain that their chosen fields are in line with their personalities and need to sample related life experiences before finally committing to a career choice. In both cases, counselors and mentors who work with the gifted can help.

Identification Process

One method of increasing diversity and fairness is out-of-level testing by one grade level to ensure that the resultant scores are more accurate, since many of the students will score at the upper ranges in their areas of strength, where it is difficult to tell the differences among applicants.

IQ tests are not the only ways to measure intelligence, and IQ tests should not be regarded as the sole predictors of children's futures in professional or artistic endeavors.

The basic psychometric quality for the tests and other instruments used in admissions for gifted and talented programs has to do with their predictive validity. These tests should be indicators of whether a child has the potential for achieving giftedness by high school graduation or eminence by mature adulthood. In any case, predictive validity studies typically require an extensive follow-up of students, a feature that public gifted education needs to develop. Adjustments in the criterion scores on tests used for initial screening can then be made empirically according to such characteristics of the student as type of giftedness, age/grade when the student was tested, ethnicity, gender, and socioeconomic status.

Documentation of results is important, but is only rarely done. For example, it is important to document the results of the children who qualify only on the basis of IQ, to see how these children compare (a) to those who qualified for the program on only one or two scales of an achievement test; (b) to those who qualified on three or more achievement scales; and (c) to those who qualified under both achievement and ability criteria. Outcomes should include a number of exclusively gifted criteria: furloughs from the gifted and talented program, achievement in college and later in life, "false starts" in college, and, for those still in high school who need more proximal measures, scores on Advanced Placement (AP) tests and ACTs or SATs, grades on Advanced Level Products, number and extensiveness (years) of scholarships earned, and actual college placements (not just admissions). The ultimate fates of generalists and specialists, both, can be specified empirically, not as a matter of personal belief. Educators might be surprised at the results of such follow-ups.

Teacher Nomination

Furthermore, reliance on teachers to initiate the assessment-selection cycle actually makes their

power to nominate the most important factor in the identification process, what is called a threshold variable, because it can block any further consideration of a child's qualifications. Considerable bias enters at this crucial point unless the teachers are well trained in both gifted and talented identification strategies *and* multicultural education. In the case of students who are English language learners (ELLs), the teacher must know the child's native language and culture well enough to detect a high level of linguistic sophistication, for example, or appreciate the role reversal and linguistic-cognitive facility necessary for a child to serve as an interpreter for her or his newcomer family. Also, Max Plata has shown that teachers tend to nominate and rate highly those Hispanic students who are most acculturated, not those who maintain strong ethnic bonds and exhibit traditional behaviors.

Talent Pools

These issues make a compelling case for selecting students for the gifted and talented program only after they have been tried out in a talent pool under the mentorship of a gifted and talented teacher who can provide an advanced opportunity to learn. Teachers can certainly contribute knowledge about a child's learning characteristics and motivation, for instance. A talent pool in the early elementary years may eliminate the need for premature labeling of a child as gifted yet still allow different children to slip in and out of the gifted and talented learning and creating mode as needed (somewhat like Renzulli's *revolving door identification model*).

Talent pools take the guesswork out of selection to a great extent, precisely because they reveal actual performance and achievement. Talent pools can offer a practical definition of giftedness by focusing on pupil products, which are essential to identification.

The Able Learner

First, there are few truly gifted children who, as children, make independent, creative contributions to a field. Second, the task of gifted education is to select able learners and cultivate them to become gifted and talented young adults. The selection process is only a way to pick the ones who, with the right development, will turn out to be the gifted young adults and the leaders or disciplinary experts of tomorrow. Giftedness is thus left as the goal of gifted education, not as the starting point.

The "best and brightest" children require the best teachers in every discipline, teachers who want to work with bright kids and meet their needs, even if this means getting some of the children motivated and interested in learning.

Implications for Education Professionals

The selection of gifted and talented students for the program has implications for the professional development of teachers, counselors, and administrators.

- Education professionals can open many avenues for nominating students. They can encourage peer, parental, and self-nominations. Gifted and talented students in the third grade and above who are already in the gifted and talented program often know other capable children who have not yet been selected.

- In order to avoid the problems caused for culturally or linguistically different students by late nomination to the gifted and talented program, educators can provide such programmatic options as dual-language gifted and talented or highly differentiated instruction in ESL classes, and ensure that all schools in the district can accept students beyond, say, Grade 2. If one's district has bilingual teachers, one can train the teachers in bilingual education and design a dual-language option for gifted and talented students in selected schools, programs where the parents of native speakers of English and ELLs empower the school to bring their gifted children together to receive their academic instruction in all core areas in both languages, develop high levels of proficiency in two languages, and secure thereby the cognitive advantages of bilingualism to children's development.

- The incorporation of matrices summarizes—and weights—the results of previous assessments and performance, such as scores, grades, and behavioral factors. As a result, these matrices can bias the selection-identification process if these

instruments have not been empirically validated for the district. It does not matter that the matrix in question is commercially available or "looks" to be valid; wrong weights can turn an otherwise good summary into an invalid one.

It is important that all rating scales be validated against the critical indicators of performance of gifted and talented students. A representative from the R & D office in the district can help design the study, or an independent consultant who can work with the Gifted and Talented Coordinator can be contracted to get this done. Gifted and Talented Project Coordinators should remember that evaluation research is an important tool for improving the selection process itself. An objective evaluation might find that major parts of the process are flawed and need to be reconceptualized.

- The use of multiple criteria should be promulgated in a multiple regression manner so that all the gifted and talented students can be selected and educated, and the gifted and talented program can have a validated system of selection. Multiple criteria also permit some criteria to compensate for others and to identify content specialists, thereby promoting diversity in the selection of students.

- Including portfolio assessments in the selection battery as an avenue for certain children to qualify for the gifted and talented program allows children's actual intellectual performances, not just test scores, to be included prior to selection. Linda Silverman warns that the use of tests that rely almost exclusively on sequential cognitive processing will screen out children with a strong visual-spatial learning style. Different avenues to selection, including leadership and musical skills, should be available.

- Although there are a few economically disadvantaged gifted children who can compete on the composite score, many poor and minority students who do well on only one or two subtests of a larger achievement battery will nevertheless make outstanding gifted and talented students and often do better than some of their advantaged peers in the long run.

- Consequently, a sole high score on a subtest on either reading or mathematics or science or social studies should suffice for the diagnosis of "capable learner." The final step is to review children's products for advanced content and creativity.

Additional Considerations for Equitable Assessment

Teachers and diagnosticians should be trained in how assessment can be made helpful to students. Assessment criteria for admission, for example, should be diagnostic as well as selective, so that students may find their results useful in designing their courses of study and providing vocational guidance.

An updated, multicultural review of the notion of giftedness is appropriate in order to improve the contributions made by teachers to the selection of children of poverty and culturally and linguistically different backgrounds. Too often the children's beliefs and social practices mask their giftedness from the eyes of teachers who are not used to noting intelligent behaviors among them.

Ernesto M. Bernal

See also Identification; Intelligence; Multicultural Curriculum; Underrepresentation

Further Readings

Alamprese, J. A., & Erlanger, W. J. (1989, March). *No gift wasted: Effective strategies for educating highly able, disadvantaged students in mathematics and science: Vol. 1. Findings* (Report prepared under contract No. 300–87–0152, U.S. Department Education, OPBE). Washington, DC: Cosmos Corporation.

Bernal, E. M. (2003). Delivering two-way bilingual immersion programs to the gifted and talented: A classic yet progressive option for the new millennium. In J. F. Smutny (Ed.), *Underserved gifted populations: Responding to their needs and abilities.* Cresskill, NJ: Hampton Press.

Dai, D. Y., & Renzulli, J. S. (2000). Dissociation and integration of talent development and personal growth: Comments and suggestions. *Gifted Child Quarterly, 44*(4), 247–251.

Howard, E. R., & Sugarman, J. (2001, March). *Two-way immersion programs: Features and statistics.* Washington, DC: ERIC Clearinghouse on Languages and Linguistics, Center for Applied Linguistics. (ERIC Document Reproduction Service No. EDO-FL-01–01)

Masten, W. G., & Plata, M. (2000). Acculturation and teacher ratings of Hispanic and Anglo-American students. *Roeper Review, 23*(1), 45–46.

Passow, A. H. (1985). The gifted child as exceptional. In J. Freeman (Ed.), *The psychology of gifted children* (pp. 23–34). New York: Wiley.

Silverman, L. K. (2003). The power of images: Visual-spatial learners. *Gifted Education Communicator, 34*(1), 14–17, 38–40.

Sternberg, R. J. (1984). Testing intelligence without IQ tests. *Phi Delta Kappan, 65*(10), 694–698.

Sternberg, R. J. (2000). Patterns of giftedness: A triarchic analysis. *Roeper Review, 22*(4), 231–235.

Valdés, G. (2003). *Expanding definitions of giftedness: The case of young interpreters from immigrant communities*. Mahwah, NJ: Lawrence Erlbaum.

Multicultural Creativity

Culture determines what parents and schools will teach their children based on the needs of the community. Multicultural creativity is based on an expanded concept of giftedness in which unrecognized multiculturally creative students have shown exceptional abilities that have not been valued due to the difficulty of identifying their talents. The concept of multicultural people refers to individuals who belong to or are very comfortable in living and interacting in more than one culture and who, because of it, have the potential to produce unique strengths such as bilingualism, cognitive development, and multiculturalism.

Demographic changes in the United States have brought a significant number of culturally diverse populations. Continuous mass immigration had been a feature of economy and society since the first half of the 19th century. The absorption of the stream of immigrants became, in itself, a prominent feature of the United States. About 25 percent of the total U.S. population report that they belong to a race other than European American; this group consists of Black or African Americans, Asian Americans, American Indian or Alaska Natives, Native Hawaiian or other Pacific Islanders, Hispanics or Latinos, and also by people who belong to more than one race or a race different from the ones mentioned above. Cities like New York, Los Angeles, and Miami are characterized by their diverse population, in which Latinos and Asians are the main growing groups. Immigrant cultures in the United States are mixed and amalgamated, developing new subcultures within a given ethnic group. In 1992, the U.S. Census Bureau reported that the number of biracial children was increasing faster than the number of monoracial babies; more than 100,000 biracial children have been born every year since 1989; and since that time, more than 1 million first-generation biracial babies have been born.

Diverse students in the United States are predominantly Latino or Hispanic, Asian, African American or Black, and Native American. Latinos in the United States are well known for the rapid growth of their numbers. According to the Surgeon General's report in 1999, census projections reported that by 2050 the number of Latinos will increase to 97 million, becoming nearly one-fourth of the U.S. population. This dynamic group is a community of first-, second-, and third-generation immigrants who have uprooted their families and left homes, friends, and relatives for economic, political, professional, ideological, and educational reasons. Asians comprise people who come from more than two dozen Asian nations such as Cambodia, China, Korea, Japan, India, Vietnam, and Thailand, to mention a few. This group is expected to continue to grow, reaching close to 41 million by 2050. Native Americans are those whose origins are found in any of the original peoples of North America and who maintain cultural identification through tribal affiliation or community recognition. Although not as fast-growing as the previous groups mentioned, projections on Native Americans indicate an increase in their population.

The focus of this entry is on the United States, but it is clear from international trends that the world is becoming a multicultural society; immigration and emigration are powerful forces on every inhabited continent and in every industrialized country. In the future, most societies will benefit from the meeting of many cultures, producing creative work across domains of human endeavor.

Education and Multicultural Creativity

The term *multiculturalism* refers to both a state of cultural and of ethnic diversity within the demographics of a particular social space. A multicultural

individual is one who experiences two or more cultures at the same time, learns the languages spoken, believes in the values established, lives important traditions, and possesses a great sense of belongingness in the cultures the person belongs to.

It has been said that children who belong to more than one culture enrich the U.S. educational system but also represent challenges to educators, policymakers, and parents due to their unique educational characteristics. Today's monocultural and monolingual education does not offer the tools and resources needed by multicultural students to capitalize on their unique strengths. On the other hand, when students who are culturally and linguistically diverse are properly guided and instructed, they have the potential to produce unique strengths.

Following are some of the strengths that multiculturally creative students bring to the education system:

Skills in their first (native) language, which includes listening, speaking, reading, and writing. Concepts already learned by bilingual learners can be easily transferred into English and developed as students apply them to many second-language activities. Bilingualism enhances cognitive and social growth, competitiveness in a global marketplace, national security, and understanding of diverse peoples and cultures.

Bicultural cognitive and affective experiences that enable them to survive successfully in two worlds. By growing up in two or more cultures they possess the information concerning customs, languages, and perceptions of the world from each culture they belong to. This background knowledge will affect their conceptualization of the world and their personal insights. In addition, the use of more than one language increases their fluency, originality, flexibility, and elaboration in thinking. Bilingual learners may have two or more words for a single object or idea, they may enjoy more advanced processing of verbal material, more discriminating perceptual distinctions, more propensity to search for structure in perceptual situations, and more capacity to reorganize their perceptions.

Personal psychological insights and the capacity for empathy. This unique social intelligence allows multicultural students to gather valuable conceptualizations of the world around them in their first language. Proficiency in two or more cultures creates multiple systems for perceiving, evaluating, believing, and acting. It has been suggested that multicultural individuals are more likely to respect other people and other cultures that are different from their own; they develop an appreciation for the range of cultural competencies available to all human beings. Music, art, science, and social systems are likely to be transformed by the challenge of synthesizing new ideas from the many cultures of the world.

Victoria Elena Frehe

See also Bilingualism and Creativity; Cultural Conceptions of Giftedness; Literary Creativity; Multilingualism; Verbal Ability

Further Readings

Esquivel, G. B., & Houtz, J. (Eds.). (2000). *Creativity and giftedness in culturally diverse students.* Cresskill, NJ: Hampton Press.

Sogunro, O. (2001). Toward multiculturalism: Implications of multicultural education for schools. *Multicultural Perspectives, 3*(3), 19–33.

Wardle, F. (2000). Multiracial and multiethnic students: How they must belong. *Multicultural Perspectives, 2*(4), 11–16.

Multicultural Curriculum

The curriculum in American public and private schools is a curriculum that tends to support the lifestyle of the White upper-middle and upper classes, the groups that determine both the ethos and the directionality of American society. Yet American educators must ask why the power structure overlooks the moral/ethical, intellectual, historical, and cultural traditions of nondominant ethnic groups. Some educators believe that gifted education programs exclude the brightest children who are from nondominant ethnic groups, segregating the children of parents with social capital from those whose parents do not have it. Students traveling to Europe can be excused for missing

school for a week, whereas the travel that migrant students do for the purpose of learning by earning, doing manual farm labor, is not recognized as being educational.

Also, many school systems fail to offer placement in the gifted and talented program to qualified poor and culturally and linguistically different students. Researchers have known for years that certain White students who do not qualify are sometimes admitted to the gifted and talented program, and some culturally and linguistically different students who do qualify are not.

Similarly, there are numerous examples of monocultural gifted and talented programs that deracinate bright culturally and linguistically different children; encourage the victims of poverty to blame themselves; never incorporate ethnic social issues into their social studies curriculum; do not debate sexism in educational, political, and economic institutions; rarely read literature authored by a person from a nondominant ethnic group; do not bring diverse American cultures' music to the concert stage or recital hall; or seek other countries' perspectives on world events.

Programs

The U.S. Department of Education's Javits Program and the Advanced Placement (AP) Incentive Program have funded a number of public school projects that hold great promise for extensive institutional change in how schools meet the needs of gifted English language learners (ELLs) and gifted students who are not native speakers of English. The Connecting Worlds/*Mundos Unidos* project was funded by the Javits Program in the El Paso (Texas) Independent School District (ISD) to nurture the dual-language gifted and talented program that previously received magnet school status from the district. Here gifted and talented students receive all core-area instruction in English and Spanish, each represented 50 percent of the time, without translation. The project had its first high school graduates in 2007.

A second project, Supporting Optimal Scholarship, was funded by the AP Initiative to effect change in the AP offerings in five of Austin ISD's high schools and in the pre-AP courses in seven of its middle schools—the campuses with the highest number of low-socioeconomic students that serve as feeders to the five target high schools. Once again, this effort to increase the proportion of low-socioeconomic students in these classes means that more than superficial adaptation would be necessary. Low-socioeconomic students in these schools were surveyed to determine what constraints keep them from signing up for the pre-AP or AP classes and what modifications would be necessary to make the courses more attractive and accessible to them. This feedback alerted the AP teachers to the skills that some students still have to develop in order to succeed in the rigorous AP classes or in college. The teachers were given extensive instruction in how to "multiculturize" and attune their classes in content and method to the needs of children from poverty backgrounds.

Equity

Gifted and talented education can be made more effective for *all* gifted students at the same time. Multicultural content can introduce perspectives that are not possible from a monocultural position. The prescription for professional development is on multicultural content and on teacher sensitivities about ethnicity, gender, class, and competition versus cooperation. There are several areas of cultural competence that teachers of multicultural curriculum must exhibit: awareness and acceptance of differences, awareness of own culture, the dynamics of cultures in contact, knowledge of the different cultures represented in the classroom, and adaptation of teaching skills to new cultural contexts.

The notion that children from nondominant ethnic groups and from the poorer socioeconomic classes are just as valuable as children from the Anglo upper–middle class and need the same respect and deference should be discussed and debated outright among participants during professional training sessions. These discussions can then serve as a basis for the repartee these teachers can expect to have in class with their own students, who in turn must come to terms with their own ethnicities and biases. The immediate outcomes of these debates do not matter, for the debate itself opens options that will be reevaluated throughout the lives of the teachers—and of the students.

Over a few years, minority gifted and talented teachers can be trained in multicultural education

for the gifted and talented program. This can help to ensure an equal opportunity to learn and to promote the development of multiculturally competent future leaders among the students. Gender, cultural, and class issues are potent ways educators can promote critical thought and apply creative solutions to social problems.

As a matter of practice, if not of policy, more gifted and talented teachers of color should be placed in predominantly White gifted and talented programs. If this does not happen, it is likely that change will be so slow that it may seem imperceptible. Once a critical mass of teachers of color enter the gifted and talented program, however, many of the seemingly insurmountable difficulties of achieving equity will likely disappear, for the minority teachers can help their colleagues get a perspective on the issues and resolve the problems they perceive.

The integrated gifted and talented teachers should be engaged in cooperative curriculum development, selecting and designing educational materials, and expanding the effective methodologies employed in the education of gifted and talented children, for example, by adopting the use of Advanced Academic Products and their rubric-guided assessments.

It is important not to accelerate ELLs out of their ESL or bilingual programs just because they have been selected for the gifted and talented program. Instead, educators should make certain that these ELL gifted and talented students are receiving appropriately paced instruction in their content areas from ESL or bilingual teachers who have learned how to doubly differentiate instruction for gifted and talented students. In fact, educators should treat any effort to teach English to linguistically different gifted and talented students as enrichment. This way, the message that any language other than English is not of any value will not be communicated (at least not in class), and these ELL gifted and talented students may grow up to be both bilingual and bicultural, with all the associated cognitive and vocational benefits that such traits accrue.

The focus should continue to be on multidimensional and cross-cultural ways of finding the qualities of intellectual and creative potential of children, not just on the scores they earn, or else gifted and talented students from culturally and linguistically different groups may forever be excluded in greater proportions than Whites and not have an equitable opportunity to enter gifted and talented programs and, later, to be admitted to selective colleges or graduate or professional programs, either. That they may not take to the gifted and talented program in a completely conforming and "grateful" manner just has to be chalked up to the cultural diversity in the gifted and talented pool.

Multicultural Education

Though some schools may attempt to change the selection process, the gifted and talented curriculum and support services are not changed by these efforts. There is also the question of curriculum that fails to reflect the cultures of the students and the issues that count with them. A monocultural curriculum accounts for much of the variance in why some students from nondominant ethnic groups either eschew the gifted and talented program in the first place or elect to leave it soon after they are admitted—factors that contribute to their alienation and to underrepresentation as well. If the gifted and talented program had a reputation of responding to children from nondominant ethnic groups in a positive manner, then "acting White" could become a thing of the past.

Multicultural education requires educators not only to learn new attitudes, new pedagogy, and new content, but also how to integrate these into their everyday work with all gifted and talented students. Multicultural education helps White students discover whiteness; examines male privilege cross-culturally; and raises awareness of the dominant economic, political, and educational institutions. Multicultural education, in short, honors diverse cultural traditions and moral values; reflects the artistic, literary, and scientific accomplishments of the different groups; recognizes the intellectual and philosophical contributions made to the world by various cultures; utilizes pedagogy that capitalizes upon the repertoire and learning styles of each group; and purchases educational materials that reflect their social realities. Multicultural education, then, legitimizes individual choice, so that "majority" and "minority" students alike can acculturate without shame, maintain their cultural identities, or become multiculturally and bilingually competent.

Multicultural education must deal with current issues and leaders, and use the differences among groups to explore the underlying realities that are at the core of what society has constructed. What is more, the underlying motive for engaging these activities is to empower students to act responsibly, better control their own destinies, and make a difference in society as well.

Ernesto M. Bernal

See also Multicultural Assessment; Underrepresentation

Further Readings

Banks, J. A. (1993). Multicultural education: Development, dimensions, and challenges. *Phi Delta Kappan, 75*(1), 22–28.

Bernal, E. M. (2007). The plight of the culturally diverse student from poverty. In J. VanTassel-Baska & T. Stambaugh (Eds.), *Overlooked gems: A national perspective on low-income promising learners* (pp. 27–30). Washington, DC, and Williamsburg, VA: National Association for Gifted Children, and College of William and Mary, Center for Gifted Education.

Bourdieu, P. (1984). *Distinction: A social critique of the judgment of taste*. Cambridge, MA: Harvard University Press.

Harris, C. I. (1993). Whiteness as property. *Harvard Law Review, 106*(8), 1709–1791.

Nieto, S. (2000). *Affirming diversity* (3rd ed.). New York: Longman.

Ogbu, J. U. (2003). *Black American students in an affluent suburb: A study of academic disengagement*. Mahwah, NJ: Lawrence Erlbaum.

Philips, S. U. (1976). Commentary: Access to power and maintenance of ethnic identity as goals of multicultural education. *Anthropology and Education Quarterly, 7*(4), 30–32.

Valdés, G. (2003). *Expanding definitions of giftedness: The case of young interpreters from immigrant communities*. Mahwah, NJ: Lawrence Erlbaum.

MULTILINGUALISM

Multilingualism, and also bilingualism, refers to a person's ability to speak more than one language. Although there are many ways to become bi- or multilingual, the capability of becoming multilingual is universal to all humans, barring severe mental and/or language impairment. Verbal aptitude as well as verbal giftedness may play a part in becoming multilingual, but they are not necessary preconditions for successful language learning. Finally, bi- and multilinguals who are also gifted are frequently overlooked in schools, as these children may be in the process of learning the language of the classroom and are assessed by instruments that have been normed on monolingual children.

Bilingualism and multilingualism are technically not synonyms, because bilingualism refers to the ability to speak two languages and multilingualism refers to the ability to speak multiple languages, though the terms will be used interchangeably here. Also, a distinction is drawn between minority and majority languages, where the majority language is the language spoken by the most socially powerful community and the minority language is the language spoken by a smaller, less powerful group, such as an immigrant or indigenous community.

Becoming Multilingual

Many factors can influence the development of bilingualism, including the age of acquisition, which will be discussed here. Other factors include the manner of acquisition, identity, motivation, and language community. Children who are raised in a bilingual environment from birth, where each parent speaks a different language, for instance, are referred to as simultaneous bilinguals. The cognitive processes of becoming bilingual at this age mirror the processes of a monolingual child acquiring one language and fall under the scope of *first language acquisition*. For this reason, simultaneous bilinguals are traditionally assumed to be equally proficient in both languages. Sequential bilinguals, on the other hand, learn a second or subsequent language after learning their first language. The cognitive processes involved are different to some extent from first language acquisition, and the process is referred to as *second language acquisition*. There are also associated age-of-acquisition effects in second language acquisition, such that few sequential bilinguals become as proficient as simultaneous bilinguals or native speakers.

Verbal Giftedness and Multilingualism

Howard Gardner was one of the first researchers to suggest that linguistic intelligence is separate from general intelligence, and he has shown that linguistic intelligence can exist independently of other forms of intelligence. However, all normally developing children acquire their first language(s) as a result of a process innate to humans. In addition, linguistic intelligence and verbal giftedness may facilitate success in learning a second language, but they do not guarantee multilingualism nor do they indicate that all bilinguals, particularly sequential bilinguals, are gifted. Yet the variable degrees of success in second language acquisition indicate that there are many factors involved in becoming bilingual, and verbal giftedness may well play a part in the most successful cases.

Bi- and Multilingual Children and Giftedness

Bilingual children, especially minority language children, are frequently overlooked in assessing giftedness for a number of reasons. First and foremost, children who are still in the process of learning the language of the classroom may not be able to demonstrate their full intellectual potential, especially in monolingual environments. Moreover, many of the assessment instruments used to determine giftedness have been normed on monolingual children, and research has shown that bilingual children perform differently on standardized measures as compared to monolingual children. In addition, these measures, such as the WISC (Wechsler Intelligence Scale for Children) or the SAT—V (Scholastic Aptitude Test—Verbal), focus on academic skills, which may not reflect the abilities of gifted bilingual children, especially on verbal tasks. Last, the educational policies and attitudes concerning minority language students may affect the identification of gifted bilingual children, especially if monolingualism in the majority language is seen as the norm. In this case, children who do not speak the majority language are seen as deficient, and the rapid acquisition of the majority language is considered normal rather than valued as a talent.

There is a small, growing body of research concerning gifted bilingual children. Ernesto Bernal, for instance, has focused on identifying and supporting gifted bilingual children, especially those who may not be verbally gifted. In particular, he has advocated for the early identification of gifted bilingual children, even before they have become fully proficient in the classroom language. He argues that these children benefit from early identification and the subsequent access to gifted programs, especially if those programs are bilingual. Alternatively, Guadalupe Valdés has looked at the special case of children, referred to as *language brokers,* who interpret for their families and community members. Language brokers utilize a wide range of skills in interpreting (i.e., sensitivity to social roles); draw on cognitive resources such as memory and comprehension speed; and must interpret in a wide variety of situations, which requires both an understanding of the language involved as well as knowledge of the underlying themes and topics. For instance, a child who interprets in a medical situation must understand doctor–patient relations, understand and convey the topic being discussed, and be able to temporarily assume the roles of doctor and patient, such that misunderstandings are anticipated and prevented. Consequently, Valdés has suggested that these children also demonstrate characteristics typical of giftedness.

Kara T. McAlister

See also Bilingualism and Creativity; Multiple Intelligences; SAT; Verbal Ability; Wechsler Intelligence Scale for Children–Fourth Edition

Further Readings

Baker, C., & Prys Jones, S. (Eds.). (1998). *Encyclopedia of bilingualism and bilingual education.* Clevendon, UK: Multilingual Matters.

Bernal, E. (1994, April). *Finding and cultivating minority gifted/talented students.* Paper presented at the National Conference on Alternative Teacher Certification, Washington, DC.

Garcia, E. E., & Flores, B. (Eds.). (1986). *Language and literacy research in bilingual education.* Tempe, AZ: Arizona State University, Center for Bilingual Education.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Valdés, G. (2003). *Expanding definitions of giftedness: The case of young interpreters from immigrant communities.* Mahwah, NJ: Lawrence Erlbaum.

Multiple Intelligences

The theory of multiple intelligences was developed by Howard Gardner in the early 1980s. According to Gardner, individuals possess eight or more relatively autonomous intelligences that they use to create products and solve problems. The eight intelligences identified by Gardner are linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, naturalistic, interpersonal, and intrapersonal.

Multiple intelligences theory is a departure from the traditional conception of intelligence that stretches back to the start of the 20th century. In the early 1900s, French psychologist Alfred Binet designed a 30-item intelligence test for identifying schoolchildren in need of special education. Binet's test gained a wider audience after American psychologist Lewis Terman developed a commercial version for use in schools and the workplace. Around the same time as Binet's pioneering work, English psychologist Charles Spearman published a paper on "general intelligence" (g) in which he argued that all forms of intellectual activity stem from a unitary or general ability for problem solving. Although Binet and Terman had developed their scales with the goal of predicting particular types of performance and *not* as a general measure of intelligence, their work was taken as support of Spearman's theory. And, in fact, Spearman's unitary conception of intelligence went relatively unchallenged for much of the 20th century.

Development of Multiple Intelligences Theory

In 1983, Howard Gardner published a book titled *Frames of Mind* that was inspired by several simple but powerful questions; Gardner wondered whether talented chess players, musicians, and athletes could be considered intelligent in their respective fields and, if so, why these abilities were not considered in traditional conceptions of intelligence. Out of these initial questions came Gardner's assertion that intelligence is better conceived of as multiple rather than unitary in nature. Though proponents of general intelligence believe a high IQ score to indicate an individual's potential for high achievement across a wide spectrum of intellectual activities, multiple intelligences theory conceives of its eight intelligences as relatively autonomous from one another. In other words, an individual who demonstrates a particular aptitude in one intelligence does not necessarily demonstrate comparable aptitude in another intelligence. Rather, individuals can be thought of as possessing profiles of intelligence in which they demonstrate varying levels of strength and weakness for each of the eight intelligences. Thus, it is a misunderstanding of multiple intelligences theory to claim, for example, that a particular individual possesses "no" logical-mathematical intelligence. It is certainly possible for an individual to demonstrate a low skill level in logical-mathematical intelligence, but, excluding cases of severe brain damage, all individuals possess the full range of intelligences.

Most proponents of general intelligence conceive of intelligence as an innate trait with which one is born and can do little to change. In contrast, multiple intelligences theory regards intelligence as a combination of heritable potentials and of skills that can be deepened through relevant experiences. For example, one individual might be born with a strong potential for spatial intelligence that allows him or her to read maps quickly and easily while another individual needs to study and practice diligently in order to acquire a similar level of expertise. Both individuals achieve strong levels of performance in spatial intelligence, though their pathways to acquiring this skill differ.

Identifying the Intelligences

Multiple intelligences theory remains controversial in psychology due, in large part, to the evidence upon which the theory is based. Most other theories of intelligence are based upon empirical data collected from psychometric instruments or experimental studies in which subjects are presented with test items believed to assess intellectual capability. The theory of multiple intelligences, in contrast, draws from a wider and more varied body of data. Specifically, Gardner developed multiple intelligences theory by synthesizing research from evolutionary biology, neuroscience, anthropology, psychometrics, and psychological studies of prodigies and savants. From these varied sources, Gardner developed several criteria for

identifying an intelligence. These criteria are described by Mindy Kornhaber, Edward Fierros, and Shirley Veneema in their 2004 book, *Multiple Intelligences: Best Ideas From Research and Practice:*

- It should be seen in relative isolation in prodigies, autistic savants, stroke victims, or other exceptional populations. In other words, certain individuals should demonstrate particularly high or low levels of a particular capacity in contrast to other capacities.
- It should have a distinct developmental trajectory. That is, different intelligences should develop at different rates and along paths that are distinctive.
- It should have some basis in evolutionary biology. In other words, an intelligence ought to have a previous instantiation in primates or other species and putative survival value.
- It should be susceptible to capture in symbol systems.
- It should be supported by evidence from psychometric tests of intelligence.
- It should be distinguishable from other intelligences through experimental psychological tasks.
- It should demonstrate a core information-processing system. That is, there should be specifiable mental processes that handle information related to each intelligence.

Shortly after issuing the original theory, Gardner pointed out an important distinction. An *intelligence* is a raw intellectual potential to process certain kinds of information in certain kinds of ways. In contrast, a *domain* or *discipline* is an organized body of skill and knowledge in a culture. Observers cannot directly measure intelligences; they can only infer an intellectual strength from the ease with which an individual improves his or her performance in a domain. Thus, for example, high performance in the domain of surgery or of aviation suggests high spatial intelligence; and an individual with high bodily- kinesthetic intelligence is likely to achieve success in the domains of athletics, dance, or crafts.

From the aforementioned criteria, Gardner conceived of eight distinct intelligences. These intelligences are best described in terms of the domains in which individuals with high intellectual potentials are likely to be found. Thus, for example, individuals with high *linguistic intelligence* are able to analyze information and create products involving oral and written language such as speeches, books, and letters. Politicians, poets, and trial attorneys typically possess profiles of intelligence high in linguistic intelligence. *Logical-mathematical intelligence* allows individuals to create proofs, solve equations, and carry out complex calculations. Engineers, scientists, and analytic philosophers are likely to be highly skilled in this intelligence. *Spatial intelligence* allows individuals to understand maps and other types of graphical information. Architects and graphic designers typically demonstrate high levels of aptitude for spatial intelligence. *Musical intelligence* enables individuals to create and make meaning of different patterns of sound. Violinists, DJs, and scientists specializing in bird calls or whale songs are all likely to possess profiles of intelligence high in musical intelligence. *Bodily-kinesthetic intelligence* entails using one's own body to create products or solve problems. Surgeons, athletes, and dancers typically demonstrate high levels of aptitude in bodily-kinesthetic intelligence. *Interpersonal intelligence* reflects an individual's ability to recognize and understand other people's moods, desires, motivations, and intentions, while *intrapersonal intelligence* reflects an individual's ability to recognize and assess these characteristics within him- or herself.

Gardner's original theory of multiple intelligences identified the seven intelligences described above. However, in the mid-1990s, Gardner determined that naturalistic intelligence also met the criteria for identification as an intelligence. *Naturalistic intelligence* enables individuals to identify and distinguish among various types of plants, animals, weather formations, and other products of the natural world. Individuals with high levels of naturalistic intelligence might be suited for careers in zoology, meteorology, and botany.

Existential intelligence has been described as the intelligence of big questions—the ability to consider issues of life, death, love, being, and the like. Individuals with a high aptitude for existential intelligence might be drawn to careers in philosophy, poetry, or theology. Gardner has jokingly referred to existential intelligence as a "half-intelligence" because, thus far, it has been found to meet a substantial number of the criteria for identification as an intelligence, but not all of them. For now,

Gardner has held off on classifying existential intelligence as a full-fledged ninth intelligence.

Other researchers have suggested the existence of additional intelligences: moral intelligence, humor intelligence, cooking intelligence, and so on. To date, however, Gardner has found none of these proposed intelligences to meet a substantial number of the criteria for identification as a unique intelligence. That said, Gardner leaves open the possibility of advances in fields such as genetics or neuroscience leading to the identification of additional intelligences in the future or, even, the reconstitution of existing intelligences. For example, it is possible that the intelligence currently identified as logical-mathematical intelligence will be found to be composed of several subintelligences: a subintelligence for processing small numbers, a subintelligence for estimation, and so on. Such adjustments to the current theory of multiple intelligences are virtually inevitable. Determining the precise number of intelligences, however, is far less important than multiple intelligences theory's overarching premise that intelligence is better understood as multiple rather than general.

Multiple intelligences theory is a departure from the traditional conception of general intelligence and has been the target of substantial critique from the scientific community since its emergence in the 1990s. One criticism is that a theory such as multiple intelligences theory that was developed through a synthesis of existing research requires empirical validation that neither Gardner nor anyone else has provided. A second criticism of multiple intelligences theory focuses on Gardner's claim that "g" (or general intelligence) has little explanatory power beyond predicting success in school. Researchers such as Daniel Willingham and Linda Gottfredson have reported that an individual's performance across a variety of intellectual tasks tends to be highly correlated and that traditional IQ tests are, in fact, strong predictors of a variety of outcomes, including future job performance. Other researchers have added that tests measuring Gardner's individual intelligences highly correlate with traditional IQ tests as well.

Applications of Multiple Intelligences Theory

Educators from a diverse range of schools in dozens of different countries have embraced the theory with tremendous enthusiasm. Nevertheless, it is important to bear in mind that multiple intelligences theory offers neither an established curriculum nor an educational goal for either students or educators to pursue. Rather, the theory of multiple intelligences is an *idea* about the concept of intelligence. Thousands of different teachers, schools, and researchers have applied this idea to education in many different ways. Some schools have utilized the vocabulary of multiple intelligences theory among their faculty to discuss the strengths and weaknesses of their students. Other educators have explicitly sought to develop curricula and lesson plans that allow students to draw upon several different intelligences. The most effective uses of multiple intelligences theory have been those that recognize multiple intelligences theory to be a tool for achieving a particular educational goal rather than an end in itself.

One school that has effectively utilized multiple intelligences theory to support teaching and learning is the New City School in St. Louis, Missouri. The New City School is an urban elementary school that began in 1988 to design and implement curriculum that allows students to draw upon all eight of their intelligences. Rather than shifting the school's goals to adapt to multiple intelligences theory, however, the New City faculty recognized that multiple intelligences theory held the potential to support their existing beliefs that all children are talented in different ways, that the arts are a critical piece of the elementary school curriculum, and that children need to learn interpersonal skills in the same ways that they learn their academic subjects. In short, educators at the New City School believe that schools should be places where students learn to solve problems in a variety of ways. They have found multiple intelligences theory to provide a useful framework for achieving this educational goal.

A very different application of multiple intelligences theory can be found at Danfoss Universe. Danfoss Universe is a 10-acre science experience park that opened in 2005 near Sønderborg, Denmark. The park includes a museum-sized building called the Explorama that contains dozens of hands-on exhibits through which visitors learn about their various intelligences. For example, an exhibit on musical intelligence allows visitors to create their own melodies on a theremin—an

electronic instrument that responds to movement rather than touch. By moving their hands in different directions and in different patterns within the vicinity of two antennae, visitors are able to produce and learn about different melodies. Another exhibit called Teambot is designed to highlight interpersonal intelligence. In this exhibit, museum visitors must work cooperatively to design a robot arm capable of moving an object from one location to another. Through these and many other exhibits, Danfoss Universe encourages visitors to reflect upon their own profiles of intelligence—their own intellectual strengths and weaknesses. Visiting can be a powerful learning experience.

Future Outlook

For more than 25 years, educators at every level, from every type of school, and from virtually every corner of the world have drawn upon multiple intelligences theory to support teaching and learning. The idea that individuals possess profiles of intelligence with varying strengths and weaknesses aligns with educators' daily experiences in working with diverse groups of students. It is likely for this reason that, even as high-stakes testing seeks to prioritize students' linguistic and logical-mathematical intelligences, there remain numerous schools such as the New City School committed to developing all eight of their students' intelligences. The next decade promises to be an exciting one for multiple intelligences theory as advances in neuroscience and genetics will undoubtedly shed further light on the pluralistic nature of intelligence and lead to further refinements of the theory.

Scott Seider

See also Emotional Intelligence; Intelligence; Intelligence Testing; Intelligence Theories; IQ; SAT

Further Readings

Chen, J., & Gardner, H. (2005). Multiple intelligences: Assessment based on multiple intelligence theory. In D. Flanagan & P. Harrison (Eds.), *Contemporary intellectual assessment: Theories, tests and issues*. New York: Guilford Press.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Gardner, H. (2006). *Multiple intelligences: New horizons*. New York: Basic Books.

Gottfredson, L. (2002). g: Highly general and highly practical. In R. Sternberg & E. Grigorenko (Eds.), *The general factor of intelligence: How general is it?* (pp. 331–380). Mahwah, NJ: Lawrence Erlbaum.

Jensen, A. (1998). *The g factor: The science of mental ability*. Westport, CT: Praeger.

Kornhaber, M., Fierros, E., & Veenema, S. (2004). *Multiple intelligences: Best ideas from research and practice*. Boston: Pearson Education.

Olson, L. (1988, January 27). Children flourish here: Eight teachers and a theory changed a school world. *Education Week, 7*(8), 18–19.

Willingham, D. (2004, Summer). Reframing the mind. *Education Next,* pp. 19–24.

Multipotentiality

Multipotentiality was defined by Ronald Fredrickson as "any individual who when provided with appropriate environments, can select and develop any number of competencies at a high level" (p. 268). Multipotentiality is readily seen among gifted individuals, as many have the ability to develop the necessary, specific skills to perform well in a variety of situations and possess a large number of interests. Multipotential individuals are more prevalent among the gifted population than "early-emergers," who possess intense and early interest and talent in a particular area. Multipotential students often show a pattern of high achievement in schoolwork and regular involvement in a variety of social, athletic, community, and solitary activities.

Multipotentiality has been a major concern for gifted individuals, especially when attempting to make a career decision. They often receive high-flat profiles when taking vocational or interests assessments. This indicates that they possess a large number of interests and skills; therefore, having a clear focus is difficult because a vast amount of opportunities exist. Hence, multipotential individuals often have trouble choosing a career, which can result in distress. Further, multipotential individuals may have difficulty developing a sense of purpose because they cannot easily integrate or prioritize their abilities and talents.

It is incorrect to assume that although intellectually gifted, multipotential students will be able to be successful on their own, without any guidance. Indeed, many gifted individuals report pressure to commit prematurely to the wrong career choice. Without a clear focus, multipotential individuals often prolong a career decision or resort to choosing a career haphazardly. They may choose an occupation quickly to reduce dissonance caused by competing career options or choose based on the influence of peers or family. Further, they may not become aware of other options if they focus on one strength.

To address these concerns, Barbara Kerr and her colleagues have recommended using value-based counseling, as it can be more effective for multipotential individuals than traditional vocational assessments and career counseling, which match students' abilities and interests to a particular occupation. The purpose of value-based counseling is to promote making career decisions based upon values, rather than on the more traditional focus of abilities, interests, the job market, or others' expectations. Value-based interventions include life-planning workshops, vocational and value assessments, and individual counseling. Value-based counseling can lead to a better sense of identity and purpose as well as a defined career path.

In addition, various techniques have been suggested to address the specific needs of multipotential individuals. Helping to facilitate contacts with other multipotential individuals such as peers, role models, or mentors can help validate career indecision and reinforce the idea that vocational choices are ongoing, and not a one-time decision. Contacts may also help multipotential individuals to make new discoveries about their interests through opportunities they provide. Assisting multipotential students to locate hands-on experiences, such as internships in fields related to the student's interests, are beneficial as well. Identifying or creating careers that integrate a large number of the student's interests and abilities is another way to address multipotentiality. In addition, individual counseling during the career search process can be useful to address the specific needs of the individual.

Another perspective to address vocational concerns for multipotential individuals is to embrace the magnitude of skills and interests they possess rather than focus on finding one occupation that will be suitable. Multipotential individuals who can be flexible and view themselves as being qualified for a large number of positions may find some relief for their vocational distress. Further, helping multipotential individuals recognize that they may be just as happy in one occupation as another, or that their ability to adapt to a large number of situations, may also be constructive. This perspective may help multipotential individuals feel a better sense of control and direction in their career path.

Some researchers argue that there is little empirical evidence for the existence of multipotentiality as a concept. Kerr has argued, however, that the populations showing little multipotentiality have been with Talent Search students, whose high performance on specific tests of aptitude suggests early emergent, focused career interests. Regardless of one's stance on multipotentiality, recognizing the specific needs of gifted individuals is crucial, especially when individuals lack guidance and display distress over the lack of differentiation in their interests and talents.

Rhea L. Owens

See also Adolescent, Gifted; Career Counseling; College, Gifted; Giftedness, Definition

Further Readings

Achter, J. A., Benbow, C. P., & Lubinski, D. (1997). Rethinking multipotentiality among the intellectually gifted: A critical review and recommendations. *Gifted Child Quarterly, 41*(1), 5–15.

Colangelo, N., & Zaffrann, R. T. (Eds.). (1979). *New voices in counseling gifted.* Dubuque, IA: Kendall/Hunt.

Fredrickson, R. H., & Rothney, J. W. M. (Eds.). (1972). *Recognizing and assisting multipotential youth.* Columbus, OH: Charles E. Merrill.

Kerr, B. A. (1981). *Career education for the gifted and talented.* Columbus, OH: Educational Resources Information Center Clearinghouse on Adult, Career, and Vocational Education.

Kerr, B. A., & Sodano, S. (2003). Career assessment for gifted students. *Journal of Career Assessment, 11*(2), 168–176.

Musical Creativity

Musical creativity is the ability through which subjects can express their own, personal relationship with the domain of sound, employing skills of the mind, body, and spirit. It can be found in every act related to music making, such as listening, performing, improvising, conducting, arranging, composing, and more. Musically gifted and talented people possess to a high degree what Howard Gardner defines as musical intelligence; one aspect of this type of intelligence is musical creativity. Although most humans possess the capacity to make music, musical ability is one of the earliest developing abilities, and research has shown that it must be nurtured and trained from an early age in order for the capacities to grow rather than atrophy.

In fact, most researchers consider creative thinking and acting in music as a mostly acquired behavior, claiming that musical creativity can be nurtured. They believe that everybody has the potential to produce music; most musical abilities, such as the ability to perform or compose a piece, or to make a musical improvisation, are linked more with the chances offered by the environment (exposure, learning opportunities, etc.) than to talent. This can be demonstrated by tests focused on creative thinking in music: Students who had music lessons and experienced through those lessons products and processes of musical creativity, scored higher than those who had had no music lessons.

For these reasons, a creativity-promoting music education should be given to all children and adults in order to enhance their musical knowledge and skills and promote their experience of the self and others. Moreover, because people can express with music their thoughts, feelings, memories, and fancies in a socially acceptable way, fostering musical creativity is one of the most important and widespread aims of music education.

Promoting Creativity

Different teaching styles have been studied with the aim of recognizing their effects on the development of creative thinking in music. The teacher-controlled style can undoubtedly promote positive outcomes in the student's musical development, but only the learner-centered teaching style can support and enhance learners' creative improvement, not to mention their psychological and social development. Creative teaching has therefore been proved to be essential for creative learning.

A creativity-promoting music education can be based on many different, not alternative but complementary methods. The main ones are as follows:

- Cultivating students' music awareness
- Showing students the products of musical creation and analyzing the creative processes that led to these products
- Contributing to students' active involvement in the learning process
- Giving students opportunities to experience music as their own
- Encouraging analysis of musical products
- Enhancing students' ability to think critically
- Stimulating students' imagination
- Encouraging students to find analogies and differences between basic elements in music and the arts (e.g., such as dot, line, color, form, texture, rhythm, balance, repeated modules, ornamental elements, etc.)
- Allowing students to seek analogies and differences between musical motifs and body movements (e.g., walking, jumping in place, jumping from A to B, slithering)
- Establishing comparisons between music pieces and paintings, sculptures, architectures, poems, dances, and the like
- Appraising and encouraging students' self-expression through musical products

In the past, it was thought that musical creativity could be expressed mainly through composition and improvisation. Nowadays, music pedagogues claim that creativity is central to all musical activities and takes place in different kinds of tasks: listening, analyzing, and evaluating music, performance, improvisation, and composition.

In creative listening to, analyzing, and evaluating music, subjects are actively involved in identifying, comparing, and appraising melodic, harmonic, and rhythmic elements, musical structures, styles, and so on.

In performing, subjects can express their creativity by making personal choices in many fields:

for instance, in dynamics (selecting which sounds shall be performed louder, and which softer), in timing (selecting the tempo of a piece), in agogics (selecting which sections shall be performed faster and which slower), in timbre (selecting an appropriate touch or sound for each musical phrase), in the use of embellishments (selecting if and how a phrase could be decorated through embellishments such as trills, mordents, etc.).

In improvisation and composition, subjects reveal their creativity by selecting elements belonging to their own theoretical knowledge and practical experience and bringing them together in new ways: musical form and style, melodic and rhythmic patterns, repetitions and variations, tonal stability/instability, and so on. In using these elements, a creative subject will maintain some characteristics given by tradition, and change other characteristics in order to realize a musical product that reflects his or her thoughts, feelings, and preferences.

A subject will obviously choose something he or she likes, and a subject generally likes something he or she knows well and considers familiar. Indeed, behavioral experiments have shown a significant connection between how well one knows something and how much one likes it.

Therefore music educators should allow their students to know and practice as many musical variables as possible: styles (Western art music, ethnic, commercial popular, rock, etc.), genres based on different mediums (acoustic, electronic, etc.), instruments and nontraditional sound sources, forms, works of composers, performances of interpreters, and so forth. In fact, the more learners understand and practice the musical language, the more they enlarge their musical background. Thus they will have more musical elements at their disposal and be able to improve their musical creativity.

Tools and Strategies

Information technology is present in our everyday lives as well as in our cultural lives; it follows that in music education the relationship between new technology and learning is gaining more and more significance.

The use of digital tools is very effective in enhancing the user's musical creativity, because it promotes indirect acquirement of powerful, complex musical processes. This strategy puts into practice the Pragmatists' famous principle of "learning by doing." The core concept of this approach is to place the user in a situation where specific musical processes can be acquired in an almost intuitive way. In fact, they are practiced and developed without initial, specific theoretical input, in the interaction that results between the user and the system.

For example, there are systems based on a question/answer scheme that can promote creativity in improvisation. Each phrase played by a user is continued or answered by the system in the same style. As the musical phrases produced by the system are similar but not identical to those proposed by the user, the interaction is structured on ever-changing musical phrases. In this way these devices can enhance musical invention and exploration.

Moreover, synthesizer and specific computer programs can be used with the aim of promoting musical creativity in composing. These devices can make many musical elements available to the user, who can compose pieces by putting them together in a personal way. Among these elements are vocal and instrumental timbres, melodic and rhythmic patterns, specific sound combinations such as chords and clusters, and accompaniments in different styles.

Alessandra Padula

See also Creativity Training; Musical Intelligence; Music Education; Technology

Further Readings

Parncutt, R., & McPherson G. E. (Eds.). (2002). *The science and psychology of music performance: Creative strategies for music teaching and learning.* New York: Oxford University Press.

Rowe, R. (2001). *Machine musicianship*. Cambridge: MIT Press.

Sloboda, J. A. (Ed.). (1988). *Generative processes in music.* Oxford, UK: Oxford University Press.

Musical Intelligence

From the classical compositions of Mozart to the reggae rhythms of Bob Marley, the works of many

singers and musicians are respected as valuable cultural contributions, and it is likely that this has generally been the case throughout human history. Archeological and anthropological evidence suggest that music has been performed and appreciated across eras and cultures. Given the ubiquity of music, the claim made by Howard Gardner for the importance of a musical intelligence seems plausible, in that it is clear that there are large individual differences in musical ability and skill.

Gardner indicated that musical intelligence involves the composition, performance, and appreciation of music, with pitch and rhythm as the core elements of music. Individuals who are described as musically intelligent would possess greater sensitivity to these elements than would those who are considered to be less musically intelligent. However, some authors such as John Sloboda have suggested that the notion of musical intelligence is derived from the relatively modern and Western idea that music performance must be relegated to the domain of the expert—presumably, the highly musically intelligent.

Development of Musical Intelligence

It seems clear that infants are predisposed to enjoy and to generate music. The universality of rocking and singing to babies would seem to indicate a very early receptivity to music. At 2 months, babies can match the pitch, intensity, and contour (the pattern of pitch within a melody) of songs. Babies recognize pitch and tempo differences, and they prefer songs they heard when still in the womb to unfamiliar songs. That babies show some level of musicality is clear. What is less clear is the nature and origin of individual differences in musical intelligence, and when these differences become noticeable.

Gardner cited the very early accomplishments of child prodigies as evidence that some individuals are biologically predisposed to high musical achievement. Other authors have noted the unreliability of accounts of very early achievement, and have pointed to intensive instruction and practice as key components in the early development of these prodigies.

There is a widely held belief among students and music educators that without innate musical talent, a child is unlikely to ever achieve musical excellence. On the other hand, some recent research evidence has suggested that, in general, accomplished musicians differ from less accomplished musicians not in early indicators of exceptionality but, rather, in opportunities and in hours of practice. Some have argued that such research indicates only that instruction and practice are necessary but not sufficient requirements for excellence in musical performance—that is, without some requisite level of musical ability, opportunity and hard work are unlikely to yield excellent levels of musical achievement.

Given the substantial heritability of other cognitive abilities (e.g., about 50 percent for general cognitive ability), it seems likely that there would be at least some genetic influence on musical ability. Behavioral genetic studies of musical ability and/or achievement are few and limited by available criterion measures, but seem to suggest a heritable component to musical abilities. For example, a study of identical and fraternal twins suggested that genetic variation accounted for at least 70 percent of the differences between people in musical pitch recognition ability; in contrast, the effect of the family or household was zero. Studies of musical *achievement*, however, have suggested substantial influence of the shared family environment. It is likely that musical achievement is more influenced by upbringing than are many other cognitive abilities, partly due to the relatively unequal exposure to musical training across families. At this point, it seems reasonable to assume that both genetic and environmental influences are involved in the development of individual differences in components of musical intelligence.

Music and Other Abilities

There have been suggestions that musical ability is related to mathematical ability. Gardner himself suggested that the relationship between math and music was likely one of interest, in that mathematicians tend to enjoy the patterns of music, but that musicians are probably not unusually interested in mathematics. He has also hypothesized that there are families and ethnic groups that emphasize both scholastic and musical achievement, resulting in children who tend to show high achievement in both mathematics and musical performance.

Musical ability has shown small but consistent positive correlations with general cognitive ability as well as with some narrower abilities. In studies comparing musicians with nonmusicians, however, there are generally few or no differences in measured cognitive abilities, broad or narrow. It seems likely that the correlations between musical ability and general cognitive ability would be greatest when the sample is of diverse intellectual ability and musically untrained. Research has suggested that musical training in childhood might lead to small but lasting gains in psychometric intelligence and academic performance, and that these gains are not specific to any particular narrow cognitive ability.

Music and the Brain

Efforts have been made to localize areas of the brain that are responsible for musical ability. It was once thought that music was a "right brain" activity, along with visual art, but the evidence now indicates that neural networks related to music run through both hemispheres. Listening to music, composing music, and performing music would seem to engage nearly every area of the brain. The auditory cortex processes the sounds of music, and frontal regions process the musical structure. Pleasurable arousal from music involves the mesolimbic system, and the foot-tapping and rhythmic movements associated with music involve the motor cortex. The cerebellum and basal ganglia are active in processing the rhythm and meter of music, with the cerebellum likely also involved in the emotional reactions to music.

Gardner stated that although musical ability was not as clearly localized in the brain as some other aspects of mental ability, the existence of amusia, a selective loss of musical ability due to brain damage, was evidence of some brain specificity for music. Studies involving patients with brain lesions have indicated that damage to the left hemisphere can result in the loss of abilities related to rhythm. Lesions on the right temporal lobe, on the other hand, have been associated with the loss of ability to perceive melody. Case studies highlight the autonomy of musical and linguistic abilities. There are brain damaged patients who have retained the ability to read music but not conventional text, and individuals who cannot recognize melodies but can recognize lyrics. There are patients who cannot recognize speech but can recognize music, and patients who cannot sing songs despite being able to speak the lyrics.

Brain studies of individuals with absolute or perfect pitch—the ability to identify and reproduce various pitches without being provided with a relative pitch—show relative enlargement of the left planum temporale, a portion of the auditory cortex. Other studies have focused on the estimated 4 percent of the population that has tone deafness, otherwise known as congenital amusia. These individuals have otherwise normal auditory, memory, language, and intelligence, but are unable to recognize melodies or detect pitch changes, perhaps as a result of malformations in the right auditory cortex.

The cerebellum seems to be involved in the processing of rhythm and meter, and perhaps also in the emotional experience of music. The cerebellum has been found to be strongly activated when individuals listen to music, but not when they listen to noise. Similarly, the cerebellum shows greater activation when people listen to music they enjoy versus music they do not enjoy and to familiar versus unfamiliar music. Interestingly, the neocerebellums are enlarged in individuals with Williams syndrome, a genetic disorder characterized by intellectual impairment, musicality, and extreme sociability. The neocerebellum tends to be smaller than normal in individuals with autism, who may also have intellectual impairments, but are also characterized by emotional detachment and a failure to enjoy or understand the emotional qualities of music.

Evolutionary Basis

Many evolutionary theorists, including Darwin, have speculated that musical intelligence was evolutionarily adaptive. In *The Descent of Man,* Darwin proposed that music played a role in sexual selection, and that musical tones and rhythms might have been first used by men or women to attract mates, and came to be used instinctively for that purpose. There would seem to be a nonhuman parallel in songbirds, in that some male songbirds attract mates with their extensive repertoires of songs.

Similarly, singing and dancing might have been used to demonstrate one's physical and mental

health to prospective mates, by advertising one's stamina and creativity. Musical competence, like clever conversation, might have evolved to advertise one's intelligence to potential sexual partners. Another theory would suggest that one who exhibits well-developed musical ability would demonstrate to prospective mates that one has resources to spare, and can thus afford to spend time refining an unnecessary skill. Like the peacock's tail, musical intelligence could exist to advertise one's health and resources. The fact that interest in music seems to peak in adolescence reinforces theories that suggest a role of music in mate selection. Alternatively, music might have served an important role in the functioning of a society, in promoting group unity and reinforcing social bonds.

Another proposed evolutionary role for music is in the preparation of the brain for the development of language and other complex cognitive activity. Babies seem particularly sensitive to musical contour, which may be related to the contour of spoken language. Gardner noted that the structure of music was, in many ways, parallel to that of linguistic intelligence. Caregivers tend to speak to infants in a rhythmically slower fashion in a higher pitch, and with exaggerated pitch differences. By the age of 2 years, children show a preference for the music of their own culture, which perhaps not coincidentally is around the same time that children show specificity in language processing.

Assessment

At this point, there is no single widely accepted measure of musical intelligence that is dominant in research and applied fields, nor has the assessment of musical intelligence sparked the intense research interest that has produced increasingly sophisticated batteries to assess other cognitive abilities. Gardner suggested that to test musical intelligence, individuals could be exposed to a new melody and be evaluated on how well they recognized, sang, and transformed it. One shortcoming of this strategy would seem to be that people will have had very different levels of exposure to musical training and practice; thus, this musical testing method would be likely to assess taught skills as much as aptitude.

Some well-known tests of musical ability include those of Carl Seashore of the University of Iowa, who published the first version of his *Seashore Measures of Musical Ability* in 1919. Seashore's tests were based on the premise that sensory capacities were the foundation of all musical abilities. Test-takers were required to discriminate pitch, loudness, tempo, timbre, and rhythm. Versions of the Seashore tests are still in use, but the tests of Edwin E. Gordon are more widely used in North America today. In 1965, Gordon introduced the *Musical Aptitude Profile* and then in 1979, he introduced tests of what he referred to as *audiation,* or the multistage cognitive process through which we give meaning to music. Although audiation is relevant to all aspects of music, Gordon's tests focus on the audiation of the core elements of tone and rhythm. An advantage to Gordon's tests is the availability of large-sample age norms.

Future research might benefit from a focus on the continued refinement of tests of musical ability and, in particular, tests that incorporate recent research findings related to cognitive, neurological, and emotional aspects of musical intelligence.

Beth A. Visser

See also Musical Creativity; Musical Talent Assessment; Music Education

Further Readings

Gardner, H. (1983). *Frames of mind.* New York: Basic Books.

Howe, M. J., Davidson, J. W., & Sloboda, J. A. (1998). Innate talents: Reality or myth? *Behavioral and Brain Sciences, 21,* 399–442.

Levitin, D. J. (2007). *This is your brain on music: The science of a human obsession.* New York: Plume.

Sloboda, J. (2005). *Exploring the musical mind.* Oxford, UK: Oxford University Press.

Musical Talent Assessment

In simple terms, musical talent is the ability to be keenly aware of sounds, to inwardly sense and manipulate these sounds, and to communicate these sounds to others with personal interpretation. The assessment of musical talent has drawn interest and controversy of opinion since the turn

of the 20th century, with different viewpoints debated across different musical fields of study. A comprehensive approach to assessment recognizes the multifaceted nature of musical talent, which includes fine-tuned discrimination of sound (music aptitude), an adept cognitive-developmental process of learning through music (musical intelligence), the physical ability to perform well, and the creative/interpretive process of communicating ideas and emotions through sound.

Music Aptitude

The capacity to discriminate sound is detectable prior to birth and observable from infancy. Music psychologists define this capacity of aural discrimination as music aptitude. According to leading music psychologists Carl Seashore and Edwin Gordon, music aptitude is displayed in children from an early age prior to musical training, does not vary with intelligence, and is measurable reliably by the age of 10.

Gordon's battery of music aptitude tests assesses music aptitude from kindergarten to adulthood, all based on the concept of audiation. Audiation is internal realization of sound through recall or creation with the sound not physically present. Tests measure aural discrimination of pitch, rhythm, dynamics, and instrumental timbre. Gordon recommends the use of the *Intermediate Measures of Music Audiation* to measure high music aptitude in young children because its test ceiling is higher than the *Primary Measures of Music Audiation,* which measures normal music aptitude in Grades K–3.

Debate on the use of music aptitude testing as an assessment measure of musical talent encompasses the nurture–nature argument of musical talent being a product of skill development and achievement rather than inherent from birth. The use of music aptitude testing as one component of a talent assessment procedure provides an objective measurement of aural discrimination or fine-tuned listening ability.

Musical Intelligence

Musical intelligence describes the cognitive-developmental process of learning through music, with the assessment of musical talent reliant on how a student demonstrates conceptual understanding while problem solving in musical tasks. The concept of musical intelligence stems back to early Chinese and Greek theories of music and is included in the texts of Carl Seashore. More recently, Howard Gardner's theory of multiple intelligences was instrumental in extending the term to an audience beyond specialized musical fields.

Musical intelligence studies by Jeanne Bamberger, Lyle Davidson, and Larry Scripp show that talented students are adept at shifting between different representations of a musical task (performing, reading a score, listening) and are more inventive in the way they solve musical problems. Curricular-based assessment of musical intelligence includes portfolio development and domain projects that broaden musical performance to include production, perception, and reflection. Musical intelligence assessment emphasizes the student's creative functioning while engaged in musical tasks.

Musical Performance Ability

The audition is the traditional mainstay for recognition and assessment of musical talent in the fields of music performance and music education. Musical performance is inextricably meshed with commitment and achievement, with early detection of talent reliant on rapid skill development of performance abilities. John Sloboda and K. Anders Ericcson, researchers in the field of expertise of performance, argue that the element of deliberate practice over time is the deciding factor of musical talent rather than any innately determined superiority of musical capacities from birth.

The assessment of musical talent through an audition is problematic because of the inherent interpretive/subjective nature of its adjudication. Joanne Haroutounian, J. David Boyle and Rudolf Radocy, and Gene Wenner recommend development of a balanced dualistic form for performance assessment that includes rating specific elements of performance (technique, interpretation, performance skills) as well as qualitative comments (see Figure 1).

Musical Creativity—Creative Interpretation

The musical creative process involves internally realizing and interpretively manipulating sounds and communicating to others in a unique way.

Indicators of Potential Talent
Music Performance Assessment Form

Date_____ School_____

Student_____ Grade_____ Age_____

Instrument/Voice_____

Performance Information:

Title_____ Composer_____

Title_____ Composer_____

Title_____ Composer_____

Please assess each performance with a written critique in the open space on the front and back of the assessment form. Please assign ratings on the lines for each category.

1	2	3	4	5
FAIR	GOOD	VERY GOOD	EXCELLENT	OUTSTANDING

Performance Skill _____
- Accuracy
- Notes
  - Rhythm
  - Rests
  - Fingering
  - Slurs, articulation
- Memory
- Performs with ease, poise

Technique _____
- Dexterity and facility
- Clarity
- Tone quality
- Bowing, breath control

Interpretation _____
- Stylistically appropriate
- Phrasing
- Tempo
- Mood

Artistry _____
- Intensity & focus
- Creative involvement

TOTAL_____

Figure 1 Dualistic Performance Assessment: Critique and Quantified Musical Elements

Source: Haroutounian, J. (2007). Indicators of Potential Talent Music Performance Assessment Form.

Indicators of Potential Talent in Music
Observation Rating Scale

Student Name _____ Age _____ Grade _____

School _____ Type of Class _____

Person completing form _____ Title _____

You have known student _____ Years_____ Months Date: _____

Please indicate how often the student listed above has shown the following behaviors by circling the appropriate number.

1	2	3	4
SELDOM OR NEVER	OCCASIONALLY	FREQUENTLY	ALMOST ALWAYS

Aptitude and Ability

I. Can remember and repeat melodies and rhythms.	1	2	3	4
2. Keeps steady pulse and responds to subtle changes in rhythm and tempo of music.	1	2	3	4
3. Can hear small differences in melodies, rhythm, and sounds.	1	2	3	4
4. Can differentiate individual sounds in context: identifies patterns, melodies, instruments in a musical composition, or specific environmental sounds.	1	2	3	4
5. Performs with accuracy and ease, learns quickly.	1	2	3	4

Creative Interpretation

6. Enjoys experimenting with sounds: making up songs and manipulating melodies and rhythms.	1	2	3	4
7. Is aware of slight changes in mood, loudness or softness, and sounds of different instruments in music.	1	2	3	4
8. Performs and reacts to music with personal expression, shows intensity and involvement with the music.	1	2	3	4

Commitment

9. Shows perseverance in musical activities: works with focused concentration, energy, and internal motivation.	1	2	3	4
10. Strives to refine musical ideas, sets high goals, constructively critiques musical work of others and self.	1	2	3	4

Please use the back of this form for further comments describing specific strengths or weaknesses of this student that would be helpful in determining the potential talent of this student in the area of music.

Figure 2 Indicators of Potential Talent in Music

Source: Haroutounian, J. (2002). *Kindling the spark: Recognizing and developing musical talent* (p. 182). New York: Oxford University Press. Reprinted by permission.

Musical creativity is observable at the earliest stages of musical learning through musical improvisation or play. As musical development advances, this creativity is realized generatively through musical improvisation and composition, interpretively through musical performance, extending to include creative listening and critique.

Haroutounian defines metaperception as the perceptive/cognitive functioning indicative of creative–interpretive decision making, parallel to metacognition in academic areas. Peter Webster offers an assessment tool using simple creative activities that measure extensiveness, flexibility, originality, and syntax in musical tasks, reflecting behaviors measured in general creative testing. Haroutounian, Sloboda, and Webster concur that creative interpretation in musical performance, listening, and critique are more complex to identify but are an integral part of the profile of musical talent.

Musical Giftedness and Talent

The field of gifted education has enlarged the parameters of intelligence to include artistic ways of knowing, which includes the recognition of musical talent. However, the comprehensive identification of musical talent has met challenges because of the lack of a cohesive identification procedure and the diminishing role of music programs in general in schools.

Both Haroutounian's and Barry Oreck's research recommends development of a simple talent identification tool usable at the classroom level to encourage arts talent identification. Haroutounian offers the *Indicators of Potential Talent in Music Observational Rating Scale* for initial identification of potential talent rating 10 musical characteristics categorized under aptitude and ability, creative interpretation, and commitment (see Figure 2).

Musical giftedness or exceptional talent in music is portrayed by the musical prodigy, who exhibits musical capabilities equal to those of a highly trained adult by the age of 10. David Feldman cautions that these extraordinary abilities often lie within the domain of music rather than extending to academic giftedness. Studies of the unique musical giftedness of the savant and individuals with Williams syndrome show isolated exceptional musical abilities in persons with low cognitive reasoning capabilities.

Requirements for Comprehensive Assessment

The multiple facets of musical talent provide assessment opportunities well beyond the traditional audition setting. Comprehensive assessment requires recognition of the inherent measurable components of music aptitude, keen observation of the behavior of students engaged in challenging musical tasks, and providing opportunities to assess the creative process of music making and interpretive musical performance.

Joanne Haroutounian

See also Artistic Ability; Creativity, Definition; Musicians; Prodigies; Talent Development

Further Readings

Bamberger, J. (1995). *The mind behind the musical ear: How children develop musical intelligence*. Cambridge, MA: Harvard University Press.

Haroutounian, J. (2002). *Kindling the spark: Recognizing and developing musical talent*. New York: Oxford University Press.

Haroutounian, J. (2007). Musical talent. In C. Callahan & J. Plucker (Eds.), *Critical issues and practices in gifted education* (pp. 409–427). Waco, TX: Prufrock Press.

Sloboda, J. (2005). *Exploring the musical mind: Cognition, emotion, ability, function*. Oxford, UK: Oxford University Press.

Music Education

Music education is a specific area of education that aims at the development of musical ability. According to Howard Gardner's theory of multiple intelligences, there is a specific musical intelligence that is probably a result of inborn characteristics and that can be developed by training. Musically gifted, creative, and talented people can probably profit best from high-quality music education, which includes the opportunity to have instrumental and vocal instruction. Nevertheless, as part of general education, music education should be given to all children and adults in order to enhance their knowledge and skills.

Effects of Music

The aims of music education are closely related to the effects of music. As a general rule, these pertain to the physical, cognitive, and psychological areas. With regard to physical health, listening to music can play a significant role in influencing fundamental physiological processes, for instance modifying heart and pulse rate, blood pressure, digestion, and activating certain regions of the brain. It can also enhance motor skills and acquisitions, such as relaxation, balance, joint mobility, and fluidity and economy of motion. As regards the cognitive area, several reports demonstrate that musical activity has positive effects on intelligence and achievement. With regard to psychological growth, listening to music can play an important part in influencing moods, feelings, and visualization; for example, activating reminiscences and fantasies.

Because music can have a wide range of effects, musical response can vary considerably. From time to time music education can promote some of these effects; as a consequence of this, the aims and goals of music education can change too. Historically, musical ability has been considered mainly in relation to aural abilities, but recently this conception has been modified. The fundamental aim of education is now considered to be the ability to transfer previously learned knowledge and skills to new domains. Therefore, research was done to see if the acquisition of the ability to identify different pitches, rhythms, chords, timbres, and the like, can be connected with the acquisition of other abilities outside the musical field. As a result of these studies, music education is now considered to have aims that pertain to the musical area itself (e.g., sound perception and comprehension, musical creativity), and to other, broader educational goals. For example, singing or playing music in ensembles unites the members of the group, and so it enhances social communication. Indeed, collective music making reinforces values; subjects who sing or play together are willing to identify themselves with the group values, and consequently to experience feelings of belonging to one another. These can in turn set up collective identities, in the cultural, national, or political field.

Musical training develops both musical ability and language, and enhances emotional intelligence, because it improves the ability to decode the emotions expressed in speech through prosody. Musical practice increases mathematical ability and extends the ability to perceive visual-spatial elements and understand their connections. The ability to memorize pitches has been shown to be related to a sequential way of processing information; this characteristic seems to be linked with logical thinking. Moreover, data from the National Center for Education Statistics show that students who attended music courses received better grades and more academic honors and awards than students who did not attend these courses.

It seems clear, therefore, that music competence can encourage physical and mental well-being, and can establish more neuronal connections, enhancing transfer of learning, promoting intelligence and creativity.

Goals

Among goals that pertain to the musical area in itself, there is the ability to listen to, read, and analyze music. This includes the knowledge of the language and grammar of music (identifying musical symbols and melodic structures) and the development of a sense of pulse (recognizing strong and weak beats), a sense of duration (imitating patterns of long and short sounds and silences), a sense of texture (differentiating single sounds from sound combinations), a sense of pitch (discriminating between high and low sounds), a sense of dynamics (distinguishing between loud and soft sounds), a sense of structure (recognizing musical forms), a sense of timbre (identifying the "voices" of different instruments), and a sense of style (recognizing different styles, such as Western art music and jazz).

Other important goals pertain to the following abilities: describing and evaluating music; arranging, composing, transposing, and adapting pieces; improvising and performing (singing or playing) expressively and technically accurately as a soloist. As music is one of the most important mediators of socialization, very significant goals concern improvising and performing in ensembles, with or without the leadership of a conductor, and conducting choral and/or instrumental ensembles.

Teaching Principles and Methods

The development of musical abilities can be improved with a holistic approach to musical experience, where listening, performing, composing, and appraising are linked together. Even the opportunity to have competent, regular, and frequent instruction is quite relevant. Teachers should describe music principles and show how to use them while trying to connect theory, facts, and skills, and allowing students to learn significantly. They should ensure that students have frequent opportunities to practice music and to participate successfully in appropriate music experiences. Moreover, students can derive great benefit from the opportunity to collaborate with music professionals within the school, and with artists, art organizations, and enterprises, which can support their musical development.

Among the most influential methods of music education are those of Zoltan Kodàly, Carl Orff, Emile Jacques-Dalcroze, and Kazuo Suzuki. The Kodàly method uses folk songs of the students' cultural heritage to involve them in reading and writing music, singing, playing instruments, and dancing. The Orff approach uses percussion instruments with the aim of developing students' creativity, and encouraging improvisation, composition, and movement. The Dalcroze method includes ear training, sight singing, performance, and improvisation. The Suzuki approach aims to teach small children to play an instrument from the age of 3; it is based on reading music notation, performing and memorizing pieces with the assistance of parents or other adults.

Musically Gifted Students

Musically gifted students can benefit from all of these approaches. The development of musical talent has been documented by Benjamin Bloom in his book on talent development. Musically gifted students need not only the highest quality musical training; they need mentors who can teach them the art of the audition, the establishment of a repertoire, and such fine-tuned skills as stage presence and interaction with audiences. Families of musically gifted students need to be willing to provide these specialized teachers and coaches, and may need to move to an area that would provide access to appropriate education. Musically gifted students often receive less recognition in school that academically gifted students, and may need out-of-school opportunities for recognition. Therefore, much of music education will continue to take place out of the school environment.

Alessandra Padula

See also Cognitive Development; Emotional Intelligence; Multiple Intelligences; Musical Creativity

Further Readings

Bloom, B. (1985). *Developing talent in young people.* New York: Ballantine Books.

Elliott, D. J. (1995). *Music matters: A new philosophy of music education.* New York: Oxford University Press.

Mark, M. L., & Gary, C. L. (1992). *A history of American music education.* New York: Schirmer Books.

Reimer, B. (1989). *A philosophy of music education.* Englewood Cliffs, NJ: Prentice Hall.

Musicians

The development and unique talents of a professional musician have intrigued psychologists, music researchers, and the general public for decades. Although the genres chosen may differ, from symphonic to jazz to pop/rock, musicians share similarities in factors that influence the development of these fine-tuned skills and talents. These factors include early perceptive capacities, environmental influences, the different stages of musical talent development, and the continuous unfolding of the specific properties of the musician's brain and "ear." In addition, the wonder of the prodigy and the mystery of the savant and those with Williams syndrome attest to the uniqueness of musical intelligence.

Early Perceptive Capacities

Children listen before they are born. Numerous prenatal studies have measured movements and startle reflexes to a mother's voice, music, and other environmental sounds. Studies have also

indicated that infants can discriminate melodic contours, range, and tempo, and recognize songs heard while in the womb. Helmut Moog's 1970 studies indicated that 6-month-olds showed an attraction to "sensuously beautiful sound." Hanus Papoušek's studies have shown that intuitive parenting can echo an infant's vocal play, creating a preverbal musical conversation. Longitudinal studies of youngsters describe a growing awareness of the melodic contour scheme of pitches, with sliding pitch schemes and snatches of melodic ideas, leading to singing a song with stabilized pitch by the age of 6.

The discrimination of pitch and rhythm are the basic sensory attributes of music aptitude—inborn capacities that function from early childhood. Edwin Gordon and Carl Seashore's studies have shown that these capacities can be measured prior to training and that they basically stabilize by the age of 10. Environmental musical stimulation during the early years may contribute to the development of these capacities during the malleable years when the musically perceptive inner "ear" is still evolving.

Environmental Influences

The overall role of parental or family guidance and interest in music plays a pivotal role for youngsters who show musical talent. John Sloboda has found that children who receive high levels of exposure to and engagement in music through informal musical activities show a notable superiority in musical ability over their peers by the time they reach school age. Background studies of concert pianists, talented teenagers, and rock/pop musicians have indicated that parents need not have been musicians themselves to recognize that their children were drawn to music and to seek out instruction for them. Decades of studies showing the importance of early exposure to music have spawned a number of early childhood music curricula designed to enhance parent–child musical experiences from birth through age 5.

Nevaida Layton Lee Ries's study of children who sang spontaneously in homes where music was an important part of family life showed children singing with definite tonality by 2-1/2 years of age. Project Zero research found similar effects when parent–child interplay that included singing was a normal part of family life. There are numerous anecdotes of musical prodigies singing on pitch before they could speak. These talented youngsters often begin lessons as early as age 5, guided by parental interest.

Stages of Musical Development

Formal music instruction may begin as early as preschool, with Suzuki instrumental training beginning as early as age 3 and multiple piano methods available for preschool instruction. Lauren Sosniak's study of concert pianist talent development found that the earliest teachers worked well with young children and made lessons an enjoyable experience. Young children learn the basic techniques of playing and reading music in this first stage of musical talent development. Lessons emphasize "play and romance," with lots of encouragement, freedom to explore, and immediate rewards. Parents play an important role in monitoring consistency of practice at home.

The middle stage of development arrives at a point when the student musician reaches a level of technical proficiency and repertoire that requires more attention to precision in performance and discipline in practice. This stage may require a change of teaching studio to accommodate more rigorous training for the talented young musician.

Many professional musicians recall entering competitions and performance opportunities at this stage, experiences that provided a way to judge their progress and instill a sense of identity as a musician. Parental motivation and monitoring become less important at this stage, as the student acquires an internal motivation to achieve.

The role of practice is a significant factor in the development of musical talent. Studies of "deliberate practice," which involves intensive levels of concentration in solving musical problems, show that it takes 10 years of intensive preparation to achieve an expert level of performance. Some music psychologists believe that practice contributes much more than inherent talent to expert performance.

During the advanced stage of development, the musician acquires individuality and insight,

generalizing previously learned concepts, and recognizing that music will play a significant role in his or her life. Talented students may receive instruction by a master teacher at this point, or seek multiple venues of musical experience through specialized programs or schooling, summer music camps, national competitions, or early entry into professional conservatories. Jenny Boyd has noted that students in the pop/rock and jazz fields may be performing professionally while still in their teens.

The Musician's Brain and "Ear"

Recent neurological research has discarded the notion that musicians are "right-brained," discovering that the process of music-making involves auditory, visual, cognitive, affective, and motor processing. Gottfried Schlaug and colleagues found that the musician's brain actually shows a pronounced left hemisphere dominance, with the planum temporale of musicians with absolute pitch enlarged on the left side; this is especially the case in those who began study before the age of 7. These studies suggest that the brain is "plastic" in the first decade of life, reinforcing the importance of active musical engagement in early childhood.

Absolute pitch has received increased attention in recent research. Absolute pitch is more common in musicians who began training at an early age. However, many talented musicians fail to develop absolute pitch, even after years of intensive training. Diana Deutsch and colleagues provided evidence of differences in absolute pitch between American and Chinese conservatory students who began training between the ages of 4 and 5, with 60 percent of the Chinese students having absolute pitch compared with 14 percent of the Americans. When musical training began between the ages of 8 and 9, 43 percent of the Chinese students had absolute pitch, compared with none of the Americans. (Of course, it must be noted that Chinese as a language employs pitch, whereas European languages do not.)

Special Gifts: Prodigy, Savant, and Williams Syndrome

A musical prodigy displays extraordinary talent at an early age and performs at a level of a highly trained adult in the field by the age of 10. Prodigies have an exceptional ear, with many (but not all) having absolute pitch at an early age. An extraordinary musical memory allows them to reproduce complicated music after hearing it a single time or briefly examining the score. Their retention of memorized repertoire far exceeds the norm. They persistently engage in deliberate practice, with stamina and the "rage to master" indicative of their personality.

Jeanne Bamberger describes the "midlife crisis" that faces many prodigies during adolescence following intensive early advancement. Immersion in learning and performance in childhood is confronted, in adolescence, with the need to pull ideas apart for reflection and analysis. Some prodigies have a difficult adjustment during this transition into the mature adult musician.

The musical savant is an individual of very low intelligence whose musical accomplishments resemble those of musical prodigies at a young age. Savants can replicate tunes after a single hearing and have an exceptional tonal memory. Musical savants are often visually as well as developmentally disabled. Their intense interest in music begins at a young age, they all have absolute pitch, and they are all pianists.

Persons with Williams syndrome, a chromosomal disorder, have mild to moderate developmental disability and an assortment of physical motor difficulties and heart problems. They also have exceptional tonal memory relative to absolute pitch, a strong rhythmic sense, and a passion for music. Neurological studies show that the brain of individuals with Williams syndrome is smaller than normal; however, part of the brain that is enlarged—the *planum temporale,* which is the same area enlarged in professional musicians with perfect pitch. Despite the rarity of this disorder, which occurs in 1 in 20,000 people, it has attracted many neurological studies to discover more about the uniqueness of musical intelligence.

Continuing Research

The development of a musician relies on a combination of musical talent capacities noticeable from early childhood with ongoing support and

guidance by family members and teachers through the stages of talent development. Ongoing studies are providing new insights into the workings of the musician's brain and the intriguing capabilities of prodigious musicians, savants, and those with Williams syndrome. Professional musicians arrive on stage only through years of self-disciplined practice, motivation to succeed, and opportunities that provide an impetus to bring performance to a level of expertise.

Joanne Haroutounian

See also Musical Talent Assessment; Prodigies; Talent Development

Further Readings

Deliège, I., & Sloboda, J. (1996). *Musical beginnings: Origins and development of musical competence.* New York: Oxford University Press.

Haroutounian, J. (2002). *Kindling the spark: Recognizing and developing musical talent.* New York: Oxford University Press.

Kenneson, C. (1998). *Musical prodigies: Perilous journeys, remarkable lives.* Portland, OR: Amadeus Press.

Sloboda, J. (2005). *Exploring the musical mind.* Oxford, UK: Oxford University Press.

Sosniak, L. (1985). Learning to be a concert pianist. In B. Bloom (Ed.), *Developing talent in young people* (pp. 19–67). New York: Ballantine Books.

N

Naglieri Nonverbal Ability Test

The *Naglieri Nonverbal Ability Test–Second Edition* (NNAT2) is a nonverbal measure of general ability based on a testing method (see Figure 1) supported by nearly a century of research. NNAT2 items assess ability without requiring the student to read, write, or speak. Students must rely on reasoning using geometric designs, not on verbal skills. The NNAT2 has been developed with the goal of providing a means of testing intelligence that is a fair assessment across gender, race, and ethnicity. The NNAT2 is a revision of the *Naglieri Nonverbal Ability Test–Multilevel Form,* which was a revision of the *Matrix Analogies Test–Expanded Form* and the *Matrix Analogies Test–Short Form,* which were used extensively in educational settings.

Versions and Standardization

There are two versions of the NNAT2; one uses a traditional paper-and-pencil method and the other is presented and scored online. Both versions consist of seven separate sets of items organized into levels corresponding to different grades. Each set is made up of 48 items that are presented in the colors black, blue, white, and yellow (these colors are least influenced by color-impaired vision). Each level contains items shared from both the adjacent higher and lower levels, as well as exclusive items. The shared items were used to develop a continuous scaled score across the entire standardization sample. These items yield a total raw score that is converted to a Nonverbal Ability Index standard score set at a mean of 100 with a standard deviation of 16 through an intermediate value called a Scaled Score.

The NNAT was standardized on a large nationally representative sample of more than 33,000 students in Grades K through 12 (ages 5 through 18 years). The sample closely matches the U.S. population on the basis of geographic region, socioeconomic status, urbanicity, ethnicity, and school setting. The sample included children with special needs such as those with emotional disturbance, learning disabilities, hearing and visual impairment, and those who were mentally handicapped. Children with limited English proficiency were also included in the standardization sample. More details may be obtained from the *NNAT2 Technical Manual.*

Validity

The validity of the NNAT has been examined in a series of published research papers. Jack Naglieri and Margaret Ronning studied mean score differences and correlations to achievement for matched samples of White (n = 2,306) and African American (n = 2,306); White (n = 1,176) and Hispanic (n = 1,176); and White (n = 466) and Asian (n = 466) students in Grades K through 12. The three pairs of groups were carefully selected from a larger sample included in the NNAT standardization sample and matched on all demographic variables.

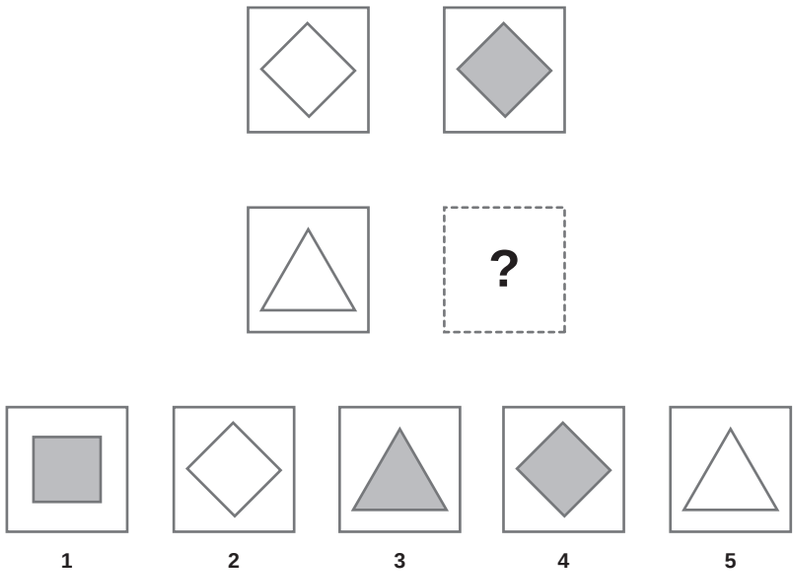


Figure 1 Illustrative Naglieri Nonverbal Ability Test–Second Edition item

Only small differences were found between the NNAT scores for the White and African American samples (Cohen's *d* ratio = .25), White and Hispanic (*d* ratio = .17), and White and Asian (*d* ratio = .02) groups. In addition, the correlations between NNAT and academic achievement were strong and consistent across Grades K through 12 and similar for each of the samples. The small mean score differences and the strong correlations strongly suggest that the NNAT has utility for fair assessment of minority children and that the scores the test yields are good for statistical prediction of achievement.

Jack Naglieri, Ashley Booth, and Adam Winsler examined the performance of Hispanic children with and without limited English proficiency (*N* = 296) who were administered the Naglieri Nonverbal Ability Test and the Stanford Achievement Test–Ninth Edition. The two groups of Hispanic children were matched on geographic region, gender, socioeconomic status, urbanicity, and ethnicity. The results showed that there was only a small difference (*d* ratio = .1) between the NNAT standard scores for the Hispanic children with limited English proficiency and those without limited English proficiency. In addition, the NNAT correlated similarly with achievement for the Hispanic children with and without limited English proficiency. The results suggested that the NNAT scores have use for assessment of Hispanic children with and without limited English proficiency and that these children earned scores that were close to average.

Jack Naglieri and Donna Ford studied the practical question: If the NNAT yields small mean score differences between minority and majority groups, would it identify similar percentages of White, Black, and Hispanic children as gifted? They used a sample of 20,270 children who were representative of the national school population according to socioeconomic status, urbanicity, and ethnicity. They found that 5.6 percent of the White (*n* = 14,141), 5.1 percent of the Black (*n* = 2,863), and 4.4 percent of the Hispanic (*n* = 1,991) children earned an NNAT standard score of 125 (95th percentile rank) or higher, and 2.5 percent of White, 2.6 percent of Black, and 2.3 percent of Hispanic children earned NNAT standard scores of 130 or higher (98th percentile). Their results suggested that the percentages of children earning high scores on the NNAT were similar across race and ethnic groups, suggesting that this instrument may help address the problem of the underrepresentation of minority students in gifted education.

Gender differences on the NNAT were examined by Johannes Rojahn and Jack Naglieri for the

entire standardization sample. They found that the NNAT scores indicated that, on average, males and females earn the same scores on this nonverbal measure of ability.

The NNAT is an empirically validated nonverbal test of general ability that provides a method for equitably evaluating students who vary by culture, language, and gender.

Jack Naglieri

See also Identification; Intelligence; Nonverbal Tests

Further Readings

Naglieri, J. A. (1997). *Naglieri Nonverbal Ability Test Multilevel Form.* San Antonio, TX: Psychological Corporation.

Naglieri, J. A. (2003). *Naglieri Nonverbal Ability Test Individual Form.* San Antonio, TX: Psychological Corporation.

Naglieri, J. A. (2008). *NNAT2 manual.* San Antonio, TX: Pearson.

Naglieri, J., A. & Ford, D. Y. (2003). Addressing underrepresentation of gifted minority children using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly, 47,* 155–160.

Naglieri, J. A., & Ronning, M. E. (2000). Comparison of White, African-American, Hispanic, and Asian children on the Naglieri Nonverbal Ability Test. *Psychological Assessment, 12,* 328–334.

Rojahn, J., & Naglieri, J. A. (2006). Developmental gender differences on the Naglieri Nonverbal Ability Test in a nationally normed sample of 5–17 year olds. *Intelligence, 34,* 253–260.

National Academies of Sciences

The National Academies of Sciences is an honorary society of scholars who are engaged in scientific and engineering research. Dedicated to the use of science and technology for the general welfare, the Academy was authorized initially as the National Academy of Sciences (NAS) by President Abraham Lincoln in 1863. In 1916, the National Research Council (NRC) was created to focus on public policy work, and incorporated under the umbrella of the NAS. The National Academy of Engineering was incorporated in 1964, and in 1970, the Institute of Medicine. Today, these three entities make up the National Academies.

The National Academy of Sciences was created to provide national leaders with independent scientific advice relating to public policy decisions. The membership of the NAS is elected from the United States' top scientists, engineers, and other experts—as many as 72 members and 18 foreign associates may be elected annually—based on their contributions to original research. All members operate as volunteers independent of any government framework while performing membership activities. Led by a council of 12 members and 5 officers elected from academy membership, the NAS currently boasts 2,100 members and 380 foreign associates. Of these, 200 have won Nobel Prizes. Outstanding members are recognized for their accomplishments in the field of science with awards and prizes ranging from $15,000 to $60,000. In 2008, 13 outstanding members were recognized for their achievements in the fields of biology, chemistry, solar physics, ecology, mathematics, oceanography, paleontology, social sciences, and psychology.

Publications and Funded Research

The NAS publishes a number of scientific papers, reviews, reports, and more. In 1914, the organization began publishing *Proceedings of the National Academies of Science,* a weekly multidisciplinary scientific serial focusing on colloquium papers, reviews, and actions taken by the organization. The National Academies Press publishes monthly research reports and more than 200 books each year issued by the NRC, the National Academy of Engineering, and the Institute of Medicine. The quarterly publication, *Issues in Science and Technology,* is a public policy forum for topics related to science and technology. *Women's Adventures in Science* is a biography series targeted to middle school girls and copublished by The Joseph Henry Press and Scholastic Library Publishing. It features trailblazing women in a variety of scientific fields from robotics to forensics. *Biographical Memoirs,* published since 1877, features the life memoirs and biographies of deceased Academy members.

More than 6,000 scientists from the National Academy of Sciences, the National Academy of Engineering, the Institute of Medicine, and the National Research Council volunteer to serve on committees to conduct and review cutting-edge scientific research. Funded primarily through federal and state agencies, as well as National Academies endowments, the studies produce between 200 and 300 reports on a wide range of scientific topics each year.

Activities and Resources

In addition to publications and funded research, the NAS promotes a number of science-related activities and resources. The Marian Koshland Science Museum in Washington, D.C., has been in operation since 2004. It features informative and entertaining exhibits on a variety of scientific topics, including the wonders of science, climate change, and DNA sequencing, as well as public events and educational programs.

Evolution Resources from the National Academies Press is a Web page designed to provide easy access to books, position statements, and additional resources on evolution education and research and to explore the links between scientific research and everyday life.

The Arthur M. Sackler Colloquia are organized four to six times a year by a committee of members from the Academy. Colloquia last 2 days, and typically feature presentations from leading scientists as well as a discussion among hundreds of other scientists on a broad range of interdisciplinary scientific topics.

The Kavli Frontiers of Science annual symposia have been organized by the NAS since 1989 for the purpose of bringing together talented young scientists to discuss their ideas and research. Approximately 25 scientists, all under the age of 45, are invited each year to present to a highly qualified trained group of researchers and writers, where they discuss research challenges and methodologies. The NAS has published the presentation proceedings from the years 1989, 1991, and 1992.

The National Academies Keck Futures Initiative is aimed at encouraging communication among researchers, funding organizations, universities, and the general public. Three core activities sustain the initiative, including conferences, grants, and communication awards. The Futures Initiative, which began its work in 2003 with a $40-million grant from the NAS and the Keck Foundation, is scheduled to run through 2018.

Cultural programs funded through the NAS include a number of rotating exhibitions and concerts that take place at the NAS building in Washington, D.C. Past exhibitions have included photography and painting exhibits as well as lectures related to a number of scientific topics. Concerts take place Sunday afternoons and often feature renowned, classically trained musicians and singers.

Distinctive Voices @ the Beckman Center is a popular series of lectures by scientists who speak about cutting-edge research that highlights innovation and discovery. The series takes place several times a month at the Beckman Center in Irvine, California, and is free of charge and open to the public.

Created in 1976, the Committee on Human Rights deals with the cases of 225 to 300 scientists who are unjustly imprisoned each year. The NAS works with the Institute of Medicine and the National Academy of Engineering under the guiding auspices of the Universal Declaration of Human Rights. Using the prestige of scientists from these three institutions, the Committee makes appeals to governments to encourage the release of these prisoners and provides moral support to detainees and their families.

Nancy Heilbronner

See also Nobel Prize; Scientifically Gifted; Scientists

Further Readings

National Academy of Sciences:
http://www.nasonline.org/site/PageServer

National Academy of Arts, Sciences, and Engineering

The National Academy of Arts, Sciences, and Engineering (NAASE) program is an acceleration program for highly gifted students. The NAASE program was founded in 1999 to provide an

academically challenging learning environment to assist gifted students in the development of their ability. This program is administered by the Belin-Blank Center for Gifted Education in affiliation with the University of Iowa, and provides an opportunity to enroll at the University of Iowa after the junior year of high school. Because this program does not include a transition stage for radical acceleration such as that provided by the University of Washington Early Entrance Program, the screening process is thorough to ensure the success of its students. To enter the NAASE program, students are expected to have completed their junior year in high school or the equivalent, to have a composite score on a standardized test such as the ACT or SAT at or above the national 95th percentile, and to have earned at least a 3.5 grade-point average (GPA) before applying to NAASE. Also, all qualified applicants are interviewed to determine each potential student's maturity, independence, and general readiness for the college environment.

Among many acceleration options, an early college entrance program such as the NAASE program is one of the radical acceleration programs for advanced high school students. Students enter college early to meet their intellectual needs. Although the early college entrance program is radical, college will provide valuable experience and motivation for learning if high-ability students are mature enough to adjust to college life. Also, advanced high school students may have experienced acceleration in any form by whole grade or by subjects.

If students are admitted to the university as NAASE students, they are automatically accepted as freshmen into the University of Iowa Honors Program. In these courses, unlike ones they may have experienced in high school, the NAASE students take challenging college-level classes and are eligible to undertake research with faculty members. When students decide to consider early college entrance, it can be a challenge to find suitable programs in prestigious universities because few early college entrance programs exist in the United States. The NAASE program offers high-quality courses and research along with support and guidance from the professional staff of the Belin-Blank Center. During the period from 1999 to 2006, 87 students from 15 states in the United States and 1 international student were enrolled on the NAASE program to meet their learning needs. Of these students, 82 percent were 17 years old at entry.

During the first year of the program, the NAASE students are required to live together in the honors residence hall. This residency provides students with the opportunity to socialize and to meet with professionals at the Belin-Blank Center for Gifted Education. Because research has indicated that homesickness is the primary difficulty for students during their first year at college, the program intends to help students develop a strong institutional connection. The Belin-Blank Center for Gifted Education offers a community for bright and motivated young scholars as well as a variety of specialized educational opportunities. In addition, the Belin-Blank Center leads the field in research and practice for talent development through its involvement in the development of curriculum resources for gifted students, the professional development of educators, the dissemination of information related to the education of gifted students, and its provision of an enhanced learning environment.

Although acceleration programs offer improved learning environments for gifted students, many parents and educators are cautious about acceleration programs like early college entrance because the success of these students in college is uncertain. However, a study performed by the Center for Talented Youth at Johns Hopkins University in 1994 found that 95 percent of the 175 youths in the study who had participated in acceleration programs perceived positive consequences, and less than 2 percent of the respondents reported negative effects. In their first year, NAASE students showed higher GPAs than the average GPA of regular freshmen in the college. Although some students have experienced negative consequences from acceleration, the majority have found acceleration to be a positive experience. Students enjoy in-depth learning in college, have the benefit of a peer group of similar ability, and are able to undertake research with faculty support during their college life. Furthermore, challenging courses both motivate students to learn more and promote self-esteem and a positive self-image.

Despite evidence that the majority of early entrance college students are academically successful, social and emotional issues cannot be overlooked. The NAASE program developers

acknowledge that early college entrance programs should meet the individual's social as well as intellectual needs. The Belin-Blank Center provides a first-year weekly seminar with Belin-Blank Center staff members that deals with various topics, including study skills, learning styles, time management, communicating with teachers, and preparing for graduate school, to assist students' transition to college life. In addition, students in the NAASE program have opportunities to meet with a Belin-Blank Center graduate assistant to discuss any issues or questions they have as they begin their studies.

Research has shown that about half of the students who drop out of the NAASE program do so during the first year. This statistic suggests that students and parents should be well informed regarding the benefits and possible hardships of the first year of the transition. Because early college entrance has been considered a radical way of supporting gifted students, there must be full recognition of the academic, social, familial, and transition issues, and these issues must be balanced against the needs of students. To ensure the success of early college entrance, students, parents, and educators should acknowledge that many other options for acceleration, including advanced courses, mentorship programs, and precollegiate programs, are available. If students require greater academic challenge than other options can offer, then the NAASE program, which is an early entrance program to college, can provide valuable experiences for their growth. In addition to the need for academic challenge, emotional readiness and parental support will be necessary for the successful transition to college.

Mihyeon Kim

See also Acceleration Options; Belin-Blank Center; Early Admission, College

Further Readings

Muratori, M., Colangelo, N., & Assouline, S. (2003). Early-entrance students: Impressions of their first semester of college. *Gifted Child Quarterly, 47*(3), 219–238.

Noble, K. D., Vaughan, R. C., Chan, C., Sarah, C., Chow, B., Federow, A., et al. (2007). Love and work. *Gifted Child Quarterly, 51*(2), 152–166.

Olszewski-Kubilius, P. (1995). A summary of research regarding early entrance to college. *Roeper Review, 18*(2), 121–126.

National Association for Gifted Children

The National Association for Gifted Children (NAGC) is an organization of parents, teachers, educators, other professionals, and community leaders who collectively advocate for the unique needs of children and youth with demonstrated gifts and talents as well as those children who may be able to develop their talents and potential with appropriate educational experiences.

NAGC supports and develops policies, standards, and practices that encourage and respond to the diverse expressions of gifts and talents in children and youth from all cultures, racial and ethnic backgrounds, and socioeconomic groups. NAGC also supports research and development, staff development, advocacy, communication, and collaboration with other organizations and agencies to improve the quality of education for gifted and all students.

NAGC was founded more than 50 years ago by a group of educators and parents to serve an estimated 3 million academically gifted children in classrooms across the United States. For more than five decades, NAGC has worked to increase public awareness of the needs of gifted and high-potential children and to create positive changes in their classrooms. More than 8,000 teachers, parents, educators, and researchers belong to NAGC, an organization that invests its resources to train teachers, encourage parents, and educate administrators and policymakers on how to develop and support gifted children and to understand the loss to society if high-potential learners are not challenged and encouraged.

Many state gifted education associations are affiliates of NAGC, and they offer an array of services, education opportunities, and publications for their members. Many of these groups host state conferences and also provide speakers to local groups and advocate for gifted students in their state capitals. The NAGC publishes *Gifted Child*

Quarterly (GCQ), acknowledged to be the preeminent scholarly journal of the field of gifted education. Since 1957, *GCQ* has published manuscripts offering new information and creative insights about giftedness and talent development, including quantitative and qualitative research studies written by experts in gifted education and related fields as well as manuscripts reviewing policy and policy implications. *GCQ* also serves an archival function for NAGC, publishing position papers and other official documents of the organization.

NAGC also produces magazines for both teachers and parents. *Parenting for High Potential,* a quarterly magazine, is designed for parents and caregivers who want to help develop their children's gifts and talents. *Teaching for High Potential* is a journal for educators, offering practical guidance and classroom-based materials for educators striving to understand and challenge their high-potential learners.

NAGC believes that in order to ensure that highly able learners are adequately identified and nurtured in our schools, it is essential that teachers are educated in the relevant theory, research, curriculum strategies, and educational practices necessary for developing and sustaining classroom-based opportunities for advanced student learning. NAGC has addressed this issue through its many publications, annual conferences, and professional development programs, as well as its comprehensive Web site, which contains practical information and resources for parents and teachers. The Web site also includes PreK–12 professional standards to help educators identify the characteristics of exemplary gifted programming, nationally approved standards to accredit college and university teacher preparation programs in gifted education, position statements that are well researched, endorsed viewpoints of NAGC, advocacy guides, a listing of summer programs, and helpful links to articles and Web sites that provide information about gifted education.

Sally M. Reis

See also Council for Exceptional Children—The Association for the Gifted; Davidson Institute for Talent Development; *Gifted Child Quarterly;* Torrance Center for Creativity and Talent Development

Further Readings

National Association for Gifted Children: http://www.nagc.org

National Merit Scholarship Program

The National Merit Scholarship Corporation (NMSC) conducts two annual scholarship competitions based on student performance on the College Board's Preliminary SAT (PSAT/NMSQT), which is also known as the National Merit Scholarship Qualifying Test. Some gifted children perform sufficiently well on the PSAT/NMSQT to qualify for recognition, scholarships, and other benefits flowing from the program.

The National Merit Scholarship Program provides opportunities for gifted students to gain recognition, scholarships, and college acceptance. The participation rules and procedures are complex; students can find pertinent information on the program's Web site or from their high school counselors. Students typically begin the competition process in October of their junior year in high school. Special rules apply to students who intend to finish high school in fewer than 4 years.

This entry discusses the mission, procedures, and benefits of the National Merit Scholarship Program, and discusses special issues relating to the program.

Mission, Procedures, and Benefits

The NMSC is a nonprofit corporation founded in 1955. Its mission includes identifying and honoring academically talented students. The primary program of the corporation is the National Merit Scholarship Program, which recognizes approximately 50,000 students annually.

A new cycle of the National Merit Scholarship Program begins each October when high schools around the country administer the PSAT/NMSQT to approximately 1.4 million students, most of whom are high school juniors. In December, the students receive their scores. Each score report includes a selection index score, which is the total of the student's critical reading, math, and writing

scores, each of which ranges from 20 to 80 points. A perfect selection index score is 240. In April, the NMSC uses a selection index cut point, usually near 200, to choose the top 50,000 scorers in the nation.

The following September, the NMSC names approximately 16,000 of those top students as semifinalists, and sends letters of commendation to the other 34,000 students. The selection index cut point varies by state, from near 200 to over 220. The NMSC varies the cut point in order to ensure that equal percentages of students are chosen from each state. Special rules determine cut points for boarding school students.

The NMSC invites each semifinalist to fill out an application form, write an essay, submit additional test scores, and send transcripts in order to advance in the scholarship competition. Of the 16,000 semifinalists, 15,000 advance to finalist status. Each year approximately 8,200 of the finalists win merit scholarships provided by the NMSC, corporations, and colleges. The total value of the National Merit scholarships awarded in 2007 exceeded 44.7 million dollars.

Some colleges and universities give full scholarships to students who advance to semifinalist status. The NMSC's 2007–2008 annual report shows which institutions attracted the largest numbers of National Merit awardees in 2008: Harvard University (285), the University of Texas at Austin (281), University of Southern California (254), Northwestern University (239), University of Chicago (222), Yale University (213), University of Oklahoma (178), Princeton University (175), Rice University (169), and the University of Florida (166). Carleton College has a high percentage of National Merit scholars in its student body; *The New York Times* reported that in 2006 Carleton admitted 99 National Merit scholars to its freshman class of 500.

Special Circumstances and Restrictions

Although the NMSC program is geared toward high school juniors, the official rules of the program invite students to participate in the program earlier if they intend to graduate early. Because NMSC will consider a student for scholarships during only one annual competition, students taking nontraditional paths through high school should choose with care which year they compete.

Lack of citizenship and poverty may pose barriers for some students who wish to participate in the program. The scholarship competition is restricted to students who are either U.S. citizens or permanent lawful residents (or applicants for permanent residence) who intend to become U.S. citizens as soon as possible. The College Board provides some fee waivers for low-income students.

Controversies and Research

Several controversies about the scholarship program have occurred. In 1994, the National Center for Fair and Open Testing filed a sex discrimination civil rights complaint against the College Board alleging that the PSAT was unfair to girls, who then made up 55 percent of the test-takers but only 39 percent of students winning National Merit scholarships. To settle the case, the College Board added a writing section to the PSAT. Because NMSC does not receive federal funds, it is not subject to the civil rights law involved in the case brought against the College Board.

More recently, a former College Board trustee raised claims that the test falsely defines merit and thus harms minority and poor students. Despite those claims, the College Board voted in 2005 to continue using the PSAT as the National Merit qualifying exam. In 2006, however, the University of California stopped giving scholarships to National Merit scholars, claiming that the scholar designation is unfairly based on just one test.

Results of the scholarship program occasionally have been used for research purposes. In one study, researchers found that a significant percentage of National Merit program scholars were judged as below the mastery level on standardized tests adopted by the state of Kentucky. The researchers assumed the validity of the National Merit scholar determinations and concluded that the Kentucky tests were highly suspect. In other studies, researchers have used National Merit scholar status as a proxy for gifted status.

Wenda Sheard

See also Academic Advising; Academic Talent; Guidance; Presidential Scholars; Scholarships

Further Readings

Closing the gender gap on the PSATs. (1996, October 14). *U.S. News & World Report*. Retrieved February 9, 2008, from Academic Search Premier.

Hoover, E. (2005, July 22). U. of California will stop financing National Merit Scholarships. *Chronicle of Higher Education, 51*(46), A25.

Lawton, M. (1996, October 9). PSAT to add writing test to settle bias case. *Education Week, 16*(6), 9.

National Merit Scholarship Corporation: http://www.nationalmerit.org

Noble, K. D., & Robinson, N. M. (1993). All rivers lead to the sea: A follow-up study of gifted young adults. *Roeper Review, 15*(3), 124–132.

Tutelian, L. (2007, April 22). At the top of the heap. *The New York Times,* pp. 4A, 14.

National Research Center on the Gifted and Talented

The National Research Center on the Gifted and Talented (NRC/GT) is a consortium of researchers dedicated to research on gifted and talented students. Directed by Joseph Renzulli, the NRC/GT was established in 1990 as the result of funding provided under the Elementary and Secondary Education Act of 1965 (ESEA; Title V, Part D, Subpart 6, Sec 5464(d); 20 U.S.C. 7253c(d)), otherwise known as the Jacob K. Javits Gifted and Talented Education Program. The statute charged the U.S. government with funding a national research center for education of gifted and talented youth to fund research activities on methods and techniques for identifying and teaching gifted and talented students and for using gifted and talented programming strategies and methods to serve all students. Hence, the mission of the NRC/GT from its inception has been to plan and conduct research on the psychology and education of high-potential youth from preschool through postsecondary levels and to investigate ways to integrate the practices of gifted education into regular classrooms and to develop ways to encourage the development of potential in students not ordinarily identified for gifted programs.

The NRC/GT has been committed to investigating practice-relevant questions and to creating consumer-oriented products. Accordingly, the NRC/GT has carried out a broad-based dissemination function. Very early in its existence, the directorate of the NRC/GT established a nationwide cooperative of researchers, practitioners, policymakers, and others with a stake in the education and psychological and social adjustment of gifted children and young people from all ethnic and cultural groups and from all socioeconomic strata.

Research Projects

In accord with the priorities of the federal legislation that established the Center, during the first year of the funding for the NRC/GT, the original consortium of universities (University of Connecticut, University of Georgia, University of Virginia, and Yale University) initiated research projects based on the agenda presented in response to the initial funding priorities focusing on identification, curriculum compacting, regular classroom practices in providing for needs of gifted students, learning outcomes related to grouping arrangements, program evaluation, curriculum modification based on Sternberg's triarchic theory of intelligence, and the identification of students from underserved populations from culturally diverse populations. In addition to the execution of these research projects, the NRC/GT carried out a national needs assessment to identify research priorities of the field, established relationships with more than 360 school districts as a Collaborative School District pool, and created a Consultant Bank with more than 175 members associated with nearly 100 universities. In the second year, studies of high-ability students in urban environments, staff development models, preservice teacher preparation, and the social and emotional adjustment of the gifted were added to the research agenda. In subsequent funding cycles, the U.S. Department of Education stipulated that there be increased emphasis on the importance of investigating the development of talent among students traditionally underserved in gifted programs. The research projects and principal collaborators from that time forward reflect that focus. As part of its contract with the U.S. Department of Education, the National Research Center on the Gifted and Talented was also commissioned by the U.S. Department of Education to carry out two national

evaluations of the demonstration projects funded under the Javits Act and to sponsor annual conferences for the state directors of programs for the gifted.

With each funding cycle, the NRC/GT reformulated its research agenda according to the newly stipulated government priorities, the results of available research in gifted education, and education in general. The researchers at the University of Connecticut, the University of Virginia, and Yale remained the core of the NRC/GT through 2007 and were joined by researchers from several other universities at various points in its existence. The University of Connecticut and the University of Virginia have been funded to execute the current research project funded by the Department of Education.

The products produced as a consequence of the research of the NRC/GT have been designed to reach a wide spectrum of stakeholders. The audiences for NRC/GT products were identified as researchers, policymakers, administrators, teachers, counselors, and parents. Not only have the topics for research included areas of interest to these constituencies, but the types of products created as a result of the research and commissioned work by the NRC/GT represent a wide variety of outlets for communicating research findings. Hence, for each technical report produced, the authors were responsible for creating an executive summary that could be distributed independently of the full report. The researchers also wrote articles both for research journals in gifted education and in the general education field, and presented at local, regional, and national conferences. The Directorate of the NRC/GT has produced one-page bulleted summaries of the research findings, practitioner trifold brochures (some available in both English and Spanish), newsletters summarizing the research agenda and research carried out by the NRC/GT and other researchers, and videotapes with accompanying handout packets based on the Center's research. Through 2005, newsletters summarizing the NRC/GT research projects and other research being conducted in affiliated universities were distributed regularly. Nearly 3,500 presentations have been made to more than 1.5 million attendees by Center staff, and nearly 1,800 journal and magazine articles, books, and chapters have been published on NRC/GT work since 1990.

Products

In addition to the products related to the specific research studies of the Center, work was begun in 1990 to commission and publish work authored by members of the Consultant Bank on controversial topics identified by the National Research Center Advisory Board, representatives of the Consultant Bank, and later, on topics identified through the national needs assessment. The first of this series, the Research Based Decision-Making (RBDM) monographs, included reviews and meta-analyses of the literature on such topics as grouping practices, self-concept, cooperative learning, identification in the arts, and ability grouping authored by members of the Consultant Bank. RBDM monographs have been produced by NRC/GT collaborative researchers on additional topics ranging from attention deficient disorder and creativity, to counseling gifted African American students, to gifted students with behavioral problems. During the 2000–2005 funding cycle, the NRC/GT collaborated with the Great Cities' Universities (a coalition of 19 urban research universities dedicated to making a positive difference in urban environments) to commission four papers on strategies for producing high academic achievement among minorities and sponsored a symposium to respond to those papers. In addition, Senior Scholars were identified and invited to prepare monographs about the most defensible, research-based identification and programming practices. The authors were charged with providing a summary and analysis of a particular topic within the monographs as well as practical advice to practitioners and advice on what direction the field should be moving. Thirteen monographs were produced in the series. An NRC/GT Web site guides consumers to all the products of the NRC/GT as well as other Web sites in the field of gifted education. The available materials are organized by topic and author, and include the following: Acceleration, Affective Learning, Characteristics of Creative Students, Characteristics of Gifted Students, Curriculum Models, Definition of Giftedness, Elementary Program, Enrichment, Gifted Children With Disabilities, Grouping, History of Giftedness and Gifted Education, Identification Models, Middle School Programs, Parenting the Gifted Child, Primary Programs, Program Evaluation, SEM-R Study,

Secondary Programs, Self-Concept, Thinking Skills, and Underachievement. At the end of 2007, 113 monographs (NRG/GT research technical reports, Research Based Decision-Making Series, Senior Scholar Series, and research reports on other topics), 38 trifolds, four videotapes, and two CDs had been produced. The newsletter articles and all out-of-print monographs are available for free by downloading them from that Web site. Others may be obtained at cost from the NRC/GT.

Future Directions

The 5-year plan for research focus during 2006–2011 is an empirical study including quantitative and descriptive understandings of "what works in gifted education." The emphasis on identification, instructional/curricular models, and traditional and performance-based assessments is designed to demonstrate how to nurture and develop the talents and abilities of young people while promoting equity and excellence in the general education program.

Carolyn M. Callahan

See also Javits Program; Research, Qualitative; Research, Quantitative

Further Readings

Gubbins, E. J., St. Jean, D., Berube, B. N., & Renzulli, J. S. (1995*). Developing the gifts and talents of all America's students—1990–1995* (RM9522). Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Neag Center for Gifted Education and Talent Development: http://www.gifted.uconn.edu

Renzulli, J. S. (1991). The National Research Center on the Gifted and Talented: The dream, the design, and the destination. *Gifted Child Quarterly, 25,* 81–83.

Renzulli, J. S., & Reid, B. D., & Gubbins, E. J. (n.d.). *Setting an agenda: Research priorities for the gifted and talented through the year 2000*. Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

University of Connecticut, University of Virginia, Yale University. (n.d.). *The National Research Center on the Gifted and Talented. 2000–2006 research studies: Abstracts and executive summaries*. Storrs: University of Connecticut, National Research Center on the Gifted and Talented.

Native American, Gifted

Native American gifted students, also called American Indian and First Nations students, may be the most underserved of all gifted populations in the United States. They have a history that is shared with many colonialized, indigenous people like the Aboriginals or Koorie of Australia, or the peoples of the Pacific Island nations. These include invasion of their lands, disruption or destruction of lifeways and spiritual traditions; violation of women and conscription of men into military, agricultural, or menial work of the conquerors; kidnapping and forced reeducation of children into the dominant culture's ways; and decimation or extinction of populations through disease, starvation, and murder. Native Americans also have their own unique history of many migrations, rise and fall of cities and nations, and a population that once ranged over two continents and diversified into hundreds of cultures and languages. The impact of history of subjugation, impoverishment, and the spread of disease and alcoholism is great upon this population of students; but so is the impact of the rich, compelling, complex world views of the tribes, nations, and communities that make up Native America. This entry first describes educational practices as they have evolved with Native American students, and early attempts by educators of gifted to develop identification and programming for Native Americans.

Indian Boarding Schools

Native American children, beginning in the 1870s, were subject to a national policy of "Americanization." The instrument of this process was the *Indian boarding school*. The original missionary-led schools on reservations were replaced by Bureau of Indian Affairs schools, and many Native American children were forcibly removed from their homes to attend boarding schools on the reservation or far from home in Indian Schools in cities and towns. These schools had as their goal the extinguishing of Indian languages (students were not allowed to speak their own languages); the replacement of Indian foods, clothing, and customs with European American ones; and the training of Indian children for

vocational and agricultural work. Enrollment in these schools grew steadily, with the highest enrollment in the 1970s of 60,000 students out of a population of about 500,000 children and adults. Since that time, it has been documented that these students suffered psychological problems, abuse, and mismanaged and inferior education at most of these schools. The Indian Self-Determination and Education Assistance Act of 1975 encouraged community schools and community input into the educational process, resulting in many large Indian boarding schools being closed in the following decades. By 2007, only 9,500 American Indian children lived in Indian boarding schools, out of a rapidly growing population of 1.5 million.

Because the purpose of Indian boarding schools was complete assimilation, those students who adapted best to European American culture were recognized as the best and brightest. Students who obeyed the rules and passed courses with excellent grades might be recognized with awards, special tutoring, and occasionally scholarships to colleges. No efforts were made to identify or educate Native American students who did not assimilate or perform well in what was, for them, an alien culture. In each generation, a few extraordinarily resilient Native Americans not only succeeded in these schools, but have gone on to become leaders, educators, and policymakers.

Since the Indian Self-Determination and Educational Assistance Act, great changes have taken place in schooling of Native American children. Nevertheless, the legacy of the boarding schools remains in loss of languages and traditions; deracination of Native American students through adoptions to non-Indian families; displacement into urban centers; and disbursement as minority populations in urban, non-Indian schools.

Most Native American children now go to public schools, both on and off the reservation. A strong movement has begun among Native American people to reclaim language, culture, and religion, and many of the new community schools on reservations reflect this movement. Those Native American children who go to public schools with non-Indians off the reservation are likely to have only gifted education programs that are developed for white, English-speaking children.

Great Diversity and Profound Differences

Because there are 561 federally recognized tribes, nations, and communities of Native Americans, there is an extreme diversity of languages, history, traditions, and world views. Native American gifted children may speak only English; may have learned their tribal language as their first language, and speak English as a second language; may speak English, but have learned their tribal language in their home, often from grandparents; or may speak English, but are learning their tribal language in school. Many of these students are multilingual; for example, many Navajo students understand other Athabaskan languages such as Apache and use some of the Hopi language and the Spanish of their neighbors.

Each tribe has a history that may cover thousands of years of residence in the same place; of removal from homeland; or of having both land and customs devastated and families dispersed. For many Native American children, the grief resulting from the loss of culture is unresolved through generations. Many Native American scholars attribute the high rates of poverty, substance abuse, domestic abuse, and unemployment to the loss of cultural traditions, and see these risk factors as interrelated. The majority of scholars agree that the key to well-being for Native American youth is not assimilation into the dominant culture, but rather an education that embraces the tribal culture as well as providing skills that allow young people to succeed in the dominant culture. Given the great difficulties of providing sustenance and education in both cultures, biculturalism remains an ideal that is available to only a minority of students.

Although traditions include stories, songs, ceremonies, and ways of living and relating to others that are vastly different from one tribe to another, nearly all Native American people have a reverence for the knowledge and wisdom within these traditions. Because this knowledge has been passed down by their elders, and not from texts or school learning, elders' wisdom is cherished by most tribes. Finally, the world views of Native Americans are often profoundly different from those of non–Native Americans. Various scholars have attempted to describe common themes in Native American world views, and there is general consensus about a few of these. One difference is an emphasis upon

a harmonious relationship with the Earth; all things, inanimate and animate, belonging to the Earth are regarded as sacred. Another is the belief that the life and interests of the community are more important than the life and interests of the individual. Within this context, individual achievement has little value apart from the good that results for the community. Competitiveness and self-promotion are seen as negative, selfish traits and cooperativeness and generosity are seen as critically important to good character. Despite this collectivist or communal orientation, great individuality in person tastes, interests, humor, friendships, and occupations is encouraged.

Harold Begay and C. June Maker, in "When Geniuses Fail: Na Dene' (Navajo) Conception of Giftedness in the Eyes of the Holy Deities," show how profoundly Native American views of giftedness and education can differ from European American conceptions. They show how, among the Navajo, giftedness is perceived as a special maturity, or *hoya,* that is a gift from the sacred deities. The gifts are described as follows:

> *Category 1: Ayoo Ba'iliil*—Extraordinary transcendent power to cause effect
>
> *Category 2: Ayoo Ba'iideelni*—Skill to cause a consequence in concrete and immediate matters
>
> *Category 3: Ayoo t'aa doo le'i nizhonigo iil'I*—Exceptional ability to always do things or make things in the right way, exemplifying highly desired character values

These gifts may be manifested in childhood as a special capacity for healing, a role as caretaker of Earth and its beings, the symbols and ways of communication with the deities, and the ceremonies that bring health; for peacemaking through empathy; for leadership through consensus and self-discipline; for being a family provider; or for being skilled in traditional arts, cuisine, handling of livestock, making the home structure, storytelling, and teaching. The child's gifts are noticed and observed carefully by elders, who gradually introduce the child to adult knowledge and skills appropriate to the child's gifts. Begay shows the complexity and care that is taken in the teaching, for example, of the skill of a dry painting, with symbols represented by as many as 10,000 words, or of the memorization of many hours of oral chants and prayers. All of this intricate, highly emotional and spiritual teaching takes place with subtlety and quietness, so that gifted children learn to be humble and generous with regard to their talents.

Identification

Identification by intelligence tests, achievement tests, and current formulae are highly unlikely to select Native American students, except those who are most assimilated and therefore unaware of their own culture. Intelligence tests often contain items and tasks that are alien to Native American culture and world view. Achievement tests, in themselves, are antithetical to many Native American cultures that discourage intellectual competition. Most multiple choice tests begin with, "Choose the best answer," a concept that does not make sense to children whose word for "best" is not "the one that excels over others" but "the one that is most harmonious."

Stuart Tonemah was one of the earliest proponents of appropriate, multiple criteria assessment for Native American gifted students. He was active in the development of the American Indian Research and Development, Inc. (AIRD), project that examined assessment procedures to identify those that use the concept of multicriteria assessment. Only a few were found to be appropriate for use with American Indian and Alaska Native gifted. AIRD created the *American Indian gifted and talented assessment model* (AIGTAM), with multiple assessment techniques to predict future tribal leadership, individual fulfillment, and cultural understanding.

The multicriterion assessment approach allows students to be nominated by parents, school, community, tribe, peers, or themselves. Once a student is nominated, a case study approach using the Indian Student Biographical Data Questionnaire (ISBDQ) provides a variety of data regarding skills in leadership, creativity, visual arts, performing arts, and tribal/cultural understanding. A panel of Indian educators, gifted and talented educators, school administrators, and tribal representatives assists in making the decision.

Another approach to identification of Native American gifted was the DISCOVER Project (*D*iscovering *I*ntellectual *S*trengths and Capabilities while *O*bserving *V*aried *E*thnic *R*esponses), begun

in 1987 under the direction of C. June Maker. Her theory of giftedness included the idea that the most important component of exceptional success was the superior ability to solve complex problems. The DISCOVER Projects were created to study, categorize, and measure a broad spectrum of "problem-solving strategies" used by various age groups of different ethnic, economic, and cultural backgrounds. Her research suggested that different intelligences could be measured effectively by observing the number and the choice of problem-solving strategies an individual uses.

Through a Javits grant, Maker was able to test the DISCOVER method with Navajo children, and found that the method was effective in identifying gifted children with advanced, specialized problem-solving abilities that would have been overlooked by conventional testing methods. Maker cautioned, however, that DISCOVER is not a curriculum, and that efforts need to be made to develop appropriate gifted education strategies for children identified with these techniques.

Native American Culturally Based Gifted Education

In studying gifted Native American students attending a summer program, AIRD found that Indian students preferred cooperative learning rather than conventional competitive classrooms. They learned that these students enjoyed being with their peers rather than spending all their time in regular classrooms. They incorporated these elements into program design. A holistic design that included physical, intellectual, social, emotional, and traditional components was used to enhance the greatest development of their potential. A cornerstone of the AIRD program design was the Individual Educational Plan that used the results of the assessment to create ways of teaching basic information, applying that information in real situations, and integrating that information into the rest of the student's knowledge and world view. The program made careful use of Native American role models and self-confidence-building exercises.

The Jacob Javits federal funding program for gifted education, with an emphasis on underserved populations, held great promise for the development of culturally appropriate gifted education programs for Native American gifted students. Funding for Native American gifted programs grew until 2006, when funding for the Javits program was cut. An example of a Javits program that integrated cultural identity into a gifted education program was the Dream Catchers Gifted and Talented Project for Arapahoe students. The Dream Catchers project had three interventions: Mastery Leaning, Creative/Artistic Expression, and Community Service/Social Responsibility. Programs like the Dream Catchers program have proliferated in tribal schools throughout the United States. In addition to these comprehensive programs are specific strategies that stress involvement with elders, learning traditional arts, and immersion in indigenous languages. Adopt-an-Elder programs provide stipends to elders to share history, language, and arts knowledge with students; Native American art galleries and museums provide programs for talented Native American art students; and community colleges located near reservations offer classes in Native American languages, available to advanced high school students.

Finally, the National Science Foundation (NSF) has funded programs designed to encourage talented Native American students in science. The Summer Science Camp for Native American Youth, developed by the Center for Native Peoples and the Environment (CNPE) at the State University of New York (SUNY) College of Environmental Science and Forestry (ESF) nurtures motivation and preparation for higher education in environmental sciences among Native American youth, through this summer science experience that combines scientific and traditional ecological knowledge. NSF also funded a guidance program for talented at-risk girls, serving Navajo, Pima, and Apache girls with math/science talent, at Arizona State University; the program was found to have built math/science self-efficacy, self-esteem, and hope for the future.

Final Thoughts

The above are rare examples of culturally appropriate gifted education. Most Native American gifted children are still identified in the usual ways and expected to succeed in gifted education programs that have little relevance to their own culture. Despite the many difficulties of attaining a culturally relevant education, maintaining self-esteem and

self-efficacy, and finding a harmonious balance between achievement and giving back to the community, increasing numbers of Native American children are becoming successful as bicultural, bilingual members of American society.

Barbara Kerr

See also Cultural Conceptions of Giftedness; Underrepresentation

Further Readings

Begay, H., & Maker, C. J. (2007). When geniuses fail: Na Dene' (Navajo) conceptions of giftedness in the eyes of the Holy Deities. In S. N. Phillipson & M. McCann (Eds.), *Conceptions of giftedness: Sociocultural perspectives*. Mahwah, NJ: Lawrence Erlbaum.

Robbins, R. (1991). American Indian gifted and talented students: Their problems and proposed solutions. *Journal of American Indian Education, 31*(1), 56–63. Retrieved December 28, 2008, from http://jaie.asu.edu/v31/V31S1Ame.htm

Tonemah, S. A. (1991). Philosophical perspectives of gifted and talented American Indian education. *Journal of American Indian Education, 31*(1), 24–30. Retrieved December 28, 2008, from http://jaie.asu.edu/v31/V31S1phi.htm

Neuropsychology

Neuropsychology concerns itself with brain functioning in both healthy and pathological states, using tools such as functional imaging, specific cognitive or behavioral tasks, trained observation, and data gathering. A neuropsychologist is a licensed psychologist with expertise in how behavior and skills are related to brain structures and systems. This expertise is gained through special training during graduate school, as well as 2 years of formal training during internship and postgraduate years. Neuropsychologists often informally divide themselves into two groups, those who prefer engaging in research and those who focus on clinical work with patients. Clinical neuropsychology is the study of behavior and cognition as it is affected by neurodevelopmental anomalies and injuries and diseases that affect neurological functioning. Giftedness is rarely a topic of inquiry.

Neuropsychological Evaluations

Neuropsychological evaluations are typically requested specifically to help doctors and other professionals understand how the different areas and systems of the brain are working. Neuropsychological assessments are broader than traditional psychological or psychoeducational evaluations, and are often used to answer questions or resolve contradictions that remain after a more basic evaluation.

A neuropsychological evaluation typically assesses the following: general intellect; higher-level executive skills (e.g., sequencing, reasoning, problem solving); attention and concentration; learning and memory; language; visual-spatial skills (e.g., perception); motor and sensory skills; and mood and personality. Some abilities may be measured in more detail than others, depending on the specific situation.

The evaluation produces not only qualitative data about a person's neurological functioning, but it also provides objective benchmarks that allow comparisons to scores from people who are demographically similar. By using a database of scores from large groups of healthy people for comparison, a neuropsychologist can judge whether or not the scores are normal for the subject's age and educational background. The pattern of test scores can be reviewed to estimate whether or not there have been changes in certain abilities. How the subject goes about solving the various problems and answering questions during the examination will also be noted. These methods reveal a person's unique profile of strengths and weaknesses.

Neuropsychological assessment results can be used to understand an individual's situation in a number of ways:

- Testing can identify weaknesses in specific areas. It is very sensitive to mild memory and thinking problems that might not be obvious in other ways. When problems are very mild, testing may be the only way to detect them and formally identify them. Gifted individuals often perform at levels that require elevated skills, and subtle deficits and strengths can have a disproportionate effect when tasks are challenging.

- Testing can also help determine whether memory changes are normal age-related changes or if they reflect a neurological disorder. Testing might also be used to identify problems related to medical conditions that can affect memory and thinking, such as medication side effects, diabetes, metabolic or infectious diseases, or alcoholism.

- Test results can also be used to help differentiate among illnesses, which is important because appropriate treatment depends on accurate diagnosis. Different illnesses result in different patterns of strengths and weaknesses on testing. Therefore, the results can be helpful in determining which areas of the brain might be involved and what illness might be operating. For instance, testing can help to differentiate between Alzheimer's disease, stroke, or depression. Depression can profoundly undermine cognitive performance and a gifted, depressed child may be excluded from gifted programs in error.

- Sometimes testing is used to establish a baseline, or document a person's skills before there is any problem, such as before a medication trial. In this way, later changes can be measured very objectively. For example, a perfectionistic, inattentive child may respond well to a stimulant medication or it may heighten anxiety and worsen performance.

- Test results can be used to plan treatments that utilize strengths to compensate for weaknesses. The results help to identify what target problems to work on and which strategies to use. For example, the results can help to monitor and rehabilitate the recovery of skills after a neurological injury or to help an individual who is twice exceptional develop strategies for working around an attention deficit or tendency to become overloaded by sensory stimuli.

- Studies have shown how scores on specific tests relate to everyday functional skills, such as managing money, driving, or readiness to return to work. This applies to individuals with injury, but it can also be used to document competence of exceptional ability that exceeds that of a person's age peers.

A neuropsychological evaluation usually consists of an interview and testing. During the interview, a neuropsychologist may ask about symptoms; educational, work, and medical histories; medications; and other important factors. Testing involves taking pencil-and-paper or computerized tests and answering questions. The time required depends on the problem being assessed. In general, several hours would be needed to assess the many skills involved in processing information.

Pediatric Neuropsychology

Evaluating cognitive development in children is more challenging because their functional abilities are often described, accurately, as a moving target. Children's skills emerge on their own unique schedules, with some gross reference to the standard developmental trajectory. Injuries and deficits may not be apparent until children enter the middle and high school years; difficulty with abstract thinking appears as a problem only when children fail to master the reasoning abilities and self-regulation skills of normal development. If a 3-year-old throws a tantrum when a parent refuses to buy chewing gum, we call it normal (or maybe naptime). If a 17-year-old does it, we call it pathological.

Children are also part of larger systems, and any intervention requires working with parents, the schools, and medical practitioners. Speaking practically, there is no such thing as an individual intervention with a child. Children are usually referred to neuropsychologists for slightly different problems. These may include the following: difficulty in learning, attention, behavior, socialization, or emotional control; a disease or inborn developmental problem that affects the brain in some way; or a brain injury from an accident, birth trauma, or other physical stress. Testing can help detect the effects of developmental, neurological, and medical problems, such as epilepsy, autism, attention deficit hyperactivity disorder (ADHD), dyslexia, or a genetic disorder.

Different childhood disorders result in specific patterns of strengths and weaknesses. These profiles of abilities can help identify a child's disorder and the brain areas that are involved. For example, testing can help differentiate between an attention deficit and depression, or determine whether a language delay is due to a problem in producing speech, understanding or expressing language, social shyness,

autism, or asynchronous development. A neuropsychologist may work with a physician to combine results from medical tests, brain imaging, or blood tests to sort through the effect of a child's difficulties. Testing provides a better understanding of the child's behavior and learning in school, at home, and in the community. The evaluation can guide teachers, therapists, and parents to help a child achieve better his or her potential.

Neuropsychological Evaluation of Gifted Individuals

Giftedness has not been a typical domain of study for neuropsychologists because the profession has historically been focused on pathological states. There have been no presentations at the national-level neuropsychology conferences nor have there been any articles in the primary journals addressing the issues of giftedness per se. Most neuropsychologists will not be familiar with the literature on giftedness, but they will have the advantage of being very familiar with the idea that an individual can have profound abilities and profound disabilities simultaneously. Neuropsychologists routinely see accomplished, brilliant individuals who have sustained strokes or mild traumatic brain injuries and now struggle to reconcile performing at the two end points of ability. Neuropsychologists are most helpful in evaluating twice-exceptional individuals, gifted individuals with complex medical or developmental histories, and individuals with perplexing or contradictory assessment findings.

Nadia E. Webb

See also Neuroscience of Creativity; Neuroscience of Intelligence; Neuroscience of Leadership; Twice Exceptional

Further Readings

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, P. F., & Olenchak, R. (2004). *Misdiagnosis and dual diagnoses of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders*. (2004). Scottsdale, AZ: Great Potential Press.

Neuroscience of Creativity

Creativity has been one of the single greatest influences on human civilization and culture. It allows individuals, cultures, and civilizations the ability to grow and to adapt to unique situations. Creativity allows people to create novel tools to make life easier, or create unique stories to describe the world, or come up with novel solutions to difficult problems. In short, creativity has allowed humankind to grow and thrive continuously and to adapt to any situation. Creativity plays a key role in problem solving, adaptation, and learning.

Creativity can be defined as a cognitive activity that results in a new or novel way of viewing a problem or a situation. Creativity is an indispensable tool, or potential, that we all share. It is associated with intelligence, imagination, insight, and innovation. It is not a single trait, ability, or skill, but rather a combination of several factors. Where creativity originates—more specifically, its location or origin in the brain—is a question that researchers have never previously been able to answer. The past 20 years, however, have seen the advent of new technologies that are allowing researchers to study the human brain as never before. Prior to brain imaging techniques, creativity was seen as a rather ambiguous topic, one that could not be easily defined or studied. Functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) are two new tools that have allowed the study of the human brain in vivo, while it is working. Prior to this watershed period in research technology, scientists and researchers were forced to study creativity by indirect methods and simple guesswork. Now they are able to view the brain and which areas of it are actively working as individuals perform certain creative tasks, such as writing unique stories or thinking up images in their minds.

Theories and Research

Although the origins and seat of creativity have been studied repeatedly throughout the years, there has been no dominant theory in the last 20 years that has pulled together the contrasting and sometimes inconsistent studies of creativity.

What is known is that creativity is influenced by both genetics and the environment. It is a mixture of each individual's genes, combined with his or her unique environmental experiences and influences. It is novel, unique or unexpected, and appropriate, useful, and adaptive. It can be fostered and used by anyone, to differing extents and pursuits.

Initial studies of the neuroscience of creativity were actually done as far back as 1964, albeit by accident. Roger Sperry studied individuals who had received commissurotomies, which is the cutting of the corpus callosum. The corpus callosum serves as the bridge between the two hemispheres of the human brain; when it is cut, neither side can communicate with the other side. It is as if each hemisphere were alone in the human body. Sperry found that these "split-brain" individuals showed an astounding lack of creativity after the commissurotomy. He hypothesized that creativity was situated in the right hemisphere of the human brain. This belief has given way, however. The initial studies on this topic, published in 1964, were done with a small sample size and in a limited portion of the population (individuals with commissurotomies). Numerous studies since then have shown that both hemispheres contribute to creativity. Thus, there is no one seat of creativity in the human brain. Rather, creativity is derived from several different areas.

Arne Dietrich, currently working at the University of Beirut, Lebanon, is presently researching the neurocognitive mechanisms of creativity. Dietrich emphasizes the importance of using current cutting-edge knowledge in cognitive and neural processes as a stepping-stone for research into the neuroscience of creativity while eliminating the outdated beliefs that have plagued the field. Mark Jung Beeman has been studying how people think; specifically, high-level cognition in the neuroscience of insight and the "Aha!" experience.

Genetics and Environment

Genetics set a range in which the environment and experience have an effect on an individual. Genes provide the basis for the neuro-anatomical composition of the brain. Multiple research studies have looked at which specific receptors result in creativity. Several specific receptors have been found to manifest themselves in latent creativity. The higher the amount of dopamine, for example, that one has is related to increased goal-directed behavior. High dopamine levels in conjunction with temporal lobe function result in creative drive. Much research on the genetic basis of creativity has come from twin and adoption studies, as well as family genealogies.

Role of the Frontal Lobe

The human brain consists of several main structures and systems. The most frontal of these is the frontal lobe. This area is in charge of motor functions, executive functioning, planning, reasoning, judgment, impulse control, and memory. Behind this lobe is the parietal lobe, which deals with information processing, pain and touch sensation, spatial orientation, speech, and visual perception. Below this region is located the temporal lobe, which handles emotional responses, hearing, memory, and speech. The region of the brain farthest to the back is the occipital region. The occipital lobe controls vision and color recognition. In sum, the temporal-occipital-parietal region is devoted mainly to perception and long-term memory. The area in which to begin research into the neuroscience of creativity is the frontal lobe, specifically the prefrontal cortex.

The prefrontal cortex integrates highly processed information and complex cognitive behaviors, allowing cognitive functions such as self-construct, complex social function, willed action, planning, theory of mind, self-reflective consciousness, cognitive flexibility, and abstract thinking. It is believed to be involved with arousal, attention, consciousness, and personality expression. Because one of the keys to creativity is novelty, circuits in the prefrontal cortex are necessary to transform this novelty into creative behavior. These circuits make novelty fully conscious, evaluate its appropriateness, and implement its creative expression. Put another way, the prefrontal cortex allows highly integrative computations of conscious experiences, allowing novel combinations of information to be recognized and applied to works, such as science or art. It is necessary to store this information in order to compute the complex cognitive functioning necessary for creativity. Working memory, attention, and sustained and directed attention across time are the infrastructure that

allows the mind to work creatively. The prefrontal cortex also inhibits inappropriate or maladaptive emotional and cognitive behaviors.

The prefrontal cortex can be further subdivided into the ventromedial prefrontal cortex (VMPFC) and the dorsolateral prefrontal cortex (DLPFC). Functional imaging studies have shown that the DLPFC is responsible for semantic memory retrieval, working memory, and sustained attention. The VMPFC is specialized for social function, abstract thought, and future planning. Working memory is the ability of the human brain to process information. It is a limited-capacity storage system that allows information to be kept online in order to be mentally manipulated and is responsible for our immediate conscious experience of the here and now. This is a requirement for abstract thinking, strategic planning, long-term memory access, cognitive flexibility, and sentience itself.

Types of Creativity

It is believed that novelty is inherent and inevitable due to the sheer volume of information processing that occurs in neural circuitry. Appropriateness, the second part of creativity, depends on the higher-order structures of the brain that assess the complex and variable rules that individuals come across in their culture. Thus, creativity is essentially Darwinian in that it uses a variation–selection process to determine which ideas are in fact creative.

There are believed to be four basic types of creativity. Novelty production occurs in either cognitive or emotional structures, combined with two types of processing, deliberate and spontaneous. All four types of creativity are assessed by the prefrontal cortex, allowing novel thought into consciousness; applying cognitive functions such as attention, working memory, and abstract thinking; and implementing of the results of the insight.

Controversies

There have been some controversies associated with creativity research. The first of these is the relationship between age and creativity; specifically, how creativity changes with age. Because creativity is reliant on the prefrontal cortex, it should be related to prefrontal cortex development across the life span. The prefrontal cortex is the last major brain structure to mature, around the early 20s. It is also the first to decline in old age. This explains the somewhat inappropriate and less-structured creativity of children and the declines in cognitive flexibility and working memory associated with old age. Despite the research discoveries, there is still disagreement over the exact relationship, with some arguing that increased age results in greater creativity, while still others argue that individuals are at their most creative as children. The simple answer, at this point, is somewhere in between. Between prefrontal cortex maturation and decline, individuals should be at their most creative.

Another controversy in the field is the relationship between creativity and knowledge. It is widely accepted that knowledge is essential for creative thinking; however, the nature of this relationship is not agreed upon. Some argue that too much knowledge restrains creativity, whereas others believe that increases in either are good for both. Still others believe that all problem solving is based on knowledge. It is important to note that knowledge is stored in the temporal-occipital-parietal regions of the brain and that creativity is made possible by the cognitive abilities of the prefrontal cortex.

Future Research and Current Knowledge

The neuroscience of creativity is a field that still holds much to be learned. Creativity tests and studies have given researchers a broad knowledge base to work from. The advent of brain-imaging techniques has allowed researchers to study this area as never before, but there is still much to be done. There is a lack of communication between neuroscience and creativity testing and research. It is important for both fields to come together more. None of the major measures of creativity has been used in combination with functional neuroimaging tools or other measures of the brain. In addition, the link between mental illness and creativity can and should be described more precisely than it has been to this point. Another topic of future research should be the influence of emotions on cognitive processes underlying creativity. Do altered moods, for example, result in greater or less creative ability? A final area of

future research involves creating better and more accurate psychometric measures of creativity. Existing tests suffer from poor validity and inconsistent results. Instruments that better utilize working memory or sustained attention, for example, in tests of creativity, would provide better insight into the dependence of creativity on specific brain structures and regions.

The neuroscience of creativity is a complicated yet powerful field of research. Despite the initial difficulties in defining and studying creativity, more information is being discovered at a rapid rate. What is generally agreed is that creativity is both novel and appropriate to the given circumstances, and that it is a function of both genetics and the environment. It is evident that the prefrontal cortex enables cognition, which allows creative ability, the essence of cognitive flexibility. The prefrontal cortex allows cognitive abilities such as sustained attention, cognitive flexibility, judgment of propriety, and working memory required for creativity. Converging evidence from fMRI, PET, and EEG studies suggest that activation of the frontal lobes clearly differentiates creative from noncreative tasks, and that creative individuals have greater efficiency in frontal lobe functions. The temporal, occipital, and parietal regions of the brain allow perception and long-term memory storage, two other prerequisites for creativity. Though there is still much to be done in the field, researchers now know a great deal about the neuroscience of creativity.

Samuel Loren Deutch

See also Adolescent, Creative; Creative Process; Creativity, Definition; Creativity Assessment; Creativity in the Workplace; Creativity Theories; General Creativity; Genetics of Creativity; Psychotherapy; Relationship of Creativity to Intelligence

Further Readings

Damasio, A. R. (2001). Some notes on brain, imagination, and creativity. In K. H. Pfenninger & V. R. Shubik (Eds.), *The origins of creativity* (pp. 59–68). Oxford, UK: Oxford University Press.

Dietrich, A. (2004). The cognitive neuroscience of creativity. *Psychonomic Bulletin & Review, 11,* 1011–1026.

Kaufman, J. C., & Sternberg R. J. (Eds.). (2006). *The international handbook of creativity.* New York: Cambridge University Press.

Pfenninger, K. H., & Shubrik, V. R. (2001). Insights into the foundation of creativity: A synthesis. In K. H. Pfenninger & V. R. Shubrik (Eds.), *The origins of creativity* (pp. 213–236). Oxford, UK: Oxford University Press.

Runco, M. A. (2007). *Creativity theories and themes: Research, development, and practice.* New York: Elsevier Academic.

Solso, R. L., Maclin, M. K., & Maclin, O. H. (2005). *Cognitive psychology* (7th ed.). Boston: Pearson Education.

Neuroscience of Intelligence

Studies of twins show a strong genetic basis for differences in performance on psychometric measures of intelligence. Most estimates indicate 50 to 80 percent of the intelligence differences among people are due to heredity, with the highest heritability in older people. Since genes work through biology, there must be some biological basis to intelligence. Identifying the specific biological properties of the brain that are responsible for intelligence, however, has remained elusive. Once any brain property is found to be associated with intelligence, even if there is a strong genetic basis for the property, how that property develops and how it may be influenced by other biological and nonbiological factors are separate issues. An understanding of the neurobiological factors related to intelligence may have implications for optimizing brain development, learning, and cognitive performance. Treatments for the low intellectual ability that defines mental retardation might be possible in some cases. Concern about Alzheimer's disease has focused considerable interest on the potential for drugs to increase learning and memory, two critical aspects of intelligence. This raises a question as to whether any such drug could increase general intelligence (i.e., what is common among all cognitive tests, often called *g*) or specific cognitive abilities (e.g., mathematical reasoning). Creativity, which is related to intelligence, also may be related to specific brain characteristics amenable to change or enhancement.

With these motivations, neuroscience studies of intelligence are driven by increasingly sophisticated technology.

Studies to Locate Intelligence

Considerable research efforts have sought to identify whether single brain areas are related to intelligence. It has long been observed that significant brain damage to humans often does not result in a dramatic lowering of IQ scores. Even "psychosurgery" to sever the connections between the frontal lobes and the rest of the brain practiced in earlier decades (rarely used today) to treat schizophrenia and other mental conditions, produced little impairment in tests of general intelligence. Retrospective studies of humans after brain injury do not provide definitive maps of "intelligence areas," although specific areas for language and other cognitive abilities have been identified, and there is evidence that a network of these brain areas also underlies intelligence. Similarly, early lesion experiments in laboratory rats found that the severity of impaired performance during learning experiments was more related to the size rather than to the location of a brain injury, and more recent rat studies show discrete brain networks throughout the brain are related to general problem solving and that different networks are related to specific problems. The existence of a general cognitive factor underlying diverse problem solving in mice also is now well established. Together, both clinical lesion studies in humans and experimental lesion studies in animals indicate that intelligence may be represented throughout the brain rather than reside in a single specific center.

Brain Waves and Intelligence

The brain is constantly active as billions of neurons create and react to chemical and electrical interactions. One noninvasive technique to measure the electrical activity produced as neurons fire on and off is the electroencephalogram (EEG). Because the brain is always engaged in many simultaneous activities, all of which contribute to the overall EEG, spontaneous EEG is a noisy mixture. It is no surprise that attempts to correlate spontaneous EEG to measures of intelligence have been disappointing overall. However, there are a number of EEG techniques that separate specific brain responses to specific stimuli from the noise of the totality of all the brain's activity at any one moment. The most widely used technique is based simply on repeating the same stimulus many times and averaging a half-second block of the spontaneous EEG that occurs just after each stimulus presentation. With averaging, only the specific EEG response to the stimulus will be left because it is the same each time. This technique is called the average evoked potential (AEP), also referred to as the event-related potential (ERP). In general, modest correlations have been reported between some AEP parameters and intelligence measures. A number of detailed reviews of this literature are available.

One explanation for these correlations is that higher-IQ subjects process information more efficiently than lower-IQ subjects. Early studies suggested that brains that use fewer neurons to process sensory input save neural energy and function efficiently. Researchers found that shorter latencies or more complex wave forms were found in higher-IQ subjects. They argued that these results were a consequence of having a fast mind or an efficient brain. It was even hoped an AEP measure of efficient information processing would have practical screening uses to identify poor learners for early remedial attention. Subsequent attempts to replicate the relationship between AEP indexes and intelligence were inconsistent, however, and this work was critiqued on a number of technical grounds.

Recently, more advanced studies using AEP have focused on how high- and low-IQ individuals differ with respect to activation of different brain areas as various cognitive stimuli are processed. Using multiple electrodes across the entire scalp, researchers can create maps of brain activity as information flows among brain areas millisecond by millisecond. These EEG-based studies are powerful because they use sophisticated experimental designs. Overall, they suggest that high- and low-IQ subjects show differences in complex temporal sequences of activity (measured as various amplitudes and latencies) across multiple brain areas during performance on many cognitive tasks. The differences have been interpreted as consistent with the view that higher IQ is associated with more efficient brain processing. These data also

encourage the idea that it may be possible to develop a reliable and valid EEG-based measure of IQ for widespread use, although this has not been achieved. There is a newer technology (magnetoencephalogram, MEG) that measures minute magnetic field changes generated from populations of neurons. MEG, which is more spatially accurate than EEG and considerably more expensive, is now being used to study temporal processing across brain areas and intelligence.

Search for Intelligence Centers

Starting in the 1980s, several neuroimaging technologies allowed researchers, for the first time, to visualize human brain structure and function in extraordinary detail, well beyond the relatively low spatial resolution of cortical EEG techniques. Positron emission tomography (PET), for example, uses low-level radioactive tracers to image regional increases or decreases in brain activity as a subject performs a cognitive task. The first modern neuroimaging study of intelligence used PET to determine specific brain areas active while subjects performed difficult nonverbal reasoning problems. The subjects who performed best on the nonverbal reasoning test, highly correlated with general intelligence, showed *less* brain activation in several areas distributed throughout the brain. This result was interpreted as evidence that intelligence was related to brain efficiency and that no one brain area was an intelligence center. Subsequent PET studies of learning, mental retardation, mathematical reasoning, and visual processing confirmed the importance of neuroimaging for identifying where individual differences in brain function across the entire brain were related to scores on psychometric tests. More recently, structural imaging studies using magnetic resonance imaging (MRI) have revealed that the amount of tissue (both gray matter and white matter) in specific brain areas is related to measures of intelligence. Moreover, these areas may differ for men and women, and for children and for young and older adults.

Most recent neuroimaging studies of intelligence use one of several MRI-based techniques. Fundamentally, MRI works by using strong magnetic fields to snap molecules alternately into and out of alignment rapidly. This produces information that is the basis for computing the spatial locations of where those molecules are located. Water molecules are especially amenable to MRI, and because the brain and blood are mostly water, brain tissue and blood flow can be imaged in great detail. Whereas PET is intrusive because it requires the injection of a radioactive tracer, MRI does not require any injection or radioactive tracer and is noninvasive. MRI can produce images of brain structure, function (fMRI), and chemistry (MRI spectroscopy). A recent review of the past 20 years of neuroimaging and intelligence research included 37 studies using PET and MRI techniques, including the newest studies using diffusion tensor imaging (DTI, another MRI technique well suited to image white-matter tracts). Overall, with few exceptions, the neuroimaging data support the hypothesis that intelligence is related to a network of areas distributed throughout the brain. Specifically, a frontal-parietal network, including both gray and white matter, appears to be a major backbone for intelligence. A similar network also appears to underlie basic cognitive functions, including attention and memory. This work suggests that a definition and a measure of intelligence could be based on how efficiently information flows through this network. The network includes areas where stimuli are first perceived and areas that integrate the sorting and interpretation of stimuli and their association to information in memory. Information processing efficiency may depend on having more gray matter or more white matter in specific areas, neurotransmitter levels or activity, or characteristics of individual neurons. These and many other possibilities remain to be determined by future neuroscience research.

The Genetic Irony

The role of genes in any of these brain parameters may be especially important. The idea that intelligence may be under strong genetic control usually is interpreted to mean that intelligence is relatively fixed because it is apparently not much influenced by environmental factors found within families. However, there already is evidence that genetic manipulation of specific receptors can lead to enhanced learning and memory in mice, and the mechanisms of this are under study in many laboratories. Moreover, the Human Genome Project has revealed a surprising finding that may

cause a rethinking of simplistic genetic determinism. Prior to the completion of the entire mapping of the human genome, it was assumed that there must be at least 100,000 genes to account for all the known gene proteins. The biology assumption was that, generally, one gene made one product. However, the Human Genome Project has determined that there are fewer than 25,000 genes in a human, and it is now estimated that there may be more than 2,000,000 human gene products. This means that each gene can express itself in perhaps a thousand different ways. It could well be that unknown biological and environmental factors, called epigenetic factors, influence gene expression through mechanisms not previously known, and these influences may differ according to age and sex. Individual differences in intelligence, and perhaps creativity, may be based on these interactions that likely influence structural and functional brain characteristics. It may be possible to manipulate the genetic influence on intelligence by manipulating these other epigenetic factors once the neuroscience is better understood. As a consequence, it may be possible to increase intelligence and other cognitive abilities, including creativity, in ways not now imagined.

Richard J. Haier

See also Brain Imaging; Fluid and Crystallized Intelligence; Genetics of Creativity; Intelligence Testing; Intelligence Theories; Neuroscience of Creativity

Further Readings

Bouchard, T. J. (1999). IQ and human intelligence. *Science, 284*(5416), 922–923.

Haier, R. J., Jung R. E., Yeo R. A., Head, K., & Alkire, M. T. (2004). Structural brain variation and general intelligence. *NeuroImage, 23*(1), 425–433.

Haier, R. J., Jung R. E., Yeo R. A., Head, K., & Alkire, M. T. (2005). The neuroanatomy of general intelligence: Sex matters. *NeuroImage, 25*(1), 320–327.

Haier, R. J., Siegel, B. V., Nuechterlein, K. H., Hazlett, E., et al. (1988). Cortical glucose metabolic rate correlates of abstract reasoning and attention studied with positron emission tomography. *Intelligence, 12*(2), 199–217.

Jensen, A. R. (1998). *The* g *factor: The science of mental ability.* Westport, CT: Praeger.

Jung, R. E., & Haier, R. J. (2007). The parieto-frontal integration theory (P-FIT) of intelligence: Converging neuroimaging evidence. *Behavioral and Brain Sciences, 30*(2), 135–154.

Silverman, P. H. (2004). Rethinking genetic determinism. *Scientist, 18*(10), 32–33.

Tang, Y. P., Shimizu, E., Dube, G. R., Rampon, C., Kerchner, G. A., Zhuo, M., et al. (1999). Genetic enhancement of learning and memory in mice. *Nature, 401*(6748), 63–69.

Neuroscience of Leadership

For most of history the factors contributing to the development of leadership talent remained unclear. Recent advances in technology, however, have allowed researchers insight into the neurobiological underpinnings of leadership. New research suggests that certain brain structures are heavily involved in skills necessary for leadership and that a handful of neurochemicals play a powerful role in how and whether leadership is expressed.

Leadership

Currently, there is a lack of consensus about what leadership actually is. For example, cooperative leaders may lead by encouraging others to override self-interest in favor of group concerns. Other types of leaders, however, use social dominance to cement leadership status. Highly dominant leaders may be unpleasant, ambitious, and aggressive individuals who rule by force. This type of leadership is often seen in animal studies—the source of much of our current knowledge about leadership. Depending on species and social context, aggressive, forceful leaders may or may not lead effectively.

Although conceptions of leadership vary, many of the qualities and actions of leadership are readily recognizable. These may include personality factors such as charisma, dominance, flexibility, agreeability, and extraversion, and behaviors such as motivating, delegating, organizing, and planning. In today's complex world, leaders are also often intelligent, and capable of using their intelligence to predict outcomes and think critically. William Anderson and Cliff Summers suggest that leaders tend to react more quickly to social cues

than do followers, and to terminate physiological and behavioral responses to social events more quickly as well.

Brain Structures and Leadership

Neural systems involved in social dominance are those related to emotion processing and social behavior. These include specific areas of the prefrontal cortex, sensory cortex, and limbic structures such as the amygdalae. R. Adolphs suggests a model for the roles these systems play in social behavior, beginning at the most basic level with the superior and inferior colliculi processing sensory information. More detailed processing occurs in the cortex, specifically the fusiform gyrus and superior temporal gyrus. The amygdalae and other limbic structures bind emotions to the information. Finally, higher-level cortical areas interpret the emotions and information by fitting the data into a representation of the social world and one's role in it. He notes that these processes are not linear, but rather interactive and multidirectional.

Neurochemistry of Leadership

Primate and human studies have linked a number of hormones and neurotransmitters to leadership and social dominance. Most often cited are serotonin, testosterone, cortisol, and dopamine, which work to modulate mood, motivation, and aggression. Serotonin is among the most studied modulators of social dominance. In mammals, including primates, higher levels of serotonin seem to lead to greater social dominance. In one well-known study by M. J. Raleigh, M. T. McGuire, G. L. Brammer, D. B. Pollack, and A. Yuwiler, researchers removed the naturally dominant males from groups of vervet monkeys, then manipulated the serotonin levels in the remaining males. In all cases, the males whose serotonin levels increased moved into the now vacant dominant positions in their groups, in part by using social skills and affiliation to enlist support from females. Males whose serotonin levels decreased showed increased aggression and lowered social status.

"More is better" is not necessarily the rule when it comes to serotonin and social dominance, however. Anderson and Summers note that socially dominant animals may actually have lower levels of baseline serotonin than do subordinate animals. They propose that faster than average response times in the activation of neurochemicals such as serotonin, testosterone, and dopamine may account for many of the advantages dominant animals have over subordinates, rather than higher chronic levels of these substances. This response time may account for dominant individuals' abilities to react quickly to social challenges, and just as quickly return to normal functioning.

Further complexity arises from the issue of where hormones and neurotransmitters are released. For example, a heightened release of mesocortical dopamine triggered by stressful events may decrease the ability of an organism to react effectively to stress, whereas prefrontal dopamine release may aid in overcoming fear in the face of stress, as noted by Dennis Charney. These seemingly contradictory findings suggest that caution should be used when attempting to interpret the role of neurochemicals in social dominance or leadership.

Nature and Nurture

A finding across the literature on the neurobiology of leadership and social dominance is that, although some predispositions may exist, nurture plays a strong role in the development of social dominance. Anderson and Summers note, for example, that the levels and relative availability of serotonin, testosterone, dopamine, and other neurochemicals that may contribute to social dominance are at least partially heritable, as is intelligence, another factor in social dominance. However, they also repeatedly stress that context impacts the ways that these factors are expressed. A good example of this phenomenon can be found in Raleigh and colleagues' study of social dominance in vervet monkeys with manipulated levels of serotonin. Although the monkeys with increased serotonin became socially dominant when the natural group leader was removed from the environment, the original dominant male regained dominance when returned to the group. This finding suggests that serotonin can increase male social status in unstable social situations, but not necessarily in situations in which social hierarchies are already established.

Moreover, the environment can directly influence levels of hormones or neurotransmitters, impacting leadership and social dominance. Testosterone, for example, tends to increase in environments where

social challenges frequently occur. Thus, aggression, which is sometimes linked to testosterone and which may also be linked to lower social status, may or may not emerge in an individual or animal, depending on its environment. Further, while many environments punish aggression, others may select for it. These complexities demonstrate the difficulties of determining precisely how neurobiological and environmental factors interact to produce leadership traits.

Erin Sullivan

See also Brain Imaging; Neuroscience of Creativity

Further Readings

Adolphs, R. (2003). Cognitive neuroscience of human social behavior. *Neuroscience, 4,* 165–178.

Adolphs, R., Tranel, D., & Damasio, A. R. (1998). The human amygdala in social judgment. *Nature, 393,* 470–474.

Anderson, W. D., & Summers, C. H. (2007). Neuroendocrine mechanisms, stress coping strategies, and social dominance: Comparative lessons about leadership potential. *Annals of the American Academy of Political and Social Science, 614,* 102–130.

Charney, D. S. (2004). Psychobiological mechanisms of resilience and vulnerability: Implications for successful adaptation to extreme stress. *American Journal of Psychiatry, 16,* 195–216.

Raleigh, M. J., McGuire, M. T., Brammer, G. L., Pollack, D. B. & Yuwiler, A. (1991). Serotonergic mechanisms promote dominance acquisition in adult male vervet monkeys. *Brain Research, 559,* 181–190.

Nobel Prize

Alfred Nobel, in his will, established a fund to award an annual award for recent important discoveries, which became known as the Nobel Prize. Nobel was born in 1833 in Stockholm, Sweden, to a capitalist family known for its energy, ambition, creativity, and entrepreneurship. His creative successes in chemistry and business made him famous, though they were shadowed by his reclusive lifestyle. In this entry, the history of Nobel and the Nobel Prize is explored with respect to its creative visionary. The reader will also learn about the myriad ways that theoretical and practical creativity was employed to amass a fortune as well as the unique notoriety thrust onto prizewinners.

Background

It has been argued that Nobel Prizes are modeled after Nobel's family, who encouraged both creativity and literacy. Nobel's father could generate new ideas, a hallmark of creativity, but he could hardly read or write. He made and lost several fortunes, experiencing both fame and bankruptcy with his family in the munitions business. His creative successes allowed funds for his family to travel and to uniquely educate his children.

Alfred Nobel had only one year of public education. He was educated at home by his mother and by well-known scientists of the time such as Nikoli Zinin. He showed interests in chemistry and proficiency with languages, mastering, in addition to his native Swedish, German, English, French, and Russian. Still, his academic training was surpassed by his business acumen.

In the mid-1860s, before Nobel's brothers left munitions to make their oil fortunes in Baku, Azerbaijan, Nobel was asked to work on the problem of handling nitroglycerin safely. He eventually invented and patented a detonator that was hailed as the most important discovery ever made in the principle and practice of explosives. He took out patents in England, Switzerland, Belgium, France, and Finland. This detonation system was used by the Central Pacific Railroad to blast across the Sierra Nevada. The safe ignition of nitroglycerin saved millions of dollars for the corporation, but nitroglycerin remained unstable and dangerous and reports of mishandling mounted. Explosions and deaths were reported from all over the world. Nobel returned to the chemistry lab after the death of his younger brother in 1865 from a factory explosion.

In 1867, Nobel invented dynamite, the handling of which was nearly foolproof and therefore much less dangerous. It was a powerful explosive that, with precautions, was safe to handle. Nobel found that when nitroglycerin was absorbed in *kieselguhr,* or diatomaceous earth, it could be shaped into sticks that, when combined with his detonation system, proved highly stable. The demand for his "safe" explosives exploded and he built factories around the world, adding to his ever-increasing fortune. He held more than 350 industrial and

scientific patents, founded over 75 companies in more than 15 countries, and was one of the richest men in Europe.

Establishment and Awarding of Prizes

Before he died, Nobel composed several complicated, lawyer-crafted wills to distribute his enormous holdings. Yet shortly before he died, he created a new will that was critically brief—consisting of a single paragraph—ambiguous, and legally imprecise. This will named no apparent heir; instead, the largest portion of his estate was given to establish an annual prize for recent important discoveries that benefited humankind. It was unclear how to determine what it meant for a discovery to be "important" or whether there was a difference between a "discovery" and an "invention." In his brevity, Nobel set the stage for countless court challenges between individuals and both academic and political institutions before even the first recipient could be vetted. The will indicated that one prize should go to the most important discovery in Physics, one to Chemistry, one to Physiology or Medicine, one to Literature, and one for the advancement of Peace. But the most vexing part of executing the will was that the estate was left to a foundation that had yet to be established.

Three Swedish academies and the Norwegian parliament took more than 2 years of vigorous debate to establish preliminary administrative foundations. A lot of money was at stake, and awarding the prizes would be time consuming and professionally daunting because the fields were extremely technical and specialized. Qualified nominators would have to be found from around the world as well as advisors, translators, and consultants. The will said nothing about compensating the adjudicators, although eventually it was decided that honorariums would be awarded at one-quarter the worth of the prize.

Today, Nobel prizes are decided via nominations. Each Nobel Laureate is selected by his or her respective committee, and each committee usually consists of four or five elected members. In the first stage, several thousand people are asked to nominate candidates. These names are scrutinized and discussed by experts in their specific disciplines until only the winners remain. The names of the nominees are not announced, and neither are they told that they have been considered for a prize. Nomination records are sealed for 50 years.

Prize Winners

A Nobel Prize had launched many unknown winners into the celebrity spotlight, at least for a year, but often longer. Because of Nobel's name and the vast amounts of money awarded with the Laurels, the bestowments often receive wide media coverage. The Nobel Prize also produces much drama and debate, including commentary on those who have been ignored by the Nobel committee: for example, Leo Tolstoy, Bertolt Brecht, James Joyce, Virginia Woolf, and Mark Twain were never awarded a Nobel Prize in Literature. Still, the majority of award winners are well vetted and deserving of their prizes. For example, Jean-Paul Sartre was given the award for his work filled with the spirit of freedom and search for truth. Gao Xingjian won for his insights into universal linguistic ingenuity. Ivan Pavlov won for his work with digestion. Hans Krebs won for his work describing the citric acid cycle. Jane Addams was awarded the prize for her promotion of education, literacy, and social enlightenment of women. Recently, Wangari Muta Maathai won for her contribution to sustainable development, democracy, and peace.

Gregory Decker

See also Creative Productivity; Creativity in Science; Entrepreneurial Ability; Social Development; Social-Emotional Issues; Women, Gifted

Further Readings

Feldman, B. (2000). *The Nobel Prize*. New York: Arcade Publishing.

Gray, T. (1976). *Champions of peace*. Birmingham, UK: Paddington Press.

Sherby, L. (2002). *The who's who of Nobel Prize winners 1901–2000*. Westport, CT: Oryx Press.

No Child Left Behind

One of the most influential pieces of education legislation in the United States in recent years has

been the No Child Left Behind Act (Pub. L. 107–110), otherwise known as the Elementary and Secondary Education Act of 2001. It has changed the environment and the content of school programs for all students, including gifted students.

Requirements

The avowed purpose of the legislation was to bring more accountability to the public schools. To achieve this purpose the law requires schools to show Adequate Yearly Progress (AYP), meaning that greater proportions of students will be judged *proficient* each year. Schools are required to embark on an extensive testing program that will document this progress.

Failure to meet these goals will be met with increasing levels of sanctions that would end, at the extreme, in dismissal of teachers and administrators and a takeover of low-performing schools by the state. This is the essence of high-stakes testing, meaning that important decisions will be made about the students (and teachers) as a result of these tests. There is an additional requirement that the gap between low-performing groups (minority, disability, and economically disadvantaged groups) and high-performing groups will be reduced over time.

Another requirement of the No Child Left Behind Act was that "highly qualified" teachers (teachers certified to teach in the subject area of their instruction) would be put in place in the schools by the 2006–2007 school year. As of 2008, this provision had not been met due to the lack of supply of "qualified teachers." Still other parts of the law stress early literacy and the increasing use of educational technology.

Schools have responded to these requirements by establishing comprehensive testing programs and by paying particular attention to the education of economically disadvantaged children and those students from recognized minority or ethnic groups.

The clear assumption behind this legislation is that the public schools have been performing poorly and that teachers have either been unprepared or inadequate, resulting in poor performance by their students. The solution presented for these assumed difficulties has been to enforce academic standards. Raising performance standards with accompanying sanctions would, therefore, be one strategy to *force* better performance from public schools. However, there are many more societal differences between students from low-income or ethnically different families and students from high-income mainstream families. These differences include student mobility, parental participation, peer group relationships, hunger and nutrition, television watching, and more, which also have proven to be related to school achievement. Unless these other factors are also changed, schools may have a difficult time reaching the school achievement goals set for them by this legislation.

Consequences for Gifted Students

A number of unintended consequences have occurred since the law was enacted that impact the education of gifted students. Primary among them has been the increased emphasis in the school on basic student competencies rather than excellence in performance. Gifted students have not often had the opportunity to use the extent of their talents in the regular classroom, and the No Child Left Behind Act seems to compound the problem.

One of the additional problems faced by students in public schools who are gifted and talented has been the new policy of *inclusion*. This policy, established for children with disabilities, has directed that all children will receive the best education in the regular classroom, instead of in resource rooms of special classes. Although this policy was not aimed at gifted students, many schools took inclusion as an overall policy, so gifted students were often placed in a classroom where the average student was two or three grades below the performance of the gifted student and the lessons were often pitched at a lower conceptual level. When added to the emphasis on basic learning stressed by the No Child Left Behind Act, school often became an unstimulating environment for the gifted student.

Another unintended consequence is that teachers are "teaching to the test," trying to prevent the failure of students and themselves. The result of this is gifted students in inclusive classrooms having to bear up under simplistic test item practices that do nothing for them or their interests.

The movement toward extensive testing has also had uncertain results for gifted students. The tests were often pitched at a basic level to check on mastery of basic academic goals and not aimed at

a higher conceptual level for the gifted student. For example, a likely question would be, "Who won the battle of Gettysburg?" rather than, "Discuss the economic factors undergirding the Civil War."

Also, the personnel requirements for qualified teachers may well result in schools hiring remedial teachers to help borderline students rather than a gifted consultant who could raise the level and interest in the content.

Reauthorization

There has always been a tug-of-war between the interests of *equity* and *excellence* in the division of time and resources in the schools, and the No Child Left Behind Act leans toward equity. The law itself was scheduled for reauthorization hearings and amendments in 2008, but it was extended past the 2008 elections for a different Congress to take up the challenge of modifying this landmark legislation.

James J. Gallagher

See also Curriculum Models; High-Stakes Testing; Teacher Attitudes

Further Readings

Gallagher, J. J. (2004, September 18). No Child Left Behind and gifted education. *Roeper Review, 26*(3), 121.

Rawe, J. (2007, September 13). No gifted child left behind? *Time*. Retrieved December 21, 2008, from http://www.time.com/time/magazine/article/0,9171,1661701,00.html

Nonverbal Tests

Much ongoing controversy and debate exist about traditional intelligence tests and their validity and usefulness for making decisions in all educational settings (including gifted education, special education, higher education) and other settings (career, employment). Discussions of perhaps the most controversial topics revolve around the appropriateness of using tests standardized primarily on White and middle-class populations with culturally and linguistically diverse groups (Black, Hispanic, American Indian) and low socioeconomic status groups. Traditional intelligence/ability/cognitive tests have been charged with containing bias and being unfair; subsequently, they are thought to effectively limit the educational and vocational opportunities of diverse groups, especially African Americans. A central objection is that traditional intelligence tests have a high linguistic demand and high cultural demand, which serve to lower the test scores of diverse groups. On traditional intelligence tests, Black students, for example, tend to score one standard deviation (15 points) below White students. Opponents of using traditional intelligence tests with diverse groups are more likely to advocate for the use of culturally sensitive, bias-reduced measures.

Verbal and nonverbal tests are two different *ways* of measuring general ability. The verbal–nonverbal distinction refers to the *content* of the items on an intelligence test, not to the type of thinking or intelligence required. A nonverbal test measures intelligence in nonverbal ways (e.g., Raven's Progressive Matrices, the Naglieri Nonverbal Ability Test, Universal NonVerbal Intelligence Test, Comprehensive Test of Non-Verbal Intelligence). Essentially, nonverbal tests are paper-and-pencil or online tests designed to measure cognitive processes that do not involve verbal language. This does not mean that verbal instructions and strategies have been eliminated entirely; instead, it means that no words are included in the tests and no verbal responses are required. Such tests use shapes, patterns, diagrams, and sequences to measure general intellectual skills of a nonverbal nature. On these types of tests, Black students earn approximately the same score as White students; the one standard deviation gap is virtually eliminated.

Nonverbal tests have been used to measure general intellectual ability for many years; however, their use does not come without controversy. Debates exist about what types of skills nonverbal tests measure, whether they are more culturally fair than other tests, and whether they are less biased than traditional intelligence tests. Several theorists have offered insights into this type of measure. Charles Spearman proposed a two-factor theory of intelligence whereby all test questions contained a general intelligence factor known as *g* and another factor specific to each question. He proposed that this general intelligence (factor *g*)

represents reasoning ability. Philip Vernon developed a hierarchical model of intelligence based on the earlier work by Spearman. Vernon proposed that the general intelligence factor *g* could be divided into two group factors, a spatial–mechanical–practical factor and a verbal–educational factor. It may be that tests that use pictures and visual stimuli may favor students with greater spatial–visual ability. J. P. Guilford adopted a model in which several equally important factors ran parallel with each other, with "general reasoning" being identified as one of these factors. Raymond Cattell defined nonverbal tests as measuring a "fluid-general intelligence," which involves the ability to reason with novel material, without the need to rely upon learned knowledge. Cattell contended that nonverbal tests were "culture fair," thereby providing a more appropriate measure of general intelligence, compared with verbal reasoning tests, for test takers not fluent in the language being used and those who were culturally diverse.

For persons whose first language is not English, the use of verbal tests poses problems if their English skills are poor. Both logic and research support the conclusion that they do poorly on English measures of general intelligence that contain verbal tests because of their limited English-language skills—not because of low intelligence or ability. This language barrier presents a solid rationale for having nonverbal measures as part of decision-making processes. Stated another way, because the test items do not require knowledge of words, nonverbal tests allow a fairer evaluation of individuals from different cultural and linguistic groups.

Although nonverbal tests are particularly useful for individuals with limited English-language skills, their value is not limited to that group. For example, individuals whose economic or social circumstances have limited their acquisition of knowledge and verbal skills may be better able to demonstrate their knowledge through this particular type of test. Nonverbal tests, being unlike most school-related tests, may not be as likely to induce stereotype threat. Taking nonverbal tests of intelligence will give these students the same opportunity to gain access to opportunities as other groups. Specifically, these students will have a better chance of being identified as gifted and talented.

In summary, nonverbal tests may provide a valid way to measure general ability for all populations. Nonverbal tests have several characteristics that are worth noting: (a) nonverbal content; (b) do not require written or oral responses; (c) tap cognitive processes less likely to involve verbal language; and (d) are more culturally fair, less culturally biased, than traditional intelligence tests that require verbal language and/or written responses.

Researchers have found that nonverbal tests identify similar proportions of Black and Hispanic/Latino children as gifted. This suggests that the problem of underrepresentation of minority children in classes for the gifted may be addressed by using such tests. Such tests provide information that can be used in conjunction with information from a variety of sources. Provided that nonverbal test scores are accepted or valued as a legitimate measure of intelligence, they have an important role to play in decision making and services. Given the increasing diversity of our nation and our schools, professionals can ill afford to continue using the same measures with all groups.

Donna Y. Ford and Gilman W. Whiting

See also Cultural Values; Diversity in Gifted Education; Intelligence; Naglieri Nonverbal Test of Ability; Raven's Progressive Matrices; Test Development

Further Readings

Bracken, B. A., & Naglieri, J. A. (2003). Assessing diverse populations with nonverbal tests of general intelligence. In C. R. Reynolds & R. W. Kamphaus (Eds.), *Handbook of psychological and educational assessment of children* (2nd ed., pp. 243–274). New York: Guilford Press.

Flanagan, D. P., & Ortiz, S. (2001). *Essentials of cross-battery assessment*. New York: Wiley.

Ford, D. Y., & Whiting, G. W. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (Part 1). *Gifted Education Press Quarterly, 20*(2), 2–6.

Naglieri, J. A., & Ford, D. Y. (2003). Addressing underrepresentation of gifted minority children using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly, 47,* 155–160.

Whiting, G. W., & Ford, D. Y. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (Part 2). *Gifted Education Press Quarterly, 20*(3), 6–10.

O

Online Gifted Education

Online education involves instruction through electronic communications media to persons engaged in learning in a place or time different from that of the instructor or other students and in which online interaction accounts for at least 50 percent of the graded part of the course. *Online instruction, distance learning via the Internet, e-learning, Web-based learning, virtual learning,* and *e-studies* are the terms usually used, interchangeably, in programs and research studies to describe essentially the same type of instruction. At the same time, lack of conceptual distinction among the above-mentioned terms means that programs identified by the same terms may vary significantly, and programs with different names may be quite similar.

Online programs for gifted students are programs specializing in service to the gifted population and offering enrichment, Advanced Placement (AP), or acceleration courses in online format. Some educational institutions offer several online classes, and others serve as online schools, educational organizations that offer K–12 courses through Internet- or Web-based methods. The types of online schools include university based, state sanctioned, consortium/collaborative, charter, and private. Most programs use more than one type of technology and blend them together in ways that create an optimal mix for effective online learning.

General Online K–12 Learning

Distance learning in the form of correspondence courses appeared as an educational option more than a century ago. Computer-based instruction emerged in the 1960s. With the increase in the use of personal computers in recent years, and the exponential growth of the Internet, online education offerings have grown significantly in popularity. In recent years, online education went through several stages and has taken the form of virtual schools. Recent surveys show that K–12 online learning is a rapidly growing phenomenon. According to a report by North Central Regional Educational Laboratory, more than 500,000 K–12 students are currently enrolled in online classes in all 50 U.S. states. Enrollments in K–12 online courses showed steady increase over the past 5 years. As of November 2005, the North American Council for Online Learning reported that its database contains 157 unique K–12 online learning programs in 42 states (including 32 virtual charter schools, 3 online homeschool programs, and 53 public noncharter virtual schools that offer programs). Utah Electronic High School alone, the nation's largest online learning program, serves more than 35,000 students. Florida Virtual School (FLVS) is the second largest online learning program and serves around 33,000 students.

According to the U.S. Department of Education, during the 2002–2003 school year, 36 percent of U.S. school districts (5,500 out of 15,040) had students enrolled in distance-education programs,

and 38 percent of public high schools (approximately 6,000) offered distance-education courses. Postsecondary institutions build on a long history of distance education and are the major providers of K–12 online learning. About 48 percent of public school districts reported an online education enrollment through a postsecondary institution in 2002–2003. According to J. Carl Setzer and Laurie Lewis, at least seven independent-study programs at universities have developed an online high school curriculum. Other postsecondary online K–12 learning programs originated in gifted education, dual enrollment, or early college credit.

Most attempts to define virtual schools distinguish them based on their operating unit. The problem, though, is that in such a way we miss a range of important elements and critical distinctions. Randall Greenway and Gregg Vanourek identified six defining dimensions of virtual schooling: comprehensiveness (complete program or discrete class offerings), reach (i.e., spanning over district, state, internationally), type (public, private, charter, contract, magnet, etc.), location (in school, at home, or a combination), delivery method (synchronous or asynchronous), and control (run by a school district, university, state, other provider, or combination). Another important dimension is type of interaction in online programs. It can be organized as independent study (one-on-one interaction between a student and an instructor) or group based (where in addition to interaction with the teacher, students participate in discussion groups with each other).

Online Learning for Gifted Students

Online education has emerged as an option for a number of special populations of learners whose needs are difficult to meet in the classroom. One such group is gifted students. In the past 10 years the online instructional methods have undergone some major changes, from simple downloading and posting of information to complex interactive courses and use of a wide range of multimedia. Online classes offer opportunities for learners whose needs are not met in the regular classroom but who are highly motivated to meet their educational goals—which describes nearly all gifted students. The literature shows that technology-enriched education of gifted students has been directed primarily to four types of experiences: (a) university-based programs, (b) specialized schools both private and public, (c) homeschooling, and (d) technology-based options. Del Siegle states that there are six different types of learning activities for gifted and talented students using the Internet: information resources, e-books, interactive projects, online classes, publishing platforms, and mentoring resources.

Literature on effective practices for working with gifted students shows that they need to learn at their own speed; skip over work they already know and understand; study topics of interest beyond basic schoolwork; and work with abstract concepts that require advanced thinking skills. The online environment provides them such an opportunity. Gifted learners like to take command of their own learning, master more things in shorter periods of time, and do not rely on being taught but like to take the initiative. From this perspective, such advantages of online instruction as flexibility of time and place of learning, more learner control, exposure to innovations, and optimization of learning rate make online classes appealing to gifted learners. In addition to the abovementioned factors, one of the major advantages of online instruction is in reducing the social isolation of individuals who do not have gifted education programs in the area of their residence.

From the philosophy of different online education programs, it can be inferred that gifted students are expected to possess more self-motivation, and be able to take personal responsibility for learning. The need for self-direction is one of the biggest differences between a course offered in an independent learning environment and the course offered in the regular environment. More freedom and personal responsibility for the learning process and individualized attention are the things that most attract gifted students to such opportunities. Generally, distance education is seen as an opportunity to enhance student autonomy and the intellectual community and to create a self-paced, expert-directed, time/place independent environment for learning.

Online Programs for Gifted Students

Academically gifted children have the desire to learn beyond the level of instruction that many

local school districts can offer. In response to their needs, several universities have initiated online learning programs to meet their unique needs. Such universities as Duke University, Johns Hopkins University, Northwestern University, the University of Missouri, Stanford University, and University of Iowa have online programs designed specifically for gifted and talented learners. Most of them offer independent study, AP, and enrichment online classes that have well-defined expectations for the participants in their program. Students use online courses to earn university credit before they begin their college education, earn extra credits in order to finish high school early, ease classroom scheduling conflicts, supplement schedules with courses not offered at their schools, enrich their high school experiences with more challenging courses, make up credits they lack to graduate on time, or even earn their high school diploma completely online.

Distance Education at the Center for Talented Youth, Johns Hopkins University

The Center for Talented Youth (CTY) at Johns Hopkins University, one of the pioneering programs in distance education for students of very high ability, opened its first distance education class in writing in 1984. Since then the program has grown to more than 6,000 enrollments per year and offers more than 45 courses in writing, mathematics, computer science, chemistry, physics, biology, psychology, and other subjects. Students who participate in CTY distance education classes come from all around the world. Mathematics courses are available to students beginning at age 5, and writing courses are open from Grade 5 and up. To become eligible to enroll in CTY's distance education, students need to show outstanding performance on above-grade tests in the subject of their strength. Students at CTY have many year-round options for advanced studies, including a wide range of AP courses, acceleration, and enrichment in the students' strongest areas.

The Center for Talented Youth, Talent Identification Program e-Studies, Duke University

The e-Studies Program at Duke's Talented Identification Program (TIP) is an online learning opportunity for students in Grades 8–12. In this program, gifted students connect with other students and TIP instructors to pursue advanced high school and university-level coursework. These e-studies courses are delivered through the Blackboard course management system. Students in the e-Studies Program read course materials, post completed assignments, and interact with their peers and their instructor through online discussions, virtual lectures, and real-time collaborations. A variety of online classes in chemistry, psychology, writing, advanced mathematics, economics, science, and technology are available. Students are admitted to the program based on their scores on either the SAT or the ACT. Admission to courses in mathematics, computer science, science, and economics is based on math scores; admission to courses in the humanities and social sciences is based on verbal and reading scores. Students are expected to be committed to spend 10–14 hours per week on one online course. Most of the interactions in Duke TIP e-Studies courses are asynchronous, which means that students can participate by accessing the course online at a time different from their instructor or other students. Creators of the program claim that e-Studies courses at Duke allow students to benefit from a high level of interaction, while also allowing flexibility not found in most face-to-face classes.

Gifted LearningLinks Distance Learning Program, Center for Talent Development, Northwestern University

The Gifted LearningLinks distance learning program (LL) in the Center for Talent Development at Northwestern University has been in existence since 1982. In recent years this program evolved into an interactive online program offering a variety of courses to students in Grades 3 through 12. These online options are designed for students who can work independently and want to move quickly to advanced levels of coursework. Flexibility of scheduling is one of the biggest advantages of the Gifted LearningLinks program. Students have an option to enroll throughout the year in online high school honors and AP courses, take enrichment courses in math, science, and humanities beginning in Grade 3, or enroll in 6-week online high school accelerated honors courses during the summer.

Education Program for Gifted Youth, Stanford University

Since 1990, the online Education Program for Gifted Youth (EPGY) at Stanford University has served more than 50,000 gifted students. In 2006, Stanford University also opened the first university-based high school designed specifically for the gifted population. The first 30 gifted students started their comprehensive program in the fall of 2006 and are expected to receive their high school diploma completely online.

Using a combination of asynchronous and synchronous technologies, EPGY offers computer-based courses to students in Grades K–8. EPGY also provides curricular and instructional support, trainings, and course materials for schools that want to add an online component for gifted and talented students throughout the United States.

Independent Study Program, University of Missouri

Originally formed as an independent study division in 1911, the Center for Distance and Independent Study (CDIS) at the University of Missouri is known throughout the nation for its pioneering efforts in the field of distance and continuing education. In recent years the University of Missouri's Independent Study Program created online courses to enhance the courses with new and promising interactive technologies. Among a variety of courses, CDIS offers several challenging independent study courses designed specifically for academically talented middle school and high school students. CDIS courses give gifted students an opportunity to take courses in their academic interest and to complete them at their own pace. Typically, it takes students from 6 weeks to 9 months to complete their course work. Gifted students work on a challenging curriculum that promotes the construction of new knowledge through technology-based interactions. Courses integrate the traditional study guides with the vast resources of the Internet and with supplementary technologies.

Iowa Online Advanced Placement Academy, University of Iowa

Established in 2001, the Iowa Online Advanced Placement Academy (IOAPA) delivers AP courses to high school students across the state of Iowa using Apex Learning online technology and the Iowa Communications Network. This program gives gifted high school students an opportunity to take college-level courses and exams. The focus of IOAPA is on helping accredited rural and small schools in Iowa. Students are eligible for enrollment in only one AP course per semester. The courses available are AP Calculus, AP Chemistry, AP English Language and Composition, AP English Literature and Composition, AP Physics, AP Statistics, and AP U.S. History.

Wisconsin Center for Academically Talented Youth

The Wisconsin Center for Academically Talented Youth (WCATY) is the North Central Association Commission on Accreditation and School Improvement accredited organization that has offered a versatile set of services to gifted children from elementary through high school statewide for almost 20 years. Among other year-round programs, WCATY offers district online cooperative courses (district Co-ops). District Co-ops combine online instruction and face-to-face workshops to allow academically talented students throughout a region or across a school district to learn together. District Co-op courses are run through the schools and school districts and are developed cooperatively. Co-ops can replace up to a quarter of the curriculum in the student's home school in one or more subject area. Co-ops typically run for 9 weeks and are designed to replace one hour of school each day. Students who take these online classes typically work independently in a resource room setting with Internet access, responding to assignments and classmates comments online, completing research, reading, and writing papers.

Future Directions

Rapid advancements in current computer technologies offer a lot of promising new directions for the online education of gifted students. Because the popularity of online classes among gifted students continues to grow, careful examination of current educational options for gifted students in the online environment needs to continue. Current online programs need to accumulate evidence of

best practices for working with gifted and talented students in online environment.

With online learning expanding to the K–12 setting, there is also a pressing need for a scientific discussion on the necessity of a framework of standards to provide support for guidance and evaluation of online programs for gifted students.

Olha Skyba

See also Technology; Web-Based Learning

Further Readings

Center for Distance and Independent Study, University of Missouri: http://cdis.missouri

Center for Talented Youth, Talent Identification Program e-Studies: http://www.tip.duke.edu/e-studies

Education Program for Gifted Youth, Stanford University: http://epgy.stanford.edu/ohs/index.html

Greenway, R., & Vanourek, G. (2006). *The virtual revolution: Understanding online schools*. Retrieved April 4, 2006, from http://www.educationnext.org/20062/34.html

Iowa Online Advanced Placement Academy, the University of Iowa: http://www.education.uiowa.edu/belinblank/programs/ioapa/index.html

Johns Hopkins University, Center for Talented Youth: http://cty.jhu.edu/cde/index.html

Northwestern University, Center for Talent Development: http://www.ctd.northwestern.edu

Setzer, J. C., & Lewis, L. (2005). *Distance education courses for public elementary and secondary school students: 2002–03* (NCES 2005–0 10). Washington, DC: National Center for Education Statistics. Retrieved October, 2006, from http://nces.ed.gov/pubs200s/20050_10.pdf

Siegle, D. (2005). Six uses of the Internet to develop students' gifts and talents. *Gifted Child Today, 28*(2), 30–36.

Wallace, P. (2005). Distance education for gifted students: Leveraging technology to expand academic options. *High Ability Studies, 16*(1), 77–86.

Wisconsin Center for Academically Talented Youth: http://www.wcaty.org

Optimal Development

The optimal development of gifted and talented students has been a focus for theory, research, and practice since Lewis M. Terman's longitudinal investigation of the nature of giftedness and Leta Hollingworth's exploration of the differential needs of gifted students highlighted the importance of the relationship between social and emotional well-being and effective learning and functioning. Their common focus was a holistic understanding of giftedness and the realization of potential that has engendered an enduring emphasis on aspects of self-development (self-actualization) and social responsibility (interdependence), as well as high-level performance (productive achievement). Theories of giftedness have increasingly acknowledged that the realization of the intellectual potential of gifted students depends in part on optimal educational interventions so that the motivation for learning, training, and practice is maintained and the social and emotional needs of students are met.

Nicholas Colangelo has emphasized that such an approach is predicated on knowledge of both the affective and the cognitive needs of gifted students, and a view of giftedness as a challenge to be embraced as a natural function of the recognition of differences among students. All students require educational experiences that enable them to develop knowledge about and belief in themselves as effective lifelong learners, and this may be particularly important for gifted students whose beliefs about themselves may be influenced by their identity as learners from an early age. It is through effective learning that these students experience authentic motivational engagement. Students who have knowledge about and belief in themselves as learners, and who are able to pursue learning that enables them to experience authentic engagement, tend to apply their learning in ways that are productive and meaningful for themselves and their communities. Such engagement and connectedness are also correlated with mental well-being and healthy adjustment.

The primary goal of the developmentally oriented educator of the gifted is to establish an optimal environment that is conducive to students' educational growth. The work of Julian Stanley established that the pace of learning, as well as the breadth and depth of study in the context of strong academic programs, is vital to this growth process. The *optimal match,* a term first coined by Hal Robinson, therefore involves consideration of not

only students' assessed ability and proven performance, but also students' motivation and other affective dimensions such as interests and learning preferences. Furthermore, Mihaly Csikszentmihalyi's research into intrinsic motivation suggests that optimal learning is facilitated when educational opportunities are responsive to a student's interests, abilities, and prior knowledge and actively promote cognitive growth through the intrinsic pleasure of developmentally appropriate learning experiences. In accordance with this approach, one of the most powerful tools for engaging intrinsic interest is providing a supportive learning context that affords opportunities to engage in sufficiently challenging experiences that, when mastered, make the student feel competent and help develop the coping strategies and resilience required to tackle future challenges.

Powerful connections have been identified between intimacy, self-esteem, and productive talent. Social relationships, particularly in late adolescence and early adulthood, greatly enhance self-esteem and may allow abilities to be realized as productive achievement. The task for educators of the gifted is, therefore, to create learning communities that enable students to experience academic rigor and complexity; to increase their intellectual interaction with like-minded others; and to foster collaborative and dynamic approaches to learning that enable students to build interdisciplinary connections and develop an integrated knowledge base. To facilitate optimal development, educators must foster a learning culture that provides opportunities to risk and experiment, and that directs the learning experience toward increased intellectual, social, and emotional engagement.

Students who demonstrate the goal of understanding rather than simple performance goals also show greater persistence and better achievement results. Similarly, students who have a positive self-concept, and believe themselves to be in control of their learning, are more likely to achieve in school. Albert Bandura has stressed that a major goal of education for all students should be to equip students with the intellectual tools, self-beliefs, and self-regulatory capabilities to educate themselves throughout their lifetime. Acquiring appropriate habits of mind, self-direction, and a healthy attitude toward lifelong learning are also, therefore, as desirable as the traditional emphasis on acquiring a sound knowledge base and sophisticated skills and processes. To implement this perspective within a school system, mediating developmental goals therefore also includes such important affective goals as learning goal orientation and a realistic and secure self-concept (academic and social).

Linda Silverman has emphasized that enabling gifted children to develop positive social adjustment, emotional maturity, and healthy self-concept depends to a great extent on a supportive environment. Indeed, an emerging pattern in the studies reporting that gifted students evidence better than average psychosocial development is the fact that in so many of the cases the gifted students are in special academic programs such as acceleration and ability grouping. Extensive literature reviews and meta-analyses conducted by Karen Rogers indicate a number of strategies that have been repeatedly identified as being particularly well suited to supporting gifted students to learn effectively; these include grouping with like-ability students, enrichment, acceleration, freedom to choose curriculum material, and access to mentors. These strategies have been shown to improve a number of motivational and well-being constructs, such as self-efficacy, control, optimism, intrinsic motivation, connection with others, and quality of school life. Time in specialized contexts may permit gifted students to establish their social competence in a safe environment. In such settings they may no longer worry about stigmatization, ridicule, excessive praise, or unfair expectations. Lawrence Coleman has suggested evidence of a learning context that enables gifted learners to develop their academic talents in ways that are challenging for them, without sacrificing peer acceptance, may be considered an important indicator of successful educational interventions that promote optimal development.

Counselors and psychologists who wish to contribute to gifted and creative students' optimal development may find the work of the various counseling laboratories for gifted and creative students useful. The Counseling Laboratory for the Exploration of Optimal States (CLEOS) provides counseling that has been found to promote engagement, purpose, and exploration and publishes its methods online.

Katherine Hoekman

See also Self-Actualization

Further Readings

Colangelo, N., & Davis, G. A. (Eds.). (2003). *Handbook of gifted education* (3rd ed.). Boston: Allyn & Bacon.

Counseling Laboratory for the Exploration of Optimal States (CLEOS): http://www.cleoslab.org

Csikszentmihalyi, M. (1992). *Flow: The psychology of happiness*. London: Ryder.

Kerr, B. A., McKay, R. A., & Hammond, D. (2008, August). *Increasing engagement of creatively gifted youth*. Paper presented at the annual meeting of the American Psychological Association, Boston. Available at http://www.cleoslab.org

Rogers, K. B. (2001). *Re-forming gifted education: Matching the program to the child*. Scottsdale, AZ: Great Potential Press.

Silverman, L. K. (Ed.). (1993). *Counseling the gifted and talented*. Denver: Love.

Originality

An idea or product must be original to be considered creative: Reproducing exact copies of paintings, verbatim quotes from poetry, or repeating scientific theories that others have already presented before the world cannot be considered creative. Definitions of *originality* usually focus on novel or unusual behavior and ideas, something or someone that does not imitate past action or practice. Originality involves escaping the obvious and commonplace, breaking away from habit-bound thinking. Originality—that is, novel or unusual behavior and ideas—is necessary for creativity. By itself, however, originality may characterize the bizarre and the inappropriate; therefore, originality is not sufficient for an idea or product to be deemed creative. Social value, aesthetic appeal, and appropriateness are also necessary.

Most measures of creativity assess originality by using the criterion of statistical infrequency or rarity of responses. The number of unique ideas is often used to score divergent thinking tests, which are the most commonly used estimate of creative potential.

Research findings support the existence of high correlations between originality and fluency on most measures of creativity. Fluency is the ability to produce many ideas; it enables the individual to formulate more ideas than others do. Paul Torrance found that a person who generates a large number of alternatives is more likely to produce original ideas, and Dean Simonton confirmed those findings, showing that a person's originality is a function of the number of ideas formulated. Measures of originality, however, usually predict creative behavior more accurately than do measures of fluency. Therefore, though fluency increases the chance that original ideas will be produced, it is not sufficient for generating original ideas.

For meaningful measurement, originality must be defined with respect to sociocultural norms. Ideas that may be original in one culture may be old news to members of another culture. Although originality is a hallmark of creativity, the determination of originality needs a comparative base, whether it is the repertoire of an individual or the norms of a population, society, or culture. At the highest levels of creativity, the comparative base is worldwide or historical.

To assess originality of thinking across cultures, Paul Torrance administered three nonverbal and six verbal tasks to students in Grades 1 through 6 in the United States, Australia, Germany, India, and Western Samoa. Some responses were common across all cultures, whereas others were common in one culture but were considered original in others. For example, on the Circles Task, baseballs, basketballs, hoops, doorknobs, doughnut holes, steering wheels, and satellites were common in the United States but were scored as original for other cultures. Boats, bowls, breadfruit, cats, and leaves were common in Samoa but were unusual—and therefore scored as original—in other cultures. Eggplants, melons, pomegranates, rackets, pitchers, and tables were common in India but original elsewhere. Butterflies and traffic signs were common in Germany and original in other cultures. Buttons, clowns' faces, targets, and tires were common in the United States and Germany but were original in other cultures. Goats, lollipops, pumpkins, and scissors were common in the African American students in the United States sample, but were original in other cultures, including the broader United States. The cultural specificity of originality has been confirmed by the experiences of various scorers of creativity tests, including the Torrance Tests of Creative Thinking (TTCT), using comparisons of American responses with the responses of people from other countries.

Originality scores on measures of creativity also change over time. Kyung Hee Kim questioned the reliability of originality scores from the latest version of the TTCT: It uses 1984 norms, and the frequency of different responses may well have changed since then. She suggests the creation and use of independent criteria for different times as well as cultures.

Mark Runco concluded that originality by itself is not a sufficient indicator of creativity, and that social value, aesthetic appeal, and appropriateness are also necessary. In fact, by itself, originality may characterize bizarre and obviously inappropriate work or behavior. Some researchers emphasize the fit or adaptiveness of creative ideas, and others define creativity in terms of originality and value, which includes intrinsic worth and/or pragmatic usefulness. An original idea or product is judged not by the originator but by its recipients; for instance, an original symphony that lacks beautiful or exciting themes and fails to make a deeper emotional connection with the audience lacks creativity when considering the criterion of adaptiveness.

Runco and his colleagues conducted a study to assess the relative contributions of originality and appropriateness to judgments of creativity. Their findings suggest that the best strategy for generating creative ideas or solutions focuses on originality because the judges in the study valued originality more than appropriateness.

Kyung Hee Kim

See also Creativity Assessment; Creativity Theories

Further Readings

Kim, K. H. (2006). Can we trust creativity tests? A review of the Torrance Tests of Creative Thinking (TTCT). *Creativity Research Journal, 18,* 3–14.

Runco, M. A. (1993). Operant theories of insight, originality, and creativity. *American Behavioral Scientists, 37,* 54–67.

Simonton, D. K. (1999). *Origins of genius: Darwinian perspective on creativity.* New York: Oxford University Press.

Torrance, E. P. (1963). *Education and the creative potential.* Minneapolis: University of Minnesota Press.

Torrance, E. P. (1979). *The search for Satori and creativity.* Buffalo, NY: Bearly Limited.

Out-of-School

Out-of-school activities can play an important role in the life of gifted youth. Parents and gifted youth educators, challenged to meet the unique needs of students using established school curriculums, often turn to out-of-school programs to support the enrichment needs of gifted youth. Unfortunately, only sparse empirical data exist that directly examine the impact of out-of-school activities on gifted youth, although several guides to opportunities for out-of-school activities for gifted young people have been published, including Julia Roberts and Frances Karnes's *Enrichment Opportunities for Gifted Learners*. Existing research on development of non-gifted youth who participate in out-of-school activities, however, provides compelling evidence for the benefits of participation in these activities for gifted youth; out-of-school activities can provide ideal conditions and opportunities to facilitate and meet specific needs and motivations that typify gifted youth. This entry summarizes the research on organized out-of-school activities and discusses how they are uniquely situated to meet the needs of gifted youth.

The Prevalence of Out-of-School Activity Participation

The term *out-of-school* typically refers to weekday hours when parents are at work and unable to directly supervise their children during the after school hours; recently, this time has been called the *after-3–hours*. It is estimated that about 25 percent of K–12 youth in the United States, approximately 14.3 million youth, are unsupervised during these after-3–hours, with the rate increasing to nearly one-third in families where both parents work or in single-headed families. Among older youth in Grades 9 through 12, the rate of unsupervised time during the after-3–hours is much higher, at around 60 percent. Although unsupervised time is not inherently detrimental, having large blocks of time without supervision is known to place youth at risk for behavioral and academic problems. Out-of-school activities provide important places where youth can spend time engaged in structured endeavors during the after-3 hours, providing a

host of positive personal and social benefits while diminishing potential risks.

The Variety of Out-of-School Activities

In the United States there is a wide range of organized out-of-school activities from which youth can choose to participate. The term *out-of-school activities* is often used as the broader heading to which activities belong and is not related to where the activities occur, such as on school grounds or in a community center. The range of activities available to youth includes sports, arts, academic, service, and community-oriented and faith-based youth groups, although these categories are not the only way of grouping activities. Some researchers, for example, combine service and faith-based youth groups together. Research shows that sport activities draw the highest rates of participation among youth, followed by art activities; this includes school-sponsored activities and non-school activities. Based on a representative sample of 11th-grade youth, Reed Larson, David Hansen, and Giovanni Moneta reported that 87.7 percent of youth in their study participated in at least one of the categories of organized activities, and 70.3 percent participated in two or more activities concurrently. Thus, a large majority of youth in the United States regularly participate in organized activities. Although youth in the United States generally have a wide variety of activities to choose from, it should be kept in mind that the variety and availability of activities differ markedly by the geographic location (e.g., rural vs. suburb) and economic conditions of the community.

Youths' Time in Out-of-School Activities

The time youth spend participating in any single out-of-school activity can be considerable, depending on the type of activity. For example, youth in a sport activity spend on average between 10 and 20 hours per week participating; youth participating in academic activities report substantially fewer weekly hours, between 1 and 5 hours per week. Although many researchers assume that the amount of time youth spend in an activity influences their development, few studies have directly evaluated the effect of time or "dosage." Among the few studies that have evaluated "time," the findings suggest that a greater amount of time is related to higher rates of learning, providing preliminary support for researchers' long-held assumptions. The research, however, has not yet adequately examined whether there is a point at which too many hours of participation, such as 20 hours per week, leads to detrimental outcomes.

Developmental Conditions of Out-of-School Settings

Although youth participate in a variety of out-of-school activities and for considerable amounts of time, it is the result or the outcome of this participation that interests those concerned with the development of gifted and non-gifted youth. Research on out-of-school or organized youth activities suggests this setting provides a unique blend of conditions that facilitate growth and development: intrinsic motivation, challenge, and sustained effort. Theory argues that these three conditions are necessary for youth to develop *initiative,* the ability to use self-directed and sustained effort over time to achieve a challenging goal. Initiative (closely related to the concept of agency) is at the core of development for gifted youth; a consistent characteristic of gifted youth is an intense drive to master and achieve in a domain, such as arts, sports, music, or science.

Unlike many contexts in youths' lives, out-of-school activities are one area in which youth report feeling "alive"; that is, they report experiencing high levels of intrinsic motivation and concentrated effort as they participate in the activities of the program over time. By way of comparison, research shows that youth in a classroom experience low levels of intrinsic motivation and moderate levels of concentration; when with their friends, youth report high intrinsic motivation but low concentration. It is only in the out-of-school activity setting that youth report high levels of both motivation and concentration.

Implications

The function of out-of-school activities in the United States is typically to promote youths' engagement in learning. For gifted youth, these activities may take on an added dimension, providing an environment in which intense drives to achieve can

be met. Within the out-of-school setting, challenges and a caring interpersonal environment cultivated by adults can encourage the creative expression of gifted youths' innate drive to excel. As research on participation of gifted youth in out-of-school activities increases, we will have a better understanding of the processes that best encourage the development of these youths' abilities.

D. M. Hansen and T. L. Arrington

See also Summer Camps; Summer Programs

Further Readings

Afterschool Alliance. (2005, March). *Working families and afterschool: A special report from America After 3 PM*. Retrieved June 15, 2008, from http://www.afterschoolalliance.org

Larson, R. (2000). Toward a psychology of positive youth development. *American Psychologist, 55*(1), 170–183.

Larson, R., Hansen, D., & Moneta, G. (2006). Differing profiles of developmental experiences across types of organized youth activities. *Developmental Psychology, 42*(5), 849–863.

National Institute on Out-of-School Time at Wellesley College. (2008). *Making the case: A 2008 fact sheet on children and youth in out-of-school time*. Retrieved June 15, 2008, from http://www.niost.org

National Research Council and Institute of Medicine. (2002). *Community programs to promote youth development*. Washington, DC: National Academy Press.

Roberts, J. L., & Karnes, F. A. (2005). *Enrichment opportunities for gifted learners*. Waco, TX: Prufrock Press.

Winner, E. (2000). The origins and ends of giftedness. *American Psychologist, 55*(1), 159–169.

Overexcitabilities

The concept of psychic overexcitabilities (OEs) emanated from Kazimierz Dabrowski's original concept of developmental potential, which he defined as a genetic endowment of traits that determine what level of moral development a person may reach under ideal circumstances. The five forms of OEs—psychomotor, intellectual, imaginational, sensual, and emotional—are considered types of increased psychic excitability and specific types of nervous energy Dabrowski witnessed in gifted and creative individuals. The OEs are described as a special kind of understanding, experiencing, and responding to the world. Michael Piechowski hypothesized that these overexcitabilities may be more prevalent in gifted and creative individuals than in the general population. The OEs are emerging as important components of giftedness and creativity, especially in light of the particular social and emotional needs of gifted individuals. The following sections further describe the specific OEs and the research that has been conducted on the OEs in typical and gifted school-age children, college students, and adults.

Overexcitabilities and Gifted Individuals

The psychomotor mode is one of movement, restlessness, action, excess of energy. The sensual mode relies on sensory contact and a need for sensory stimulation, including sensuality. The intellectual mode is characterized by analysis, logic, questioning, the search for truth, and a need for continuous and intense intellectual stimulation. The imaginational mode combines vivid dreams, daydreams, fantasies, images, and strong visualizations of experience. The emotional mode is expressed in attachments and bonds with others, and feelings of empathy, loneliness, and the happiness and joy of love.

Gifted, talented, and creative individuals are known to be energetic, enthusiastic, task committed, endowed with vivid imaginations, and strongly sensual, but they are also known to be emotionally vulnerable. Some are known to be aggressive, others to be morally sensitive. They may react strongly to aesthetic, intellectual, emotional, sexual, and other stimuli. According to Piechowski, the overexcitabilities feed, enrich, empower, and amplify talent, but they may also intensify emotional and intellectual insight, creating a tendency toward perfectionism, unrealistic expectations, and social and intellectual asynchrony.

Research

Michael Piechowski, Linda Silverman, Frank Falk, and Nancy Miller were instrumental in introducing

the OEs to the gifted community through research studies utilizing various versions of the Overexcitability Questionnaire (OEQ), which has been used as an essay response instrument and as semistructured interview protocols. The most recent version of this instrument contains 21 questions such as, "Are you poetically inclined?" The instrument is holistically scored by trained raters. This line of research continues today and suggests that the overexcitabilities may be more prevalent among gifted, talented, or creative individuals, and that profiles of overexcitabilities differ among various groups. Researchers have found differences in the OEs among children and adolescents, with those identified as gifted scoring higher than those who are not identified as gifted. Some OEs were found to be strongest in artists when compared to the gifted and to have greater strength in more creatively gifted adolescents than less creatively gifted ones, but the artists in this study were self-identified, and not peer-recognized through the channels of the domain of visual arts. Other research has concluded that the Intellectual and Emotional OEs classified students as creatively or intellectually gifted and predicted group membership from among gifted, near-gifted, and non-gifted students. The authors of the original instrument found gender differences in which females had significantly higher emotional OE scores and males had higher intellectual OE scores. Others studied 9th- and 10th-grade gifted students enrolled in two private Catholic schools and found that they were differentiated from their non-gifted peers based on their higher psychomotor, intellectual, and emotional OE scores, with psychomotor providing the best predictor of giftedness.

More recent research, using a Likert-type instrument, the Overexcitabilities Questionnaire II (OEQII), found significant differences between males and females, gifted students and their parents, and gifted and typical students on the five OEs. Females scored higher than males on the Sensual and Emotional OEs. In addition, gifted students demonstrated higher Emotional and Intellectual OE scores, which may make them more insightful and volatile in their relationships with peers and others; this tension may also result in a discrepancy between how they perceive themselves and how they wish to be perceived. These two factors may help explain the asynchrony that gifted children often manifest when comparing themselves to their peers and to their imagined ideal selves.

The presence of high Psychomotor, Intellectual, and Emotional OEs in gifted students may be problematic because it may lead to diagnoses of attention deficit hyperactivity disorder (ADHD) and other behavior disorders. Gifted students with ADHD demonstrate behaviors such as daydreaming, incessant talking, inability to sit still, and social immaturity; all potential characteristics of the various manifestations of overexcitability. Researchers in the area of gifted students with learning issues found that gifted students with learning disabilities were typically the most disruptive students in their classes. Additional research suggested that gifted children with disabilities understand faster, ask more questions, hurry through math, and may be terribly disruptive. This evidence muddies the literature on gifted students with learning disabilities or ADHD because it becomes difficult to separate the characteristics of students with learning disabilities or ADHD from behaviors and characteristics often associated with gifted or creative children.

In a subsequent study using the OEQII, the researcher found significant differences between males and females, elementary and middle students, and typical and gifted students on the composite OE subscales. Mean OE subscale scores were relatively stable for typical students, but varied greatly for gifted students. Gifted elementary students scored higher on all five OE subscales, whereas typical middle school students scored higher on the Sensual and Imaginational OEs. Post hoc probing suggested that the mean Intellectual and Imaginational OE scores represented a majority of the difference between typical and gifted students. Finally, cross-cultural studies of the OEs continue today across Europe, Asia, and the Middle East.

Further research is needed into the construct of the OEs and the validity of results obtained from the OEQ instruments. Future research on the use of the OEs as a tool for discriminating among groups should focus on longitudinal patterns and differential manifestations of giftedness, because the literature suggests that highly gifted students may be more susceptible to social and emotional problems than those considered moderately gifted.

Finally, intervention research is needed to examine the OEs in school-age gifted children and to identify instructional strategies that may help gifted students understand and celebrate rather than disguise these intense behaviors and reactions.

Carol L. Tieso

See also Emotional Development; Emotional Intelligence; Existential Depression; Giftedness, Definition; Identification; Moral Development; Social-Emotional Issues; Supporting Emotional Needs of Gifted

Further Readings

Ackerman, C. M. (1997). Identifying gifted adolescents using personality characteristics: Dabrowski's overexcitabilities. *Roeper Review, 19*(4), 229–236.

Dabrowski, K. (1964). *Positive disintegration*. London: Little, Brown.

Falk, R. F., Lind, S., Miller, N. B., Piechowski, M. M., & Silverman, L. K. (1999). *The Overexcitability Questionnaire-Two (OEQII)*. Denver, CO: Institute for the Study of Advanced Development.

Piechowski, M. M. (1999). Overexcitabilities. In S. R. Pritzker & M. A. Runco (Eds.), *Encyclopedia of creativity* (Vol. 2). San Diego, CA: Academic Press.

Piechowski, M. M. (2006). *"Mellow out," they say. If I only could: Intensities and sensitivities of the young and bright*. Madison, WI: Yunasa Books.

Silverman, L. K. (2008). The theory of positive disintegration in the field of gifted education. In S. Mendaglio (Ed.), *Dabrowski's theory of positive disintegration* (pp. 157–174). Scottsdale, AZ: Great Potential Press.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Olenchak, F. R., & Beljan, P. (2005). *Misdiagnosis and dual diagnoses of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders*. Scottsdale, AZ: Great Potential Press.

P

Parallel Curriculum Model

The *parallel curriculum model* (PCM) is a comprehensive, concept-based approach to creating or revising curriculum. The model is intended to develop the strengths of a wide range of learners, including but not limited to those with high achievement and potential. PCM builds on previous theoretical beliefs concerning quality curriculum. The ultimate goal of PCM is to develop high-quality curriculum for the widest range of learners while still ensuring that the brightest learners are challenged. Through the use of the four parallels (Core, Connections, Practice, and Identity), either individually or in combination, PCM curriculum offers students opportunities to examine and engage the concepts and principles of a discipline in varied and compelling ways while growing toward expertise at an appropriately challenging level.

Theoretical Underpinnings

The model derives from the work of important theorists in the fields of psychology and curriculum and instruction to develop a rich and flexible approach to exploring and understanding the disciplines. Among the model's theoretical underpinnings are the following:

1. The key concepts and principles of a discipline represent the enduring knowledge of humankind. They are powerful in helping students understand what they study and in helping them organize, retrieve, transfer, and apply information. Concept-based curriculum leads to a depth of knowledge that is more powerful than the breadth without depth typified by a fact-based or coverage-based approach to curriculum.
2. Representative topics are those facets of a discipline that are highly reflective of other topics in the discipline. They are economical in helping students see how a discipline works and what it means. Representative topics enable students to study fewer topics in a discipline at much greater depth in order to see how the key concepts and principles make sense and how they govern the discipline as a whole. It is then possible for students to study subsequent topics with greater efficiency and effectiveness.
3. Process skills are central in powerful curriculum. Students learn more by doing than by listening and memorizing. Thus it is essential in curriculum design to engage learners' minds in a variety of kinds of thinking.
4. Knowledge is most useful when students can use what they learn to extend current knowledge and produce new knowledge. It is therefore important to teach students to work as much as possible like practitioners and problem solvers in a field would work.
5. Product-oriented curriculum enables students to draw on essential information, processes, and methodologies in a discipline in order to grapple with and ultimately address important issues and

problems. When students view themselves as producers of knowledge, they are more engaged in learning, find more satisfaction in their work, and have a more realistic opportunity to consider a range of possible futures for themselves.

6. Curriculum that serves as a catalyst for persistent movement toward expertise is necessarily concept based, process and method driven, and product oriented. To guide students toward increasing levels of expertise is to provide them with dynamic learning experiences and access to a promising future.

Curricular Parallels

PCM proposes four curricular parallels or ways of thinking about content. Each parallel can be used individually or in some combination with other parallels, and is unique in its intent and purpose. The four parallels are as follows: (1) The Core Parallel, which emphasizes the key concepts, principles, skills, information, and attitudes that shape a discipline; (2) the Connections Parallel, which helps students use the key concepts and principles of a discipline to make connections among and between various disciplines, time periods, places, and topics; (3) the Practice Parallel, which affords students opportunities to use the key concepts, principles, and methods of a discipline to engage in practitioner- and expert-like experiences that address key issues of a discipline; and (4) the Identity Parallel, which guides students in relating the key concepts and principles of a discipline to their own experiences, strengths, and goals.

The parallel curriculum model also encourages teachers to use key components of curriculum (e.g., content standards, assessments, introductory and closure activities, teaching methods, learning activities, grouping strategies, student products, resources, extension opportunities) as vehicles to ensure that students continue to focus on the key concepts, principles, and methods of a discipline as well as on the unique nature of a particular parallel. In addition, the model incorporates an approach to differentiating or personalizing instruction called Ascending Intellectual Demand (AID). AID guides teachers in examining a student's development in a particular segment of study and then adjusting the depth, breadth, pacing, and progression toward expertise as a means of providing optimum academic challenge.

Elements

Following is a brief examination of key PCM elements.

Core Curriculum

The Core Curriculum is designed to help teachers and students establish a framework of relevant knowledge, understanding, and skill that represents the nature and goals of a particular discipline. Although state and district standards play a key role in developing Core Curriculum, the main goal of Core Curriculum is to ensure that students develop a deep understanding of a discipline by coming to understand how experts in the discipline organize, make meaning of, and think about the discipline. Thus, in developing Core Curriculum, the teacher or curriculum developer ensures that content standards are organized conceptually in order to provide students with learning opportunities that help engage them in understanding the nature and structure of a discipline and to engage in complex thinking about the discipline.

Curriculum of Connections

Like the Core Curriculum, the Curriculum of Connections engages students in developing meaning based on the key concepts and principles of a discipline or topic. The Curriculum of Connections, however, helps students see how key concepts and principles reveal patterns and relationships across and among a variety of time periods, settings, cultures, events, people, and places. Thus, the Curriculum of Connections provides students, for instance, with opportunities to see meaningful relationships among topics being explored in U.S. history and in literature, in biology and in chemistry, in math and in art, in economics and in today's news, in the lives of "new world explorers" and lives of those who currently explore outer space. A heavy emphasis on subject-specific standards in schools makes this Parallel particularly useful in that it helps students organize discrete pieces of information around more meaningful concepts and principles and isolated skills into more purposeful tools.

Curriculum of Practice

As with the Core and Connections parallels, the Practice Parallel focuses on key concepts and principles of a discipline. The Curriculum of Practice, however, is intended to provide students with opportunities to take on the role of practitioner or expert in a discipline, seeing firsthand how experts use key concepts and principles to think about and address problems in the discipline. Further, this Parallel asks students to understand the methods, skills, habits of mind, and tools of production that experts in a discipline use. The Curriculum of Practice asks students to be disciplinarians—to "do" a discipline, rather than simply study it. Students thus address key issues and problems within a discipline as they seek solutions from the perspective of a practitioner in the discipline. The Practice Parallel provides students a window to the world outside of the classroom, making learning more compelling as students see real-world applications of classroom experiences, and leading to higher levels of student motivation.

Curriculum of Identity

The purpose of the Identity Parallel—also rooted in the key concepts and principles of a discipline—is twofold. First, students learn about the concepts and principles of a discipline or engage in expert-like activities. Simultaneously, however, the Curriculum of Identity helps learners see themselves in relation to the concept and principles and/or in comparison with practitioners. Students connect the discipline with their own lives, both now and in the future. Reflective opportunities simultaneously help students increase awareness of the nature of a discipline and of their own strengths, interests, and potential contributions to their world. The Curriculum of Identity is a means by which students can understand themselves more deeply as learners in relation to the concepts and principles of a discipline and in relation to the lives and work of those who practice that discipline.

Ascending Intellectual Demand

A goal of PCM is to ensure that virtually all students in a school are engaged with meaningful, high-quality curriculum. This does not suggest, however, that students should participate in one-size-fits all learning activities. Instead, an essential aspect of any PCM unit or lesson is to ensure that the unique needs of students are accommodated through a unique approach to differentiated instruction called Ascending Intellectual Demand (AID). AID both guides teachers in challenging students through more traditional differentiation and is based on students' personal growth trajectories as they move toward increasing expertise in a discipline. AID can be achieved (a) by offering students increasingly complex opportunities to work like experts in a discipline, (b) by using a set of AID prompts that help move students toward more advanced levels of expertise, and (c) by using rubric-like continuums that provide a learning progression from novice to expert in the disciplines.

Nonnegotiables

As is the case in implementation of any model or approach to curriculum and instruction, fidelity to the model's essential elements is imperative. The nonnegotiable elements of PCM include the following:

1. PCM curriculum is concept based and principle driven. That is, concepts and principles must be evident to and central in the work of students consistently and persistently.
2. PCM curriculum consistently reflects the "deep intent" of one or more parallels in the foreground of the unit. That is, it ensures students work to be able to answer the parallel's key questions, or other questions of equivalent importance and complexity.
3. PCM curriculum uses the curriculum components in a way that gives the unit coherence keeps the "deep intent" of the parallel(s) in the foreground of teaching, student work and thought, and class discussion.
4. PCM curriculum applies Ascending Intellectual Demand to extend student capacity by intensifying the "deep intent" of the parallels moving students progressively toward more expert-like ways of knowing, thinking, and working.

PCM curriculum should adhere to these guiding principles to ensure meaningful, high-quality learning experiences for students.

Implications

A fundamental assumption of PCM is that meaningful, high-quality curriculum should be available to virtually all students. In this way, PCM can simultaneously challenge advanced learners, serve as a catalyst for the recognition and identification of talent in groups of students who are traditionally underrepresented in gifted programs, and extend the abilities of many other students as well. AID is a novel way of looking at challenging students by meeting them at their appropriate readiness levels to help them progress toward expertise.

To these ends, PCM proposes the following:

1. There is no single "kind" of gifted learner. Students with high potential exist in all economic, racial, and ethnic groups—as well as in many facets of exceptionality—in far greater numbers than now recognized. It is important for the field of gifted education to embrace with equal energy and commitment both the extension of opportunity for high-performing students and the discovery and development of capacity in high-potential students.
2. Effective curriculum should be seen as a catalyst for both recognizing and developing high potential and for extending high performance.
3. Effective curriculum respects and responds to the unique characteristics and needs of individual students. Thus, effective curriculum provides support for students who encounter difficulty with content at a given time and for students who need to learn at a more rapid pace and at a greater depth. It attends to students' particular interests and encourages development of their particular talents.

PCM is thus intended to help those involved in educating gifted students play a more proactive role in the development of high-quality curriculum for the talents and abilities of a wide variety of students, including those who are identified as gifted and those who have undeveloped potential.

Carol Ann Tomlinson and Eric M. Carbaugh

See also Curriculum Models; Expertise

Further Readings

Tomlinson, C., Kaplan, S., Purcell, J., Leppien, J., Burns, D., & Strickland, C. (2006). *The parallel curriculum in the classroom, Book 1: Essays for application across the content areas, K–12*. Thousand Oaks, CA: Corwin Press.

Tomlinson, C., Kaplan, S., Purcell, J., Leppien, J., Burns, D., & Strickland, C. (2006). *The parallel curriculum in the classroom: Book 2: Units for application across the content areas, K–12*. Thousand Oaks, CA: Corwin Press.

Tomlinson, C., Kaplan, S., Renzulli, J., Purcell, J., Leppien, J., & Burns, D. (2002). *The parallel curriculum model: A design to develop high potential and challenge high ability learners*. Thousand Oaks, CA: Corwin Press.

Parental Attitudes

Parental attitudes about giftedness, which differ from one family to the next, are often affected by the many questions and concerns parents may have about how best to nurture and support their children's optimal growth. There is an ever-increasing wealth of information as people come to understand more and more about intelligence and giftedness, and ways to identify and address individual learning needs. Ongoing research in such domains as child development, neurological science, educational psychology, and other related fields continues to inform attitudes and perspectives on how children learn, how educators teach, and how parents can support their children both at home and at school. In addition, organizations of parents of gifted children have formed all over the world for the sharing of information and resources.

Underlying Factors

Feelings about a child's giftedness—and its many possible implications—can range from pure anxiety to confusion to unparalleled excitement, with infinite possibilities in between. Research shows that parental attitudes are often related to their socioeconomic status and knowledge about giftedness, with wealthier and more knowledgeable parents being more positive. Even those who

understand the nature of giftedness may be daunted by the task of nurturing their child's abilities. For example, parents may wonder how to navigate the school system when dealing with matters that are seemingly complex. There are inevitably questions about individual developmental differences, identification measures, exceptional learning needs as they change over time, school-based programs, practices and policies, assessment methods, and advocacy channels. Parents' attitudes about the giftedness of their child may differ with the sex of the child, with sex-role stereotyping affecting parental attitudes. For example, finding out that a boy is mathematically gifted may be gratifying; finding out that he is a gifted dancer may be disturbing. Similarly, parents may have many questions about how and why gifted girls differ from average girls. What kinds of answers are parents receiving?

The research says that high-level ability comes in many forms, that there is no single gifted profile, and there is no educational or parenting approach that is suitable for every child. That means there are no easy answers. Moreover, in the whole scheme of things, there is still a lot to learn. Nevertheless, particular types of giftedness may require different resources and parenting skills.

Whether a child is formally identified as gifted or not, and regardless of the child's age, parents may perceive a mismatch between their child's diverse needs and the various learning opportunities being provided. Sometimes those learning opportunities require adjusting, whereas at other times what is warranted is a more thorough reevaluation and restructuring of the educational landscape. Finding a proper fit between a child and the educational system requires planning, time, solid information gathering, effort, collaboration, and thoughtful and targeted decision making on the part of many people.

Initiatives

Parents can begin by finding out all they can about child development issues, the nature of intelligence, and giftedness. It is important for parents to access pertinent and current information both proactively and reactively. It can be difficult to zero in on what is most essential to one's own particular needs or concerns because of the great proliferation of resource material to sift through, read, consider, and then apply. As such, it is helpful to work in concert with a child's teachers and, if necessary, with professional psychologists, determining needs based on the lived experience of the child, and then building a framework from which to address them. For example, parents may want to know what to do in relation to their child's achievement and aptitude, social and emotional well-being, school programming and placement, and domain-specific areas of strength and weakness. Parental attitudes about giftedness will be influenced by the type and accuracy of the resource material they acquire, reflect upon, and apply; the kinds and extent of support they are given by educators, counselors, and other professionals; the degree to which they network and share useful information with other parents; and the extent to which they are open-minded, flexible, and sensitive when confronting all the smooth and rough patches encountered over time at home, in school, and within society. Children's own attitudes, uncertainties, tendencies, assumptions, excitabilities, cognitive levels, concerns, and questions about giftedness are also some of the matters at the forefront of parents' investigative and advocacy efforts.

Support and Responsibility

Parental attitudes tend to be invigorated and made more positive when their understandings of giftedness and high-level ability are clarified, and when parents perceive success in finding and providing appropriate educational opportunities for their child's optimal development. Ultimately, parents who appreciate their children's uniqueness (including their different interests, experiences, learning preferences, and ways of functioning) are better positioned to provide the right influences and guidance along the way. It helps, also, for the family to work as a team, supporting each others' goals and giving each member both support and individual responsibility for learning. Nevertheless, misinformation and controversy about giftedness can be confusing, daunting, and even overwhelming. When parents (and others) understand "being gifted" as the identification of exceptional learning needs at a particular point in time, this serves to remove some of the elitism, mystery, and confusion often associated with the label, and much of

the stigma frequently attached to it and to gifted education. Parents who cultivate inquiry, regularly access community support systems, and who have informed and positive mind-sets and understandings about giftedness from multiple reliable sources are attitudinally stronger and thereby better equipped to respond to their children's needs. This kind of acquired competence involves increasing one's familiarity with adaptive learning opportunities and environments; being attuned to children's abilities as they mature; helping children take some responsibility for their learning and to feel good about their accomplishments; learning about effective advocacy processes; and recognizing that one cannot categorize individual development, and that thus there is no predetermined path for any one child.

Parents of gifted/high-ability learners are positioned to help their children overcome difficulties that may accompany being perceived as "different" or "exceptional." Nurturing efforts should rest upon solid understandings of gifted-level development, open communication, love, and acceptance—and, most important, and unconditionally—an attitude that conveys respect for the intellectual and other domain-specific abilities and individual intricacies of the child, and all that he or she may come to be.

Joanne F. Foster

See also Attitudes Toward Gifted; Parenting; Student Attitudes; Teacher Attitudes

Further Readings

Begin, J., & Gagne, F. (1994). Predictors of general attitude toward gifted education. *Journal for the Education of the Gifted, 18*(1), 74–76.

Cross, T. (2005). *The social and emotional lives of gifted kids: Understanding and guiding their development.* Waco, TX: Prufrock Press.

Delisle, J., & Galbraith, J. (2002). *When gifted kids don't have all the answers.* Minneapolis, MN: Free Spirit Publishing.

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators.* Scottsdale, AZ: Great Potential Press.

Rogers, K. (2002). *Re-forming gifted education: Matching the program to the child.* Scottsdale, AZ: Great Potential Press.

VanTassel-Baska, J., & Stambach, T. (2006). *Comprehensive curriculum for gifted learners* (3rd ed.). Boston: Pearson Education.

Parenting

It has long been established that parents play an essential role in the development of gifted children. Twelve leading researchers, under the direction of Benjamin Bloom at the University of Chicago, studied the talent development of 120 children over a period of 4 years. In 1985, he reported in *Developing Talent in Young People* that parents played a crucial role in nurturing and encouraging these students. James Alvino's research indicates that caring, knowledgeable, and supportive parents can create a nurturing home environment that provides emotional support for students. This encouragement at home gives the child inner strength and a competent sense of self that enables the child to survive and even thrive. Linda Silverman's work in 1993 reinforces the concept that families who encourage and promote independence and exploration pave the way for a child's stable social and emotional development.

Traits that parents may have in common with their children include intensity, emotional involvement, acute sensitivity, high verbal ability, creativity and imagination, keen powers of observation, perseverance, and a tendency toward perfectionism. Thus parents have a need to meet with other parents of gifted to share experiences and learn skills to assist their children with issues such as stress, perfectionism, and friendships. Arlene DeVries and James Webb have proposed a guided discussion format that addresses social-emotional issues and parent relationships.

Parents as Advocates

Frances Karnes concludes in her studies that parents are powerful agents in advocating for appropriate educational placement for gifted children. When parents search for a school that provides a good educational fit, they need to consider whether their child's learning styles match that offered by the school; if there are provisions for the child to learn at his or her own pace; if the curricular content and

extracurricular activities match the child's interests and talents; if there are opportunities for students to ask probing questions and explore various viewpoints; if creative thinking and problem solving are encouraged; if the social and emotional needs as well as the academic needs are addressed; and if parents and community members are involved in the education of the child. When a child has been placed in a classroom, an initial meeting with the teacher allows parents to share their child's strengths and any concerns they have about their child. It is helpful when parents share specific examples of student work, interests, or behaviors. When a new program or accommodation is introduced, following up in 2 to 3 weeks in person, by phone, or e-mail is useful for evaluating its effectiveness.

A 1994 research study of 3,554 elementary gifted students and their parents conducted by the Belin-Blank Center at the University of Iowa indicated that parents were appropriately involved in both the academic and the social lives of these high-achieving students. Effective advocates first establish rapport with the school by supporting current programs, volunteering, and sending appreciative notes to educators. These parents serve on district school boards, advisory committees, and parent–teacher organizations.

Knowledge about educational philosophy, district budgets, state mandates, district staff, gifted students, and current issues in gifted education enables parents to communicate with confidence. Parents and educators both want what is best for the child, but come with unique insights into the child's needs, aspirations, interests, and aptitudes. Communication, beginning with the classroom teacher before moving to the next person in command, is built on positives, is respectful, and diplomatic, yet persistent. Parents joining together can speak collectively for the needs of gifted children in the local district or at the state level. Local parent advocacy groups are often affiliated with a state gifted association for support.

Addressing Social and Emotional Needs

Stress

Because of gifted students' asynchronous development (the uneven way in which their physical, social, emotional, and intellectual states develop), Judy Genshaft and J. Broyles, in 1991, determined that these students are more susceptible to stress. When stress is ignored, physical and mental illness, including depression, can occur. Warning signs of excessive stress include change in sleeping or eating patterns, school avoidance, difficulty concentrating, stomachaches or headaches, major change in personality, and excessive lashing out or withdrawal.

Caring parents recognize when students feel the need to hide their abilities to be accepted; when they experience excessively high expectations from within and from others; when schoolwork is too easy or too overwhelming; when they have overcommitted themselves; when they are overly concerned about existential humanitarian world issues; and when they strive to attain unrealistic goals or perfectionism. Parents can assist students in recognizing the physiological and psychological symptoms associated with stress, and then support them in finding an appropriate coping plan such as the following: Remove themselves from the situation; alter the self-talk regarding the incident; express their emotions either verbally or through a physical activity; relax through deep breathing, creative visualization, reading, or listening to music; establish priorities; examine the problem objectively; devise a plan to resolve the conflict; and finally implement the plan. Successful families establish a calm, noncompetitive environment with quiet times and places; use light-hearted humor; implement personal journaling; and a have healthy stress-reducing diet that limits caffeine and sugar. When students are affirmed in their problem solving, in their successes and failures, a strong sense of self develops. This resilience allows students to cope with the stresses they encounter. Parents are role models in how they cope with the challenges and stresses in their lives.

According to research based on the National Education Longitudinal Study in a sample of 25,000 eighth graders, among four main areas of parental involvement—home discussion, home supervision, school communication, and school participation—home discussion was the most strongly related to academic achievement.

Perfectionism

Perfectionism among gifted students has been a major concern for parents and educators as

reflected in studies of underachievement and emotional turmoil by Michael Pyryt. Research and clinical studies of gifted children and adolescents conclude that as a group gifted students are more perfectionistic than average-ability peers. Various professionals have estimated that as many as 20 percent of gifted children are perfectionists. Although parents might be concerned that they have created perfectionism in the child by having excessively high expectations, many children appear to have an inborn predisposition toward perfectionism.

D. E. Hamacheck views perfectionism on a continuum from healthy to unhealthy. A healthy pursuit of excellence means doing the best you can with what you have to work with, in the time you have; being satisfied with the results; and then moving on. Unhealthy perfectionists have an obsession with doing things perfectly, view themselves as "not good enough," often feel anxious and frustrated, and resort to procrastination and underachievement. Unhealthy perfectionists often try to imitate or live up to "perfect" standards as determined by others in society. Healthy perfectionists, on the other hand, can strive for excellence based on an intrinsic motivation to become truly themselves.

For unhealthy perfectionists, doing things perfectly is what one does to gain an identity and thus acceptance. When students lose one area of identity, such as being the "smart" student who always "gets it right," parents can assist them in finding another role. Parents can encourage them in a new hobby or extracurricular activity. They can also introduce them to an adult community or a family member who might become a role model for them in a new endeavor. In addition, parents can suggest they read biographies of successful adults in an area of their interest and discuss ways in which a character in a book overcame obstacles or failures. Parents can also share examples of when they took a risk in attempting a task in which they did not feel competent. When the student expresses a fear of risking a new undertaking, parents can be understanding and accepting.

The media and other societal influences that emphasize winning and being the "best" may contribute to students' inability to be less than perfect. The message can change from "Be the *best,*" to "Be the best *you* can be." Parents can commend students for the process or progress they make toward a goal, not just reward students for the finished product. They can help students set small manageable goals, establish priorities, and plan ahead. Students can work toward their personal best, but when they are pushed to extremes, it can cause frustration, anxiety, depression, and physical illness.

Friendships

Jonathan Plucker and Vicki Stocking in 2001 concluded that when students interact with others, they make assertions about their personal identity. Because they have diverse interests and think in ways that differ from their age-level peers, gifted children may have difficulty establishing friendships. Leta Hollingworth, in her studies as early as 1930, indicated that as IQ increased, so did difficulties with peer relations. Gifted children often are "off in their own world" and miss social cues in peer interactions. In 1942, Hollingworth indicated that highly gifted children tended to be solitary because they lacked available companions with similar interests or language abilities. Miraca Gross in 2001 concluded that most students tend to seek out friends of similar mental age rather than chronological age. It is the role of the parents to identify schools, extracurricular activities, community offerings, and gifted/talented summer schools and precollegiate programs where students will meet others with similar interests and abilities. Home can become a haven of acceptance for gifted children. Once they feel secure in the family, they are more willing to risk reaching out to others.

In her clinical observations of gifted students participating in programs of the Gifted Development Center in Denver, Colorado, Linda Silverman determined that among the highly gifted students, more than 75 percent were introverted in comparison to the 25 percent usually observed in the general population. She defines introverts as those who get energy from within compared to extraverts who are energized by interactions with others. For optimal development of predominantly introverted gifted children, parents need to respect their need for privacy. They need to give them advanced notice of changes in their routine. They can teach them new skills in private to avoid embarrassing them in public. Instead of pushing

them to have many friends, parents can enable them to find one best friend and encourage that relationship. Extravert students, on the other hand, are more comfortable in new situations and parents can arrange for them to be part of group social activities.

Often it is difficult to determine if the student honestly prefers being alone, or if he or she lacks social skills and is retreating for fear of rejection. At times it may be necessary to "practice" social skills by doing role-plays at home. Parents can encourage children to be the first to reach out to another student. They can teach what it means to be a good listener and to inquire about the other's interests. While encouraging acceptance of others, parents can acknowledge there are certain friends they can do without. A parent who has encouraged positive self-esteem in the student feels confident that the student will refuse to join a peer group that engages in behaviors that are morally or physically destructive.

Supportive Parents

Gifted students have a "need to know." When they question authority and break traditions, parents can guide them in socially acceptable ways. Although these students have long attention spans, they are often dreamers and thinkers, and may be engaged in thoughts that tune out current realities. Parents need to establish a safe environment where children can express their ideas and feelings. In 2002, Nancy Robinson's study of 5,400 children in a Head Start Program showed that those who were high achievers by third grade had caretakers who displayed positive parenting attitudes and strongly encouraged their child's progress. Schools expect that parents will provide a wide variety of reading material, expose their child to the visual and performing arts, provide opportunity for physical activity, assist the child in goal setting and problem solving, expect the child to take responsibility for household tasks, avoid overprotecting the child by allowing consequences, balance learning and leisure, support and actively encourage the child's interests, and above all, value the child for who he or she is, not what the child does.

Arlene Rae DeVries

See also Depression; Family Achievement; Parental Attitudes; Social-Emotional Issues

Further Readings

Bloom, B. S. (1985). *Developing talent in young people.* New York: Ballantine Books.

DeVries, A., & Webb J. (2007). *Gifted parent groups: The SENG model* (2nd ed.). Scottsdale, AZ: Great Potential Press.

Neihart, M., Reis, S., Robinson N., & Moon, S. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Peterson, J. (2007). *Talk with gifted/talented teens about self and stress.* Minneapolis, MN: Free Spirit Publishing.

Robinson, A., Shore B., & Emerson, D. (2007). *Best practices in gifted education.* Waco, TX: Prufrock Press.

Silverman, L. (1993). *Counseling the gifted and talented.* Denver, CO: Love Publishing.

Walker, S. (2002). *The survival guide for parents of gifted kids* (Rev. ed.). Minneapolis, MN: Free Spirit Publishing.

Webb, J., Gore, J., Amend, E., & DeVries, A. (2007). *A parent's guide to gifted children.* Scottsdale, AZ: Great Potential Press.

Parent Nominations

Parent nomination is a practice that provides opportunity for parents to recommend evaluation of their child for possible inclusion into gifted programs and solicits information about a child's potential need for gifted education. Gifted children often require educational services beyond those that can be provided within the regular classroom; however, to receive special services, these children must first be recognized as having special needs. Not all gifted students are identified through traditional means. This entry discusses the varieties of parent nomination methods and the benefits of, and concerns about, parents' input into identification of gifted students.

Many schools use a multistep, multiple measures approach for selecting students for gifted programs. Current practices generally employ a

combination of objective and subjective assessments to identify high-ability students, rather than relying on scores from single tests of intelligence. Among the various subjective measures used, such as teacher nominations, peer nominations, and self-nominations, some districts reach out to parents through a formal nomination process. Other districts handle parent nominations on an informal, individual basis.

Parent nominations have been shown to be effective in identifying students who will benefit from gifted programming, because parents are frequently able to recognize and accurately describe aspects of their child's development. Despite this information, parent nomination is often used only as a secondary, alternative, or optional method for identification. There are no statistics on how many districts across the nation include various types of parent nomination in their assessment process.

Forms

Nomination forms for parents vary from location to location. They can be short and simple, such as four or five descriptive questions about how parents observe their child's response to academic activities, ability to adapt to novel situations, task persistence, and creative expression. More detailed nomination forms involve checklists concerning a child's intellectual curiosity, creativity, motivation, and social and emotional maturity.

Benefits

Young Children

What parents know about their child can help shape a successful learning environment. Because early experiences with learning influence later attitudes toward school and achievement, appropriately placing gifted children in stimulating programs is essential. An important first step to accurate placement is identification, yet the testing of young, gifted children remains problematic. Not all schools evaluate kindergarten and primary-age students. Even if a school is open to the assessment of a gifted young child, there are few valid and reliable instruments. In addition, when considering gifted programming options such as early entrance for a very young child, schools have very little, if any, achievement, ability, and observational data upon which to base their decision. Early entry requires parents to be proactive in contacting schools.

A majority of schools do not initiate the identification of gifted students nor program for them until third or fourth grade, which means that parent observation, documentation, and nomination can be crucial components in proper program placement during the primary grades.

Researchers have shown that parents do observe developmental differences among children and can provide insight into early signs of giftedness. Parents are likely to identify early readers accurately, as well as children with extensive and expressive verbal skills, strong memory, focus, imagination, curiosity, long attention span, logical reasoning skills, and creative problem-solving ability. When provided with clear checklists, even parents who are not well educated themselves are able to recognize characteristics of gifted learners. Nomination forms that solicit parent input also help parents become aware of the gifted identification process used by their child's school. In addition, the use of a parent nomination process encourages the sharing of useful anecdotal and developmental information with educators.

Older Children

Many variables, such as health, well-being, home environment, exposure to learning opportunities, and second language acquisition can impact how well a child scores on a test. Schools that limit identification for gifted programs to a single entry point undoubtedly overlook a number of high-ability students. The option for parent nomination provides another avenue for these children to be evaluated.

Twice-Exceptional Students

Parent nominations are useful in the case of children with multiple exceptionalities (high abilities in some areas along with learning deficits in others). These students present a complex set of learning needs that includes provision for opportunities for their gifts to develop, as well as remediation for any disabilities. Accurate recognition and identification of a twice-exceptional child may result only through parent nomination.

Diverse Populations

Gifted children from disadvantaged or diverse populations, who might not perform well on standardized tests or within regular classrooms, can be brought to the attention of teachers through parent nomination. Parents from disadvantaged situations are less likely to understand the necessity for advocacy when children need special academic services. Through a formal process that includes parent nomination, parents of at-risk students, particularly those from cultural backgrounds that discourage public discussion of a child's gifts or accomplishments, are informed and encouraged to advocate for appropriate school placement.

Concerns

There are several reasons why schools may be reluctant to include parent nomination as part of their identification process for gifted services. Current teachers rarely receive training in collaborating with parents, which can result in misunderstanding and heightened sensitivity about controversial topics such as inclusion in gifted programs. Often educators are not trained in either identifying gifted children or providing effective programs to support their intellectual and social-emotional development.

Lack of training for teachers about recognizing and understanding the needs of gifted students can lead to suspicions about parent motives for nominations. Educators can discount parent information, concerned that parents are seeking a distinctive label for their child. In some instances, parents do nominate their child without a clear understanding of the negative consequences, yet teachers who understand the confusion surrounding the wide range of definitions and programs for gifted students can often refocus parents in practical and meaningful discussion.

When parent nomination forms are used, schools may expect parents to be familiar with gifted characteristics and signs of intellectual abilities, skills that even trained educators may miss. Parents need training in noting key aspects of emerging giftedness and in supporting the development of their child's abilities. Without such background, parents may miss critical clues for the nomination process. In addition, there can be a misalignment of parental conceptions of giftedness and a school's operational definition. Clear definitions and terminology can help parent nominations be effective tools.

Final Thoughts

Parents have the ultimate responsibility for their child's education. They know their child's developmental history and can accurately document signs of possible giftedness. Parent and teacher observations of an individual child may differ, but each provides beneficial insights. Including parental nomination as a viable option for discovering gifted children broadens perspective of the assessment process for multiple populations of students.

Robin Schader

See also Early Entrance, Kindergarten; Early Identification; Identification; Iowa Acceleration Scale

Further Readings

Lee, S., & Olszewski-Kubilius, P. (2006). Talent search qualifying: Comparisons between talent search students qualifying via scores on standardized tests and via parent nomination. *Roeper Review, 28*(3), 157–166.

Rogers, K. B. (2001). *Re-forming gifted education: Matching the program to the child*. Scottsdale, AZ: Great Potential Press.

Sattler, J. M., & Hoge, R. D. (2006). *Assessment of children: Behavioral, social, and clinical foundations* (5th ed.). San Diego, CA: Jerome M. Sattler.

Schader, R. M. (2008). Parenting. In J. Plucker & C. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says* (pp. 479–492). Waco, TX: Prufrock Press.

PERFECTIONISM

Perfectionism is a widely studied construct in gifted education. As such, multiple perspectives on different types of perfectionism, its origins, its prevalence in the gifted population, and its effects on students are prominent in the literature.

Perfectionism Typologies

Various typologies of perfectionism have been proposed. Inherent within this discussion is the implicit understanding that different types of perfectionism are associated with varying attitudes and behaviors. Wayne Parker identified three groups of gifted students: nonperfectionists, healthy perfectionists, and dysfunctional perfectionists. Parker described the nonperfectionists as having low levels of conscientiousness, personal standards, parental expectations, and organization as well as an overall low score on the Multidimensional Perfectionism Scale (MPS)–Frost, a measure of perfectionism that breaks the construct into six factors: personal standards, organization, concern for mistakes, doubts about actions, parental expectations, and parental criticism. Healthy perfectionists were defined as having minimal concern for mistakes and doubts about actions, low perceptions of parental criticism, high organization, moderate personal standards, and a moderate overall score on the MPS. This group scored lowest on a measure of neuroticism, but highest on extraversion, agreeableness, and conscientiousness. Finally, Parker described dysfunctional perfectionists as having a high concern for mistakes, personal standards, and doubts about their actions. They perceived their parents as highly critical. They scored the highest on the MPS–Frost, and they scored the highest of all three groups on measures of neurosis and openness to experience, and lowest on agreeableness.

Other research also suggests typology frameworks corroborating Parker's findings of adaptive and maladaptive perfectionism. Kristie Speirs Neumeister used the Hewitt and Flett Multidimensional Perfectionism Scale (MPS–Hewitt), a measure that breaks the construct into three factors, including self-oriented (individuals who have excessively high standards for themselves), socially prescribed (those perceiving others to have excessively high expectations for their performance), and other-oriented perfectionism (individuals who have excessively high standards for others) to study gifted college students. She found that those scoring high on socially prescribed perfectionism tended to overgeneralize their failures, adopted performance goals, and perceived their parents as critical. In contrast, although the self-oriented perfectionists expressed frustration with failure, they were also more likely to adopt learning as well as performance goals and to perceive their parents as supportive. These findings support the notion that different types of perfectionism may be related to different perceptions, attitudes, and beliefs among gifted students.

Development

The literature also highlights several influences on the development of perfectionism. These influences include personality, parental modeling and styles, insecure attachment, and lack of challenge.

Prevalence

The results of some studies indicate a higher prevalence of perfectionism among gifted students, while others fail to show differences in the populations. Differences in how perfectionism was measured, the operationalization of giftedness, and the age of the students may account for the conflicting results.

Implications

Researchers have offered suggestions for working with perfectionistic students, including creating a classroom where students are challenged and learn to appreciate mistakes and examining the motives underlying perfectionistic behaviors to determine how to respond. Other suggestions include setting appropriate expectations, being mindful of modeling perfectionism, praising effort rather than ability, and demonstrating unconditional love. Barbara Kerr proposed a counseling strategy for perfectionists to retrain them in positive aspects of nonperfectionism.

As more research on perfectionism is completed, parents, teachers, and counselors will be able to guide gifted students more effectively toward adaptive thoughts and behaviors that facilitate, rather than inhibit, their talent development.

Kristie Speirs Neumeister

See also Achievement Motivation; Guidance; Parental Attitudes; Parenting; Social-Emotional Issues

Further Readings

Frost, R. O., Marten, P. A., Lahart, C., & Rosenblate, R. (1990). The development of perfectionism. *Cognitive Therapy and Research, 14,* 449–468.

Hewitt, P., & Flett, G. (1991). Perfectionism in the self and social contexts: Conceptualization, assessment, and association with psychopathology. *Journal of Personality and Social Psychology, 60,* 456–470.

Parker, W. D. (2002). Perfectionism and adjustment in gifted children. In P. Hewitt & G. Flett (Eds.), *Perfectionism: Theory, research, and treatment* (pp. 133–148). Washington, DC: American Psychological Association.

Speirs Neumeister, K. L. (2004). Understanding the relationship between perfectionism and achievement motivation in gifted college students. *Gifted Child Quarterly, 48,* 219–231.

Speirs Neumeister, K. L., & Finch, W. H. (2006). Perfectionism in high ability students: Relational precursors and implications for achievement. *Gifted Child Quarterly, 50,* 238–251.

Performing Arts

The performing arts use the artist's body, face, and voice to create "live art" that can be enjoyed by an audience. The performing arts require high levels of talent and creativity, requiring great physical and mental exertion during performances. The performing arts express human culture across a broad time span of human history. This entry discusses the nature of performing arts careers as well as the ways in which gifted students are involved in performing arts.

The performing arts involve the artist's own body, face, and physical presence. Performing arts include dancing, singing, acting, circus performances, theater, film, opera, music, and acrobatics. The performing arts take place before a live audience, and exist in real life for a finite amount of time. Artists who participate in the performing arts include actors, dancers, musicians, and singers.

The Western model of performing arts began during the 6th century BCE in Ancient Greece with Sophocles' tragic plays. During the 9th through the 14th centuries, performing arts in the Western world were limited to religious reenactments and morality plays. In modern times, the performing arts have expanded to include television and movie performances. New technologies allow viewers to see past performances that have been prerecorded, and in this day and age the performing arts are both a live and a historical art form.

The performing arts require a lengthy talent development process, a deep understanding of the art, and the ability to connect with a live audience on the stage. There are many exciting opportunities for gifted individuals in the performing arts, but hard work and perseverance are required for a successful career in this area. Performing artists can take lessons, practice their skills, work with mentors, and perfect their talent to a professional level.

Earning a living in the performing arts requires talent, hard work, and knowledge about a specific industry. However, many performing artists are able to create their own niche in the marketplace, finding audiences through unconventional methods ranging from word of mouth to reality television shows.

Gifted individuals who are exposed to the performing arts develop an understanding and appreciation of culture and become producers of art experiences. Individuals who have artistic talent can pursue careers in a variety of areas that are suited to their aptitude and natural talent.

Suzanna E. Henshon

See also Artistic Ability; Dance; Drama; Talent

Further Readings

Karnes, F. A., & Stephens, K. R. (2007). *A girl's guide to achieving in the arts.* New York: Royal Fireworks.

Pasternack, C., & Thornburg, L. (2000). *Cool careers for girls in performing arts.* Manassas Park, VA: Impact Publications.

Piirto, J. (1999). *Talented children and adults: Their development and education* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Wright, B. (2002, Fall). Performing arts instruction for exceptionally and profoundly gifted children. *Gifted Education Press Quarterly, 16,* 4–5.

Personality and Intelligence

Intelligence refers generally to the capacity to collect, screen, process, and select information in an

adaptive manner. It is commonly treated as a global capacity of the individual to deal effectively with his or her environment. However, it has been conceived alternatively as a set of specific capacities that are content, domain, or context dependant (social, emotional, academic, practical, creative, mathematic, linguistic, etc.).

Personality refers to the preferred ways that an individual behaves or interacts with the environment. Personality is classically associated with the notion of traits that are stable, preferred ways of being and acting across time and situations. Recent work taking an interactive *person–situation* approach has indicated the utility of considering that behavior may be codetermined by an individual's preferences and environmental features, which vary across situations.

Diverse theoretical positions relating personality and intelligence have been proposed. In general, intelligence and personality are currently considered as two separate psychological components. Nevertheless, it is not excluded that some personality traits favor intellectual activity and that some specific factors of intelligence favor the development of certain aspects of personality. Understanding the interplay between these two basic concepts in psychology is important for modeling complex phenomena such as giftedness, talent, and creativity.

Theoretical Articulation Between Intelligence and Personality

Intelligence as a Part of Personality

Kant separated the mind into three components: cognition, conation, and affect. Some personality theorists, such as Raymond Cattell, have suggested, however, that intelligence refers to a stable mode of functioning and should be included within the concept of personality. Based on a lexical approach according to which all human behavior is represented in language and more specifically in each language's adjectives, Cattell identified 16 primary factors of personality with 1 referring specifically to intelligence: contrasting lower general mental capacity and inability to handle abstract problems with abstract thinking, higher general mental capacity, and fast learning. In this perspective, intelligence and specifically fluid intelligence may be considered part of personality.

In a similar approach, George Welsh introduced intelligence as a personality dimension, *intellectance,* related to performance on intellectual measures. Intellectance refers to the level of investment in intellectual activities: the more an individual is invested and interested in a cognitive task, the more he or she could perform well and show intelligence in this task. Thus *intellectance* may be described as an intellectual ability trait that allows individuals to achieve their objective.

In this conception of intellectual ability as a trait, the psychological variable of prudence, referring to concerned choice, and action planning as the basis of balancing between personal interests and social concerns, has been proposed. This concept may partially relate to the notion of "wisdom," involving both personality and intelligence in the extent to which people use their intelligence for a social good.

More recently, John Mayer proposed that stable behavior, defined as a personality trait, inherently involves cognitive and affective features. For example, the trait of extraversion combines positive affect (an emotional mechanism), social affiliation (a motivational mechanism), and knowledge of how to socialize (a mental model concerning intelligence).

The concept of emotional intelligence, defined as a set of abilities to treat emotion and/or emotional information, has been developed. Two kinds of emotional intelligence models exist: One is a maximum-performance-based model, an ability-based approach, and the other is a trait-based model. Emotional intelligence measures range from performance-based tests to those that capture individuals' self-perception of their emotional intelligence. In this way, emotional intelligence may be defined as a tendency to deal adequately with emotions.

Intelligence and Personality as Two Independent Structures

Many current models of personality, such as the *Big Five model,* do not include intellectual abilities. Concerning the factors often studied—Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeability—none is specially supposed to relate to differences in intellectual ability. In addition, dominant theories of intelligence do not include

personality traits; they focus exclusively on performance-based abilities, which can be considered potentialities that may be developed and expressed as talent.

Within this "independence" view of intelligence and personality, cognitive styles are often considered to represent the interface between the two spheres. Cognitive style refers to preferred modes for using one's intellectual abilities. For example, according to Robert Sternberg's *mental self-government theory* of thinking styles, people may show preferences for either legislative thinking (inventing new rules and procedures), executive thinking (following established rules to reach a goal), or judicial thinking (evaluating procedures and productions). An individual may have any of these preferred modes of thinking, regardless of his or her level of intellectual ability. Another style dimension is "external–internal," referring to a preference for thinking in social, group settings versus thinking alone. This dimension connects the personality trait of extraversion–introversion with the realm of mental activities. It is postulated that a preference for the external or internal style should not lead to differences in intellectual performance in general across a wide range of tasks (a particular style may favor performance in a certain cognitive task, however). Many dimensions of cognitive styles have been proposed with some being specifically adapted to situations involving learning, decision making, creativity, or other kinds of mental activities.

Not Independence but Some Personality Characteristics May Favor the Fulfillment of Intellectual Potential

Some interactions between personality and intelligence have been suggested, particularly in developmental approaches. For example, some authors have emphasized the idea that intelligence is partly the result of investing in intellectual activities. Personality, interests, and motivation are considered important variables in the access to knowledge. Anxiety-trait may contribute to the observation of lower scores in intelligence tests. Concerning why some people have greater knowledge than others, intellectual openness, a facet of the personality trait of openness, reflects a general interest in learning and positively predicted engagement in information-seeking activities, which positively predicted knowledge of current events.

Empirical Data

Many studies have tested relationships between intellectual performances and personality traits. For example, a meta-analysis of studies examining relationships between anxiety and intelligence showed a significant negative relationship with a mean r of .23, indicating that the more individuals are anxious, the less well they perform. Another meta-analysis examined the degree to which personality traits (other than anxiety) and intelligence are related. Some personality traits tend to be positively correlated across ability, including Well-Being, Social Potency, Achievement, Social Closeness, Intellectance, Extraversion, and Openness to Experience. Personality traits that tend to be negatively correlated across ability traits include Stress Reaction, Alienation, Anxiety, and Psychoticism.

Recently, several studies have examined links between academic performance, intelligence factors and Big-Five personality traits. These studies showed a positive significant relationship of openness to experience with academic performance, but also with fluid intelligence. In fact, a causal association between openness and knowledge-based components of intelligence has been proposed whereby individuals with high levels of openness are more likely to "invest" in activities that stimulate the acquisition of knowledge. Moreover, it was observed that the trait of conscientiousness was negatively correlated with fluid intelligence. More precisely, conscientiousness was negatively linked to fluid intelligence but positively linked to exam grades (academic performance). These results support the idea of a "compensational function": lower fluid intelligence led to higher conscientiousness, which, in turn, led to higher academic performance. The trait of conscientiousness may compensate for lower cognitive ability.

Intelligence and Personality in Giftedness, Creativity, and Talent

Many theories of giftedness, creativity, and talent propose that both intellectual variables and personality factors are involved. For example, recent

work on creativity suggests that a combination of intellectual abilities, such as divergent thinking, analogical-metaphorical thinking, and evaluation skills are necessary but not sufficient. There must be certain personality factors present to a sufficient degree to provide the right conditions to use the intellectual abilities. Risk-taking trait is often evoked in this context as a key element for creativity because novel thinking involves, by definition, breaking away from traditional ways of solving a problem or approaching a situation. However, it is difficult to break with tradition, in particular when these traditions serve as the basis of one's knowledge and expertise. Thus, in this context, the trait of risk taking provides the needed context in which intelligence can be turned to creative ends.

This example suggests that personality variables may provide a context for the use of intelligence. The opposite relationship has also been proposed within the context of giftedness, creativity, and talent. For example, the personality trait of tolerance of ambiguity has been found to be involved in creativity; tolerance of ambiguity trait allows one to explore potential avenues of a situation and ultimately to find a novel idea, because the problem solver avoids rapidly seeking closure and accepting a nonoptimal idea. Tolerance of ambiguity requires, however, noticing that there is some ambiguity. This awareness of ambiguity, which in turn may be tolerated to a greater or lesser degree, requires a sufficient level of intelligence. If an individual does not notice any ambiguity, the question of tolerating the ambiguity does not exist, and neither does the potential benefit of tolerating the ambiguity for creative thinking. Thus, complex phenomena such as giftedness, creativity, and talent most probably involve intelligence, personality, and their interactions.

Todd Lubart and Franck Zenasni

See also Creative Personality; Emotional Intelligence; Intelligence; Learning Styles

Further Readings

Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121,* 219–245.

Chamorro-Premuzic, T., & Furnham, A. (2006). Intellectual competence and the intelligent personality: A third way in differential psychology. *Review of General Psychology, 10,* 251–267.

Chamorro-Premuzic, T., & Furnham, A. (2008). Personality, intelligence and approaches to learning as predictors of academic performance. *Personality and Individual Differences, 44,* 1596–1604.

Hembree, R. (1988). Correlates, causes, effects, and treatment of test anxiety. *Review of Educational Research, 58,* 47–77.

Mayer, J. D. (2007). *Personality: A system approach*. Boston: Allyn & Bacon.

Sternberg, R. J., & Ruzgis, P. (Eds.). *Intelligence and personality.* New York: Cambridge University Press.

Playwrights

A playwright creates literature that is typically designed to be performed by actors on a stage. Because of the interactive nature of theater in general, a final dramatic piece may be the accumulation of creative contributions by the playwright, a director, a dramaturge, a choreographer, actors, reviewers, and sometimes the audience. Perhaps because playwrights produce a creative product that is a blend of individual creativity (such as that produced by a poet) and group creativity (such as that produced by an improvisational acting troupe), they have not inspired a great deal of psychological research. There are many studies of actors and performers, and there are many studies of poets or fiction writers. There is also an extensive literature on dramatic therapy—but the research on playwrights and playwriting is sparse.

Some of the research on playwrights focuses on the performing arts more broadly, touching on some of the characteristics that may also apply to playwrights. Nathan Kogan and Barbara Kangas, for example, looked at environmental and familial determinants of a career in drama. They found that most drama students did not have a parent who was professionally involved in theater, and students differed on both the age when they decided to become involved in the theater and in their schooling experiences.

Several studies, many including playwrights, have examined writers' longevity. James Kaufman,

for example, found that poets tended to be more likely to have mental illness and were more likely to die at a younger age. In contrast, playwrights did not die notably young or have notably high rates of mental illness. Antonio Preti studied suicide rates in different types of artists, and also found that poets had higher rates of suicide, and visual artists had lower rates; playwrights were not exceptional in either direction.

James Pennebaker and Lori Stone studied the collected works of 10 well-known playwrights, novelists, and poets. They found that across most writers (regardless of domain), aging brought a number of linguistic changes in their work. Specifically, writers tended to use more positive affect and fewer negative affect words, fewer self-references, less past tense and more future tense verbs, and they demonstrated a general pattern of higher complexity in cognition.

Kogan notes the paucity of work on the dramatic arts, and makes a call for more research. He outlines some basic distinctions that can be made, such as separating the study of creators (which would include playwrights) and interpreters (such as actors). Although much of his article is more focused on the performing arts, he does offer a model of artistic development that could also be applied to playwrights.

James C. Kaufman and Bethany A. Pritchard

See also Eminent and Everyday Creativity; Emotional Intelligence; Everyday Creativity; General Creativity; Literary Creativity; Relationship of Creativity to Intelligence; Writers

Further Readings

Crimmens, P. (2006). *Drama therapy and storymaking in special education*. Philadelphia: Jessica Kingsley Publishers.

Kaufman, J. C. (2001). The Sylvia Plath effect: Mental illness in eminent creative writers. *Journal of Creative Behavior, 35,* 37–50.

Kaufman, J. C. (2002). Dissecting the golden goose: Components of studying creative writers. *Creativity Research Journal, 14,* 27–40.

Kaufman, S. B., & Kaufman, J. C. (Eds.). (in press). *Psychology of creative writing*. Cambridge, UK: Cambridge University Press.

Kogan, N. (2002). Careers in the performing arts: A psychological perspective. *Creativity Research Journal, 14,* 1–16.

Kogan, N., & Kangas, B. L. (2006). Careers in the dramatic arts: Comparing genetic and interactional perspectives. *Empirical Studies of the Arts, 24,* 43–54.

Pennebaker, J., & Stone, L. (2003). Words of wisdom: Language use over the life span. *Journal of Personality and Social Psychology, 85,* 291–301.

Perry, S. K. (1999). *Writing in flow.* Cincinnati, OH: Writer's Digest Books.

Piirto, J. (2002). *"My teeming brain": Understanding creative writers*. Cresskill, NJ: Hampton Press.

Preti, A., & Miotto, P. (1999). Suicide among eminent artists. *Psychological Reports, 84,* 291–301.

Sawyer, R. K. (2007). *Group genius: The creative power of collaborations*. New York: Basic Books.

Poets Laureate

The term *poet laureate* has existed since before 1619, when Charles I appointed Ben Jonson the first poet laureate in Great Britain. A poet laureate is a writer of poetry who receives honor for eloquence. The word *laureate* comes from the laurel, *Laurus nobilis,* a type of bay tree whose leaves are used to make an entwined crown as an emblem of victory or of distinction—in this case, in poetry. The laurel tree was, in Greek mythology, sacred to the god Apollo, who was the patron of poets. The poet laureate assumes an official position within a government, and is often called upon to write poems in honor of ceremonial occasions. Many countries, states, and cities have poets laureate. The custom seems to be more prevalent in English-speaking or British-influenced countries than in others in Europe, though Nazi Germany had a poet laureate (Hanns Johst). A Children's Poet Laureate has been funded by the Poetry Foundation of America.

The British poets laureate are salaried, and members of the royal household. They have been, since 1619, all males, including Ben Jonson, Sir William D'Avenant, John Dryden, Thomas Shadwell, Nahum Tate, Nicholas Rowe, Laurence Eusden, Colley Cibber, William Whitehead, Thomas Wharton, Henry James Pye, Robert Southey, William Wordsworth, Alfred Lord Tennyson, Alfred Austin, Robert Bridges, John

Masefield, Cecil Day-Lewis, Sir John Betjeman, Ted Hughes, and Andrew Motion. Students of British literature may recall having read the poetry of some, but not all of these poets laureate.

The United States has had poets laureate since 1937; they are attached to the U.S. Library of Congress and appointed to a one-year term, except for Joseph Auslander, the first poet laureate, who served from 1937 to 1941. The Library of Congress poets laureate have been mostly White male and female, with males outnumbering females. The first African American poet laureate was Robert Hayden. Currently, the position pays $35,000 per year. The poet serves as "official lightning rod for the poetic impulse of Americans," according to the Library of Congress. Each poet works on a special project designed to raise the awareness of Americans about poetry. Poets after Auslander were Allen Tate (1943–1944), Robert Penn Warren, Louise Bogan, Karl Shapiro, Robert Lowell, Leonie Adams, Elizabeth Bishop, Conrad Aiken (who was to serve two terms, 1950–1952), William Carlos Williams, Randall Jarrell, Robert Frost, Richard Eberhart, Louis Untermeyer, Howard Nemerov, Reed Whittemore, Stephen Spender, James Dickey, William Jay Smith, William Stafford, Josephine Jacobsen, Daniel Hoffman, Stanley Kunitz, Robert Hayden, William Meredith, Maxine Kumin, Anthony Hecht, Robert Fitzgerald, Reed Whittemore, Gwendolyn Brooks, Robert Penn Warren (second term), Richard Wilbur, Howard Nemerov, Mark Strand, Joseph Brodsky, Mona Van Duyn, Rita Dove, Robert Hass, Robert Pinsky (for 6 years), then Rita Dove, Louise Glück, and W. S. Merwin (who were the bicentennial consultants), Stanley Kunitz, Billy Collins, Louise Glück, Ted Kooser, Donald Hall, Charles Simic, and Kay Ryan.

Most states and the District of Columbia have a poet laureate. In some states the governor appoints the poet; in others it is the legislature. The selection processes vary. In some states the poets apply; in others, they do not. Poets have various backgrounds; some have advanced degrees in creative writing, others are self-taught. Some teach poetry in English departments at colleges and universities, others are poets who have widespread followings among the common people. Arizona, Hawaii, Massachusetts, Michigan, New Jersey, New Mexico, Ohio, and Pennsylvania have no poet laureate.

In 2008, the poets laureate for the other states were as follows. Alabama: Sue Walker; Alaska: Jerah Chadwick; Arkansas: Penny Vining; California: Al Young; Colorado: Mary Crow; Connecticut: Marilyn Nelson; Delaware: Fleda Brown; District of Columbia: Dolores Kendrick; Florida: Edmund Skellings; Georgia: David Bottoms; Idaho: Kim Barnes; Illinois: Kevin Stein; Indiana: Robert Dana; Kansas: Denise Low; Kentucky: Jane Gentry Vance; Louisiana: Brenda Marie Osbey; Maine: Betsy Sholl; Maryland: Michael S. Glaser; Minnesota: Robert Bly; Mississippi: Winifred Hamrick Farrar; Missouri: Walter Bargen; Montana: Greg Pape; Nebraska: William Kloefkorn; Nevada: vacant; New Hampshire: Patricia Fargnoli; New York: Jean Valentine; North Carolina: Kathryn Stripling Byer; North Dakota: Larry Woiwode; Oklahoma: N. Scott Momaday; Oregon: Lawson Fusao Inada; Rhode Island: Lisa Starr; South Carolina: Marjory Heath Wentworth; South Dakota: David Allan Evans; Tennessee: Margaret Britton Vaughn; Texas: Larry D. Thomas; Utah: Katharine Coles; Vermont: Ruth Stone; Virginia: Carolyn Kreiter-Foronda; Washington: Samuel Green; West Virginia: Irene McKinney; Wisconsin: Denise Sweet; Wyoming: David Romtvedt. Some states appoint poets each year; some have terms that are longer.

Other government entities also have poets laureate. For some, the selection process is quite elaborate. In Sonoma County, California, for example, the poet laureate is selected by a committee made up of representatives from many of the arts organizations and libraries. In Ohio, the selection of the Lucas County poet laureate (Joel Lipman) was made by a committee of poets. Boston has a poet laureate, although the state of Massachusetts does not. Denver has one (Chris Ransick), and so does San Francisco (Laurence Ferlinghetti).

Though most poets laureate serve out their terms without disagreement, some do not. One poet laureate wrote such a controversial poem that the position of poet laureate was cut from the state budget. This was the poem "Somebody Blew Up America," which the poet laureate of New Jersey, Amiri Baraka, wrote after September 11, 2001, suggesting that Israel had something to do with the World Trade Center attack. Tsegaye Gabre-Medhin, the poet laureate of Ethiopia until his death in 2006, had works banned by all the

governments in his lifetime: Haile Selassie's, the Derg's, and the TDLF. In 2003, U.S. Library of Congress poet laureate Billy Collins declared his opposition to the war against Iraq, and an event where the First Lady Laura Bush was to appear was canceled by the White House. Collins's appointment was not without controversy among fellow poets; when he was appointed, poet Anselm Hollo declared himself the anti-poet laureate.

Jane Piirto

See also Eminence; Nobel Prize; Verbal Ability; Writers

Further Readings

McGuire, W. (1988). *Poetry's catbird seat: The Consultantship in Poetry in the English Language at the Library of Congress, 1937–1987*. Washington, DC: Library of Congress. (Library of Congress: http://www.loc.gov)

Political Leaders

Unlike what holds in the arts, sciences, chess, and sports, political leadership is not always counted as a major domain of giftedness or talent. Even so, several classic investigations included notable political leaders along with eminent scientists and artists. For example, Francis Galton's 1869 *Hereditary Genius* has a whole chapter devoted to prime ministers, presidents, and other heads of state, and Catharine Cox's 1926 *Early Mental Traits of Three Hundred Geniuses* examined illustrious politicians and revolutionaries among other professions. Whether or not political leadership can be considered as talent or giftedness depends on a scientist's stance on the causes of effective leadership. On the one hand, some investigators hold that political leadership depends on *being the right person*. On the other hand, some researchers defend the proposition that such leadership is actually contingent on *being at the right place at the right time*. The former position is sometimes called the *great man theory*, the latter the *Zeitgeist theory*. However, researchers in this area more often frame the debate as concerning the relative impact of individual and situational variables.

Individual Traits

If political leadership is a matter of being the right person, then it should be possible to identify one or more personal characteristics that correlate with the eminence or performance of political leaders. If it can also be shown that these predictive traits are inherited in some fashion (e.g., genetic endowment), then it is reasonable to speak of someone having a talent or gift for political leadership. For instance, psychometric studies have shown that leader effectiveness is positively correlated with general intelligence, and historiometric inquiries have indicated that intelligence is the trait that most strongly predicts achieved eminence or greatness as a political leader. Furthermore, general intelligence has one of the highest heritabilities of any individual-difference variable. Therefore, this trait can be taken as one component of political talent. Because most other personal predictors of leadership also feature a genetic contribution, talent in political leadership may be defined by a specific set of partially inherited traits.

Even so, several considerations render such talent much more complicated than in other domains of achievement. First, in some instances the traits have nonlinear associations with the success criterion. For example, political leadership can be a curvilinear inverted-U function of general intelligence. Second, sometimes a personal traits effect on leadership is indirect rather than direct. For instance, although leaders are more extraverted than introverted, extraversion does not predict performance but rather predicts policy stances that may or may not determine performance. Third, almost invariably individual traits have less predictive power than do situational factors. Although a politician must be the right person, it is even more important that he or she be at the right place at the right time.

Situational Factors

Political scientists are fond of enumerating all of the situational variables that influence leadership in governmental positions. These variables are not just political but also economic, military, and diplomatic. Not surprisingly, these factors

tend to account for far more of the variation in leader performance than all the individual traits put together. Presidential leadership in the United States offers many examples: (a) voter approval ratings automatically go up when the nation is subjected to a surprise attack, (b) success in getting legislation through Congress is dependent on the president's party having majorities in both houses of the legislature; (c) the probability of getting reelected is lowered if an economic downturn takes place in the months leading up to the election, and (d) the president's ultimate greatness according to expert evaluations is enhanced if the chief executive just happens to get assassinated.

These situational influences are so powerful that they can convert an incompetent leader into a competent leader, and the reverse as well. An excellent example in U.S. political leadership is what has been called the *vice-presidential succession effect*. Presidents who enter the nation's highest office through the death or resignation of their predecessor—such as Andrew Johnson succeeding Abraham Lincoln and Gerald Ford succeeding Richard Nixon—encounter numerous problems dealing with Congress, and especially the Senate. For instance, they are more likely to have their appointments to the cabinet or the U.S. Supreme Court rejected, and they are more prone to having their vetoes overturned. Yet when "accidental presidents" manage to get reelected to a term in their right, these detriments immediately disappear. Apparently, elected legislators do not accept the legitimacy of a chief executive who was not really elected to that office—regardless of the politician's genuine talents.

Individual–Situational Interactions

Although situational factors are more crucial than individual traits in the achievements of political leaders, it is not always easy to separate out their effects. This difficulty results from the fact that interaction effects sometimes appear between the two sets of variables. In other words, it is often not just a matter of being the right person or at the right place and time, but rather it is important to be the right person at the right place and the right time. A person who has the constitution to be a very effective leader in one set of circumstances may be a very ineffective leader in another set of circumstances. Hence, political achievement may require just the right match between individual talents and the conditions under which those talents will be exercised. Thus, a wartime head of state needs to have different characteristics than a peacetime head of state. For example, Winston Churchill was far more effective when he served as Great Britain's prime minister during World War II than he was when his nation was no longer engaged in a military conflict. Specific personality traits that are assets in one situation may become drawbacks in another. To illustrate: Inflexible, even dogmatic presidents can be very effective if their political party controls Congress, but they can become very ineffective if their party is in the minority. A case in point is Woodrow Wilson, who did very well in the White House until the opposing party took over the Senate.

Because of such complexities, the talent underlying political leadership may be far more subtle than the talents providing the basis of most other domains of achievement. Indeed, in certain contexts a given talent may even cease to exist.

Dean Keith Simonton

See also Emotional Intelligence; *Genetic Studies of Genius;* Historiometry; Intelligence; Leadership

Further Readings

Ilies, R., Gerhardt, M. W., & Le, H. (2004). Individual differences in leadership emergence: Integrating meta-analytic findings and behavioral genetics estimates. *International Journal of Selection and Assessment, 12,* 207–219.

Simonton, D. K. (2001). Kings, queens, and sultans: Empirical studies of political leadership in European hereditary monarchies. In O. Feldman & L. O. Valenty (Eds.), *Profiling political leaders: Cross-cultural studies of personality and behavior* (pp. 97–110). Westport, CT: Praeger.

Simonton, D. K. (2008). Presidential greatness and its socio-psychological significance: Individual or situation? Performance or attribution? In C. L. Hoyt, G. R. Goethals, & D. R. Forsyth (Eds.), *Leadership at the crossroads: Vol. 1. Leadership and psychology.* Westport, CT: Praeger.

Polymaths

A polymath is an individual with unusual ability in more than one discipline. A classic example is Leonardo da Vinci—engineer, inventor, artist, gymnast, and entertainer. The existence of such Renaissance people in modern times has become a contentious issue of great significance to creativity studies.

The debate centers on whether creativity springs from intensive training and effort in a single domain or whether it results from combining talents and experience from several. Differing definitions of creativity complicate the matter. Some psychologists differentiate between personal or "little c" creativity and discipline-based on socially recognized "Big C" creativity. If creativity requires combining talents and experiences from several domains, "little c" creativity in one set of domains may foster "Big C" creativity in another. An associated issue is whether individuals can have general creative ability or whether creative ability, even in polymaths, is always specific to a single field.

The study of polymathy began in the 19th century. In 1878, J. H. van 't Hoff, who would be awarded the first Nobel Prize in Chemistry in 1901, noted that the greatest scientists, unlike their less able colleagues, displayed their imaginative ability outside of science as well as within it. Many were artists, musicians, poets, and even social and religious visionaries. Van 't Hoff himself was an accomplished flautist, a poet in four languages, and one of the founders of four new disciplines: stereochemistry, physical chemistry, geochemistry, and the history of science.

Subsequent research confirmed van 't Hoff's insight. Studies of mathematicians and physicists by Henri Fehr, Paul Julius Moebius, and Jacques Hadamard helped to establish the oft-repeated observation that mathematical ability is often associated with musical talent. Francis Galton and Wilhelm Ostwald both noted that eminent scientists were often successful artists, musicians, and craftsmen. Paul Cranefield found a direct correlation between the number of avocations that eminent scientists had and the range and importance of their discoveries. And Robert Root-Bernstein and his collaborators have shown that scientists who have the greatest impact on their fields are significantly more likely to have adult avocations (or even second vocations) in one or more arts.

More general psychological studies have confirmed what was first seen when scientists Lewis Terman, Robert K. White, and Catherine Cox surveyed hundreds of eminent historical figures: They concluded that the typical genius surpassed the typical college graduate in range of interests and ability. In prospective studies, Roberta Milgram has reported that the only significant predictor of career success in any field is having at least one intellectually intensive, long-lasting avocation.

Polymaths themselves have often commented on the essential connections between their professional and avocational activities. The Nobel Prize–winning physicist Max Planck, a concert-caliber pianist, argued that the creative scientist needs an "artistic imagination" and used musical theory in devising his concept of quantum mechanics. Santiago Ramon y Cajal, a Nobel laureate in neurobiology, painter, and pioneer of color photography, believed that polymaths developed useful skills and knowledge and employed their arts every day in their scientific studies. Writer and painter Henry Miller summarized this point of view by saying that, like the painter Ingres who was as devoted to his violin as to his paintbrush, every artist has a serious avocation.

Psychologists have recognized the validity of such individual insights. John Dewey noted that what distinguishes the most creative people are what he called "integrated activity sets" that make use of concepts, information, techniques, methods, and processes from multiple domains. Howard Gruber calls these sets "networks of enterprise," and Root-Bernstein "correlative talents." The key for all three is that the creative individual is not a dilettante, but explicitly recognizes and makes use of transdisciplinary thinking.

The major criticism leveled at the studies summarized above is that they do not really represent true polymathy. Some cognitive scientists insist that to qualify as a polymath, an individual must succeed at a very high professional level ("Big C" creativity) in two or more disciplines, which they argue does not and cannot happen in today's ultraspecialized and competitive world. There are two responses to these charges.

First, the intellectual or cognitive importance of avocational skills and activities need not depend on the extent to which that activity is professionalized

or socially recognized. The point of integrated activity sets, networks of enterprise, and correlative talents is that knowledge and skills developed in one domain as "little c" activities are necessary ingredients for "Big C" creative success in another domain. Note, however, that this response depends explicitly on the transferability of concepts, knowledge, and skills from one domain to another, which is also a contentious issue in creativity studies. Some psychologists argue that all knowledge is domain specific. A long tradition of creativity studies stemming from Arthur Koestler and Albert Rothenberg, however, defines creativity as the useful combining of previously disparate concepts, processes, or objects. It follows that only those individuals who are capable of transferring experience between previously separated domains can be creative and that creativity can be recognized precisely because it results in new paradigms, disciplines, or domains.

Second, polymaths who have succeeded in multiple professions exist in droves. Van 't Hoff and Ramon y Cajal are two of hundreds of examples. Nobel Laureate Roger Guillemin (Physiology or Medicine) has an international reputation as an electronic artist; Oxford zoologists Desmond Morris and Jonathan Kingdon as internationally recognized painters. Miroslav Holub achieved international acclaim as both a poet and immunologist; Nobel Laureate (Literature) Vladimir Nabokov as a Harvard entomologist. The chemists Carl Djerassi ("father of the birth control pill") and Roald Hoffmann (Nobel Prize) are widely published and produced playwrights, novelists, and poets. Nobel literature laureates Derek Wolcott, Gao Xingjian, and Günter Grass all have second careers as fine artists. Composer Charles Ives not only revolutionized music but was a pioneer of the insurance industry. Composer George Antheil was hailed internationally for his revolutionary music and also for inventing (with actress Hedy Lamarr) the method of frequency hopping that underlies most secure electronic communications. Iannes Xenakis managed simultaneous careers in engineering, architecture, and composing, achieving international acclaim in the latter two.

The polymathic Renaissance person is very much alive, well, and capable of multiple forms of "little c" and "Big C" creativity.

Robert Root-Bernstein

See also Adult, Gifted; Artistic Ability; Eminent and Everyday Creativity; General Creativity; Genius; Scientists

Further Readings

Hjerter, K. G. (1986). *Doubly gifted: The author as visual artist*. New York: Abrams.

Milgram, R., & Hong, E. (1993). Creative thinking and creative performance in adolescents as predictors of creative attainments in adults: A follow-up study after 18 years. In R. Subotnik & K. Arnold (Eds.), B*eyond Terman: Longitudinal studies in contemporary gifted education*. Norwood, NJ: Ablex.

Root-Bernstein, R. S., Bernstein, M., & Garnier, H. (1995). Correlations between avocations, scientific style, work habits, and professional impact of scientists. *Creativity Research Journal, 8,* 115–137.

Root-Bernstein, R. S., & Root-Bernstein, M. (2004). Artistic scientists and scientific artists: The link between polymathy and creativity. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization* (pp. 127–152). Washington, DC: American Psychological Association.

Van 't Hoff, J. H. (1967). Imagination in science (G. F. Springer, Trans.). *Molecular Biology, Biochemistry, and Biophysics, 1,* 1–18.

Popular Culture

Once viewed as the antithesis of high cultural art forms (e.g., opera, literature, or classical music), *popular culture* was a term coined to describe the art and communication forms that were aimed at the masses. As such, popular culture includes forms such as newspapers, television, advertising, popular music, "low-brow" novels, film, and so on. Inherent in this delineation between high and low art is an assumption that the latter forms are of lesser quality. In the past couple of decades, however, a high level of academic interest has been directed to popular culture, which confirms the need for educators to seriously consider both the topic and its impact for young people.

Popular culture is an important topic in relation to giftedness because although a great deal is known about how parents, peers, teachers, and

schools influence the development of talent, little is known about the role that popular culture plays in the realization of talent. This entry summarizes the relatively small quantity of research that has been conducted on giftedness and popular culture, most of which deals with the medium of television. The research literature has also been directed more toward gifted girls than boys. The entry concludes with recommendations for the type of research that is still needed on this topic.

Popular Culture and Giftedness

While there has been a significant quantity of scholarly research into popular culture in the context of general education, there is very little research that has considered the relationship between popular culture and giftedness. There are two main lines of research that could be taken on this topic. The first is to consider how giftedness, or gifted children and adults, are depicted in popular culture. Educators need to know what role models gifted students can access in popular culture texts because these depictions play a key role in the creation and maintenance of stereotypical notions of giftedness in the general population. The second line of research relates to the impact that popular culture has on gifted students. It is useful to know what they watch, read, and listen to and how they respond to the messages, particularly if those messages are negatively impacting their academic outcomes and their social-emotional well-being. Given their popular nature, television and other forms of popular culture have an important influence on other people's attitudes toward gifted students as well as on the gifted students themselves.

Television

Television has been the most commonly researched form of popular culture generally, but very little of this research has focused on gifted students. The debate on the value or danger of television viewing has occupied the attention of researchers for several decades. The majority of studies on television viewing and academic achievement, for example, are negative and argue that time spent in television viewing leads to reduction of time on reading and homework, and culminates in lower academic achievement. Nevertheless, some research points to the positive influences of good quality television on academic outcomes.

One example of the potential of television to shape the perceptions of its audience may be in the career aspirations of youth. Observers commenting on the current global decline in the numbers of young people studying science and a rise in boys wanting to be chefs instead, have suggested that this is a direct result of the influence of television, where there are many more cooking shows compared to portrayals of science other than forensics and medical doctors.

One of the earliest forays into the topic of giftedness and popular culture was a study of gifted children and television completed by Robert Abelman in the 1990s. This comprehensive research found that gifted children were attracted by television but preferred more complex programs compared to their peers. Interestingly, he observed that although gifted preschoolers tended to watch more television than their non-gifted counterparts, their consumption dropped markedly once they started school. Nevertheless, it remained an important influence in their lives.

Abelman's research also looked at depictions of gifted children in television in the United States. He indicated that the depiction of children in television shows is low overall, but the depiction of gifted children is even lower (less than 2 percent). Less than 11 percent of what children watch on television is specifically made for children. As a result, he argued that there are few role models for gifted children on television. More important, though, the portrayal of gifted youth is particularly poor at a time when they may be more susceptible to the messages contained in television programs. A national report in the United States also stated that the depiction of young women in television shows emphasizes appearance rather than intellect, with smart young women often portrayed as social misfits who are generally attractive only to gifted males who are also social misfits. Little has changed in television programming since these studies were undertaken.

Educators should not underestimate the influence of media such as television and film on young people. Research by Albert Ziegler and Heidrun Stoeger illustrated that even relatively short exposures to positive role models in film can influence young people's views about their own abilities in

mathematics and science. In their study, the male students and the females who were interested in mathematics and science rated their own abilities higher after exposure to the film *IQ,* which depicts a lead character who is feminine and mathematically gifted. Students exposed to other films without such a role model did not rate themselves as highly.

Depiction of Intelligent Females

A key theme in the research on popular culture and giftedness has been the depiction of intelligent females in television and the potential this has for impacting the outcomes for gifted girls. Writers have suggested that issues and debates related to women's role in society—and particularly, the conflict between femininity and feminism—derive from the conflicting messages for girls presented in the mass media. Consequently, some studies have investigated the treatment of females in popular culture texts.

Wilma Vialle, for example, analyzed popular television programs *The Simpsons* and *Daria,* and the Harry Potter books and films to determine how giftedness was portrayed. She determined that there was a clear gender divide in how gifted children and youth were represented in these texts. Gifted girls, such as Lisa Simpson and Hermione Granger, were portrayed as studious, unpopular, and not interested in sports, whereas their male counterparts tended to be nonstudious or even mischievous and more interested in sports. Interestingly, these divisions parallel research that demonstrated that students and teachers most prefer adolescents who are average in ability, nonstudious, and athletic and least prefer those who are brilliant, studious, and nonathletic. Vialle also indicated that the gifted schools in the popular culture texts she examined were presented as privileged settings populated with "precious" characters. These images stand in stark contrast to the overwhelming research evidence on the value of grouping gifted students together, and may contribute to negative opinions among some educators toward homogeneous grouping.

Michele Paule extensively investigated gifted girls' reactions to television programs and indicated that there are conflicting messages of femininity versus intelligence for young women in these programs. Paule observed that giftedness was often subjugated by female characters for the sake of popularity or romantic success. The gifted girls in Paule's study recognized the stereotypes in television texts but did not necessarily believe that these reflected their own experiences. They also reported that in the absence of positive images of giftedness in television programs, they identified gifted traits in many of the female characters they viewed (e.g., Rachel, Phoebe, and Monica in *Friends*). Despite the mixed messages on television for gifted teens, there were good examples of female adult characters for whom giftedness was not a social handicap. Michele Paule proposed that there may be an element of delayed gratification for gifted girls in viewing these fictional gifted women.

A comprehensive treatment of giftedness and popular culture was recently released in the aptly titled *Geek Chic,* a collection of essays that explores the depiction and treatment of intelligent women in the media, ranging from real women such as Hillary Rodham Clinton to television characters such as Daria and the Gilmore Girls. A central tenet of all these essays is that popular culture endorses feminine stereotypes at the same time that it challenges the marginalization of intelligent women. The chapter by Paule in this volume, for example, explores the *super slacker girls,* a term coined to describe smart young female characters who opt out of academic success and career paths commensurate with their abilities; instead, through supernatural intervention, they take up altruistic roles. As such, they present a disturbing model of the underachieving gifted girl, one who does not fulfill her potential.

For gifted girls, the messages in popular culture, thus, are contradictory and highlight the dilemma experienced by many gifted youth in having to choose between their intellectual needs and the need for social acceptance. If popular culture is viewed as a reflection of society's beliefs and attitudes, it is hardly surprising that many gifted girls are constrained by expectations that are more aligned to their gender than their potential, as researchers such as Barbara Kerr have demonstrated.

Popular Music

It is somewhat surprising that there is not more research on giftedness and popular music, given

that adolescents are by far the biggest consumers of popular music. Music is significant in the lives of young people, gifted or otherwise, not only for its entertainment value but also as a means of establishing a social identity.

A recent study, conducted by the National Academy of Gifted and Talented Youth, explored the musical preferences of more than 1,000 gifted adolescents in the United Kingdom. Six percent of these students ranked heavy metal as their first choice from the nine categories presented, and approximately 30 percent of the students ranked it in their top five. The researchers' findings seem to contradict the stereotypical negative images of the heavy metal fan and links that have often been made between this genre and rebelliousness, poor academic performance, and negative attitudes to school. The researchers then looked at the young people who had ranked heavy metal in their top five and found that they had slightly lower self-esteem and spent more time listening to music and playing computer games than those who did not rank heavy metal in their top five choices. In follow-up Web-based interviews, the research team explored the reasons that the gifted youth were attracted to heavy metal music. The students predominantly described it as a means to relieve stress and to work off their frustrations. Other students indicated that they appreciated the content of the lyrics in heavy metal songs, which provided cynical social and political commentary.

Future Directions

There is a strong need for further research into popular culture and giftedness. Although further research into the impact on gifted girls of popular culture is desirable, similar analyses of the treatment of gifted boys are particularly important. Finally, additional research is needed into popular culture forms other than television. Given the place of music in young people's lives, this would be a particularly fruitful area for additional investigation.

Wilma Vialle

See also Attitudes Toward Gifted; Eminent Women; Film and Film-Making Gifted; Girls, Gifted; Women, Gifted

Further Readings

Abelman, R. (1992). *Some children under some conditions: TV and the high potential kid.* Storrs, CT: National Research Center on the Gifted and Talented.

Cadwallader, S. M. (2007). *The darker side of bright students: Gifted and talented heavy metal fans.* Occasional Paper No. 19. Available online at http://www.nagty.ac.uk

Douglas, S. J. (1994). *Where the girls are: Growing up female with the mass media.* New York: Random House.

Inness, S. A. (Ed.). (2007). *Geek chic: Smart women in popular culture.* New York: Palgrave Macmillan.

Kerr, B. A. (1997). *Smart girls: A new psychology of girls, women, and giftedness.* Scottsdale, AZ: Gifted Psychology Press.

Steenland, S. (1988). *Growing up in prime time: An analysis of adolescent girls on television.* Washington, DC: National Commission on Working Women.

Positive Disintegration

The *theory of positive disintegration* (TPD) is Kazimierz Dabrowski's theory of individual personality development. According to Dabrowski, personality is shaped and created by each individual. The process of this development is called *positive disintegration*. It describes how people transform themselves from conforming and self-serving to introspective and self-directed individuals. Growth and development occur as a person moves from a lower level of integration to a higher level of integration through a series of psychological disintegrations and reintegrations that change one's view of self and the world. Dabrowski placed emotions more than intelligence at the heart of personality development and believed some individuals, especially gifted and highly creative people, possess higher levels of developmental potential. Overexcitabilties, the heightened sensitivity of the nervous system resulting in above-average responsiveness to stimuli, and dynamisms, the autonomous inner forces that control behavior and development, are key elements of developmental potential. According to this theory, these elements predispose gifted and highly creative people to experience life at a more intense level, resulting in frequent and often severe crisis or disintegrations.

Educators and administrators in gifted education have embraced Dabrowski's theory as a way to provide insight into the intense experiences of gifted students. The theory is difficult to study, given the problems with objectively assessing levels, investigating claims of neuropsychological bases of behavior, and empirically establishing links between Dabrowski's levels of functioning and giftedness. It is, therefore, the compelling metaphor and the explanatory power of the theory for gifted people that seem to account for the theory's popularity among educators of the gifted. This entry discusses the theory of positive disintegration, the stages and levels of positive disintegration, and the implications for gifted and creative individuals.

Personality Development

TPD believes that the journey from lower levels of mental functioning to higher levels comes as result of experiencing inner conflict. Therefore, negative emotions are an essential part of advanced personality development and should be welcomed as a sign of positive growth and development. The first part of the positive disintegration process is the dissolving of existing mental structures. Intense external and internal conflicts arise as one becomes aware of discrepancies between the world that is and the world that ought to be. The dynamisms of self-awareness and self-direction force the creation of a new higher-level and more-integrated mental structure that resolves the inner conflict.

Levels

Dabrowski grouped the disintegration/reintegration process into five levels. He cautions against treating levels as stages. A person can be at one level in one aspect of life and at a different level in another area of life. These levels are not universal. In fact, only a few individuals actually reach the last level of development. The five levels represent a general movement from egocentric, motivated by basic human drives, to altruistic, motivated by inner values and autonomy.

Level I. Primary Integration

A person at this level is focused on self-gratification, self-interest, and survival. There is little inner conflict. People at this level experience challenges and crises but are not transformed by them. They spend energy gaining advantage over others and quickly turn to the victim mentality of blame if something goes wrong. The two factors of biological impulse and social convention guide behavior.

Level II. Unilevel Disintegration

This is the beginning of disintegration, meaning development is occurring. Usually a milestone such as puberty, or a crisis such as a friendship ending trigger a sense of uncertainty, frustration, or despair. When a person does not have the mental structure in place to deal with the situation, the choice is reintegration back into the previous level or becoming motivated to find a solution and move to the next level. During Level II a person is pulled in many directions, becoming influenced by others and experiencing inner fragmentation and conflict. Level II is a transition phase. One cannot stay at this level for any length of time without dire consequences.

Level III. Spontaneous Multilevel Disintegration

The transition from Level II to Level III is a quantum leap that requires an extraordinary amount of energy. At this level, one spontaneously begins to examine beliefs, attitudes, and emotions and can see both higher- and lower-level alternatives. During this level, the vertical struggle between the "ideal" and the "real" changes the way one views the world and oneself. Instead of automatically adhering to social norms, one begins to develop a personal set of values to guide thinking and behavior. The dynamism of self-dissatisfaction dissolves as self-awareness increases. Level III is also a time of inner conflict.

Level IV. Organized Multilevel Disintegration

The conflict of Level III gives way to new dynamisms such as autonomy, self-education, and self-determination. People begin to make deliberate choices of higher values, pre-think actions, and exhibit a strong sense of responsibility for self and others. Social justice and empathic connections

guide their interactions with others. At this level, people actively seek out information and pursue learning, thereby developing the necessary tools to guide themselves through times of crisis. Behavior moves from reactive to deliberate.

Level V. Secondary Integration

This is the peak of human development. A person becomes at peace with him- or herself. Life is driven by a constructed hierarchy of values. There is no inner conflict because the motivations causing inner conflict at lower levels have been destroyed.

Dabrowski believed that, at the lower levels of development, a person operated at the mercy of biological impulses (factor one) and social pressures (factor two). Once a person moved into Level III, multilevel development, he or she became more autonomous and was driven by self-determination (factor three). The goal of development is for ideals and actions to become one and the same.

Implications

The first implication of TPD for gifted and highly creative people is to understand the role emotions play in development. Focusing on the cognitive aspect with little or no attention to the emotional aspect of development is inadequate. A second implication is acknowledging that gifted and highly creative people will, by definition, experience internal conflict and struggle over the gap between what is and what ought to be. This is not a negative experience, but rather a positive indication of growth and development.

Joyce E. Juntune

See also Meaning of Life; Overexcitabilities; Personality and Intelligence; Social-Emotional Issues

Further Readings

Gifted and Talented Education Council. (2002). Dabrowski's theory of positive disintegration and gifted education [Special issue]. *AGATE, 15*. (Alberta Teachers' Association)

Mendaglio, S. (Ed.). (2008). *Dabrowski's theory of positive disintegration*. Scottsdale, AZ: Great Potential Press.

Poverty and Low-Income Gifted

Does being financially poor hurt creativity, talent, or giftedness? At first glance, one may immediately want to respond to this question negatively because of the belief that creativity, talent, and giftedness are innate, not something that can be taught. However, after consulting the literature and reflecting more carefully, one has to conclude that yes, in some ways being poor or living in a low-income family can hinder the complete development of an individual's abilities, talents, and skills. To quote Barbara Kerr when talking about women in her book, *Smart Girls Two,* "Another major barrier to achievement by gifted women is a lack of money" and the "scarcity of funds is the primary barrier between minority women and achievement" (p. 159).

According to the 2006 Census report, nearly 1 in 5 children under the age of 18, in the United States, live in poverty. Poverty can be defined not only as the deprivation of things such as food, clothing, safe drinking water, and shelter, but often individuals considered impoverished lack intangible items such as being educated, being properly socialized, being respected, and having opportunities for personal successes. Income level, for the purpose of this entry, is used as an indicator of whether a child lives in poverty. This entry discusses the impact of poverty on identification of gifted students; the difficulties of providing services to impoverished, gifted students; and the impact of poverty on career attainment, creativity, and personal strengths.

Identification of Gifted

This begs the question of whether the initial identification of giftedness and talent is related to family income. With such staggering numbers of children and adolescents living in poverty or below the median income level in the United States, it is important that educators look beyond the outward manifestations of income when identifying these special children. These outward manifestations may be related to poor hygiene, noncompletion of homework, and even acting-out behaviors that draw attention away from the

child's or adolescent's unique talents and abilities. For example, Barbara Kerr and Robinson Kurpius found that when asked to identify adolescent girls who were at risk in some way and also talented/gifted, schools focused primarily on at-risk issues and were concerned with giftedness and talent second. Furthermore, the vast majority of these girls were living in what could be labeled poverty or low-income conditions. Family income influences teachers' perceptions of children and, therefore, may well influence their accurately placing these children in classes and other activities that would foster their creativity, talent, and/or giftedness.

Proper and equitable identification of persons chosen to participate in gifted and talented programs continues to be a problem. Underrepresentation of the poor, of minorities, and of the handicapped is particularly concerning. Perhaps this discrepancy is also related to the measurements currently in use. Typically, children are assessed using scales that address academic achievement and require a certain knowledge base. Children living in poverty or even in low-income families have many challenges just with basic survival. For example, according to Abraham Maslow's hierarchy, safety and security needs (food, clothing, shelter, safety) must be met before higher-level needs can be considered. Parents who make up "the working poor" may be so busy just trying to put food on the table that they don't have time to read to their small children; attend school events, which is often interpreted as parental support and concern; and may need to have older children miss school in order to care for younger siblings when the sibling is sick and the parent has to work. This certainly may hinder the academic achievement of gifted children if they are not in school where they can learn and expand what they know or if they are in families where books are not available nor is there time or support for them to visit local libraries. Even if these students check out books from the school library, expectation for helping at home may leave them little or no time to do homework, much less time to read extra books to expand their knowledge base and broaden their worlds. Although intellectual giftedness may be innate, it still needs to be nurtured and fostered so that it expands and develops as the child matures.

Service Difficulties

Mobility is an issue that contributes to difficulty in serving gifted children in poverty. Because single mothers and poor families must move often in order to secure better employment, housing, social services, medical care, or even food, their children must change schools. Different district policies make identification and placement in gifted programs spotty or nonexistent for poor, mobile children. Follow-up of student progress, grade reports, and portfolios get lost as students move about.

Social distancing is yet another hindrance affecting poor America, according to Dave Capuzzi and Douglas Gross. Bernice Lott notes that behaviors that manifest outwardly as classist discrimination, devaluation, separation, and exclusion on both a conscious and subconscious level exemplify the distance imposed by the nonpoor on the poor. This marginalization can perpetuate the view that the poor are uneducated, lazy, expendable, unpleasant, angry, and stupid. For example, classism in schools can be perpetuated by teachers treating children with disdain and not providing adequate encouragement. It is important to note, however, that children are incredibly resilient. Even with the enormous barriers that potentially thwart their successes, the majority still achieve academic, social, and personal success.

It should also be remembered that often the family living in poverty is a single-parent family, with a mother trying to support the family and raise children. According to Kerr, divorce is the quickest road to poverty; over 50 percent of marriages in America end in divorce, and 50 percent of remarriages also end in divorce.

Career Attainment

It should also be noted that there is a relationship between career attainment and poverty. According to Linda Gottfredson's *theory of circumscription and compromise,* individuals eliminate unacceptable occupations based on gender and perceived prestige of the occupation. The eliminating process is also influenced by socioeconomic status (SES) and ability. Individuals with higher SES tend to have higher career aspirations, and individuals with lower SES tend to have lower career aspirations. Therefore, it appears that low SES, as well

as ability, imposes ceilings on what someone thinks of as a possible career.

Donating $200 million in cash and $200 million in computer equipment to libraries in low-income communities, Bill and Melinda Gates are trying to help bridge the gap in educational and career attainment related to level of income. The foundation's goal is "equal opportunity for all," regardless of income.

Creativity

When considering creativity, one needs to remember that children from all socioeconomic backgrounds often use creativity in play as an outlet for their thoughts, frustrations, anger, and imagination. Although researchers have struggled for decades to define creativity, literature on the construct suggests that creativity is product-, person-, or process-oriented. It is important to remember however, that intelligence and creativity are independent of one another and must, therefore, be measured independently. If creativity is being measured in an academic setting by the same measurements as intelligence, then it is not surprising that the outlying groups such as those living in poverty fail to be recognized and their creativity and talents fail to be encouraged and nurtured.

Researchers know a few things about what can be done to foster the creativity of children. Children can be provided with challenging environments, including developmentally stimulating toys, bright colors, and engaged parent–child and teacher–child interaction. Researchers know that creativity stems from the ability to build on past experiences. To that end, exposure to new sights, sounds, smells, tastes, and experiences is critical to the development of creative processes. This might be difficult when the family is focused on basic survival.

Benefits

Most programs and research seek to identify gifted, talented, and/or creative individuals as broadly as possible. This may require special attention when the child or adolescent comes from a low-income family. Maximizing the potential of all talented or gifted children not only benefits the individual, but society as a whole through the nurturing of one of its most precious resources.

Erin M. Carr Jordan

See also Diversity in Gifted Education; Multicultural Assessment; Resilience

Further Readings

Capuzzi, D., & Gross, D. R. (2008). *Youth-at-risk: A prevention resource for counselors, teachers, and parents* (5th ed.). Alexandria, VA: American Counseling Association.

Fisher, M. D. (2009, Winter). List of gifted programs and activities in need of federal, state and local funding [Editorial]. *Gifted Education Press Quarterly.*

Gates Foundation to invest $400 million in libraries. (1997). *American Libraries, 28(7),* 14.

Kaufman, J. C. (2006). Self-reported differences in creativity by gender and ethnicity. *Journal of Applied Cognitive Psychology, 20,* 1065–1082.

Kerr, B. A. (1994). *Smart girls two: A new psychology of girls, women, and giftedness*. Dayton, OH: Ohio Psychology Press.

Lott, B. (2002). Cognitive and behavioral distancing from the poor. *American Psychologist, 57,* 100–101.

Rostan, S. M., Pariser, D., & Gruber, H. E. (2002). A cross-cultural study of the development of artistic talent, creativity, and giftedness. *High Ability Studies, 13,* 125–156.

Practical Intelligence

Practical intelligence is one of the three forms of intelligence besides analytical intelligence and creative intelligence as theorized by Robert Sternberg in his *triarchic theory of intelligence*. Practical intelligence, also known as common sense or street smarts, is the intelligence that is highly valued in daily life, often more so than academic intelligence or book smarts. Specifically, practical intelligence is the ability that individuals have to adapt successfully to situations that arise in daily living with whatever knowledge and skills that they have to creatively overcome the problems facing them. Such situations include taking care of oneself; social interaction with others; and climbing the career ladder. Academic intelligence is useful in

academic settings, especially in school, and it is rendered useless if one does not possess some practical intelligence for navigating the tasks of day-to-day living. The core component of practical intelligence, tacit knowledge; the distinction between academic and practical intelligence; and the value of practical intelligence across culture and age are discussed in this entry.

Academic intelligence is measured by many intelligence tests and is often reported in terms of intelligence quotient (IQ) scores. It marks an individual's ability to acquire quickly the kind of formal academic knowledge that is taught in schools. Tests of such intelligence are often of the paper-and-pencil kind (e.g., school exams). Practical intelligence, on the other hand, does not have any formal intelligence tests that are specifically designed to measure it, other than some tests that exist in the practical intelligence research circle. One way to measure a person's practical intelligence would be to assess the individual's ability to acquire tacit knowledge quickly. Tacit knowledge is the action-oriented knowledge that allows one to acquire personally valued goals. It is this tacit knowledge that is more valued in the real world—more so than formal academic knowledge that may not have a practical function in daily life.

Tacit knowledge has three distinct characteristics. First, it is procedural knowledge, which requires individuals to acquire it through action and experience. Second, it is highly connected to the achievement of intrinsic goals that are important to the individual. Third, it is self-acquired, not dependent on others to transmit the knowledge to the individual in question. Tacit knowledge is so named because it requires individuals to acquire it through inferences from personal experiences with little outside help from others who may not be invested in the resulting solution. Those who are able to gain tacit knowledge have an added advantage over those who are not, resulting in an extra knowledge base for these individuals when facing similar situations in the future.

Ulric Neisser outlined academic intelligence tasks (used in classroom and intelligence tests) as (a) formulated by others, (b) often of little or no intrinsic interest, (c) having all needed information available from the beginning, and (d) separated from an individual's ordinary experience. Robert Sternberg and Richard Wagner further include that these tasks (e) usually are well-defined, (f) have but one correct answer, and (g) often have just one method of obtaining the correct solution. In contrast, practical intelligence tasks or real-world tasks are often (a) self-formulated (arise from a situation that has to be put in a problem statement by the self), (b) high on intrinsic interest, (c) short of all the information needed for the solution, (d) connected with one's real-world experience, (e) ill-defined, (f) may have multiple solutions with each of their pluses and minuses, and (g) often have more than one method to figure out the correct solution.

Academic and practical intelligence may not always go together. A strict dichotomy between the two intelligences is seen in only the most extreme cases because most people have a mix of both intelligences and are able to navigate life sufficiently well.

Evidence of the difference between academic intelligence and practical intelligence can be seen in various cross-cultural studies. The ability of mechanics in developing countries to repair broken cars without advanced diagnostic systems; the skillful navigation of the Puluwat people in Micronesia without electronic ocean-navigation devices; and the speed and accuracy of young street merchants (kids under 12 years old in Brazil) to do math transactions are strong indicators of practical intelligence in place despite the lack of academic schooling to master basic math skills or advanced mechanical skills.

While academic knowledge declines over the years, as self-reported by older adults and verified through intelligence tests, practical knowledge remains stable or increases over the years with experience and age. It would be wrong to think that practical intelligence increases through experience and age alone; it requires the additional criteria that an individual also learn from experience for it to grow. As evidenced by early research into practical intelligence with academic psychologists, not all academicians rise through the ranks to become full professors with experience and age; it requires the extra know-how that is picked up through one's experiences or through learning of others experiences.

Success in life may depend on one's ability to maneuver deftly and to master the problems that arise in daily living and successfully turn these experiences into usable knowledge that is helpful

in future dealings. As evidenced by research in practical intelligence, the focus on academic intelligence alone is not enough. More should be done to help students increase their practical intelligence so that they do not wind up being book smart but street silly.

Kai Kok "Zeb" Lim and Zi Ning Hor

See also Creative Problem Solving; Declarative and Procedural Memory; Factor Analyses Creativity; Fluid and Crystallized Intelligence; Intelligence; Out-of-School

Further Readings

Gottfredson, L. S. (2003). Dissecting practical intelligence theory: Its claims and evidence. *Intelligence, 31,* 343–397.

Sternberg, R. J., Forsythe, G. B., Hedlund, J., Horvath, J. A., Wagner, R. K., Williams, et al. (Eds.). (2000). *Practical intelligence in everyday life*. New York: Cambridge University Press.

Sternberg, R. J., Wagner, R. K., Williams, W. M., & Horvath, J. A. (1995). Testing common sense. *American Psychologist, 50,* 912–927.

Wagner, R. K. (2000). Practical intelligence. In R. J. Sternberg (Ed.), *Handbook of intelligence* (pp. 380–395). New York: Cambridge University Press.

Wagner, R. K., & Sternberg, R. J. (1985). Practical intelligence in real world pursuits: The role of tacit knowledge. *Journal of Personality and Social Psychology, 49,* 436–458.

Precocious Reading

Precocious reading occurs when very young children read in advance of their chronological-age peers. By the end of kindergarten, the typically developing child can identify letters and sounds at the beginning of a word, while the precocious reader is sounding out words and beginning to read. Typically, precocious readers are about 2 years ahead of their same-age peers on benchmarks of reading progress at the onset of formal schooling. Although the causes of precocious readers' abilities are yet undetermined, precocious reading has been defined by the Jacob K. Javits Gifted and Talented Students Education Act of 1988 as an example of giftedness, and it has been determined that these young readers require nurturing from their primary grades, teachers in order to develop their reading talent. This entry explores the characteristics of precocious readers, differentiates them from their typically developing peers, illustrates the influences of home and school environments, and gives recommendations for working with these learners.

Characteristics of Precocious Readers

Precocious readers learn letter–sound correspondence at a very young age. Their rapid advancements with language allow them to "break the code" and learn to read at a very young age. Breaking the code entails recognizing letters, identifying the corresponding sound for each letter, blending sounds to create words, and determining the sound that several letters in one word make when read together. This process of decoding, when used to create an understanding of text, is what is known as reading.

It seems that precocious readers, also called early readers, have varied strengths, weaknesses, and different orientations in their reading development. Some precocious readers decode rapidly and approach reading from a "text level" in which they think most about the decoding process as they read. Others approach reading from a "contextual level," determining whether words make sense—a process that aids them in decoding the words in any given sentence. These students use word meaning as a clue for detecting the words that belong in a passage.

Precocity in reading may be due in part to a combination of above-average intelligence and dynamic early-literacy experiences. The average IQ of precocious readers is 130, but individual IQ scores vary widely. Due to the fact that some precocious readers score well below average and others score at the highest levels, early reading and intelligence are only moderately related.

Early reading talent can present in combination with other advanced skills or appear alone. It is important to note that not all children with advanced verbal reasoning, or verbal precocity, will also read at a young age. Likewise, not all precocious readers demonstrate significantly advanced levels of verbal reasoning. Similarly, in

some precocious readers, writing develops at a rate concurrent with their reading. In other children, reading and writing development are asynchronous, and writing development is on a more normal developmental pace.

These children usually have a firm grasp of the use of language and utilize expansive vocabularies to communicate ideas easily. They understand subtleties of language and enjoy using language for humor, as in creating puns.

Precocious readers usually enjoy the reading process; this may perhaps be because many have had pleasant early experiences reading with family members. These children often spend spare time engaged in reading or other literacy activities. These children also exhibit a wide variety of reading strategies and use them to create meaning from text. Even from a young age, these readers are able to integrate prior knowledge to create context for what they are reading. These readers think abstractly about their reading and can synthesize, analyze, and evaluate text beyond peers of their same chronological age. These students are also able to make inferences about characters and plot in the stories they read. Strategy use in reading is one of the determining factors in whether precocious readers become gifted readers over time.

In some circumstances children with average and below-average intelligence have also read precociously. A condition known as hyperlexia enables children to decode very early but with little sense of the meaning behind the text. These students have the ability to observe patterns that allow them to break the reading code. Hyperlexia is sometimes found in children with autism. These students usually do not remain above-average readers once peers are able to decode well and comprehension has increased significance in the ability to read well.

Comparison to Other Children

Precocious readers typically read about 2 years in advance of their chronological development. Though these children start with a lead, other children may eventually catch up to or even surpass the reading ability of the early reader. Generally, precocious readers continue to be above-average readers and do well as they progress through their school years. On the other hand, students who do not start out as precocious readers may later become gifted readers once they crack the reading code because high levels of verbal reasoning enable them to comprehend complex story lines and complicated nonfiction passages.

Although many of these students go on to be identified as gifted, not all precocious readers are good candidates for general gifted services. When programs heavily emphasize skills not associated with reading, students who lack these skills may become overwhelmed. Gifted programs that provide advanced reading experiences, or that are highly individualized may be appropriate for precocious readers with higher overall IQ scores.

Of those in generalized gifted services, about half read early. These students were typically able to identify letters around the age of 2. Neither reading nor language precocity, however, determines whether students will become gifted readers. The complexity of the findings about precocious reading has often led administrators to discount it as a sign of giftedness. This has had unfortunate consequences, particularly for gifted girls, whose parents may never again ask for special provisions for their child if persuaded that early reading is not a potential indicator of future giftedness.

Home Literacy Environment

Evidence shows that students' reading development is greatly influenced by their home literacy environments. Children who have had rich literacy experiences at home are more likely to read early. Language-rich homes are those where books are readily available, parents read regularly to their children, and family members engage in conversations concerning daily life. Parents of children who read early are usually involved to a great extent in their child's development. These children benefit from the fact that their parents are able to choose books that are appropriate and engage them in meaningful and pleasurable reading experiences. Most parents of precocious readers do not push their child beyond his or her desire or readiness to read, and many indicate that their child's reading was self-taught. Some parents are surprised when they learn that their child is significantly ahead of developmental benchmarks in reading. Still other parents spend significant

amounts of energy coaching their children to read early; sometimes to no avail when children are not developmentally ready to begin reading. Experts agree that parents should follow the child's lead when it comes to literacy and should develop the child's interest in reading and other literacy activities. Although all young readers will benefit from these positive experiences, not all children raised in literacy-rich environments will become precocious readers. Thus, environment and nurturing alone will not produce precocious readers.

Early School Experiences

Early school experiences affect the continuous development of precocious readers. The developmental readiness of the child determines the pacing of school literacy experiences provided by the teacher, similar to the enriching home literacy experiences provided by parents.

Educators of early grades (including PreK–2) must be able to recognize precocity because early readers often enter school knowing how to read. Some young children will obscure their advanced ability in order to assimilate with the other children or because they are unfamiliar with the process of school and assume that everyone must learn the same thing at the same time, thus resigning themselves to the lack of challenge. It may also be difficult to identify reading precocity due to children's economic, cultural, or linguistic differences. For these reasons, early grades' teachers must assess the ability of their students to meet the individual needs of the students and can do so using story retellings and running records.

The ability of primary-grade teachers to differentiate the curriculum has a profound influence on the continued growth of the early reader. Though many primary-grade teachers use small groups or centers in their instruction, many do not alter the curriculum content to meet the varied needs of their learners, and these early readers have school experiences similar to those of their nonreading peers. Lack of stimulation and of rigorous content may reduce the progress of these students and cause them to make only minimal growth. On a long-term basis, this can cause young readers to become bored, frustrated, or complacent. Teachers who understand the reading process thoroughly are better able to provide differentiated experiences that will engage precocious readers and further their growth and development. These teachers understand that their precocious readers are already making the transition from learning to read to the process of reading to learn—a shift that usually occurs around third or fourth grade—and begin to provide experiences that will provide the readers with the appropriate reading instruction to help them make that shift.

Recommendations

Through support and challenge, advanced strategy instruction, and personalization of interest, teachers of precocious readers can create rich and challenging primary-grade experiences for advanced readers. The teachers must provide individualized work that will challenge the student, but must follow up with support of the student so that he or she is not working in isolation and without teacher guidance. Precocious readers will be unchallenged by the instruction and texts provided to their classmates. Teachers can model advanced reading strategies for these students and encourage them to utilize them in appropriately challenging books. Advanced readers should be guided to books that are just slightly above their current reading level and that offer rich language and advanced content, themes, and ideas. Some precocious readers may be adept at making appropriate book choices due to parental or sibling role modeling, but others may struggle to find an optimal match. Primary-grade teachers and librarians should support these students while they learn to make appropriate choices that will have sufficiently difficult text, but also appropriate content. Teachers should determine the areas of interest of their precocious readers and extend challenge through books and content in those areas.

Programmatic changes may also be necessary to accommodate the needs of precocious readers. When school administrators are aware of kindergarten children who are entering school with the ability to read, one way to meet their needs is to group them together in one classroom as a cluster group of precocious readers. This teacher will be better able to provide differentiated experiences and curriculum to a critical mass of early readers than will several teachers trying to provide these experiences to only one or two students in their

classrooms. If reading talent is spread among several classrooms, however, it is possible to use cross-grade grouping as a way for talented young readers to come together to work with advanced texts and other differentiated curriculum. Evidence shows that precocious readers need to be able to interact with other readers on their cognitive level.

Elizabeth A. Fogarty

See also Elementary School, Literature Curriculum; Gifted Readers; Precocity; Prodigies; Talented Readers; Very Young Gifted

Further Readings

Catron, R. M., & Wingenbach, N. (1986). Developing the potential of the gifted reader. *Theory Into Practice, 25,* 134–140.

Dooley, C. (1993). The challenge: Meeting the needs of gifted readers. *Reading Teacher, 46,* 546–551.

Jackson, N. E. (1988). Precocious reading ability: What does it mean? *Gifted Child Quarterly, 32,* 200–204.

Jackson, N. E., & Roller, C. M. (1993). *Reading with young children* (RBBM 9302). Storrs, University of Connecticut, National Research Center on the Gifted and Talented.

Lamb, P., & Feldhusen, J. F. (1992). Recognizing and adapting instruction for early readers. *Roeper Review, 15*(2), 108–109.

Mills, J. R., & Jackson, N. E. (1990). Predictive significance of early giftedness: The case of precocious reading. *Journal of Educational Psychology, 82,* 410–419.

Stainthorp, R., & Hughes, D. (2004). An illustrative case study of precocious reading ability. *Gifted Child Quarterly, 48,* 107–120.

Precocity

Precocity is used to indicate an intellectually gifted child's advanced development in cognitive areas. Although the term can refer to advanced performance in any domain, it most frequently is used in conjunction with advanced language and thought. Historically, starting with Alfred Binet, precocity was sometimes expressed in terms of intelligent students having a higher mental age compared with their chronological peers. Precocity is sometimes also referred to as asynchronous development wherein gifted children's mental development surpasses their physical development. Precocious children's performance, on intelligence tests or at other tasks, matches that of older children. This entry explores behaviors that may demonstrate precocity, studies of precocious children, positive and negative adjustments precocity brings about, and ways of serving precocious children.

Behaviors

Precocity manifests itself in different ways in different gifted children. Some young gifted children will begin walking or talking by 6 months of age. Others will begin speaking later, but progress to using complete, and complex, sentences very quickly after that. Precocious children can sometimes produce identifiable pictures by 2-1/2 years of age, read at age 3, and read fluently by age 4. Demonstrated interest in and ability to solve mathematical problems or play musical instruments is also evidence of precocity. It is important to note that although early accomplishments are evidence of precocity, late acquisition of any of these skills is *not* necessarily an indicator of a lack of giftedness. History abounds, for instance, with examples of highly gifted individuals who struggled with reading, including such profoundly gifted exemplars as Winston Churchill, Albert Einstein, and Pablo Picasso. Children with exceptionally high-IQ scores are also considered precocious.

Studies

Precocity studies initially focused on children with extremely high IQ as measured by their scores on Lewis M. Terman's Stanford-Binet Intelligence Scale. In defining *intelligence,* Terman focused on children's ability to acquire and manipulate concepts. As a result of this focus, high-IQ students consequently show great adeptness with the symbols required for abstract thinking. Most studies of precocious students thus have used high IQ as a threshold for a child's inclusion. The *Talent Search/Study of Mathematically Precocious Youth* (*SMPY*) model uses diagnostic above-grade-level testing followed by prescribed instruction (DT → PI) to radically

accelerate precocious children's education. The most well-known studies of precocity are those of Lewis Terman, Leta Hollingworth, Miraca U. M. Gross, Julian Stanley, Camilla Benbow, and Martha J. Morelock. Although conducted in different settings and across different decades, these studies share many similar findings.

Cumulatively, research has indicated that although no single characteristic can identify precocity in young children, the in-depth studies suggest that early talking and reading are the most consistent indicators of accelerated development. Precocious children demonstrate extraordinarily high abstract-reasoning capabilities and also tend to demonstrate advanced domain-specific skills. Precocity tends to allow children so identified to excel at, and be drawn to, a number of different domains, such as mathematics, languages, or science. The Talent Search/SMPY studies have shown that children who demonstrate proficiency on an above-level test, such as the SAT-I, the ACT, the School and College Abilities Test, or the Spatial Test Battery, are able to thrive in an accelerated program that can include, in addition to school-site acceleration, early entry to college. Precocious children with IQs in the 140 to 160 range tend to enjoy very successful careers as adults.

Adjustment

Precocious children with very high IQs, such as those above 180, demonstrated certain adjustment problems in research studies. First, many of these children failed to develop appropriate work habits, perhaps because they were placed in school settings geared to average children. The precocious students studied were found to spend much time off task and, as a result, learned to dislike school. Second, precocious students expressed difficulty in finding friends and playmates among their age peers and consequently felt isolated and alone. The children studied believed their chronological peers lacked common interests, vocabulary, and desire to engage in more complex activities. Third and last, precocious children often may demonstrate emotional vulnerability insofar that they can comprehend and are affected by major ethical issues before they are emotionally ready to deal with them. Adults who interact with children expressing such emotional vulnerability must be sensitive to the cause of these difficulties and provide necessary support to assuage the situation.

Precocity may cause issues to arise between precocious children and their families. Precocious children, for example, often are very sensitive to family values and themes. Their precocity allows them to more accurately notice, react to, and summarize these values and themes than their age peers. In addition, families that contain a precocious child often are more cohesive, insofar that family members help and support each other, and expressive, to the extent that members act openly and express feelings directly. Finally, birth order seems to influence precocity, as a disproportionately high number of children identified as profoundly gifted are firstborns. As a result, firstborn precocious children tend to define themselves more in terms of their thinking rather than their accomplishments.

Services

Precocious children should be provided with services that meet their cognitive and affective needs. Repeated studies have emphasized that providing *any* level of gifted education services to precocious children allows them to achieve at higher levels than their precocious peers who receive no services. Children who demonstrate behaviors that suggest precocity, including a very high IQ score, demonstrate strong indicators that they require gifted education services. School-based programming options that are especially appropriate for children demonstrating precocity include early entry to kindergarten, single-subject acceleration, grade skipping, honors classes, Advanced Placement or International Baccalaureate programs, or dual enrollment at area colleges. Parents and families can augment these services with Saturday and summer enrichment programs.

Stephen T. Schroth and Jason A. Helfer

See also Acceleration/*A Nation Deceived;* Acceleration Options; Asynchrony; IQ; Prodigies

Further Readings

Davis, G. A., & Rimm, S. B. (2004). *Education of the gifted and talented* (5th ed.). Boston: Allyn & Bacon.

Hollingworth, L. (1942). *Children above 180 IQ Stanford-Binet—Origin and development*. Yonkers-on-Hudson, NY: World Books.

Morelock, M. J., & Feldman, D. H. (2003). Extreme precocity: Prodigies, savants, and children of extraordinarily high IQ. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 455–469). Boston: Allyn & Bacon.

Schroth, S. T. (2007). Levels of service. In C. M. Callahan & J. A. Plucker (Eds.), *Critical issues and practices in gifted education* (pp. 281–294). Austin, TX: Prufrock Press.

Stanley, J. C., & Benbow, C. P. (1982). Educating mathematically precocious youths: Twelve policy recommendations. *Educational Researcher, 11*(5), 4–9.

Terman, L. M. (1925). *Genetic studies of genius: Vol. I. Mental and physical traits of a thousand gifted children*. Stanford, CA: Stanford University Press.

PRESCHOOL

Preschools provide a wonderful setting in which children, aged 3, 4, or 5, can develop their talents and pursue their creativity. There are skills that need to be learned because future success in school is dependent upon them, but they pale in importance compared to the understandings that children need to acquire about the learning process and their role in it. These are the years when children learn that learning is fun, that they are learners, and that they have a range of talents. Good preschools send children on a trajectory of exploration and success.

Characteristics of Preschoolers

Children usually come to preschool already brimming with the qualities that educators seek to have engendered by the time they graduate high school at age 18. Often preschoolers are excited about coming to school, even if some undergo a few days of tearful separation; they willingly learn with and from others; they are adventuresome in their explorations; they love to learn. To be fair, that is not true of every preschooler and not true of any preschooler in all situations. But by simply entering a classroom of 3-, 4-, or 5-year-olds and watching them busily exploring and learning, one can see that this is the norm. Most preschoolers think they're smart; they're proud of their talents; they willingly take risks to learn. Often, though, that begins to change when students enter "real" school in first grade. Why is this?

Preschools are designed to tap into and capitalize on students' strengths and interests. Preschool teachers focus on skills and understandings that are important and necessary, and their curriculum is rich and developmental. This is often in contrast with how education is approached beginning in first grade. As a result, too often "real school" means an exclusionary focus on skills and a narrow pathway for learning.

Managing Diversity of Talents

All children have a range of intelligences and interests. One way of managing this diversity of talents is to frame curriculum and instruction around Howard Gardner's *theory of multiple intelligences* (first described in his book *Frames of Mind*). Believing in multiple intelligences means understanding and accepting that children have strengths in many different areas. In preschool, the goal is not to create a hierarchy of learners or to identify what a student cannot do. Rather, when children are young, the focus is on their interests and talents; educators want them to make choices and use their burgeoning skills to learn and to solve problems, and ensure that they engage in joyful learning.

Learning How to Learn

On a practical basis, this means that teachers are going to challenge students by giving them a variety of ways to learn. At some times, all students will learn in the same way. In fact, learning how to learn while sitting and listening is an important skill and one that can be difficult for some children. Because that approach portends much for a child's future education, it is essential that a child learn how to do so. Likewise, it is important that children learn how to be good group members, and that means that they need to know how to be both leaders and followers. Though some children easily play one role, oftentimes it is difficult for a child to be able to do both. Promoting "active listening" and "being a good team member" are part of the routine of any good preschool teacher.

Beyond these basic requisites, children should be given options about how to learn (if not what to learn). A preschool teacher's first task is to ensure that the class's learning centers address all of the ways in which students can be talented. While still focusing on students learning how to read and write and calculate, learning centers to master the "scholastic intelligences" (as termed by Thomas Hoerr) must cover a far greater expanse of talent. Preschool teachers often create learning centers that tap into students' different intelligences. These are places where children can play dress-up and pretend, areas where they can run and throw, and settings in which they can tend to animals and touch nature. There may be art centers with paint or clay, or there might be musical centers with drums and horns. Perhaps there are teamwork centers, areas designed to teach students how to cooperate and share.

Creativity is developed and reinforced by the choices given students and by what is reinforced. If there's "one right way" or, even, "one best way," students will quickly know what it is and learn to pursue it. On the other hand, if there are many ways to show an answer, if there are a variety of ways to be correct, that will be known too. Creativity is developed when students are given different ways to solve problems and when out-of-the-box thinking is reinforced. Teachers need to show they value creativity by what they say, by what work they display, and by how they respond to students. Good teachers know that creativity is messy, and sometimes slow, and they enjoy that journey with their students.

It is essential to ensure that learning centers do more than occupy and entertain; they must also reinforce and challenge. When the centers are developmentally designed—constructed so that students can experience enough success to maintain interest and motivation but also challenging enough so that they will be stretched and pushed—children's gifts begin to unfold. This means, of course, that a classroom must have many centers and these centers must offer different levels of challenge. Good teachers steer children so that they are working at a level that nurtures them.

Student and Teacher Attitudes

The key factor in the success of this approach is the perspective of the preschool teacher. The teacher must know both the student's interests and talents, but that is not enough. The teacher must also understand the student's inclination to learn and ability to face frustration. Indeed, the student's attitude about learning is the major determinant in how much the student learns. Good preschool teachers tend to this attitude with much focus and energy.

But the greatest aspect of developing talents in preschool lies not with the centers or other aspects of curriculum, however developmentally appropriate and enticing they may be. It inheres in the attitude of the teacher toward student learning and in the teacher's understanding that all children have talents. In her seminal work, *Mindset,* Carol Dweck points out that how we define intelligence determines how intelligent we can become. Dweck says that if we have a "fixed mindset" perspective, we focus on preserving our successes and ensuring that we look smart. In contrast, a "growth mindset" perspective means that we view intelligence as evolving; this enables us to take risks and continue to learn. One way to engender the growth mind-set in students is to commend them on their effort and tenacity, rather than on how smart or talented they are.

Similarly, good preschool teachers cushion the falls but don't let children avoid them. The key is learning from new mistakes, not avoiding or repeating mistakes. Mistakes are an essential part of the creative process. If children are to grow and be creative, they must learn how to accept frustration and, sometimes, failure. Teachers need to create settings in which setbacks happen so that the student learns how to respond. Good teachers help students understand that making mistakes is part of the learning process.

Thomas R. Hoerr

See also Very Young Gifted

Further Readings

Dweck, C. (2006). *Mindset.* New York: Random House.
Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.
Hoerr, T. (2000). *Becoming a multiple intelligences school.* Alexandria, VA: Association for Supervision and Curriculum Development.

Preservice Education

Preservice education for prospective teachers provides research-based training from institutions of higher education using approaches, experiences, and materials to provide engaging curriculum content aligned with existing national standards to prepare preschool, elementary, or secondary teachers for initial teacher licensure. In most teacher training institutions, when trainees complete required courses on Exceptional Learners in the Classroom most of the instructional time is dedicated to learning about schoolchildren with various disabilities, the components of an Individual Education Plan, and the collaboration process to provide services to students with special needs. Although gifted and talented students, students from culturally diverse backgrounds, and students who are at risk are included in the broad definition of inclusion of students with special needs, courses in exceptionalities include increased awareness and understanding of the social, emotional, and behavioral concerns but often lack strategies to meet the needs of gifted and talented learners and their parents or guardians.

Understanding Characteristics of Gifted Learners

Merely distributing a packet of handouts on characteristics of gifted and talented learners and ideas for differentiation strategies is insufficient in creating interest or skills to teach gifted students. Certainly, engaging in lively class discussions, PowerPoint presentations, real-life stories, and knowing the state law are successful ways to engage teachers in addressing needs of gifted children in the regular classroom. However, several additional activities capture college students' attention.

One is using children's literature. Children's literature is a powerful teaching tool. For example, Roald Dahl has written a witty, fanciful tale about a precocious girl named Matilda who has highly advanced abilities in mathematics, vocabulary, reading, logic, and a knack for adventuresome activities. Matilda enchants her classmates and teacher, Miss Honey, while challenging her unengaged parents and rigid school authority. Students in a methods course might read this children's novel and then compare characteristics of giftedness in the general population to the central character, Matilda, using a variety of documents and activities to learn about giftedness. They discover that though Matilda seems unrealistically bright, there *are* precocious students with similar abilities, in comparison to their classmates, who require differentiated curriculum and emotional support to reach their potential.

A second approach is self-examination of attitudes toward gifted learners (Table 1). Using a modified survey ranging from 1 as *strongly agree* to 5 as *strongly disagree,* trainees reverse score the points on questions 1, 5, 6, and 9. A low score is a good score (see below). Questions include statements regarding preparation, instruction, policies, and tendencies to accommodate for the needs of gifted learners. Importantly, they learn of research that supports gifted education. They take the inventory prior to a discussion on gifted education, then again at the end of the semester as a way to reflect on attitudinal changes. Responses, kept in the hands of each student, are confidential for self-evaluation and growth. For whole class analysis, pre-and post-scores are collected anonymously, then compared to determine overall class growth related to understanding and providing experiences for gifted learners. Survey items generate lively discussion with opportunities to explore attitudes and future strategies for gifted learners.

Differentiation Strategies and Techniques

Typically, learning how to differentiate instruction for gifted students is a daunting expectation for preservice teachers as they design lesson plans for meaningful content, process, and products for elementary students they have not yet encountered. Preservice trainees need to learn at least five types of lesson plans, including direct instruction, presentation with advanced organizers, concept attainment, cooperative learning, and problem-based inquiry. Each of the five lesson plans should include a requirement to differentiate for special needs children who need time and attention, as well as for gifted learners who need a qualitatively differentiated program of instruction.

Excellent background explanation and an arsenal of strategies can be found in Carol Tomlinson's

Table 1 Examination of Attitudes Toward Gifted Learners

1	Gifted children need more attention than average children in the regular classroom.
2	When gifted children are excused to attend a pull-out class, they must make up all the work missed in their regular class.
3	Gifted children should do the same assignments as everyone else in the classroom.
4	Because gifted children often finish their work before their classmates, they should be given longer assignments or more of the same work.
5	Working with gifted children would be very stimulating.
6	Teachers of the gifted need additional release time for planning and developing instructional materials.
7	Gifted children can advance most rapidly in a regular classroom.
8	Disruptive behavior by gifted students would be eliminated by stricter discipline procedures.
9	Special materials, strategies, and curricula need to be provided for gifted learners.
10	It takes less time to prepare for gifted students than for below-average/challenged students.
11	Gifted children will succeed in life regardless of the school programming for high-ability learners.
12	Special classes for gifted foster elitism, because they think they are better than other students.
13	It would be embarrassing to have a gifted child correct me in front of the class.
14	I think all children are gifted.
15	Grouping gifted students together creates more problems than benefits.
Score:	
15–35	You are an advocate of gifted learners who understands the complexities of school gifted/talented concerns.
35–50	You have moderate understanding of issues and concerns of gifted learners. Keep reading and learning about gifted learners and their needs.
50–75	You need to revisit characteristics of gifted learners and ways to meet their educational needs.

Source: Revised by author (2001).

book, *How to Differentiate Instruction in Mixed Ability Classrooms*. Student trainees work in teams to develop lessons despite the fact that they do not have "real" classroom students whose needs they can identify. One might ask, "How would you design a lesson for Matilda if she were in your classroom?"

Research and Resources

Despite evidence of academic acceleration as best practice for many gifted schoolchildren, this strategy is often not employed in schools and districts. Preservice trainees learn the effectiveness of acceleration in *A Nation Deceived: How Schools Hold Back America's Brightest Students*. Resources from the National Association for Gifted Children (NAGC) Web site provide everything from a glossary of terms to resource directories and classroom resources and teaching for high potential. NAGC provides an invaluable collection of professional resources for teachers.

Frequently, the focus of preservice education on giftedness is how to challenge gifted learners. As a

collaborative team, trainees can present research, resources, teaching strategies, and support for new elementary teachers to gain confidence in empowering gifted students to reach their potential. The team effort produces better-prepared teachers who have more than increased awareness and understanding. They become empowered themselves.

Sally R. Beisser

See also Competencies for Teachers of Gifted; Controversies in Gifted Education; Differentiation; Elitism; Teacher Attitudes

Further Readings

Colangelo, N., Assouline, S. G., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students*. Retrieved August 27, 2008, from http://www.accelerationinstitute.org/Nation_Deceived/Get_Report.asx

Dahl, R. (1998). *Matilda*. New York: Puffin Books–Penguin Putnam.

National Association for Gifted Children: http://www.nagc.org

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed ability classrooms* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum development.

Presidential Scholars

The Presidential Scholars Program is a recognition program honoring outstanding graduating high school seniors. It was put in place in 1964 by an Executive Order from President Lyndon Johnson. At that time, he emphasized that this program should do more than *reward* excellence. It should also be a means of *nourishing* excellence. The program was to be a way to stimulate achievement. It was hoped that having such a program would give students a goal to work toward during their high school years. This entry describes the Presidential Scholars Program's goals, the process of application, and the characteristics of Presidential Scholars.

Students who score extremely high on either the SAT or the ACT are invited to apply for the program. Candidates are evaluated on their academic achievement, personal characteristics, leadership, and community service activities. The Commission on Presidential Scholars selects one male and one female from each state, the District of Columbia, and Puerto Rico, as well as representatives from families of U.S. citizens living abroad. There are also 15 students chosen at large for a total of 121 Presidential Scholars. In 1979, President Carter expanded the program to include an additional 20 students in the arts. Students being considered for the Arts Program submit evidence of artistic accomplishment in the form of videos or manuscripts. They are judged in the categories of dance, music, music/jazz, music/voice, theater, photography, visual arts, and writing. The selected students are known as Presidential Scholars in the Arts. During the 1980s, President Reagan refined the selection process to emphasize the elements of leadership and community service.

The 121 Presidential Scholars receive a trip to Washington, D.C., in June to receive the Presidential Scholars Medallion at a White House ceremony. In 1969, it was decided that the design of the medallion would be the Great Seal of the Nation. Presidential Scholars Recognition Week activities include meetings with national and international leaders, discussions of relevant issues with government officials and elected leaders, meeting accomplished people in a variety of fields, participating in community service activities, and attending recitals and receptions. Time is also scheduled during the week to visit the various museums and monuments in the nation's capital. The week culminates with the White House Awards Ceremony. Even so, many Presidential Scholars will tell you that the best and most lasting part of the experience is the opportunity to exchange ideas with other accomplished and highly motivated peers. During the week together, many friendships develop that will last a lifetime. Students often refer to themselves as becoming members of the Presidential Scholars family.

For many years, the American Association for Gifted Children had a role in the Presidential Scholars Program. Their 1994 study of the Presidential Scholars suggested that the students developed their talents and abilities because of the encouragement of teachers and parents. All of the scholars are asked to nominate a teacher who

inspired them and guided them in developing their talents and abilities. By 1998, the Distinguished Teacher award was renamed Presidential Scholars Program Teacher Recognition Award. This designation recognizes the educational excellence of outstanding teachers.

In 1981, Felice Kaufmann did a follow-up study on the Presidential Scholars of the mid-to late 1960s. She was wondering if the promise of youth lasted beyond their high school years. She found that 97 percent of the Presidential Scholars had received college degrees and slightly over 60 percent had earned a graduate degree.

Application Process

Students must be U.S. citizens to be considered for the Presidential Scholars Program. Students cannot initiate the application process. They must be invited to apply. Invitations are based on the student's test records on the SAT or ACT over a 2-year period of time. Students wanting to qualify for the Presidential Scholars in the Arts must participate in the youngARTS competition sponsored by the National Foundation for Advancement in the Arts (NFAA). This organization has been the exclusive nominating organization for the Presidential Scholars in the Arts since 1982. Approximately 2,700 students are invited to apply each year. After receiving an invitation, students send in self-assessments, school reports, a transcript, and a personal essay. The deadline for all application materials is usually in February. Semifinalists are chosen in March. The final decisions are made in April. In June, the new Presidential Scholars travel to Washington, D.C., for their Recognition Week.

The Applicants

This program recognizes young people who have learned multiple languages, worked for high-level organizations such as NASA, written scholarly papers, conducted research, held their own art exhibitions, performed concerts, or launched their own companies, all by the age of 17. Though they come from diverse backgrounds and situations, they share many qualities, such as a devotion to family and their heritage. They have often been at the forefront in their local schools, exhibiting spirit and taking on leadership roles in clubs and school-related activities. Their abundant supply of energy carries them into numerous activities within community and civic groups. They share the desire to turn their dreams for making the world a better place into reality. They go on to receive an education at some of the top schools in this country.

Today, the Presidential Scholars Program has an active and supportive alumni community. There are currently more than 5,000 Presidential Scholars. Following their recognition as Presidential Scholars, many have gone forward to impact our nation as scientists, artists, inventors, CEOs, stage and screen stars, attorneys, journalists, and teachers. They have joined the military, played in major symphonies, and become entrepreneurs. They have been awarded the Pulitzer Prize, the Rhodes Scholarship, the Marshall Scholarship, and Fulbright grants. This program illustrates the potential for education to open untold doors to the future. The Presidential Scholars continue to believe they can fulfill their dreams with passion and conviction long after the ceremony in the White House.

Joyce E. Juntune

See also Academic Talent; College Gifted; National Merit Scholarship Program; Talent; Valedictorians

Further Readings

Kaufmann, F. A. (1981). The 1964–1968 Presidential Scholars: A follow-up study. *Exceptional Children, 48*(2), 164–168.

Presidential Scholars Foundation: http://www.presidentialscholars.org

Problem Solving

Problem solving is the process of applying a complex set of thinking skills to resolve or complete a task. The ability to problem solve is thought to be the most important set of thinking skills students can learn to help them in their future lives. Problem solving involves both divergent and convergent thinking. Often linked to the literature on creativity, problem-solving skills include fluency, flexibility, originality, and elaboration of ideas.

To find a reasonable, viable, or acceptable solution to a problem, one must first generate many possibilities before evaluating the solutions that engage the higher-level thinking skills of synthesis, analysis, and evaluation. Curricula designed for gifted students often emphasize creativity and problem solving. The processes of problem solving can be domain specific such as in the field of physics, engineering, math, medicine, or business, as well as generic. This entry reviews processes, strategies, and curricula related to problem solving.

Processes

There are several articulated processes of problem solving in the literature related to psychology and creativity. Among the most frequently cited is the process for creative problem solving originally developed by Sidney Parnes and later disseminated by Donald Treffinger in the *creative problem solving model:*

Stage 1: Mess finding—Analyze and break down the big problem into smaller pieces

Stage 2: Data finding—Articulate and collect as much information as possible about the problem

Stage 3: Problem finding—Restate the fuzzy problem into a more manageable target to solve

Stage 4: Idea finding—Brainstorm as many ideas as possible to solve the problem

Stage 5: Solution finding—Select criteria to evaluate possible solutions

Stage 6: Acceptance finding—Articulate your best solution based on using the criteria above

Adhering to a process for problem solving enables students to practice specific thinking skills such as brainstorming, categorizing, comparing, contrasting, analyzing, synthesizing, and evaluating ideas as they proceed to find the most acceptable solution.

The Future Problem Solving Program International competition founded by E. Paul Torrance has students from all over the world engaged in selecting and solving problems whose solutions would better a global society. The Future Problem Solving Program International Fact Sheet describes the processes used in the problem-solving competition, which are similar to the creative problem-solving model described above:

1. Identify challenges related to the topic or future scene
2. Select an underlying problem
3. Produce solution ideas to the underlying problem
4. Generate and select criteria to evaluate solution ideas
5. Evaluate solution ideas to determine the better action plan
6. Develop the action plan

Although there are numerous versions of lists of skills and processes needed to solve problems, Robert Sternberg suggests that regardless of how they are labeled, the following six processes are used:

1. Identify the problem
2. Allocate resources
3. Represent and organize information
4. Formulate strategy
5. Monitor problem-solving strategies
6. Evaluate solutions (p. 40)

Problem-Solving Techniques and Strategies

The literature is filled with techniques and strategies to improve the thinking skills that are required to solve problems. To improve problem-solving skills, students must learn to deconstruct the characteristics of a difficult problem. As summarized by Joachim Funke, difficult problems lack clarity, have multiple goals, are complex, and have time considerations. Strategies such as "divide and conquer" to break the problem down into smaller parts, working backward, trial-and-error, experimentation, assumption reversal, and more are used to help give people the thinking tools they need to be better problem solvers.

Other problem-solving techniques may be found in the literature on creative thinking, such as incubation, which is described as putting the details of

the problem in your head, and then allowing the subconscious mind to ponder them. Edward De Bono describes six different styles of thinking in his book, *Six Thinking Hats*. Each style presents a different perspective for examining important decisions or problems. Examining a problem from different points of view allows it to become less difficult to solve.

There are many commercialized programs that support the teaching of analytical thinking skills. Some are associated with specific fields. One such strategy used in business is the SWOT framework, whereby strengths, weaknesses, opportunities, and threats are examined to help make decisions and solve problems.

Problem-Solving Curricula

Technology has advanced ways to teach problem solving to young children. Gaming is becoming a 21st-century phenomenon, giving students opportunities to learn problem-solving strategies in virtual environments. In professional fields, too, technology enables scientists to use computer-generated models to solve both real and virtual scientific problems.

In addition to being domain specific, interdisciplinary problem solving is now found in learning standards across the United States. In Texas, as early as kindergarten, students are required to be exposed to problem-solving and decision-making processes. In New York, students are required to apply the knowledge of thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions. Problem-based learning, often used with high-achieving students, provides an instructional framework for students to delve deep into a specific content area by solving real interdisciplinary and often ambiguous problems. Effective teaching practices for general and gifted education include infusing the teaching of problem-solving skills into the content and core curriculum. This includes giving students direct instruction on using thinking strategies, as well as opportunities to apply them in authentic contexts.

Nancy B. Hertzog

See also Creative Problem Solving; Creativity, Definition; Divergent Thinking; Future Problem Solving

Further Readings

Creative Problem Solving: http://www.mycoted.com/Creative_Problem_Solving_-_CPS

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology and discovery of invention*. New York: HarperCollins.

De Bono, E. (1985). *Six thinking hats*. Boston: Little, Brown.

Frensch, P. A., & Funke, J. (Eds.). (1995). *Complex problem solving: The European perspective*. Mahwah, NJ: Lawrence Erlbaum.

Future Problem Solving Program International Fact Sheet: http://www.fpspi.org/PDF/FPSP%20Fact%20Sheet.pdf

Mind Tools: http://www.mindtools.com/pages/article/newTED_07.htm

Sternberg, R. J., & Grigorenko, E. (2000). *Teaching for successful intelligence*. Arlington Heights, IL: Skylight Training.

Treffinger, D., Isaksen, S. G., & Stead-Dorval, B. K. (2005). *Creative problem solving: An introduction* (4th ed.). Waco, TX: Prufrock Press.

Prodigies

Prodigies are those children, usually under 10 years of age, who exhibit an adult level of proficiency at various tasks, jobs, or work. A prodigy performs as an adult in a respected, highly demanding domain. Although prodigies can emerge in many fields, most demonstrate their abilities in music, chess, and mathematics. Prodigies have also demonstrated extraordinary abilities in art, languages, literature, mathematics, and science, but to a much lesser extent than in music, chess, and math. Historically, prodigies have been boys almost exclusively, but this has changed rapidly in recent years because the number of girls so identified has increased considerably. This entry provides a historical overview of conceptions of prodigies, reviews the research conducted on them, explores the relationship between prodigies and intelligence, examines how much of a child prodigy's talent is innate and how much due to environment, considers how teachers and families can support a child prodigy's development, and looks at how savants are sometimes confused with prodigies.

Historical Overview

Historically, prodigies' gifts were considered to be the result of supernatural causes. Over time, this view shifted and for much of the 20th century a very high IQ was seen as the basis of prodigious talent. Today, growing understanding about prodigies suggests that their talent develops through a confluence, the "co-incidence" of influences, with levels of nurture, training, and support prodigies receive as significant as any other factor. Providing this social support sometimes can be problematic because doing so requires a great degree of cooperation and coordination among different parties: quality teachers, conscientious parents, abundant opportunities for practice and performance, resources to provide lessons, access to publicity, and a certain degree of providence that allows the child to meet the domain's challenges. Prodigies are those who can negotiate these challenges and tests more rapidly than others. As a result, they enjoy eminence in the field at a much younger age than others. This level of prodigious talent raises several obstacles for children so endowed, each of which must be dealt with appropriately.

Research

Relatively few research studies have examined prodigies. At least part of the reason for the limited number of studies is the rareness of prodigies. Studies of prodigies have tended to be case studies of individual children or analyses of historically eminent individuals. The studies have shown that child prodigies generally have high, but not extraordinary, IQ scores. The child's prodigious ability is almost always limited to a specific domain, leading to gaps or discrepancies in abilities. For example, a musical prodigy may possess extraordinary pitch but poor fine motor skills; or a math prodigy may lag in other academic areas, for instance reading below grade level. Research suggests that almost all prodigies are performing at an adult level before the age of 10, which may be attributed to a coincidence of individual, environmental, and historical forces. *Individual* factors include the prodigy's talents, intelligence, and gifts. *Environmental* aspects comprise the existence of a highly developed field that can be taught to the prodigy. *Historical* aspects take into account the importance that society places on the domain in which the prodigy excels. This amalgamation of factors has been dubbed the *co-incidence* theory.

Relationship Between Prodigies and Intelligence

An IQ score of 120 serves more or less as the threshold for prodigious performance, with almost all prodigies having an IQ above that level. For many years it was thought that high IQ and occurrence of prodigy were related. More recently, however, the domain in which the prodigy excels is considered to be of more importance than the child's level of intelligence. Domains that produce prodigies tend to have several common aspects. First, they are highly rule bound in that a general consensus exists as to what constitutes a high level of performance. Second, the domains have relatively transparent knowledge structures that proceed in a logical and sequenced progression. Third, transmission of the domain's knowledge is demonstrated in a consistent and agreed-upon manner. Fourth, the criteria for what constitutes "excellence" are adequate, accepted, and acknowledged. Fifth and last, very young prodigies must be able to perform the tasks the domain demands.

Some prodigies not only are able to master the rules of a specific domain, but are also able to experiment with the skills and understandings that are so fluently developing. Though many children can replicate a notated musical composition or draw or paint, what sets the prodigious child apart is his or her need to play with the tools of a particular domain. This playfulness affords the prodigious child ample opportunities to gain a better understand of the rules of the domain as well as provides opportunities for the child to challenge the rules and potentially develop new ways of thinking and doing within the domain. Opportunities to play with the domain's tools also allow the prodigy to experience *fruitful asynchrony,* where the prodigy can continually challenge the rules and legitimated understandings of a domain. This challenging of the field is especially important for the prodigy because it helps support his or her continued development. Fruitful asynchrony sets the prodigy apart from other age peers. It is thus imperative that parents, caregivers, and schools

that care for or work with prodigious children support this development.

Support

Children with prodigious ability require support from the home and school to develop their gifts fully. Supporting prodigies is challenging insofar as parents and schools may not have the necessary resources or expertise to support these children's learning needs. Parents and school personnel must be aware of, and have access to, resources that can best serve the child. This may mean allowing the child to work with an identified expert outside of school settings, or the child may engage in acceleration, including single-subject acceleration or, depending on the child, grade skipping within the school. No matter the choice implemented, it is imperative that these children have opportunities to work through and with the various structural principles within the domain and continue to refine and expand their content knowledge in authentic contexts. Parents, caregivers, and schools may be limited in the level of support they can provide. Thus, as the child's prodigious gifts mature, he or she often will need to seek the tutelage of an expert located outside the school or even some distance from the family home.

Early in his or her life, the prodigy's unusual gifts require an adult who can provide support. This adult must be able to ease the prodigy's way, supply opportunities, shield from critics, cushion through setbacks, and focus and channel talents in appropriate and productive directions, and otherwise act as a mentor. No matter how prodigious the child's talents, a mentor's guidance will be necessary to navigate the social intricacies of the domain. Though prodigies are often very gifted at mimicry, knowing what is taking place at the forefront of the domain and which conventional practices bear surpassing is dependent upon a knowledgeable and well-informed mentor. The mentor thus harnesses the prodigy's talent and provides the refinement and direction necessary to reach the next level. In addition, the social and emotional needs of the prodigious child must be supported by parents or other caring adults.

When prodigies are younger, their gifts tend to be most pronounced. During this period, caregivers, parents, or teachers must support the environmental, individual, and historical aspects of the specific domain in which a child is prodigious. In addition, prodigies must also have opportunity to understand how their prodigious abilities can be used to best serve the greater community as well as individual needs. The child's prodigious ability in a domain must thus be developed while the prodigy begins to understand and appreciate the limits and potentials of that ability. This understanding and appreciation is especially important as the child matures. As one-time prodigies grow into adulthood, they must compete with other masters of their domain, which may include age peers who have caught up with them in terms of skills and performance levels. This altered playing field inevitably results in a shock to the self-image of the former prodigy, one that occurs at the same time that he or she should be exerting personal career control and management. On the one hand, prodigies face a changed audience, one no longer amazed by their seemingly superhuman skills. On the other hand, prodigies may begin to face the reality that they have been the object of another's ambitions and goals, be it a parent, a teacher, or other mentor. This dual realization often causes some degree of distress, and may be one reason that many, if not most, prodigies do not fulfill their earlier potential. For those former prodigies who do make the transition to adult eminence in their field, their families are often the catalyst. Families of these individuals recognize the changing nature of their role, and allow the child to continue to grow while establishing a separate and autonomous life.

Ultimately the convergence of coincidence factors is required for prodigies to develop their gifts fully. Mozart, for example, is often portrayed as a child who received little or no tutelage in music. Mozart, of course, was a prodigy but he also had regular opportunities to see and hear the regular instruction his father provided to his sister. This training, albeit informal, was necessary for Mozart to reach his potential, as was his family's recognition and development of his prodigious gifts. Unlike most prodigies, Mozart also revolutionized the domain in which he performed. Though it is sometimes argued that prodigies are *not* creative, the speed and depth of their mystical capabilities suggest at least a close propinquity to creativity. However, because many prodigies' level of performance is what sets them apart from age peers, creativity must be looked at as a separate endeavor.

Savants

Savants are often grouped with high-IQ children and prodigies. "Idiot savants," a label originating in the 19th century, was used to describe mentally disabled persons who were able to display advanced levels of learning in certain areas. As with prodigies, savant syndrome is an exceedingly rare condition that occurs approximately 6 times more frequently in boys than girls. Savants differ from prodigies in that savants demonstrate only concrete and literal patterns of expression and thought, and show minimal abstract reasoning ability. Savants also tend to behave differently from children of the same age, with abstract expression often lagging behind that of others; moreover, they will not necessarily challenge the rules of a domain or develop refined skills and understandings. In all of these behaviors, the savant differs greatly from the prodigy, who exhibits behaviors much the same as his or her age peers with the exception of the area of prodigious talent. Current research suggests that savant syndrome is caused by a pre- or postnatal injury to the brain's left hemisphere, resulting in right hemisphere compensatory growth. No such brain abnormalities have been noted with prodigies.

Stephen T. Schroth and Jason A. Helfer

See also Genius; IQ; Mentoring Gifted and Talented Individuals; Precocity; Savants; Talent

Further Readings

Callahan, C. M., & Dickson, R. K. (2007). Mentoring. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says* (pp. 369–382). Waco, TX: Prufrock Press.

Callahan, C. M., & Kyburg, R. M. (2005). Talented and gifted youth. In D. L. DuBois & M. J. Karcher (Eds.), *Handbook of youth mentoring* (pp. 424–439). Thousand Oaks, CA: Sage.

Cox, C. M. (1926). *Genetic studies of genius: Vol. 2. The early mental traits of three hundred geniuses.* Stanford, CA: Stanford University Press.

Davis, G. A., & Rimm, S. B. (2004). *Education of the gifted and talented* (5th ed.). Boston: Allyn & Bacon.

Feldman, D. H. (2007). Prodigies. In J. A. Plucker & C. M. Callahan (Eds.), *Critical issues and practices in gifted education: What the research says.* Waco, TX: Prufrock Press.

Gardner, H. (1993). *Creating minds: An anatomy of creativity seen through the lives of Freud, Einstein, Picasso, Stravinsky, Graham, and Gandhi.* New York: Basic Books.

Morelock, M. J., & Feldman, D. H. (2003). Extreme precocity: Prodigies, savants, and children of extraordinarily high IQ. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 455–469). Boston: Allyn & Bacon.

Professional Development

Professional development in gifted education is an elusive concept. Characterized simply as the "systematic development of professional skill" by Gloria Dall'Alba and Jörgen Sandberg (p. 383), the concept of professional development defies simplicity because of the widely varying ways individuals, schools, and districts envision and participate in systematic development. Professional development ideally begins at the preservice level, when undergraduates in teacher education programs receive an overview, or at least an introduction, to the nature and needs of the gifted learners they will encounter in the classroom. According to the 2006–2007 *State of the States in Gifted Education,* however, only 5 of 43 responding states require preservice hours in gifted education. The transmission of knowledge and skills in the field necessarily continues in formal ways within the school setting; known alternatively as staff development (e.g., Dettmer & Landrum, 1998) or as inservice or teacher training, learning experiences may be provided for all educators in a building or district by specialists brought in to facilitate such programs or by local staff members assigned to work with gifted students. Alternatively, the staff members assigned to work with gifted students may be the participants in these programs, or they may organize small communities of learning to further develop their abilities.

The process continues informally, as well, as individuals learn through their day-to-day interactions with gifted learners and independently seek answers to new challenges through reading, discussion, and reflection. All too often, educators of the gifted find themselves isolated in schools, and even in districts, as the only individuals dedicated

to serving gifted and talented learners; these teachers are finding professional learning communities online, through Web sites dedicated to gifted education or through listservs in the field. Educators also can pursue continuing education, in person or through distance education, through colleges and universities; these efforts, largely funded by the individuals themselves, can result in endorsements in gifted education or in graduate degrees. Educators can attend state, regional, national, or even international conferences in gifted education, broadening their perspectives and enlarging their professional tool kits. The 2006–2007 *State of the States* reports that 6 of 43 responding states mandate some form of professional development in gifted education for the classroom teachers who spend the most time with gifted children; 15 states mandate certification or endorsement in the field.

Although systematic development as a process has defied implementation, both scholars and practitioners lack clarity about the meaning of "professional skill" in gifted education. Understanding the requisite skills required by teachers of the gifted is likely uncertain because the concepts of giftedness and talent are defined and operationalized in multiple ways. Nancy Bangel, Donna Enersen, Brenda Capobianco, and Sidney M. Moon suggest, however, that a consistent appraisal of teacher competencies emerged from the field of gifted education from the 1970s through the early 1990s. These include knowledge of both educational and affective needs of gifted children; skill in promoting high-level thinking and creative problem solving; ability to facilitate independent research; and ability to develop appropriate curricular units for the gifted. While many educators have concluded that these same competencies are evident in all effective teachers, outstanding teachers of the gifted indicate a specific preference for teaching gifted students, and they are willing to advocate for the gifted, even if it means challenging the status.

PreK–12 Standards

In 1998, the National Association for Gifted Children (NAGC) developed *PreK–Grade 12 Standards* that suggested that educators responsible for the successful implementation of gifted programs needed to be familiar with the following: *program design* based on "sound philosophical, theoretical, and empirical support"; *program administration and management,* "including developing, implementing, and managing services"; *student identification* "to determine appropriate educational services"; *curriculum and instruction* specifically for the "unique needs of the gifted child"; *socio-emotional guidance and counseling* "to recognize and nurture the unique socio-emotional development" of the gifted; *program evaluation,* studying "the value and impact of services provided"; and *professional development,* ensuring that those working with gifted learners "have specialized preparation in gifted education [and] expertise in appropriate differentiated content and instructional methods." Those accountable for program success should possess the professional skills and understandings to guide programs from minimal to exemplary competencies in each of these standards.

Initial Knowledge and Skill Standards for Gifted and Talented Education

In an effort to facilitate greater coherence in the professional development of educators of the gifted, The Association for the Gifted (TAG), a division of the Council for Exceptional Children (CEC), and NAGC promulgated *Initial Knowledge and Skill Standards for Gifted and Talented Education* to shape graduate programs in the field as well as district- or school-based decisions about personnel preparation. These standards, approved by the National Council for Accreditation of Teacher Education (NCATE), include broad areas essential for professionals in gifted education. These include the following:

- historical and philosophical foundations in the field;
- the development and characteristics of gifted learners, emphasizing comprehensive knowledge of individual cognitive and affective characteristics, as well as of developmental milestones, and the impact of family, community, and culture on development;
- individual learning differences honoring and integrating the full range of diversity in gifted education, including academic, affective, and cultural differences, into programs;
- instructional strategies, including a repertoire of curricular, instructional, and management

strategies to appropriately differentiate for the widely varying needs of all gifted learners;
- learning environments and social interactions focusing on interpersonal needs and interactions, and safe and supportive environments, necessary for optimal development;
- language and communication issues for contemporary students who come from diverse ethnic, cultural, and linguistic backgrounds, as well as those with language or communication disabilities;
- instructional planning that integrates a scope and sequence for differentiated learning into school, district, state, and national curriculum standards;
- assessment, identifying gifted learners and prescribing appropriate programming, as well as determining academic progress;
- professional and ethical practice, including competencies that facilitate the progress of gifted, talented, and creative learners from all walks of life;
- collaboration with all those who can enhance the educational experiences of gifted learners; and embedded throughout the standards,
- an emphasis on the critical importance of honoring and fostering diversity in gifted programs.

Research clearly has correlated the expertise of educators with excellence in student achievement—and inadequate professional performance with poor student achievement. The development and dissemination of national standards, both for programs and for personnel, may provide greater coherence for the systematic development of professional skill in gifted education. Within the context of standards, both individuals and systems will be able to measure current levels of proficiency and subsequently determine goals to enhance recommended skills, knowledge, and practices. As Robert Sternberg and Joseph Horvath aptly advocate, "If American public schools are to become centers of excellence, then their most important human resource (i.e., teachers) must be effectively developed" (p. 9).

Laurie J. Croft

See also Belin-Blank Center; Competencies for Teachers of Gifted; Council for Exceptional Children—The Association for the Gifted; Curriculum Models; Graduate Education; National Association for Gifted Children; Teachers of Gifted

Further Readings

Bangel, N. J., Enersen, D., Capobianco, B., & Moon, S. M. (2006). Professional development of preservice teachers: Teaching in the Super Saturday Program. *Journal for the Education of the Gifted, 29*(3), 339–361.

Council for Exceptional Children—The Association for the Gifted & National Association for Gifted Children. (2006). *CEC—NAGC initial knowledge & skill standards for gifted and talented education* (final version). Retrieved December 27, 2008, from http://www.gifted.uconn.edu/siegle/TAG/FinalInitialStandards4–14–06.pdf

Council of State Directors of Programs for the Gifted and National Association of Gifted Children. (2007). *The 2006–2007 state of the states in gifted education*. Washington, DC: National Association of Gifted Children.

Dall'Alba, G., & Sandberg, J. (2006). Unveiling professional development: A critical review of stage models. *Review of Educational Research, 76*(3), 383–412.

Dettmer, P., & Landrum, P. (1998). *Staff development: The key to effective gifted education programs*. Washington, DC: National Association for Gifted Children.

Gubbins, E. J. (2007). Professional development. In C. Callahan (Ed.), *Critical issues and practices in gifted education*. Washington, DC: National Association for Gifted Children.

National Association for Gifted Children. (1998). *Pre-K–Grade 12 standards*. Washington, DC: Author. Retrieved September 24, 2007, from http://www.nagc.org/index.aspx?id=546

Sparks, D., & Hirsh, S. (2000). *A national plan for improving professional development*. Oxford, OH: National Staff Development Council. Retrieved November 7, 2007, from http://www.nsdc.org/library/authors/NSDCPlan.cfm

Sternberg, R. J., & Horvath, J. A. (1995). A prototype view of expert teaching. *Educational Researcher, 24*(6), 9–17.

Wycoff, M., Nash, W. R., Juntune, J. E., & Mackay, L. (2003). Purposeful professional development [Electronic version]. *Gifted Child Today, 26*(4), 34.

Psychoanalytic Theories of Creativity

Psychoanalysis proposes two interrelated but distinctly different types of thinking. Sigmund Freud

labeled these processes of thinking as primary and secondary to indicate chronological priority in that primary processes are assumed to be available at birth and secondary process occurs later as speech is developed. Secondary process can be conscious or unconscious and is characterized by logic and order. It functions in adapting to reality and relies heavily on verbal symbolism. The secondary process was seen by Freud as associated with the id and the reality principle. In contrast, primary process thought is characterized by visual imagery, symbolism, and displacement. It is largely unconscious and is the wellspring of the inner subjective world. Freud viewed the id and the pleasure principle to be associated with the primary process of thought. Primary process thinking is manifested through unconscious and conscious fantasy, daydreams, dreams while asleep, jokes, and artistic and creative expressions. Thus, psychoanalytic thought suggests that creativity springs from unconscious drives. Freud hypothesized that sensory data can be linked to words to be susceptible to conscious thought. However, others believe that in many creative processes, the sensory data become the form that is translated into a medium such as a painting or interpretative dance. Even if the medium is words, such as in the creation of poetry, the translation of the data is not used in the same way as in more traditional thinking. This entry discusses psychoanalytical theories and their application to understanding giftedness and creativity.

Various psychoanalytic schools of thought have different opinions on just how creativity comes from unconscious drives. Generally, psychoanalytic theory posits that early experiences with primary caregivers (typically mother and father) shape behavior extensively. Freud, for example, believed that creativity originates from conflicts resulting from wish fulfillment and biological drives. That is, in Freud's view, creativity is the sublimation of sexual drives.

Otto Rank initially embraced the Freudian view of the origin of creativity, but soon went beyond it. For Rank, creativity was at the center of personality development. That is, each person is an artist who fashions himself or herself. Thus, Rank saw the need for self-definition as universal for all human beings. It is from this self-definition that creative products can emerge.

Other psychoanalytic theories also recognize that in many creative activities there is a repetitive engagement with either a troubling (sexual or otherwise) or a soothing theme. For example, Edvard Munch's paintings are graphic representations of grief, depression, death, abandonment, and separation anxiety. His famous painting *The Scream* dramatically depicts the helplessness and hopelessness of severe separation panic. Munch suffered from depression and loneliness. His mother died when he was 5, and his childhood was plagued by personal illness. He was never able to commit to a relationship with a woman, and his life revolved around his painting. Munch expressed his conscious and unconscious pain through artistic expression, which is likely to have served as a defense mechanism.

Defense mechanisms are a means by which an attempt is made to protect the self from painful affect. Regression is a type of defense mechanism where the person returns to an earlier, more primitive form of mental activity. The ego uses regression in a variety of forms, such as some creative activities that are a more adaptive form of defense, that is, a controlled regression.

Art therapy is partially based on this idea. In addition, various types of assessment use art as a means for revealing aspects of the personality. An example is the use of drawings.

Creative inspiration is seen in psychoanalytic terms as sampling the depths of the unconscious, which is considered irrational though having some connection to reality. There is a risk of going "too far" in that the creative and psychotic modes are thought to be similar, according to psychoanalytic theory. Mental instability appears to occur in significantly higher rates among those who are highly creative than in the general population. However, there is a "chicken and egg" problem in that it is not clear which came first. Although most highly creative people are not mentally unstable and most mentally ill people are not highly creative, there seems to be a partial correlation. Ernest Hemingway and Virginia Woolf entered psychiatric hospitals and eventually committed suicide. Other creative individuals with turbulent lives include Georgia O'Keeffe, Jackson Pollock, and Sylvia Plath. Kay Jamison has written extensively about the link between mental illness, particularly bipolar spectrum disorder, and creativity.

Some types of personalities are also associated with creativity. For example, schizoid personality organization is a withdrawal into an internal world of imagination. Healthier schizoid people can convert this withdrawal tendency into works of art, scientific discoveries, and other types of creative endeavors.

Karen D. Multon

See also Creative Personality; Creative Process; Creativity and Mental Illness; Creativity Theories; Psychotherapy

Further Readings

Freud, S. (1971). The unconscious. In *The standard edition of the complete psychological works of Sigmund Freud* (Vol. 14, pp. 159–215). London: Hogarth Press. (Original work published 1915)

Jamison, K. R. (1993). *Touched with fire: Manic-depressive illness and the artistic temperament*. New York: Free Press.

Masterson, J. F. (1985). *The real self: A developmental, self, and object relations approach*. New York: Brunner/Mazel.

Milner, M. (1987). Psychoanalysis and art. In *The suppressed madness of sane men: Forty-four years of exploring psychoanalysis* (pp. 192–215). London: Tavistock. (Original work published 1956)

Rank, O. (1932). *Art and the artist*. New York: Knopf.

Rose, G. J. (1980). *The power of form: A psychoanalytic approach to aesthetic form*. New York: International Universities Press.

PSYCHOTHERAPY

Psychotherapy is a term originally meant to describe a method, closely related to psychoanalysis, for the treatment of patients with various forms of psychological illness. Today, the term has evolved to describe any method used by specifically trained therapists who use the relationship with their patients (sometimes referred as clients) and various techniques of verbal and nonverbal communication. Its purpose is to eliminate, change, or suppress psychological processes that interfere with psychological and personality development. Techniques may involve a combination of confrontation, clarification, interpretation, insight, advice, support, encouragement, guidance, and reassurance, as well as strategies for cognitive and behavioral modification.

There are no research studies that suggest standardized procedures or uniform approaches for the psychological treatment of gifted individuals. Nevertheless, clinicians are often faced with the need to help gifted individuals in psychological distress. A review of the limited psychotherapy literature may provide some useful insights.

A range of approaches is described. Cognitive and behavioral methods address conscious aspects of psychological difficulties. Psychoanalytic and psychodynamic methods address unconscious factors. One eclectic approach describes how both approaches are combined.

The literature includes a case report of the psychoanalysis of a young, gifted girl; clinical excerpts from the psychoanalysis of adolescents; a case report of the psychotherapy of a young boy. Other authors give general descriptions of the issues for both patient (or client) and therapist as they arise in psychotherapy. A recent unpublished manuscript gives a detailed description for how a traditional psychodynamic psychotherapeutic approach can be modified when treating exceptionally gifted adolescents and adults. The report also describes how their psychotherapy unfolded in predictable stages.

The Psychoanalysis of Gifted Children

Kerry Kelly's report is of the successful psychoanalytic treatment of a 4-1/2–year-old precocious child. Functioning at 2–3 years beyond her chronological age in many areas, she developed sleep difficulties, refused to read or write, and began to wet herself day and night. Her parents were psychologically deeply disturbed individuals unable to gratify each other in their marriage. Instead, focused on their daughter, they got great pleasure from her precocious accomplishments but were unable to nurture her more age-appropriate childish needs. The child's own self-criticism and high expectations caused feelings of intense inadequacy and poor self-esteem.

The clinical material is divided into four phases: oral, anal, phallic, and terminal. It provides an excellent example of how psychodynamic/psychoanalytic play psychotherapy works. In the sessions, the child acted out her unconsciously repressed wishes and conflicts and was allowed an opportunity to express her emotions freely. The patient used the therapist to act out different versions of important relationships while the therapist, at times, interpreted different levels of the unconscious meaning of these relationships as well as gratified some of the patient's basic needs. In this process, the patient found healthier solutions to painful conflicts—no longer needing symptoms to express herself. Of particular interest is a discussion of how psychoanalysis helped this young patient express her childish needs while simultaneously retaining her precocious level of functioning.

Psychotherapy of Children

William Dahlberg's case report is of the successful treatment of a profoundly gifted 9-year-old boy who entered psychotherapy because he had become suicidal and homicidal. Dahlberg's approach is a flexible one: Both parents, the patient, and his sister were treated individually. The parents were also seen as a couple.

The issues addressed in the psychotherapy were as follows:

- Parental misunderstanding of giftedness
- The patient's social isolation caused by
  a. Peer rejection
  b. An idiosyncratic, precocious intellect that permitted secretive, spiritual, and magical thinking
  c. An inadequate educational setting
  d. The parentification of the patient and his sister

The goals of the psychotherapy were to help the patient engage in age-appropriate social tasks and to find an appropriate setting for the full expression of his remarkable gifts.

The length of the psychotherapy, although not exactly specified, appears to have been relatively short term. Rather than terminate the psychotherapy, Dahlberg made himself available in an open-ended way so that all members of the family could and did request periodic consultations.

Psychoanalysis of Gifted Adolescents

Calvin Colarusso's case report is of the successful psychoanalysis of a twice-exceptional (gifted/learning disabled) 13-year-old boy. Clinical vignettes of major themes and conflicts are provided: The identification with a defective uncle, an oedipal conflict with the father, and learning as a homosexual submission because of passive identification with the father.

The patient was helped to explore the different levels of meaning of each of these conflicts and helped to express unconsciously repressed affects that accompanied each of these conflicts. Special mention is made of how frequently his underachievement and learning disabilities were used as unconscious mechanisms to express aggression toward his parents.

Leo S. Loomie, Victor H. Rosen, and Martin H. Stein's report on the Adolescent Gifted Project is perhaps the first report of a group examination of the creative process using full psychoanalytic clinical material. In what was described as a "clinical research project," a group of experienced analysts, led by Ernst Kris, met monthly to discuss the psychoanalytic treatment of "young people with creative gifts." Strict adherence to psychoanalytic principles was maintained for treatment parameters. Although labeled as "adolescent" gifted, the ages of patients ranged from 9 years to 36 years. They included a gifted sculptor, a writer, a painter, a composer, two mathematicians, a choreographer, and a dancer. The child had many musical, graphic, and literary talents.

The techniques of psychoanalysis were not described. The substance of the report concerns general observations that evolved from each patient's treatment:

- The nature of their unconscious conflicts;
- The special difficulties facing the analyst in attempting to understand highly specialized subjects;
- The process of sublimation in each of these patients did not involve complete repression of their instinctual material. At times, these gifted patients had easy access to it and this duality of partial repression and ready availability infused their creative work with remarkable vitality.

Psychotherapy of Gifted Adolescents and Adults

Diedra Lovecky describes five traits of giftedness that she encountered in her psychotherapy practice with gifted adults: divergent thinking, excitability, sensitivity, perceptiveness, and entelechy (the need for self-determination).

Her therapeutic work takes place in the cognitive, behavioral, and experiential realms. Cognitively, she helps clients learn strategies for working with these traits so they can be used more effectively. She helps them determine if and how to compromise in order to be effective in work and social situations.

Awareness of one's own limits and the limits of others is the key to higher levels of social connectedness and thus higher levels of self-esteem because isolation can be avoided.

Lovecky also describes certain difficulties that arise in the therapeutic process: Clients often have difficulty trusting the therapist and present ongoing challenges to therapeutic authority, expertise, and the basic premises of psychotherapy. Struggles also occur with the therapist when his or her empathy is perceived to have failed. She suggests setting short-term goals with clients when appropriate to avoid impatience with the therapy process.

Experientially, she suggests the use of shared intuition in the therapeutic process to help clients feel deeply appreciated for their special gifted traits.

Last, she describes psychotherapeutic work with gifted clients as an opportunity for the therapists to grow professionally as they develop new therapeutic techniques in working with these clients.

Jerome Oremland describes the successful psychoanalysis of a 20-year-old trombonist and composer. Only passing mention is made of Oremland's analytic techniques. Details are provided about how this man's talent as an instrumentalist and composer became enmeshed in conflicts about his biologically delayed adolescence and his deeply dysfunctional parents. Oremland discusses the specific conflicts that emerged in the different phases of this young man's treatment:

- His guilt when he discovered that he was more powerful than his alcoholic father.
- His disappointment when he realized that his mother cared more about his talent than about nurturing him.
- His continual struggle to limit his abilities so as to control his anger at his parents.
- His self-punishing behavior: He would permit his talent to gain him only admiration, but not intimacy.

As his delayed adolescence finally unfolded, he discovered that his talent also included an exceptional ability to compose. As a result, his self-esteem improved, which allowed him to develop intimate relationships.

Mary Elaine Jacobsen discusses how gifted adults can achieve what she describes as a "corrected personal history" by identifying as gifted, personality traits that were thought to be liabilities. She offers two case illustrations: A middle-aged man who achieved enormous success but felt increasingly empty and a professional woman whose extreme sensitivity and empathy for others' pain left her feeling depleted.

For Jacobsen, the psychotherapy process begins when the therapist examines patients' histories for gifted traits and unusual areas of interest and curiosity. In this early stage, the therapist may need to be intuitive, as adults rarely identify themselves as gifted. She also urges caution in this identification process so that client's chief complaints can be addressed first and to give clients an opportunity to work through negative connotations of giftedness. In addition, the client must be allowed to not explore giftedness even though it has been identified.

The working-through process requires a respect for the client's defenses. Appropriate but camouflaged stories of other clients can facilitate this process. Inquiring about unfulfilled purposes or dreams may enhance the therapeutic relationship.

Jacobsen suggests a number of other psychotherapeutic tasks:

- Follow a client's interests even though they may be complex or abstract.
- Be active.
- Avoid competing with the client.
- Be transparent about your own giftedness.
- Respect idiosyncrasies.
- Do not represent social norms.
- Confront self-destructive behavior.
- Give advice about enhancing energy, creativity, and self-realization.

Jacobsen also alerts therapists to expect a wide range of positive and negative feelings of their own, such as exhilaration, hurt, rejection, envy, and intimacy.

The most recent articles are by Jerald Grobman. His first report is about the psychodynamic psychotherapy of 15 adolescents—exceptionally gifted in arts, music, dance, writing, and science—who became underachievers primarily because of unresolved conflicts about their "inner experience of giftedness" rather than because of conflicts about school, work, peers, and family.

In each of his cases the psychotherapy unfolded in predictable ways. Once their presenting crisis was resolved and more practical concerns about school, peers, work, and family were successfully addressed, these patients began to accept that emotional conflict was a universal aspect of all growth and development. They also realized that having ambivalent feelings did not mean that they were weak or defective. These insights prepared them for deeper explorations about all the unconsciously conflicted aspects of their gifted endowment: their special sensitivities, sensibilities, the power of their curiosity and inner drive for mastery; their conviction about a grand vision and personal destiny to make valuable contributions as well as a feeling that they had become charismatic.

As these conflicts became conscious, open and frank discussion about them helped his gifted patients find more mature methods of conflict resolution, minimize underachievement, and integrate their giftedness with the other parts of their personality.

In an unpublished manuscript, Grobman presents an eclectic form of psychotherapy for exceptionally gifted individuals. His approach modifies traditional psychodynamic psychotherapy to include cognitive/behavioral techniques as well as "psychologically informed" mentoring, coaching, and advising. He discusses the issues that arise for patients in each stage of their psychotherapy and the corresponding challenges for therapists.

Crisis Intervention

In this stage an active, take-charge approach is required, and accurate symptom diagnosis ensures that medication will be used appropriately. Concrete stress management techniques are suggested. Taking an extensive history from all family members can establish a central dynamic formulation that will be used to guide the therapy.

Psychotherapy Proper

Beginning Phase

As patients settled into the early stages of psychotherapy, they began to resolve their guilt for being "given" more endowment than others. Later in this phase, psychologically informed mentoring, coaching, and advising helped each patient clarify a vision for his or her giftedness. A judicious use of therapeutic transparency was useful in this phase.

Middle Phase

In this phase, patients began to relinquish their exclusive need for autonomy and slowly came to accept the importance of relying on others for inspiration and guidance.

Late Phase

In this phase, patients identified their extracognitive capacities—inspiration, imagination, intuition, clairvoyance, curiosity, and special physical and aesthetic sensitivities and sensibilities—as the core of their exceptional giftedness. Experiencing the success of the therapist's intuitive interventions gave these patients permission to use their own extracognitive abilities in their therapy as well as in the outside world. They began to experience less conflict, less anxiety, and less need to deny, disavow, their exceptional giftedness or undermine it with underachievement and self-destruction.

Jerald Grobman

See also Adolescent, Gifted; Adult, Gifted; Career Counseling; Coaching; Precocity; Supporting Emotional Needs of Gifted; Underachievement

Further Readings

Colarusso, C. A. (1980). Psychoanalysis of a severe neurotic learning disturbance in a gifted adolescent boy. *Bulletin of the Menninger Clinic, 44*(6), 585–602.

Dahlberg, W. (1992). Brilliance—The childhood dilemma of unusual intellect. *Roeper Review, 15,* 7–10.

Grobman, J. (2006). Underachievement in exceptionally gifted adolescents and younger adults: A psychiatrist's view. *Journal of Secondary Gifted Education, 17*(4), 199–210.

Grobman, J. (2008). *A psychodynamic psychotherapy approach to treating underachievement in exceptionally and profoundly gifted adolescents and adults: A psychiatrist's experience* (unpublished manuscript). Retrieved January 20, 2009, from http://www.psychotherapyservicesforthegifted.com

Jacobsen, M. (1999). Arousing the sleeping giant: Giftedness in psychotherapy. *Roeper Review, 22*(1), 36–42.

Kelly, K. (1970). A precocious child in analysis. *Psychoanalytic Study of the Child, 25,* 122–145.

Lovecky, D. (1990). Warts and rainbows: Issues in psychotherapy of the gifted. *Advanced Development Journal, 2,* 107–125.

Oremland, J. D. (1975). An unexpected result of the analysis of a talented musician. *Psychoanalytic Study of the Child, 30,* 375–404.

Pull-Out Programs

See Acceleration/*A Nation Deceived;* Enrichment Triad Model

Purdue Model

Among models that have been developed to guide the development of educational programs for gifted and talented students, the *Purdue model* is one of the most flexible and powerful. It is a conceptual framework for both program and curriculum development in gifted education. The model is applicable to many settings and developmental levels; it develops creativity and academic talent, as well as motivational abilities such as persistence and long-term planning. Gifted students benefit from instruction based on the Purdue model, especially when they are grouped for instruction with other talented students who share their interests in advanced, interdisciplinary curriculum and self-directed learning.

The model was originally developed as a curriculum framework for undergraduate, university coursework. In 1978, John Feldhusen and Penny Britton Kolloff applied the model to gifted and talented education and developed the Program for Academic and Creative Enrichment (PACE), a pull-out enrichment program for talented elementary students. Later, the model was extended to secondary gifted students by Sidney Moon. This entry describes the Purdue model and provides examples of specific applications of the model in gifted education.

The Curriculum Model

The Purdue model offers a framework for the creation of curricular units in which each stage has a specific purpose intended to fit typical characteristics of academically gifted students and to develop their abilities further. The model focuses on creative and critical thinking skills, complex problem-solving abilities, and the ability to carry out independent projects. From a content area perspective, the model exposes students to advanced and interdisciplinary content on high interest topics such as inventors and inventions, architectural design, or forensic science. Each of the three stages has a specific process and content focus. During a particular unit of instruction, the stages build on each other, enabling students to become increasingly self-directed.

Stage I

In Stage I, learners participate in short-term creative and critical thinking activities that provide a motivating introduction to the unit topic. They also begin mastering content through experiences like reading, watching movies, taking field trips, and interviewing experts. In Stage I, most activities are teacher directed and relatively short term (5–30 minutes in length). Brainstorming ideas on some aspects of the unit topic represents a typical Stage I creative thinking activity. Another typical critical thinking activity might involve comparing two short, historical documents written from opposing points of view.

Stage II

Stage II focuses on complex problem solving; students are presented with challenging problems in the discipline(s) of study, which they solve using techniques similar to those used by professionals in those disciplines. Instructional content in Stage II is typically quite advanced—usually 2–3 years beyond the age of the students. Learners work in small groups on difficult problems that have been created by the instructor to develop specific understandings and skills. The teacher's role becomes more like a coach than a lecturer or director. The teacher encourages active thinking by asking probing questions and encouraging students to come up with new strategies and perspectives. Stage II activities take longer than Stage I activities to complete (1–5 hours). The types of problems utilized in this stage vary by discipline. In a mathematical problem-solving unit, students might be working on Model Eliciting Activities—problems where students are given data sets and must come up with a model that fits the data and solves a problem for a simulated client. In a creative writing unit, students might write specific types of poetry, such as haiku and sonnets.

Stage III

In the culminating stage of a Purdue model unit, students select an individual topic within the general unit, become an expert on their chosen topic utilizing tools of the discipline(s), and present what they have learned to others in a creative fashion. For example, in a unit on inventors for fourth and fiveth graders, students might study a particular inventor and produce an original invention to demonstrate what they have learned. A ninth-grade honors English class, studying the theme of identity, might produce Stage III projects that include original term papers on works of literature that address identity issues or original novelettes with an identity theme. In Stage III, students become self-directed, independent learners. The teacher's role is to connect students with resources that will facilitate their learning and to scaffold the development of independent research and presentation skills. Older students function much like professionals in Stage III.

The Programs

The Purdue model was designed to address the learning and social-emotional characteristics of gifted and talented students. Programs based on the model involve identifying academically talented students and grouping those students for Purdue model instruction. Goals of programs based on the model include (a) developing creative and critical thinking skills, (b) promoting positive social-emotional development by providing opportunities for interaction with other gifted students, (c) developing academic and motivational abilities by engaging students in challenging instruction, and (d) developing skills in self-directed learning through participation in independent study projects.

PACE is an example of a program for elementary students based on the model; it is the oldest application of the model in gifted education. PACE is a pull-out enrichment program for students in Grades 3–6. Creatively and intellectually gifted students meet with a trained enrichment teacher for a minimum of 2 hours a week and participate in units of instruction based on the Purdue model. PACE teachers emphasize the development of thinking, problem-solving, and independent learning skills. Other elementary applications of the model, especially those offered in university settings, focus on developing advanced content knowledge in specialized areas like electrical engineering or Incan art.

At the secondary level, the model has been used to develop interdisciplinary seminars, high school courses in particular subjects, and enrichment units for university-based summer programs. One of the most sophisticated secondary applications of the model was a science research class that required 2–3 years of high school to complete. In Stages I and II, talented science students worked with their teacher to develop skills in scientific research. The heart of the program, however, was an original, independent, scientific study conducted in collaboration with a professional research scientist. As a culminating activity, these talented students shared their findings with others via poster presentations at national conferences. Many students from this program went on to win national research awards for their work.

Sidney M. Moon

See also Academic Talent; Creative Productivity; Creativity in Engineering; Creativity in Science; Curriculum Models; Problem Solving; Saturday Programs; Thinking Skills

Further Readings

Kolloff, P. B., & Feldhusen, J. F. (1981, May/June). PACE (Program for Academic and Creative Enrichment): An application of the three-stage model. *Gifted Child Today, 5*, 47–50.

Moon, S. M. (1993). Using the Purdue three-stage model: Developing talent at the secondary level. *Journal of Secondary Gifted Education, 5*(2), 31–35.

Moon, S. M., Kolloff, P. B., Robinson, A., Dixon, F., & Feldhusen, J. F. (2008). The Purdue three-stage model. In J. S. Renzulli & J. Gubbins (Eds.), *Systems and models for developing programs for the gifted and talented*. Mansfield Center, CT: Creative Learning Press.

R

Raven's Progressive Matrices

Raven's Matrices are nonverbal measures for the assessment of general cognitive abilities. These measures, constructed by John Raven, have been available for a very long time. The Standard Progressive Matrices were first published in 1938 and are still a widely used psychometric instrument. Meanwhile, a further set of matrices has been compiled and presented as measures that apply to specific ability ranges or show other specific characteristics. The original measures were constructed as paper-and-pencil tests; at present they are also available as computerized tests. This entry describes the structure of Raven's Matrices, its uses, and research supporting its usefulness to educators of gifted students.

The individual matrices are incomplete patterns that have to be completed in such a way that a regular whole is achieved. Such a pattern is composed of nine parts, of which the last is missing. There is a set of eight alternatives from which the missing part has to be selected. The contents of the individual parts are simple figures. Comparing the simple figures of neighboring parts reveals the principles that guided the construction of the pattern. Completing a matrix problem requires the detection of these principles; the problem can easily be solved when the principles are known. The individual matrices are arranged in such a way that the degree of difficulty increases from one Matrices problem to the next Matrices problem. As a consequence, the cognitive demands on encoding and analyzing the patterns gradually increase. The principle of an increasing difficulty characterizes each one of the Matrices tests that are available.

Raven's Matrices have frequently been selected for the study of problem solving. Patricia Carpenter, Marcel Just, and Peter Shell showed that only a few simple principles are necessary for completing Matrices problems successfully, and also provided an explanation for the occurrence of individual differences in the ability to complete Matrices problems. According to the results of their research, the Matrices problems are especially demanding on working memory. Exceeding the capacity of one's working memory is the major source of failure in completing Matrices problems. Furthermore, the investigation of the demands characterizing Raven's Matrices reveals that completing Matrices problems means not only encoding and analyzing available information, but also the acquisition of a lot of external information. The more difficult the Matrices problems, the higher the demands on visual searches for helpful cues.

Charles Spearman's theory of intelligence provided the theoretical basis for the construction of Raven's Matrices. This theory distinguishes one general and a number of very specific factors of intelligence. According to this theory, two main abilities determine the general factor: the first one, which enables the clarity of thinking and the mastery of complexity, is denoted educative ability. The second one, which is essential for the storage and reproduction of information, is denoted reproductive ability. These abilities are assumed to be the true source of the performance stimulated by

Raven's Matrices and give reason for considering the Matrices as a measure representing the general factor (*g*). Despite theoretical and methodological advancements, even recent results support the notion that they are a good marker of *g*.

The model of the structure of intelligence has changed considerably since Spearman's time and, as a consequence, various modifications of the allocation of Raven's Matrices within the structure have been proposed. Raymond Cattell's model of intelligence, which emphasizes the difference between intelligence as biology-based ability and intelligence as culture-induced ability, suggests an association of Raven's Matrices and fluid intelligence because the influence of elaborate knowledge on the result of completing Matrices problems is limited. The basic processing routines stimulated by Raven's Matrices seem to demonstrate a dependence on biology-based properties. Therefore, it is no surprise that within the framework of Cattell's theory of intelligence, Raven's Matrices are also considered as the marker of fluid intelligence.

L. L. Thurstone's model is another formerly very influential model of the structure of intelligence. It assumes seven equally important abilities: word fluency, verbal comprehension, spatial visualization, number facility, associative memory, reasoning, and perceptual speed. In this model, the measures associated with the ability termed reasoning come closest to Raven's Matrices. As a consequence, this test can also be considered as a measure of reasoning. The demands of this test even seem to represent the rationale of reasoning especially well. Therefore, Raven's Matrices have frequently served as the example in studies of reasoning.

Because the modern hierarchical models of intelligence, for example, the *three stratum model of intelligence* and the *Cattell-Horn-Carroll model,* integrate some or all components of the previous models, there are different allocations for Raven's Matrices. In such models the component at the top level is associated with the *g* factor (G), fluid intelligence can be found at the subjacent level (F), and reasoning is assigned to the next level (R). Accordingly, in modern hierarchical models of intelligence, Raven's Matrices seem to be associated with a complex of abilities that range from the top level to the bottom level. Some justification for this GFR complex results from the observation that the corresponding abilities are especially closely related to each other, but other vertical associations of Carroll's three-stratum model of intelligence are not as close.

At present, Raven's Matrices are an accepted measure of fluid intelligence and reasoning. The popularity of this test results from its assumed independence of the testee's educational level because specific cultural knowledge is not necessary for completing the Matrices. Furthermore, because it is a nonverbal measure, it is considered culture fair. An interesting property of Raven's Matrices is that this test can be applied as a speed and power test. There is a high degree of objectivity because the influence of the experimenter is low. Various investigations have shown the Raven to have good to excellent psychometric properties; that is, it remains a valid and reliable measure of intellectual ability.

Karl Schweizer

See also Fluid and Crystallized Intelligence; Intelligence; Intelligence Testing; Problem Solving

Further Readings

Carpenter, P. A., Just, M. A., & Shell, P. (1990). What one intelligence test measures: A theoretical account of the processing in the Raven Progressive Matrices Test. *Psychological Review, 97,* 404–431.

Schweizer, K., Goldhammer, F., Rauch, W., & Moosbrugger, H. (2007). On the validity of Raven's Matrices Test: Does spatial ability contribute to performance? *Personality and Individual Differences, 43,* 1998–2010.

Reaction Time

The relationship between reaction time, or the speed at which individuals respond to sensory information, and intelligence has long been a topic of debate among researchers in the fields of education and psychology. Discussion on the topic dates back to Sir Francis Galton, who hypothesized that intelligence was a manifestation of efficiency in underlying motor and perceptual abilities. To test his hypothesis, he assessed the reaction times and sensory discrimination abilities of thousands of

individuals in his laboratories. His work, though anecdotal and inconclusive, inspired American researcher James Cattell to incorporate speeded sensory discrimination tasks into his own research on intelligence. These tasks included purely physical reactions to stimuli, such as measuring how quickly subjects could respond to sound, and more mental tasks, such as measuring how quickly subjects could name colors as they were presented. Their combined work inspired a wave of interest in sensory/motor or psychophysical tests of intelligence that lasted until the early 20th century.

One of Cattell's own graduate students, Clark Wissler, is credited with striking a powerful blow to this line of inquiry. In 1901, Wissler published research suggesting little to no correlation between academic performance and reaction time. This finding was widely accepted, and helped to curtail interest in the topic of reaction time for a number of years. In the meantime, interest and support were on the rise for Alfred Binet's intelligence scales, further decreasing attention to chronometric measures of intelligence.

Since that time, however, various researchers have found support for a link between reaction time and cognitive ability, including Charles Spearman and Cyril Burt. Arthur Jensen, who has conducted numerous studies of reaction time, has been one of the best known proponents of this link. Jensen, like Galton, hypothesized speed and efficiency of underlying neurological mechanisms as key to the relationship between reaction time and intelligence. To study reaction time, Jensen created an apparatus that timed subjects' responses to various sized sets of stimuli. The apparatus had a home button on which the subject placed his or her finger, and buttons corresponding to eight different lights. When a light was activated on the panel, the subject moved his or her finger from the home button to the button associated with that light. Subjects were timed in their response to a single light, or asked to make a choice between multiple lights. The apparatus allowed Jensen to test the amount of time needed for removal of the finger from the home button (reaction time), and movement of the finger to the appropriate button (movement time). It also allowed measurement of differences in response time to one versus many stimuli. Subjects' times were correlated to their scores on intelligence tests.

Jensen found that reaction time was indeed significantly and negatively correlated with intelligence (i.e., faster response times equated to higher scores on IQ tests). Detailing his research, Jensen reports average correlations between reaction time and intelligence of –.19, –.21, –.24, and –.26, for no-choice, two-choice, four-choice, and eight-choice trials, respectively, on his apparatus. Other researchers have found average reaction time/intelligence correlations ranging from approximately –.22 for no-choice trials to –.40 for eight-choice trials. Most researchers accept the premise that reaction time increases as the complexity of the task increases; for example, people react more quickly to one light on Jensen's apparatus than to four lights. Some evidence has been found to suggest that more intelligent people require less additional time to respond to added information than do average individuals, creating a flatter slope to the linear relationship between reaction time and information. This finding, however, remains inconclusive and controversial.

A variety of other findings about reaction time and intelligence have emerged. Data suggest that reaction time increases as a function of age in childhood, and decreases as a function of age in adulthood. Gifted individuals have shown faster than average reaction times. There is research to indicate that men have faster reaction times than women; however, there is also research indicating the reverse. There is also research suggesting that the variability in an individual's reaction time across trials correlates with intelligence. In general, it is believed that variability correlates negatively with IQ.

One of the greatest sources of controversy in the discourse about reaction time and intelligence is research suggesting racial differences in mean reaction times. Many researchers, however, feel the evidence on this topic is inconclusive and potentially misleading. Moreover, interpretations of potential group differences in reaction time vary. Jensen has been strongly criticized for suggesting that group differences in reaction time may be genetically based. Other researchers have suggested that if intergroup differences in reaction time do indeed exist, they are likely due to environmental factors.

Also up for debate is the question of how information about reaction time may be usefully applied.

Some researchers suggest that there may be a place for reaction time tests in education, but others disagree. Proponents of the idea argue that reaction time tests are fast, simple, and content free—and thus may be more appropriate measures of intelligence than the lengthy psychometric tests widely used today. Others argue that reaction time measures are insufficiently reliable to replace current IQ testing methods. Moreover, many believe that speed of reaction is a necessary, but not sufficient, factor in intelligence. Advocates of this view note that although reaction time increases only up to between age 11 and 14, intellectual ability continues to improve. According to these individuals, measures of reaction time cannot capture the complexity of human intelligence and thus are inappropriate for assessing IQ.

Erin Sullivan

See also Intelligence; Intelligence Testing; Intelligence Theories

Further Readings

Cattell, J. M. (1890). Mental tests and measurements. *Mind, 15,* 373–380.

Deary, I. J. (1994). Sensory discrimination and intelligence: Postmortem or resurrection? *American Journal of Psychology, 107,* 95–115.

Jensen, A. R. (1987). Individual differences in the Hick paradigm. In P. A. Vernon (Ed.), *Speed of information processing and intelligence*. Norwood, NJ: Ablex.

Sheppard, L. D., & Vernon, P. A. (2008). Intelligence and speed of information processing: A review of 50 years of research. *Personality and Individual Differences, 44,* 535–551.

Regular Classroom

In contrast to the programs of the 1980s where gifted learners were pulled out of their classrooms to receive more advanced instruction, the focus shifted during the 1990s when fewer full-time and pull-out programs were implemented in favor of adjustments made in the regular classroom. The philosophy behind these types of programming options was that students could gain the benefit of a more challenging education without being pulled out. The strategies for teaching high-ability learners in the regular classroom drew on ideas and models that had existed in the field of gifted education for decades, and the move to present these ideas in a more accessible, user-friendly way better equipped some classroom teachers to meet the needs of their own gifted students. A volume of research exists that suggests that many classroom teachers do not know how to meet the needs of these students. Even when and if they have received professional development, many just do not find the time and resources to modify instruction and curriculum for gifted students in the regular classroom. Some teachers are effective in this task, but others feel the need to attend first and foremost to students who are below grade level in their achievement before any modification occurs in the curriculum for gifted students.

Curriculum Adjustment for Gifted Students

Many efforts have been offered during the past few decades to help classroom teachers adjust curriculum for gifted and talented students in the regular classroom. One of the first efforts was the creation of the Compactor Form, the core of curriculum compacting, developed by Joseph Renzulli and Linda Smith in 1978, that focused on having classroom teachers adjust regular curriculum in the classroom to challenge gifted students. In this respect, Beverly Parke was one of the first authors to write a book, in 1989, on challenging gifted students in the regular classroom. Previously, Joseph Renzulli had suggested the use of enrichment and independent study both in gifted programs and in the regular classroom in his work on the enrichment triad in 1977. Susan Winebrenner helped to make teaching the gifted in the regular classroom a more workable process through clearly articulated strategies for adjusting curriculum content, assessing student needs, and addressing special abilities and interests. Teachers who have little expertise in gifted education can implement these strategies with training. All students have the opportunity to prove their mastery in specific skills or knowledge areas. Learning contracts are key to the process of planning alternative trajectories for gifted students who need a different pace and level of instruction.

Joan Smutny, Sally Walker, and Elizabeth Meckstroth pursued similar practices for addressing the learning needs of *young* gifted children in kindergarten through the third grade classroom. They focused on the unique learning needs and circumstances of younger gifted children (e.g., *asynchronous development,* where a child's cognitive, physical, emotional, and social growth evolve at different rates), and provided a range of strategies teachers can use to create more appropriate educational experiences. Central to their ideas on adjusting the curriculum for the gifted is the importance of creativity as the most accessible resource for young students to draw upon in their earliest years of learning.

The push to teach the gifted in the regular classroom, occurring in the 1990s, contributed to current research and writing on differentiated instruction and the work of Carol Tomlinson. The strategies of all of these contributors have helped many classroom teachers to integrate this type of instruction into their classrooms. The goal is always to respond to the pace, level, and style of gifted children's learning ability—to release them from any lock-step structure that suppresses their natural gifts. At its most basic, the process involves the following steps:

- A pretest or other form of assessment to determine a child's level of mastery
- The planning of alternative learning in place of content already learned through contracts with the students that stipulate goals, activities, and time lines
- Follow-up assessment to evaluate progress and plan future adjustments

Strategies

The most effective strategies for teaching gifted students create flexibility in pacing and the possibility of in-depth learning that they need in order to learn in the regular classroom.

Curriculum Compacting

Compacting, a now familiar strategy developed by Renzulli, Smith, and Reis for differentiating the curriculum, enables gifted children to learn required content more quickly and eliminate review of what they already know through some form of preassessment. After proving mastery in some area, children either advance to more challenging content sequentially or divert from the path to investigate a related issue or idea.

Tiered Instruction

This strategy works well in mixed-ability classrooms where all students are working within the same unit. It enables teachers to accommodate gifted students by modifying the level (higher-level thinking, more difficult concepts) and pace (of reading, research). In a unit on the ecology of local forest preserves, for example, gifted students could research the introduction of the Asian long-horned beetle into the United States, analyze its impact on local flora and fauna, and evaluate current plans to eradicate it.

Clustering

James and Chen-Lin Kulik in 1991 published a study documenting the social-emotional and academic benefits experienced by gifted students in being grouped with gifted peers while working on assignments and projects. The most common form of grouping for gifted learners today is the *cluster group,* which pools advanced students from more than one class in a grade and keeps them together for the whole year.

Mentoring

A gifted child works with a mentor who can provide a much more advanced and rapid pace of instruction in a particular area of interest. Highly gifted, culturally diverse, disadvantaged, gifted girls and other underserved populations are ideal candidates for this option because the mentor can respond more specifically to their strengths, weaknesses, interests, and learning styles.

Independent Study

Most gifted children prefer independent study because it affords greater flexibility and independence than most other options. Suggested as a part of the enrichment triad in 1977, this option has become a mainstay of gifted programs. Often the

format associated with mentoring and, to an extent, compacting, it helps gifted students create a systematic approach to exploring an interest by establishing realistic goals and learning objectives, and creating a time line and criteria for the successful completion of a project.

Creativity and the Arts

As a result of the early research of J. P. Guilford and E. Paul Torrance and of the models of creative thinking that have emerged since, the following processes have become commonly known in the schools and are applicable to gifted learners: *fluency* (generating many ideas); *flexibility* (creating different thought patterns); *originality* (producing unique, unexpected ideas); *elaboration* (extending ideas, embellishing, implementing ideas); *transformation* (changing/adapting an idea or solution into a different one); and *evaluation* (assessing the viability and usefulness of an idea). By using questioning techniques and creating open-ended, divergent-thinking assignments, teachers can accommodate the ability of their gifted learners to make discoveries and originate.

The net result of these strategies is that some gifted students can attend a regular classroom that serves their abilities and interests. Yet research also suggests that some teachers do not adequately meet the needs of gifted children in regular classrooms due to a lack of training, time, and resources, and so other services and levels of intervention may be necessary to challenge these students.

Joan Franklin Smutny

See also Differentiation; Effective Programs; Individualized Instruction; Talent Development

Further Readings

Renzulli, J. S. (1977). *The enrichment triad model.* Wethersfield, CT: Creative Learning Press.

Renzulli, J. S., & Smith, L. H. (1978). *The compactor.* Mansfield Center, CT: Creative Learning Press.

Smutny, J. F., Walker, S. Y., & Meckstroth, E. A. (1997). *Teaching young gifted children in the regular classroom.* Minneapolis, MN: Free Spirit Publishing.

Winebrenner, S. (1992). *Teaching gifted kids in the regular classroom.* Minneapolis, MN: Free Spirit Publishing.

Relationship of Creativity to Intelligence

The traditional approach to creativity can be characterized as the four-Ps approach, namely studying the *person,* the *process,* the *product,* and the *productive* conditions (or environmental *press*). In addition, there are a number of confluence theories of creativity, such as the *investment theory* of Robert Sternberg and Todd Lubart, as well as the *systems theory* of Mihaly Csikszentmihalyi. In these theories the general intelligence (*g*) of a person is a necessary component but not sufficient for Creativity (C) to manifest. In other words, a person with a high IQ would not necessarily have to be creative in work. Here Creativity ("Big C") is domain specific, and a creative product is one that causes a significant shift within a specialized domain of knowledge.

In the general literature on creativity, numerous definitions can be found. Anna Craft uses the term *lifewide creativity* to describe the numerous contexts of day-to-day life in which the phenomenon of creativity (C) manifests. Other researchers have described creativity as a natural survival or adaptive response of humans in an ever-changing environment. Ruth Richardson uses the term *everyday creativity* ("little c") to describe such activities as improvising on a recipe. It is generally accepted that works of extraordinary creativity can be judged only by experts within a specific domain of knowledge. For instance, Andrew Wiles's proof of Fermat's Last Theorem could be judged by only a handful of mathematicians within a very specific subdomain of number theory. More specifically, in the realm of educational psychology, one can also find a variety of definitions of creativity, such as the use of ordinary cognitive processes that result in original and extraordinary products. Sternberg and Lubart define creativity as the ability to produce unexpected original work that is useful and adaptive. Other definitions usually impose the requirement of novelty, innovation, or unusualness of a response to a given problem. Numerous confluence theories of creativity define creativity as a convergence of knowledge, ability, thinking style, motivational, and environmental variables in the evolution of domain-specific ideas resulting in a creative outcome. Most recently, Jonathan Plucker

and Ronald Beghetto offered an empirical definition of creativity based on a survey and synthesis of numerous empirical studies in the field. They defined creativity as "the interplay between ability and process by which an individual or group produces an outcome or product that is both novel and useful as defined within some social context" (2004, p. 156).

Modern theories of intelligence can be traced back to the work of Francis Galton and Charles Spearman, who took the simplistic view that intelligence can be measured via a simple numerical score decomposable into general and specific components. Most modern intelligence tests measure components such as verbal ability, numerical ability, memory, spatial ability, and both general and deductive reasoning abilities. Psychometric approaches, however, such as those used to measure intelligence, have also been used to measure creativity. This entails quantifying the notion of creativity with the aid of paper-and-pencil tasks. An example of this would be the Torrance Tests of Creative Thinking developed by Paul Torrance, which are used by many gifted programs in middle and high schools to identify students who are gifted/creative. This test consists of several verbal and figural tasks that call for problem-solving skills and divergent thinking. The test is scored for fluency, flexibility, originality (the statistical rarity of a response), and elaboration. Sternberg claims that there are positive and negative sides to the psychometric approach of measuring creativity. On the positive side, these tests allow for research with noneminent people, are easy to administer, and are scored objectively. The negative side is that numerical scores fail to capture the concept of creativity because they are based on brief paper-and-pencil tests. Sternberg calls for use of more significant productions such as writing samples, drawings, and the like, to be evaluated subjectively by a panel of experts instead of simply relying on a numerical measure.

Sternberg's triarchic view of giftedness suggests that gifted individuals possess a varying blend of analytic, synthetic (creative), and practical giftedness. If we take any academic field, such as mathematics or science, as an example, then researchers within that field who are productive in their areas of research all have high levels of analytic and practical abilities. One can assume that all researchers within a given field have high levels of intelligence just by the evidence that they have succeeded academically. Practical abilities manifest in choosing researchable questions/problems that are accessible and publishable. Using the field of mathematics as a case study, Bharath Sriraman argues that truly creative individuals have much higher levels of synthetic abilities in comparison to the analytic and practical abilities in that their work opens up new research vistas for others in the field.

This leads to the question, What is the relationship between creativity and intelligence? The question is as yet unanswered in the domain of psychology. James Kaufman and John Baer ask whether these two constructs are "(a) two partially overlapping sets of abilities that share some common ground, (b) two sets of abilities that are distinct only in the sense of one being a subset of the other, or (c) a single set of abilities that have come to be known by different terms" (2004, p. 13).

There is general agreement that there is definitely an overlap between the constructs of creativity and intelligence. It is impossible to be creative without being intelligent; however, one can be intelligent but not necessarily Creative ("Big C").

Bharath Sriraman and Yasemin Kýymaz

See also Creativity Assessment; Creativity Theories; Flow; Fluid and Crystallized Intelligence; General Creativity; Intelligence Theories

Further Readings

Craft, A. (2002). *Creativity in the early years: A lifewide foundation*. London: Continuum.

Craft, A. (2003). The limits to creativity in education: Dilemmas for the educator. *British Journal of Educational Studies, 51*(2), 113–127.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

Kaufman, J., & Baer, J. (2004). Hawking's haiku, Madonna's math: Why it is hard to be creative in every room of the house. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization*. Washington, DC: American Psychological Association.

Plucker, J., & Beghetto, R. A. (2004). Why creativity is domain general, why it looks domain specific, and why the distinction does not matter. In R. J. Sternberg, E. L. Grigorenko, & J. L. Singer (Eds.), *Creativity: From potential to realization* (pp. 153–168). Washington, DC: American Psychological Association.

Richards, R. (1993). Eminent and everyday creativity. *Psychological Inquiry, 4*(3), 212–217.

Sriraman, B. (2005). Are mathematical giftedness and mathematical creativity synonyms? A theoretical analysis of constructs. *Journal of Secondary Gifted Education, 17*(1), 20–36.

Sternberg, R. J. (Ed.). (1999). *Handbook of creativity.* New York: Cambridge University Press.

Sternberg, R. J., Grigorenko, E. L., & Singer, J. L. (Eds.). (2004). *Creativity: From potential to realization.* Washington, DC: American Psychological Association.

Weisberg, R. W. (2006). *Creativity: Understanding innovation in problem solving, science, invention, and arts*. Hoboken, NJ: Wiley.

Research, Qualitative

Educational research is a wide-ranging field. The most common categorizations of research are quantitative and qualitative research. Both share the goal of increasing our understanding of educational policy, practices, and persons by engaging in systematic inquiry. Beyond this global statement, there are significant differences.

Three conventional notions about research are that methods of gathering, analyzing, and reporting data are equated with defining research; that research looks the same in all instances; and that research requires using numbers. These overly simplistic notions influence people to regard qualitative research as not being "true" research because the methods look different, are changeable, are situation specific, and rarely use numbers.

Differences Between Qualitative and Quantitative Research

Qualitative research, like quantitative research, its better known relative, has its own defining characteristics. Each genre of research originates from a scholarly tradition. Quantitative research (QR) grows from the natural sciences and agriculture, and qualitative research (QLR) from the social science and humanities.

In essence, the QLR tradition seeks to understand the perspective of participants in particular social and cultural contexts by discovering the meanings held by those persons; the QR traditions strive to produce highly generalizable statements of behavior and to predict future actions in situations. The two traditions take different stances in regard to data gathering, analysis, and validity. QR is very concerned with controlled data gathering using standardized measurement applied to persons who are representative of the population. Randomization is the tool for doing that, and distance between participants and researcher is carefully controlled. Objectivity is the global term summarizing that tradition. Findings are presented as statements of probability about the likelihood that, under certain conditions, something would not happen by chance.

In qualitative research, on the other hand, the investigator is at the center of the process as the data gatherer, analyzer, and interpreter of the findings. QLR believes subjectivity is always present and cannot be separated from the participants, situation, or researcher. Thus, the investigator's task is to manage bias so that participants' voices are revealed. A basic premise is that meaning is negotiated and constructed by people in social situations. Selection of participants is based on what they can reveal about the interactions going on in the situation. Description is important, but interpretation is the investigator's primary task. Claims that findings in one context are predictive of other situations are inappropriate. Each situation is unique. The results are presented so that the participants can understand and use the information.

Attributes of Qualitative Research

A list of attributes of qualitative research follows:

Insider perspective

Participant selection

Voice

Data collection—derivation of themes and discovery of process

Disclosure

Rich description (context, persons)

Interpretation

Alternate explanations-discrepant case

Triangulation/multiple sources, methods

Credibility and trustworthiness

Theory

The attributes of qualitative research in conjunction with the broad statements about QR and QLR underscore the outlines of the genre. Each is discussed below.

Insider Perspective

Describing a situation and its participants is a worthy but insufficient outcome of QLR. The goal is to capture the perspective of persons who live/work in a particular context. The meaningfulness of actions and words for insiders is not the same as for outsiders. For example, in a classroom, children can be heard saying, "I hate you" or "You loser"; yet looking inside reveals that the first means "I love you" and the second, "I notice and like you."

Participant Selection

A researcher's goal is to select informants who have data relevant to the phenomenon being investigated. Participant selection refers to persons as well as settings or context because meaning comes out of context. QLR prefers the use of a "purposive sample" or "theoretically relevant sample" and avoids convenience samples. Convenience and purpose may converge, but the scholarly reason for selection should trump the logistical reason. QLR researchers must provide enough information so the reader can understand the composition of the sample, the context, and the relevance to the research question.

Data Collection

Observing a phenomenon is at the center of every scientific inquiry, no matter the tradition. Three procedures are used in various forms of QLR: interviewing, observing, and collecting artifacts. The interviews are unstructured and open-ended. The observations are running narratives of the situation. The artifacts are papers, products, announcements, objects, and so forth, produced in accordance with the situation.

Data Analysis

The process is inductive, not deductive. Careful and repeated reading of transcripts, observation reports, and artifacts bounded by the research question reveal patterns of meaning in behavior and of relationship. These patterns, often called themes, are induced from the data, and interpretive assertions are made about the meaning and processes going on in the context. The idea is to discover what is happening beneath the surface of a particular situation.

Disclosure

The researcher is the primary research instrument. Data are collected and analyzed, filtered through the mind of the inquirer. The researcher has the obligation to report prior knowledge or assumptions about the phenomenon. The ideal is to "unpack" one's subjectivity so that the findings are happening in the situation and are not the invention of the investigator. Supplying the reader with information about what one brings into the situation, as well as the process used to arrive at a finding, allows the reader to judge the worth of the findings.

Interpretation

The outcome of any study is the interpretation of what is happening in that context with those participants. Interpretation goes beyond description and moves toward the discovery and uncovering of meanings beneath the surface of interactions. Following the elements described earlier validates the QLR process.

Voice

Revealing the voices of participants is a goal. Unearthing the tacit meanings of persons in context accomplishes this goal. The process of interacting is made apparent for the persons and others to hear. The actual meanings are created by the actors in the situation.

Rich Description

Situations are replete with subtle multiple variations and interpretations. Rich description gives the reader enough detail to enter the world of the participants, and the participants themselves would recognize the place.

Triangulation

Much like the captain of a ship at sea, the qualitative researcher uses data from multiple sources (e.g., people, newspapers, informal surveys) and multiple methods (e.g., interviews, videos, observations, artifacts) to locate the meaning in the situation. The more the interpretation can be anchored in the situation, the more the investigator validates his work.

Alternate Explanations

The researcher has an obligation to explore alternate explanations for what is uncovered. A recommended procedure is to look for a discrepant case or instance that does not match the findings and use that as a basis for reexamining the findings. Studies that offer no alternative explanation for findings and descriptions of how discrepancies were handled by the investigator are less valuable.

Credibility and Trustworthiness

Reliability and validity are parallel terms used in QR. The QLR researcher must tell the story of the participants and the situation in a manner that conveys credibility and trustworthiness. Credibility is enhanced by rich description, amount of time observing, voices of the participants, disclosure, and discrepant cases. Trustworthiness is providing information so that the reader can track how the interpretation was made. This can be done by establishing an audit trail; obtaining feedback from participants, called member checking; and asking others to examine the study.

Theory

Qualitative research is an inductive process. Theory that is produced is generally called "grounded theory" because it is derived from the soil of the situation. Theories of this type make sense to the participants, use language that is accessible, and provide information that they might use to change the situation should they wish to do so.

Given these descriptors, QLR is multifaceted and has the potential for taking multiple forms. Underlying all the potential variations is a habit of mind that seeks to study persons in social life in order to uncover meaning, reveal their voices, and discover the hidden processes of those situations.

Phenomenology, Ethnography, and Evaluation Research

Most of the attributes just enumerated are found in the research literature on gifted and creative studies. Within QLR, smaller groups of scholars implement studies in similar ways, yet not the same way as other groups. To illustrate the differences, generic studies three kinds of QLR—phenomenology, ethnography, and evaluation research—are presented. Notice that the interview or the observation or the artifact collection takes a different turn in each type.

Interviewing is used alone or with other techniques in many studies. Interviewing in QLR is open-ended and loosely structured. In phenomenological research the interview question are the most open, for example, What sticks out in your mind about (state the topic)? In an ethnography, the interview question might be, Take me through your typical day. In evaluation, the question is formulated on the basis of what objectives mean to various stakeholders. The question might be, How did you determine who should be assigned to independent study groups?

Observation takes different forms, also. In phenomenology, observation is infrequent and used to understand the participant. In ethnography, observation is at the heart of a study. Over a prolonged period the researcher inserts him- or herself into the context to experience directly what is happening and to develop interview questions relevant to the situation. In evaluation research, the observation is to see if what has been claimed to be going on is, and the manner in which it is executed.

Artifact collection is similar in all these forms. The goal is to collect information that illuminates the situation and participants. Examples of items might

be birth certificates, knives, dishes, letters, videos, tape recordings, records, newspapers, and books.

Giftedness and Creativity Research

Qualitative inquiry has a history in gifted education. QLR has grown in popularity since 1990, although it is less frequently published than QR. The study of creativity and giftedness is dominated by psychologists and educational psychologists who have been trained in quantitative techniques and philosophy. Those fields publish fewer qualitative studies than quantitative studies. There is nevertheless a growing appreciation in the field of gifted education and the psychology of creativity for qualitative methodology as a way of enhancing the understanding of the perspective of gifted and creative individuals and the people who nurture and teach them.

A wide array of topics and research questions has been studied, including individuals, classrooms, programs, families, abilities, attitudes, and talents. The results have produced new theories and deeper understanding of the meaning of concepts dear to gifted education, like challenge, social systems in schools, and the experience of being gifted. The majority of the studies are case studies.

A relatively small handful of researchers have emerged who consistently use the genre. A kind of educational research has emerged called mixed methodology. Studies of this type employ quantitative and qualitative methods to answer the research question. It is debatable just how mixed the studies really are because most examples emphasize the quantitative research component over the qualitative component. Less than a handful use the methods in an equivalent manner, taking advantage of the strengths of each genre to understand a phenomenon. This situation is not unique to gifted and creative research. Furthermore, disagreement about the importance and utility of qualitative research is evident in gifted education. Although QLR is recognized as a form of research that can lead to new understandings, it is sometimes viewed as less valuable, being more suitable for discovering phenomena that could be better studied using quantitative research. Federal funding agencies favor this view.

Laurence J. Coleman

See also Action Research; National Research Center on the Gifted and Talented; Research, Quantitative; Twice Exceptional; Underrepresentation

Further Readings

Coleman, L. J. (2005.) *Nurturing talent in high school: Life in the fast lane*. New York: Teachers College Press.

Coleman, L. J., Guo, A., & Dabbs, C. (2007). The state of qualitative research in gifted education as published in American journals: An analysis and critique. *Gifted Child Quarterly, 51,* 51–63.

Denzin, N., & Lincoln, Y. (Eds.). (2000). *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

Diezmann, C. M., & Watters, J. J. (2001). The collaboration of mathematically gifted students on challenging tasks. *Journal for the Education of the Gifted, 25*(1), 7–31.

Hertzog, N. B. (1997). Open-ended activities and their role in maintaining challenge. *Journal for the Education of the Gifted, 21*(1), 54–81.

Koro-Ljungberg, M. (2002). Constructions of high academic achievement through analysis of critical events. *Gifted Child Quarterly, 46*(3), 209–223.

Vespi, L., & Yewchuk, C. (1992). A phenomenological study of the social/emotional characteristics of gifted learning disabled children. *Journal for the Education of the Gifted, 16*(1), 55–72.

Research, Quantitative

How do gifted, creative, or talented children and adults differ from those not so identified? What instructional, identification, or parenting strategies are most effective with gifted, creative, and talented people? These are examples of basic research questions underlying the fields of giftedness, creativity, and talent. Quantitative research methods are required to answer these and derivative research questions; and finding these answers is imperative for the development of gifted education and related areas of study.

Quantitative research, often equated with scientific research, is a mode of controlled inquiry that reduces bias and advances knowledge. Quantitative research is based on the philosophical paradigm of positivism, or more accurately, postpositivism. Postpositivism holds that truth exists although it

cannot be fully known, and that we strive for probabilistic statements instead of absolute statements. As such, quantitative research relies heavily on statistical analyses to arrive at probabilistic statements. Test theory, with its concepts of true scores, error, reliability, and validity also comes from this same philosophical position.

Quantitative Versus Qualitative Research

Hans Reichenbach identified two research contexts: the context of *discovery* and the context of *verification*. Qualitative research is best suited for the context of discovery or exploration. In contrast, quantitative research is best suited for the context of verification, or for testing whether things are related to one another (correlational research) or differ from one another (experimental research). Research accumulates slowly, often not being applicable to educational or other environments until several confirmatory studies have been done. Systematic reviews of an area provide the analysis and synthesis that often build a needed link between research and practice. The quantitative review procedure of meta-analysis summarizes effect sizes from a number of quantitative studies to provide an overall effect size that allows conclusions about an intervention or relationship. However, a meta-analysis can be only as good as the separate studies included in the analysis. Understanding and evaluating the research in giftedness, talent, and creativity are difficult tasks. Carolyn Callahan and Tonya Moon provide a useful guide for accomplishing this task.

Research on Giftedness, Creativity, and Talent

Reva Friedman-Nimz, Brenna O'Brien, and Bruce Frey studied publication trends related to the topics of gifted, creativity, talent, gifted and disabled, and gifted and disadvantaged by decade from the 1960s through the 1990s. They reported a major decrease in the percentage of quantitative research articles in educational, psychological, and special education journals over these decades (1960s = 62.3%, 1990s = 18.1%). Over this same period they observed a small increase in the percentage of qualitative research articles (from 14% to 20.5%). The major increase during this period was in the percentage of program description articles (1960s = 2.6%, 1990s = 37.8%). Thus, the issue is less whether one research paradigm (i.e., quantitative or qualitative) is replacing another, but more whether research is being supplanted by descriptions of untested procedures and programs. In 1990, Kyle Carter and H. Lee Swanson published an article examining the most frequently cited gifted journal articles since the Marland Report of 1972. They concluded from their review that information on gifted education was commonly unsupported by research and theory. Contributing to this problem is the lack of consensus on definitions and the tendency to develop new models rather that validate and refine existing models.

Notable exceptions to these trends do exist. Most of what is known, as documented by published research about giftedness, talent, and creativity, is the result of quantitative research. Francis Galton's effort to operationalize genius subsequently lead to his detailed description of five interlocking propositions: (a) A measure of an individual's genius can be derived from his or her degree of eminence; (b) on this eminence rests his or her reputation; (c) that this reputation, although based on contemporary critical opinion, is long term in character; (d) that critical opinion is focused on a real, extensively acknowledged achievement; and (e) that such achievement is the product of natural abilities that are made up of a blend of intellect and disposition (or what is now termed intelligence and personality), which provided a beginning point for quantitative research. The empirical studies that were spawned by this theory of genius provide an interesting picture of early research in giftedness. Subsequently, Lewis Terman and his longitudinal *Genetic Studies of Genius* also focused on the results of quantitative data analysis over time.

Besides seeking to understand genius and its dimensions, other important research areas that have directly impacted the directions taken by the fields of giftedness, creativity, and talent include the studies on creativity (e.g., Torrance); the meta-analyses of ability grouping conducted by James A. Kulik, Chen-Lin C. Kulik, and Karen Rogers; Ann Robinson's investigations of the effects of cooperative learning with gifted students; Nicholas Colangelo, Susan Assouline, and Miraca Gross's work on the effects of acceleration; Joseph Renzulli's *schoolwide enrichment model* (SEM); Joyce VanTassel-Baska's *integrated curriculum model;* and Julian

Stanley's Study of Precocious Youth (SMPY), which led to the *talent search model* at Johns Hopkins University and was subsequently expanded to other sites nationally.

Quantitative research indicates that creativity (e.g., divergent thinking, creative problem solving, creative performance, and creative attitude/behavior) can be enhanced through well-planned programs and techniques, such as grouping programs. Robinson's review of quantitative studies on cooperative learning points out continuing concerns with using heterogeneous cooperative learning groups with gifted students. Colangelo, Assouline, and Gross's important national report, *A Nation Deceived: How Schools Hold Back America's Brightest Students,* provides empirical support for grade-based acceleration, subject-based acceleration, early entrance into kindergarten and college, as well as other forms of acceleration. The SEM has been widely researched, resulting in revision and refinement of the model. These research studies have demonstrated that the SEM can be used in a variety of school settings and with diverse students, including high-ability students. Likewise, VanTassel-Baska provides evaluation research that supports use of the ICM in science and language arts courses. The SMPY made use of the *diagnostic testing–prescriptive instruction (DT–PI) model.* Used primarily in mathematics classes, the DT–PI model includes pretesting students to determine what they already know and what the next step in the learning process is. Class time is spent on concepts not yet mastered rather than on concepts already understood. Students take a posttest after studying a topic in order to demonstrate mastery. Research supports great success for this model. Participation in talent search programs through numerous universities has involved millions of students since 1972.

Challenges

Quantitative research models have become increasingly complex and sophisticated. Multivariate models recognize the complexity of the phenomena being studied. Studies that simply correlate two variables, while ignoring many other related variables, do little to help us understand gifted, talented, or creative children and adults. But, more complex statistical procedures (e.g., factor analysis, path analysis, structural equation modeling) require (a) researchers with advanced statistical skills, (b) members of editorial boards with advanced statistical skills, and (c) large samples.

In general, many graduates of educational psychology and related programs are well grounded in statistics and quantitative research methods. Graduates of educational leadership, curriculum, foundations of education, and other education-focused programs often emphasize qualitative research methods, sometimes with little background in statistics. Further, most of the major conventions in gifted studies/gifted education (e.g., National Association for Gifted Children, Council for Exceptional Children) are heavily attended by classroom teachers who have no quantitative research training beyond the normal curve and measures of central tendency and variability. Although a select few in the field who are committed to research attend the Special Interest Group (SIG) on Giftedness and Talent at the American Educational Research Association convention or the Wallace Symposium at the University of Iowa, the majority of those interested in gifted education are classroom teachers. As a consequence, because of the lack of advanced training in quantitative methods by bachelor's, master's, and doctoral graduates involved in gifted studies, the field is hampered by a lack of common research vocabulary and skill set.

Manuscripts using complex statistical procedures create problems for editors and editorial boards. Editors and editorial boards are typically established scholars, many of whom were well trained in quantitative methods; however, their currency with developing procedures may be problematic.

To study complex phenomena requires looking at interactions among multiple variables. The appropriate statistical procedures require large samples. This is increasingly difficult because of increasingly stringent regulations by institutional review boards, especially related to minors; reluctance of schools to participate in research; new Health Insurance Portability and Accountability Act (HIPAA) requirements; and the costs involved in large-scale research.

As discussed earlier, quantitative research has produced significant, applicable results. However, this research is the product of a relatively small number of highly productive researchers. Much of the research comes from the National Research

Center on the Gifted and Talented, which is supported by a federal grant. A cursory look at major journals in the field uncovers this cadre of researchers, and their graduate students, permeating the journals. While this group of researchers is to be commended, problems can accompany this pattern. Just as pharmaceutical companies researching their own products has led to abuses, much of the research on curriculum models, for example, has been conducted by the scholars who developed the model. And, like drug companies who are invested in good outcomes, research in support of a curriculum model or talent search program has economic consequences. With consultants in gifted education/gifted studies being paid thousands of dollars a day to implement a product, to present keynote addresses at state and national conferences often promoting their model, and with the pressure on faculty to obtain external grants related to a particular model, research supporting that product has significant economic consequences. These demand characteristics, usually unintentional, raise issues about the validity of some of the research in the field. The field needs replication of findings by independent researchers.

Quantitative research tests assumptions, offers opportunity to revise practices, and builds the knowledge base of a field. As evidenced by the research cited previously, quantitative methods have been the backbone of these research programs. However, some challenges still exist: developing a larger cadre of researchers with strong research design and statistical skills; using mixed research designs; and having research validated by independent researchers not affiliated with a particular model of intervention.

David N. Dixon and Felicia A. Dixon

See also Effective Programs; Factor Analyses Creativity; Gifted Education Centers; Intelligence; Meta-Analyses of Gifted Education; Research, Qualitative

Further Readings

Callahan, C. M., & Moon, T. R. (2007). Sorting the wheat from the chaff: What makes for good evidence of effectiveness in the literature in gifted education? *Gifted Child Quarterly, 51*(4), 305–319.

Carter, K. R., & Swanson, H. L. (1990). An analysis of the most frequently cited gifted journal articles since the Marland Report: Implications for researchers. *Gifted Child Quarterly, 32*(3), 116–123.

Colangelo, N., Assouline, S. G., & Gross, M. U. M. (2004). *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson.

Friedman-Nimz, R., O'Brien, B., & Frey, B. (2005). Examining our foundations: Implications for gifted education research. *Roeper Review, 28*(1), 45–52.

Kulik, J. (2003). Grouping and tracking. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 268–281). Boston: Allyn & Bacon.

Lupkowski-Shoplik, A., Benbow, C. P., Assouline, S. G., & Brody, L. E. (2003). Talent searches: Meeting the needs of academically talented youth. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 204–218). Boston: Allyn & Bacon.

Olszewski-Kubilius, P. (2004). Talent searches and accelerated programming for gifted students. In N. Colangelo, S. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students*. Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Renzulli, J. S., & Reis, S. M. (2003). The schoolwide enrichment model: Developing creative and productive giftedness. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 184–203). Boston: Allyn & Bacon.

Robinson, A. (2003). Cooperative learning and high ability students. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 282–292). Boston: Allyn & Bacon.

Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity Research Journal, 16,* 361–388.

VanTassel-Baska, J. (2003). What matters in curriculum for gifted learners: Reflections on theory, research, and practice. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (pp. 174–183). Boston: Allyn & Bacon.

RESILIENCE

In spite of existing research, the chameleon-like nature of what is meant by resilience is evident in

attempts to define it. Resilience has been defined as a protective mechanism that modifies an individual's response to risk; as the tendency to spring back, rebound, or recoil; and as a child's ability to succeed contrary to predictions.

Resilience is not a fixed attribute, nor is successful negotiation of one stressful life event predictive of positive future adapting. Over the past several decades, resiliency has garnered the interest of researchers whose foci have included cognition, trauma, at-risk youth, as well as giftedness in children. The link between resilience and intelligence is found in longitudinal studies, among racial/ethnic groups, and among children from middle- and lower-class homes.

Characteristics of Resilient Individuals

According to Emmy E. Werner, individuals who are considered resilient typically possess (a) social competence—responsiveness, flexibility, empathy/caring, good communication, and a sense of humor; (b) problem-solving skills—thinking abstractly and reflectively, ability to plan, and flexibility; (c) autonomy—internal locus of control, sense of power and of self, and adaptive discipline; (d) sense of purpose—healthy expectations, goal directedness, success orientation, educational aspirations, persistence, hopefulness, hardiness, belief in a positive future, and a sense of meaning. Although resilient individuals may manifest all or few of these qualities, stressors during each life stage can trigger these qualities. In infancy, disruptive events include birth of siblings, separation from mother, and family disruption. During toddlerhood, stressors include maternal employment outside of the home, absent father, birth of siblings, and child/parent illness. During childhood, the child's perception of life, death of sibling, and crowding in the home can impact adaptive skills. Adolescent and adult stressors include teen pregnancy, financial problems, serious illnesses, or accidents. Although gifted/talented/creative students may encounter social and emotional difficulties due to their giftedness, L. C. Bland and C. J. Sowa postulated that gifted children have additional resources to overcome these difficulties. Internal resources common to resilient gifted individuals range from biological and psychological traits to self-taught coping strategies. Successfully coping with stressful life events can nourish one's resilience, which strengthens one's future resiliency.

Similar to other children who are resilient, gifted children may have specific genetic traits that foster resilience. For example, infants with an adaptable temperament tend to develop effective coping strategies earlier than infants with less easy-going personalities. Children with adaptive temperaments tend to develop interpersonal skills that contribute to an ability to cope with stressful situations. Biological factors, such as gender, have also been related to resiliency in gifted children, although whether these differences are due to environmental factors or genetic differences is not known. There are gender differences in how resiliency is fostered in girls and boys. Bruce Kline and his colleagues found boys tend to be more "at risk" than girls, but boys who are emotionally connected to a support network may have less difficulty overcoming barriers than their peers. In addition, Kline and colleagues found that ability to integrate an identity as a female and as gifted may be protective factors for young girls. Sharon Kurpius and Barbara Kerr studied risk and resilience extensively in talented at-risk girls and published their findings in a National Science Foundation report that includes their interventions to increase self-esteem, self-efficacy, and to reduce risk factors.

Personality characteristics have been linked to resiliency. Resiliency is impacted by how a child perceives himself or herself as a gifted individual. Gifted individuals who have higher self-esteem, confidence, optimism, motivation, and/or an internal locus of control tend to be more resilient in difficult situations than are peers without these characteristics. Talented children who have additional barriers (students of color experiencing oppression and racism) may develop stronger characteristics (e.g., motivation and internal locus of control) that assist in overcoming various barriers and contribute to resiliency. For example, Donna Ford found that gifted Black youth often use autonomy and bicultural coping skills when encountering difficult situations.

For gifted children, high intelligence alone does not reflect resiliency; it is, however, related to the ability to develop effective coping strategies. The ability to determine quickly whether a stressful situation is harmful is associated with mature adult cognitive processes. Gifted children use cognitive

appraisal processes earlier, which may allow them to assess and predict stressful situations and either adapt behavior to alter the situation or adapt their perception of the situation (emotion-focused cognitions). Self-taught coping strategies also contribute to resiliency in talented children. This resiliency is demonstrated by choosing to withdraw from stressful or harmful situations or taking time out in order to think about how to respond or cope.

Fostering Resilience

Positive coping strategies and resilience can also be fostered by family and school. In addition to providing an organized, structured home environment, parents who are consistently nurturing, engender trust in others, modeling competence, and providing opportunities for confidence-building, foster resiliency in their children. While being emotionally responsive and expressive, these parents encourage involvement in challenging experiences and support their child in coping and mastery efforts. A close bond with at least one family member provides gifted children with stability, support, and attention. This person is often the mother, although the father can play an important role, particularly among girls and African American males. Grandparents can also play this role, particularly for children living in poverty.

Teachers, peers, and the church should also not be overlooked. The responsiveness and encouragement offered by individuals from these groups help to foster resiliency. Resilience is also enhanced by involvement in activities, both during and after school. Schools, families, and peers can support an environment for learning and effective coping that, in turn, contributes to and reinforces resiliency.

Sharon E. Robinson Kurpius, Marybeth Rigali-Oiler, and Erin M. Carr Jordan

See also Adolescent, Gifted; Boys, Gifted; Girls, Gifted; Self-Efficacy/Self-Esteem; Social-Emotional Issues

Further Readings

Bland, L. C., & Sowa, C. J. (1994). An overview of resilience in gifted children. *Roeper Review, 17,* 77–80.

Colbert, R. D., Hébert, T. P., & Reis, S. M. (2005). Understanding resilience in diverse, talented students in an urban high school. *Roeper Review, 27,* 110–120.

Ford, D. Y. (1994). Nurturing resilience in gifted Black youth. In Affective dimensions of being gifted [Special issue]. *Roeper Review, 17,* 80–85.

Gjerde, E., Block, J., & Block, J. (1986). Egocentrism and ego-resiliency: Personality characteristics associated with perspective-taking from early childhood to adolescence. *Journal of Personality and Social Psychology, 51,* 423–434.

Kitano, M. K., & Lewis, R. B. (2005). Resilience and coping: Implications for gifted children and youth at risk. *Roeper Review, 27*(4), 200–205.

Kline, B. E., & Short, E. B. (1991). Changes in emotional resilience: Gifted adolescent boys. *Roeper Review, 13,* 184–187.

Kline, B. E., & Short, E. B. (1991). Changes in emotional resilience: Gifted adolescent females. *Roeper Review, 13,* 118–121.

Kurpius, S. R., Kerr, B., et al. (2005). *Counseling women: Talent, risk, and resiliency.* Arlington, VA: National Science Foundation. Available from http://www.mtrworldwide.com/Default.aspx?tabid=25

Mandleco, B. L., & Peery, J. C. (2000). An organizational framework for conceptualizing resilience in children. *Journal of Child & Adolescent Psychiatric Nursing, 13,* 99–112.

Murphy, L. B. (1987). Further reflections on resilience. In E. J. Anthony & B. Cohler (Eds.), *The invulnerable child* (pp. 84–105). New York: Guilford Press.

Reis, S. M., Colbert, R. D., & Hébert, T. P. (2005). Understanding resilience in diverse, talented students in an urban high school. *Roeper Review, 27,* 110–120.

Sowa, C., & McIntire, J. (1994). Social and emotional adjustment themes across gifted children. *Roeper Review, 17,* 95–99.

Werner, E. E. (2000). Protective factors and individual resilience. In J. P. Shonkoff & S. J. Meisels (Eds.), *Handbook of early intervention* (2nd ed., pp. 115–132). New York: Cambridge University Press.

Revolving Door Identification Model

The enrichment triad model and the three-ring conception of giftedness were responsible in the

1970s and 1980s for opening gifted education to a much broader group of bright students than had been identified by intelligence tests alone. Nevertheless, Joseph Renzulli, Sally Reis, and Linda Smith found that there were still students with great potential for achievement who were being overlooked. The *revolving door identification model* (RDIM) was a response to this problem. This entry discusses the background, the various strategies of RDIM, and its advantages for increasing the talent pool.

Background

School personnel were routinely eliminating highly creative and productive students from participation in enrichment programs because they did not score in the top 1 to 3 percent of the population on either achievement or intelligence tests. Many of the same teachers who could not recommend these students because they did not meet a specified cutoff score believed the students would excel when they had the opportunity to become involved in high levels of creative, productive, and enriched work.

Teachers also failed to identify students who were reading and doing mathematics at an accelerated level who were missing the cutoff scores for inclusion in the gifted program by a point or two. Earlier research conducted by E. Paul Torrance had demonstrated that students who were rated highly on creativity measures achieved well in school and on achievement tests but were not selected for gifted programs because their scores were below the cutoff for admission. Research conducted by Sally Reis reported that when a broader pool of students of the general population, identified as the talent pool, was able to participate in Types I and II enrichment experiences, the quality of their completed Type III products was equal to that of students who were traditionally identified as gifted.

This research led Renzulli and his colleagues to field tests and trials with the RDIM in which a talent pool (10%–15%) of students receives regular enrichment experiences and the opportunity to "revolve into" Type III creative productive experiences. In RDIM, students were selected for participation in the talent pool on the basis of multiple criteria that included achievement scores, teacher nomination, creativity, and other locally selected indicators. Once identified and placed in the talent pool through the use of multiple criteria such as test scores; teacher, parent, or self-nomination; and/or examples of creative potential or productivity, students are observed in classrooms and enrichment experiences for signs of advanced interests, creativity, or task commitment. This part of the identification process, called *action information,* was found to be an instrumental part of the identification process in assessing students' interest and motivation to become involved in Type III creative productivity. Further support for this approach was contributed by Robert Kirschenbaum and Del Siegle, who demonstrated that students who are rated highly on measures of creativity tend to do well in school and on measures of achievement. The development of the expanded identification on the RDIM led to the need for new guidelines for how all of the components of the previous triad programs and the RDIM could be implemented. The resulting work, titled the *schoolwide enrichment model* (SEM), was developed by Joseph Renzulli and Sally Reis.

Considerations

Before listing the steps involved in this identification system, three important considerations should be discussed. First, talent pools will vary in any given school depending upon the general nature of the total student body. In a school with unusually large numbers of high-ability students, it is conceivable that talent pools will extend beyond the 15 percent level that is ordinarily recommended in schools and that reflects the achievement profiles of the general population. Even in schools where achievement levels are below national norms, there still exists an upper level group of students who need services above and beyond those that are provided for the majority of the school population. Some of the most successful RDIM/triad programs have been in inner-city schools that serve disadvantaged and bilingual youth; and even though these schools were below national norms, a talent pool of approximately 15 percent of higher-ability students needing supplementary services was still identified. Talent pool size is also a function of the availability of resources (both human and material), and the extent to which the

general faculty is willing (a) to make modifications in the regular curriculum for above average ability students, (b) to participate in various kinds of enrichment and mentoring activities, and (c) to work cooperatively with any and all personnel who may have special program assignments.

A third consideration is the type of program for which students are being identified. The identification system that follows is based on models that combine both enrichment and acceleration, whether or not they are carried out in self-contained or pull-out programs. Regardless of the type of organizational model used, it is also recommended that a strong component of curriculum compacting be a part of the services offered Talent Pool students in the RDIM.

Test Score Nominations

If one were using nothing but test scores to identify a 15 percent talent pool, the task would be ever so simple. Any child who scored above the 85th percentile (using local norms) would be a candidate. In this identification system, however, the researchers have made a commitment to "leave some room" in the talent pool for students whose potentials may not be reflected in standardized tests. Therefore, they begin by dividing the talent pool in half and placing all students who score at or above the 92nd percentile (again, using local norms) in the talent pool. This approach guarantees that all traditionally bright youngsters will automatically be selected, and they will account for approximately 50 percent of the talent pool. This process guarantees admission to academically able students who are underachievers.

Any regularly administered standardized test (e.g., intelligence, achievement, aptitude) can be used for this purpose. This approach will enable students who are high in verbal or nonverbal ability (but not necessarily both) to gain admission, as well as students who may excel in one aptitude (e.g., spatial, mechanical). Programs that focus on special areas such as the arts, leadership, and athletics should use nontest criteria as major indicators of above-average ability in a particular talent area. In a similar fashion, whenever test scores are not available, or there is some question as to their validity, the nontest criteria recommended in the following steps should be used. This approach is especially important when considering primary-age students, disadvantaged populations, or culturally different groups.

The teachers should be informed of all students who have gained entrance through test score nominations so that they will not have to engage in needless paperwork for students who have already been admitted. This allows teachers to nominate students who display characteristics that are not easily determined by tests (e.g., high levels of creativity, task commitment, unusual interest, talents, or special areas of superior performance or potential). With the exception of teachers who are overnominators or undernominators, nominations from teachers who have received training in this process are accepted into the talent pool on an equal value footing with test score nominations. That is, students nominated by test scores are not referred to as the "truly gifted" and students nominated by teachers as the "moderately or potentially gifted." Nor are there any distinctions in the opportunities, resources, or services provided, other than the normal individualization that should be a part of any program that attempts to meet unique needs and potentials.

Alternate Pathways

Because all schools using this identification system make use of test score and teacher nominations, alternate pathways are considered to be local options, and are pursued in varying degrees by individual school districts. Decisions about the alternate pathways that might be used should be made by a local planning committee, and some consideration should be given to variations in grade level. For example, self-nomination is more appropriate for students who may be considering advanced classes at the secondary level.

Alternate pathways generally consist of parent nominations, peer nominations, tests of creativity, self-nominations, product evaluations, and virtually any other procedure that might lead to initial consideration by a screening committee. The major difference between alternate pathways on one hand, and test score and teacher nomination on the other, is that alternate pathways are not automatic. In other words, students nominated through one or more alternate pathway will be reviewed by a screening committee.

Special Nominations

Special nominations represent the first of two "safety valves" in this identification system. This procedure involves circulating a list of all students who have been nominated through one of the procedures mentioned above to all teachers within the school, and in previous schools if students have matriculated from another building. This procedure allows previous-year teachers to nominate students who have not been recommended by their present teacher, and it also allows resource teachers to make recommendations based on their own previous experience with students who already are in the talent pool, or students they may have encountered as part of enrichment experiences that might have been offered in regular classrooms. This step allows for a final review of the total school population, and is designed to circumvent the opinions of present-year teachers who may not have an appreciation for the abilities, style, or even the personality of a particular student. As with the case of alternate pathways, special nominations are not automatic. Rather, a case study is carried out and the final decision rests with the screening committee.

Action Information Nominations

This identification system may occasionally overlook students who, for one reason or another, are not selected for talent pool membership. To help overcome this problem, orientation related to spotting unusually favorable "turn-ons" in the regular curriculum is provided for all teachers. In programs following the schoolwide enrichment model, a wide variety of in-class enrichment experiences that might result in recommendations for special services is provided.

Action information can best be defined as the dynamic interactions that occur when a student becomes extremely interested in or excited about a particular topic, area of study, issue, idea, or event that takes place in school or in the nonschool environment. It is derived from the concept of performance-based assessment, and it serves as the second safety valve in this identification system. The transmission of an action information message does not mean that a student will automatically revolve into advanced level services, however; it serves as the basis for a careful review of the situation to determine if such services are warranted. Action information messages are also used within talent pool settings (i.e., pull-out groups, advanced classes, cluster groups) to make determinations about the pursuit of individual or small-group investigations (Type III enrichment in the triad model).

Approach Advantages

In most identification systems that follow the traditional screening-plus-selection approach, the "throwaways" have invariably been those students who qualified for screening on the basis of non-test criteria. Thus, for example, a teacher nomination is used only as a ticket to take an individual or group ability test; in most cases the test score is always the deciding factor. The many and various pieces of evidence that led to nominations by teachers are often ignored when it comes to the final (selection) decision, and the multiple criteria game ends up being a smoke screen for the same old test-based approach.

The implementation of the identification system described above has helped to overcome this problem as well as a wide array of other problems traditionally associated with selecting students for special programs. Generally, students, parents, teachers, and administrators have expressed high degrees of satisfaction with this approach, and the reason for this satisfaction is plainly evident. By "picking up" that layer of students below the top few percentile levels usually selected for special programs, and by leaving some room in the program for students to gain entrance on the basis of nontest criteria, this model has eliminated the justifiable criticisms of those persons who know that these students are in need of special opportunities, resources, and encouragement. The research underlying the three-ring conception of giftedness clearly tells us that such an approach is justified in terms of what we know about human potential.

Joseph S. Renzulli

See also Elementary Enrichment; Enrichment Triad Model; Giftedness, Definition; Schoolwide Enrichment Model

Further Readings

Kirschenbaum, R. J., & Siegle, D. (1993, April). *Predicting creative performance in an enrichment program*. Paper presented at the Association for the Education of Gifted Underachieving Students 6th Annual Conference, Portland, OR.

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting: The complete guide to modifying the regular curriculum for high ability students*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1985). *The schoolwide enrichment model*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Reis, S. M., & Smith, L. H. (1981). *Revolving door identification model guidebook*. Mansfield Center, CT: Creative Learning Press.

Risk Taking

Four basic themes can be discerned in recent creativity research literature. First, it has been suggested that all people possess creative problem-solving abilities to some extent. Second, some people tend to be more creative than others. Third, creativity can be studied as a manifestation of cognitive skills that are developed within a creativity-fostering environment. Fourth, some authors propose that one should use a combination of these themes; for example, a holistic combined theory called the *investment theory*. One recurring perspective is that creativity commonly involves taking some risks.

Investment Theory

Robert Sternberg described investment theory as six interrelated resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment. All of these themes may have relevance in describing how an individual may be more or less creative. The creative individual is able to cope with novelty. Intellectual abilities refers to synthetic, analytic, and practical-contextual abilities. Knowledge is an ability to recognize which ideas are worth pursuing, and not be hindered by this knowledge. Personality refers to a willingness to overcome obstacles, take sensible risks, tolerate ambiguity, use self-efficacy, and defy the crowd. Thinking styles refers to the ability to think in new ways. Motivation involves receiving satisfaction from engaging in a creative act instead of focusing on the potential rewards. The environment needs to be supportive and rewarding of creativity so that creative ideas can be disseminated without stifling the individual. To take advantage of the market, the creative person must "buy low" and "sell high." Buying low is defined as investing in unpopular ideas with growth potential. Selling high refers to leaving the idea to others and moving on to new unpopular ideas.

Psychologists and philosophers who study the creative person, process, and product are in consensus that creativity requires novel and adaptive solutions to problems. It appears that openness to experience and a lack of conventionality are consistent characteristics of creativity in all domains. However, the creative person is always operating within a domain, discipline, or craft.

Domains

James Kaufman and John Baer with other authors discussed how creativity is demonstrated differently among domains, even among similar domains within the sciences and within the arts. Few people may be creative in two or more domains: One may have spatial skills and abilities in art and engineering, but it seems likely that there may be different requisites for being creative in engineering design versus in the fine arts. People may be more likely to take risks within their own domain where they have a higher comfort level.

Scientific creativity and artistic creativity have been explored separately as well in comparison with each other. Christine Charyton and Glenn Snelbecker investigated general, scientific, and artistic creativity among engineering students versus music students. Their research revealed differences but also some interesting similarities between engineers and musicians. Through studying scientific and artistic creativity, researchers may gain a clearer picture of what creativity entails in personality, processes, products, and

fostering environments. For example, it may be that the risk of trying something new may involve similarities as well as differences across domains.

Cognitive Risk Tolerance and Creativity

Risk as a concept often is addressed in professional and mass media. Frank Farley has suggested that creativity and productive risk taking have been hallmarks of America from its beginnings. Individuals throughout history have encountered opposition as they try to develop novel approaches while confronting uncertainty about outcomes.

But only some aspects of risk, notably risk taking and risk tolerance, are likely to be relevant for creativity. Generally, risk involves making decisions though uncertain about outcomes. Sometimes people must cope with risk due to circumstances imposed on them. For example, individuals can be "at risk" of (a) a physical vulnerability to disease due to inherited attributes or (b) little likelihood of a good education due to poverty levels they cannot control and must endure. More relevant for creativity are instances where individuals have opportunities to make decisions that could lead to gains or benefits but also might risk dangers or losses from those decisions.

Risk as related to creativity often involves individuals facing conditions of uncertainty while making decisions with the potential for either losses or benefits. Commonly, such individuals could choose something conventional ("play it safe") versus trying new ideas or approaches while uncertain about outcomes.

Snelbecker and colleagues developed a risk tolerance model that includes a general factor along with context-specific aspects—financial, physical, social, and cognitive risk tolerance. Cognitive risk tolerance is defined as a tendency to express one's established beliefs and views for comments by other people or even to be open to new ideas or perspectives. Stated another way, instruments that were created in accordance with this model attempt to detect how comfortable a person is with voicing an opinion that may differ from that of other people. When a person interacts with others—such as in personal, educational, or business relationships—not all members of the group think the same way. Self-expression of an opposing viewpoint may result in resistance and ridicule. *Classical utility theory* addresses risk-averse versus risk-seeking approaches toward uncertainty. Risk aversion is a preference for a certain outcome over a gamble that possesses equal or higher expected value. Conversely, risk seeking is the rejection of a certain outcome in favor of a gamble of equal or lower expected value. Cognitive risk tolerance can also be considered as an attribute of general creativity and a positive psychology related construct. Just as creativity may take different forms, cognitive risk tolerance may be shared across domains yet be exhibited differently.

The creative person contributes through being novel in an applicable and useful area that is or becomes accepted. J. P. Guilford stated that higher-order transformation abilities are also an aspect of intelligence that contributes to creative behavior. Gifted people generally show superior intellect combined with a talent such as art, music, social leadership, foreign languages, science, mathematics, and creative writing—yet facility is not necessarily creativity. A person who is more likely to tolerate sensible, carefully thought-out risk prospects may also be more likely to demonstrate creativity.

Christine Charyton and Glenn E. Snelbecker

See also Creative Leadership; Creative Organizational Climate; Creativity, Definition; Domains of Talent

Further Readings

Charyton, C., & Snelbecker, G. E. (2007). General, artistic and scientific creativity attributes of engineering and music students. *Creativity Research Journal, 19,* 213–225.

Farley, F. (1991). The type T personality. In L. P. Lipsett & L. L. Mitnick (Eds.), *Self-regulatory behavior and risk taking: Causes and consequences*. Norwood, NJ: Ablex.

Kaufman, J. C., & Baer, J. (2005). *Creativity across domains: Faces of the muse*. Mahwah, NJ: Lawrence Erlbaum.

Snelbecker, G. E., Roszkowski, M. J., & Cutler, N. E. (1990). Investors' risk tolerance and return aspirations, and financial advisors' interpretations: A conceptual model and exploratory data. *Journal of Behavioral Economics, 19,* 377–393.

Sternberg, R. J. (2006). Creating a vision of creativity: The first 25 years. *Psychology of Aesthetics, Creativity, and the Arts, S,* 2–12.

Robotics

Robotics focuses science and technology on the creation of robots—artificially created mechanical devices that appear to have intent or agency of their own. Robotics education is frequently used as a source of enrichment for advanced students because it provides an excellent opportunity for students to use skills in technology, science, engineering, problem solving, and teamwork. This entry describes the history of robotics and robotics education programs.

History

Word Origin

The term *robotics* was unknowingly coined by Isaac Asimov, whose mid-20th-century science fiction short stories and novels popularized the notion of machines taking on human characteristics and fulfilling human roles. The root word *robot* is derived from the Czech word *robota,* meaning "forced labor." Josef Capek developed the term *robot,* which was used by his brother, Czech playwright Karel Capek, who wrote the play *R. U. R.—Rossum's Universal Robots* in 1920.

History of the Concept

Although it may seem that the idea of robots and robotics was an invention of 20th-century thinkers, the fascination with machines acting like humans had been sparking the imagination of creative, engineering minds long before the days of modern society. Even Leonardo da Vinci toyed with the idea of the robot, as documented through his drawings of a mechanical knight with the capacity to sit up, wave its arms, and move its jaw. There are even reports that the ancient Greeks and Chinese had conceptualized this idea of humanistic machines, as documented through ancient legends and writings.

First Robot

As 20th-century science fiction playwrights and writers began to popularize robots in the popular media, scientists and engineers were working to make robots a reality for industry. The first robot was revealed in 1954, when American George Devol created the first stationary industrial robot. This motorized lifting arm, dubbed Unimate, was eventually used by General Motors in its industrial plants. Since then robotics engineers have touched many facets of industry, including space exploration, medicine, industry, and entertainment. Robots such as R2D2 and the Roomba have become household names.

Laws of Robotics

Another important contribution to the field of robotics is the Three Laws of Robotics, authored by Isaac Asimov in his 1942 novel *Runaround.* These laws have come to be known as universal principles for engineers, writers, and philosophers alike. The three laws are:

1. A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Modern Robotics

These three laws, although the ideas of a science fiction writer, have guided robotics engineers through many modern developments. Robots are now a critical part of almost every field, including medicine, industry, space and underwater exploration, military combat, and many more. The technological advancements of the late 20th and early 21st centuries have facilitated an explosion of growth in the field. With so many possibilities, there seems to be a limitless amount of potential for the field and, therefore, an unprecedented need for talented minds to enter the field.

Robotics Education

Robotics education programs and competitions have been created by various organizations to

increase the number of students who are channeled toward fields in science, technology, engineering, and mathematics (STEM). With the growth of programs and competitions since the late 1980s and the increased availability of robotics kits, robotics programming software, and curricular resources, K–12 educators now have a large body of resources from which to draw.

Tools

The basic tools of robotics education include a robotics building kit, software with which to program the robot, and a problem-based instructional design. A variety of robotics kits are available for school- and home use. Some of the most popular kits—the LEGO Mindstorms kits—have incorporated the familiar, easy-to-use LEGO building materials with simple, intuitive software to create robotics packages that are readily available for the mass market. Vex Robotics Design Systems offers a more advanced platform, providing a more complex approach to robot design.

Robotics Competitions

Arguably one of the most widely known competitions is the FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition, created by Dean Kamen in 1989 to attract young people to science and engineering. Kamen, whose company created such modern technologies as the Segway personal transporter and the IBOT—a wheelchair that can climb stairs and traverse rough terrain—had a vision for creating a program to attract young people to science and engineering. The FIRST Robotics League Competitions aim to give students opportunities to participate in fun, healthy competitions where they can put their engineering skills, creative ingenuity, and teamwork skills to the test. With programs now expanded to include students as young as 6, the FIRST program has more than 150,000 student robotics competitors in 33 nations each year. Other popular competitions and educational programs include Botball and the BEST (Boosting Engineering, Science, and Technology) competition.

Kristina Ayers Paul

See also Competitions; Creativity in Engineering; Creativity in Science; Extracurricular Activities; Inquiry; Technology

Further Readings

National Aeronautics and Space Administration. (2008). *Robotics curriculum clearinghouse*. Retrieved May 14, 2008, from http://robotics.nasa.gov/rcc

National Aeronautics and Space Administration. (2008). *The robotics alliance project*. Retrieved May 14, 2008, from http://robotics.nasa.gov/index.php

Robotics Institute at Carnegie Mellon University: http://www.ri.cmu.edu

US FIRST Robotics: http://www.usfirst.org

Rocketry

The opportunity to build and launch rockets has been a continuing success story in the area of hands-on science education, especially for gifted and talented children. Yet what do students actually learn from these experiences? This entry examines effective structuring of model rocket activity specifically, but also looks at the bigger picture of the structure of hands-on activities for gifted students.

A widespread interpretation of Piagetian theory favors an oversensitivity to the things a child cannot do cognitively rather than a more optimistic and challenging emphasis on what children could do easily with the proper instructional sequence, structure, and social support. This optimistic and empowering emphasis on the child's early competence and strength is both a more empowering basis for science instruction for the gifted child and is in accord with current learning theory. Moreover, much of this work looks upon the child in isolation rather than as a part of a community of learners like that in which rocket scientists engage in on a daily basis.

For instance, the scientist engages intellectually with colleagues at conferences, graduate students in labs, students in classes, and receives feedback on manuscripts from reviewers. What a rich community the rocket scientist belongs to. How can classrooms be structured to take advantage of these social practices of the rocket scientist?

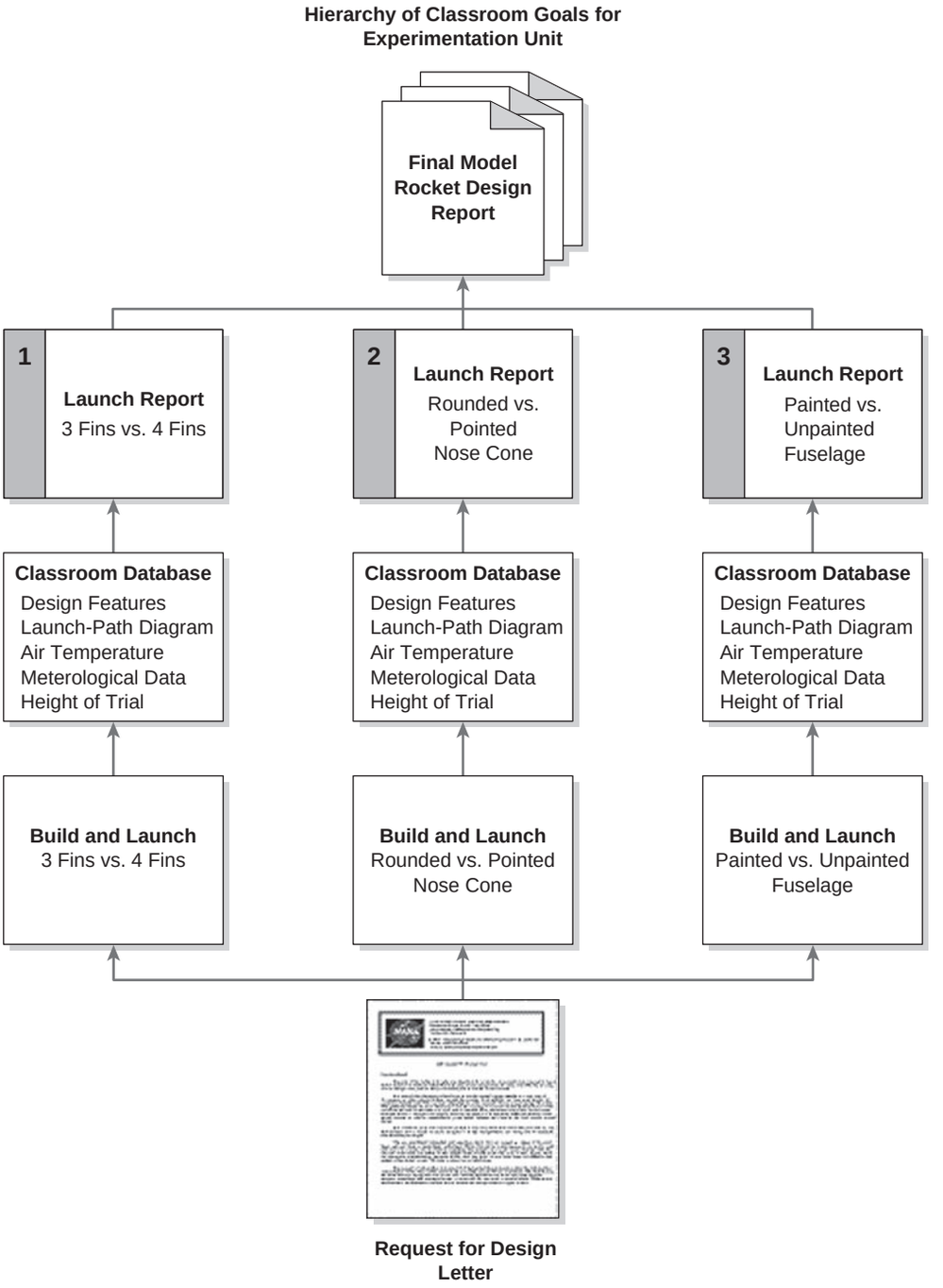


Figure 1 Activity Structure for Proposed Model Rocket Activity

Effective learning experiences are often organized around a driving question. Frequently, however, the question that drives a project is not crafted to make connections between activities and the underlying conceptual knowledge that one might hope to foster. Although the opportunity for deep learning is there, it often does not occur because of the tendency in these hands-on approaches to get caught up in the action without appropriate opportunities for reflection and revision. In such cases, the "doing" of an activity takes precedence over "doing with understanding." An

example of the need for a well-crafted, driving question comes from projects in model rocketry. Thousands of classrooms throughout the country engage in similar types of activities. The opportunities to build and launch rockets have been extremely popular for students, teachers, and parents. Launchings frequently attract press attention, with footage shown on local news programs.

A great deal of recent research has explored whether it is possible to deepen students' understanding by creating the social structures of the scientists (this is sometimes called "participatory practices") without dampening students' enthusiasm. For instance, can students learn about experimentation and measurement if they have an appropriate driving question behind a model rocket project? To examine this issue, it is necessary to add a learning-appropriate goal to the standard model rocket project that motivates the use of scientific and statistical methods. Indeed, there are many reasons to proclaim such projects a success. But what do students actually learn from their experiences? Research has found that many students who completed the traditional rocket project learned relatively little from the hands-on activity of simply making and launching their rockets. They did not, for example, understand what made a better or worse rocket, and they did not understand how to evaluate the effectiveness of their rockets in any systematic way. One reason for this may be that the students did not have a driving question that could foster focused inquiry. For example, when students were asked what they thought about the purpose of the activity, a typical response was, "You know, to build them and see how high they will go."

More often than not, when rocketry is used in the classroom, teachers build the rockets, launch them, and then watch as the students run to catch the rockets as they fall to the ground. Students should be engaged in every phase of rocketry. In setting up this activity it is possible to use a design letter as an anchoring activity. An anchor is an activity that allows for continued and deepening exploration and that is designed to pose and solve complex, realistic problems. This letter not only calls for the building and launching of a model rocket(s) but also the measuring of the height it reaches, comparing effectiveness of various design plans, and a final written report. Moreover, the way this problem is set up, students do not compete, but rather cooperate as they attempt to figure out the best design attributes for reaching maximum height. The attributes that are compared are(a) nose-cone shape, (b) surface smoothness, and (c) number of fins (see Figure 1). In this way, students learn about experimentation as well as model rocketry.

Students are more likely to learn the design goals, and to learn important skills like controlled experimentation and methods of measurement that would help achieve these goals. Not only do students understand what they are trying to learn, but this knowledge appears to help them direct their learning. In addition, students may have an increased ability to generate their own questions to guide their scientific inquiry.

Anthony J. Petrosino

See also Elementary School, Science Curriculum; Middle School, Science Curriculum; Science, Curriculum; Scientists;

Further Readings

Barron, B. J., Schwartz, D. L., Vye, N. J., Moore, A., Petrosino, A. J., Zech, L., et al. (1998). Doing with understanding: Lessons from research and project-based learning. *Journal of the Learning Sciences, 7*(3), 271–3117.

Lehrer, R., Schauble, L., & Petrosino, A. (2001). Reconsidering the role of experiment in science education. In K. Crowley, C. D. Schunn, & T. Okada (Eds.), *Designing for science: Implications from everyday, classroom, and professional settings*. Mahwah, NJ: Lawrence Erlbaum.

Petrosino, A. J., Lehrer, R., & Schauble, L. (2003). Structuring error and experimental variation as distribution in the fourth grade. *Mathematical Thinking and Learning, 5*(2 & 3), 131–156.

Sneider, C., Kurlich, K., Pulos, S., & Friedman, A. (1984). Learning to control variables with model rockets: A neo-Piagetian study of learning in field settings. *Science Education, 68*(4), 465–486.

ROEPER REVIEW

The *Roeper Review* is one of the leading scholarly journals serving gifted education and related

fields. George and Annemarie Roeper, holocaust survivors and founders of the innovative Roeper School in Bloomfield Hills, Michigan, founded the journal in 1978. Recognizing that exceptional human ability and compassion are needed in a world that occasionally gives rise to the horrors of war and other evils, the Roepers dedicated the Roeper School to discovering and nurturing the emotional, social, intellectual, and ethical development of bright young people. Roeper students are encouraged to become independent, self-aware, self-directed, curious, compassionate, and responsible individuals. The *Roeper Review* extends this vision and mission internationally while serving as a forum for leading research and theory pertaining to high ability. The journal is published quarterly by the Roeper Institute, which is a nonprofit corporation affiliated with the Roeper School. Recently, the Roeper Institute struck an agreement to transfer most of the production work to the Routledge publishing company. Routledge now produces and advertises the journal, although the Roeper Institute retains ownership and direction.

The *Roeper Review* is a juried scholarly publication, so submitted articles go through a blind review process involving three external reviewers and at least one internal reviewer. The review process is relatively expeditious, with most editorial decisions occurring within 8 weeks. Scholars who serve as reviewers must have considerable expertise and a recognized publication record in the appropriate area of expertise. More than 350 professionals are on the list of reviewers, and over 60 scholars who have extensive records of service to the journal and/or the field are listed as contributing editors. The latter are appointed by the editorial review board, which includes nine distinguished scholars of gifted education. The review board makes recommendations about the direction and content of the journal. Members of the board serve 3-year terms; their replacements undergo an intensive vetting process at periodic board meetings.

Contributing scholars follow the APA authorial style as outlined in the latest edition of the *Publication Manual of the American Psychological Association*. Submitted manuscripts typically are no more than 30 pages double spaced, including abstract and references. Most issues contain about seven articles plus special features.

Inquiry Topics and Cognitive Diversity

Primarily aimed at the needs of professionals and scholars in gifted education, articles in the journal address the interests of teachers, program developers, researchers, policymakers, and parents. In recognition that the field of gifted education is very diverse, somewhat fragmented, and contested at times, the *Roeper Review* addresses a wide array of topics. One of the key features distinguishing the *Roeper Review* from other academic journals is its mission to provide rich cognitive diversity for problem solving in the field. Cognitive diversity provides a significant advantage for those who engage in complex problem solving. A group attempting to grapple with very complex problems or issues establishes cognitive diversity if it collectively encompasses (a) diverse perspectives on problems or interpretations of issues, (b) diverse heuristics, and (c) diverse predictive models. Diverse perspectives or interpretations denote varied ways of perceiving, portraying, organizing, categorizing, or framing problems or issues. Diverse heuristics entail varied methods of problem solving. Diverse predictive models represent varied ways of inferring cause and effect.

Interestingly, cognitive diversity has been found to be at least as important as intelligence of the members for groups dealing with complex, multidimensional issues. The multidimensional nature of giftedness and the very large array of subtopics it entails make the study of high ability very complex; consequently, scholars and practitioners will understand more about giftedness if they capitalize on cognitive diversity in their research and theory development.

An academic journal that energetically strives to incorporate very diverse perspectives does much to generate the advantages of cognitive diversity within a field. The *Roeper Review* actively solicits diverse viewpoints, and the hundreds of authors who publish in the journal collectively provide considerable cognitive diversity. Taken together, they represent very diverse views on curricular and instructional issues, multicultural perspectives, research paradigms, and a wide range of cutting-edge theories.

Issues and Themes of Emphasis

Illustrating the cognitive diversity of the journal, recent topics have included conceptions of

giftedness and talent; identification issues; the nuances of creativity; gender issues; curriculum development; the psychological dimensions of high ability; instructional issues at various age and grade levels; the nuances and advantages of various research methodologies; aspects of special education; developments in teacher education; testing, evaluation, and authentic assessment; program development; and of course the perspectives of gifted children themselves. Further enhancing its cognitive diversity, the journal runs periodic special issues on a variety of important topics. Examples of recently published and proposed special-theme issues include perspectives on intelligence; ability grouping and acceleration; underrepresentation in gifted education; the conceptual foundations for research and practice; analyses of Kazimierz Dabrowski's theory of positive disintegration; global awareness of the gifted; the history of gifted education as a field; specialized science, mathematics, and technology high schools; and the neuroscience of giftedness.

The journal also runs some special features, including interviews of prominent pioneers and current leaders in the field; periodic research commentary; point-counterpoint discussions in which leading scholars debate contentious, unsettled issues; and the column "According to Jim" in which James J. Gallagher, a giant in the field, dispenses probing insights about important issues.

Overall, the *Roeper Review* aims to push back the edges of the conceptual map that charts giftedness, talent, creativity, and various other dimensions of high ability. Its ultimate goal is to support educational professionals in their work of encouraging bright young people to become well-adjusted, self-aware, positive contributors to a complex, evolving world.

Don Ambrose

See also *Creativity Research Journal; Gifted Child Quarterly*; Research, Qualitative; Research, Quantitative

Further Readings

Borland, J. H. (Ed.). (2003). *Rethinking gifted education*. New York: Teachers College Press.

Page, S. E. (2007). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton, NJ: Princeton University Press.

Tannenbaum, A. J. (1993). History of giftedness and "gifted education" in world perspective. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 3–27). Oxford, UK: Pergamon.

Role Models

The impact of being gifted or talented on the development and well-being of individuals has been thoroughly discussed and speculated on by scholars, educators, and parents. Some believe that being gifted or talented leads to additional barriers that negatively impact well-being, while others believe that being gifted or talented is actually a protective factor for children and adolescents. Generally, the latter idea is more accepted within the psychology literature. Although gifted students encounter the same challenges as their non-gifted peers, in addition to other barriers specific to being gifted (i.e., feeling isolated in school, feeling unmotivated or unchallenged in course work, etc.), being gifted or talented provides children with more internal resources to cope with such barriers. Though gifted and talented children may have the internal resources, such as advanced problem-solving skills, environmental and interpersonal influences promote resiliency in children. Interacting with role models facilitates the growth of the positive intrapersonal factors that promote well-being among gifted and talented children.

Though there has been limited research on the impact of role models on well-being, self-efficacy, and self-esteem among gifted and talented children, Albert Bandura stressed the idea that general modeling and vicarious learning are part of *social learning theory*. He suggested that individuals learn behaviors based on what they observe from others, thus learning vicariously. His theory, developed to explain how self-efficacy (the confidence one has in successfully completing a task) influences career decisions, has been applied to career development and how role models influence one's decision to choose a specific career path through direct and indirect fostering of self-efficacy.

Role models can be defined as people who influence one's behaviors and/or beliefs. Role models tend to have three components that make them especially influential: (1) the individual perceives the role model to be similar to him or her, (2) role model behavior is imitated by the individual, and (3) the belief system of the role model is incorporated into the individual's own attitudes through the process of vicarious learning. Watching someone succeeding in a similar situation and facing similar challenges and barriers can have a profound impact on individuals who have lower self-efficacy in a given area, particularly if the role model is similar in gender, race/ethnicity, or other identifiable aspects. A role model with a similar racial/ethnic background and/or the same gender as the observer may be a protective factor against stereotypes related to these background characteristics that can negatively impact the observer. Furthermore, role models whose achievements were deemed attainable by the observer are more likely to have a positive impact on the observer's self-beliefs as compared to those role models whose accomplishments are perceived as too lofty for the observer to attain.

Being gifted often involves the skill of relating well to others, which makes role models especially impactful. Not only do role models promote understanding of academic and vocational information, they also have been found to help women develop more positive views on careers in which women are typically underrepresented. Exploring the factors influencing academic motivation in gifted children, scholars have found that family role models lead to more positive beliefs and behaviors related to motivation. Peers, parents, and teachers who are role models can have a positive influence on child and adolescent development.

Although there is evidence of the value of role models for gifted, talented, and creative children, appropriate role models may be scarce. First, this may be due in part to a disproportionate number of students of color and students from low socioeconomic status backgrounds being identified as being gifted, talented, or creative and then having these characteristics being nurtured so that these individuals one day can be role models for similar students. The resulting lack of representation of women, of racial/ethnic minorities, and of individuals with lower economic backgrounds in various careers also can lead to a smaller pool of available role models. Second, school curriculum promotes this disparity through a lack of multicultural focus and of limited lessons about the accomplishments and achievements of women and people of color. Third, disproportionate college attrition rates for students of color result in fewer academically qualified role models for overcoming barriers to persistence such as family unemployment and poverty. Racial identity, negative self-concept, experiences of discrimination, and peer relationships are often negative predictors of persistence decisions of racial/ethnic minority students. In contrast, having a role model who is a racial/ethnic minority may act as a protective factor for students facing racial backlash from peers, specific to the idea that achieving academically is "acting White."

It is clear that role models can serve as protective factors for gifted and talented children by promoting positive self-concepts and academic self-efficacy. Fostering role model relationships for talented and gifted children should be considered an important goal for educators, parents, and community leaders. The potential lack of available positive role models for students, especially those from diverse backgrounds, may provide challenges for teachers of gifted, talented, and creative children. It should be noted, however, that role models do not have to have a face-to-face relationship with a student: Modeling can be facilitated through various media and educational curricula. Having a person to look to as a model for achieving goals and overcoming barriers similar to those faced by the student may be the most important component of the role model relationship in regard to fostering self-efficacy and positive self-beliefs in gifted and talented children.

Marybeth Rigali-Oiler

See also Mentoring Gifted and Talented Individuals; Self-Efficacy/Self-Esteem

Further Readings

Clasen, D. (2006). Project STREAM: A 13-year follow-up of a pre-college program for middle and high school underrepresented gifted. *Roeper Review, 29,* 55–63.

Ford, D. (1994). Nurturing resilience in gifted Black youth. *Roeper Review, 17,* 80–86.

Karunanayake, D., & Nauta, M. (2004). The relationships between race and students' identified career role models and perceived role model influence. *Career Development Quarterly, 52,* 225–236.

Lockwood, P., & Kunda, Z. (1997). Superstars and me: Predicting the impact of role models on the self. *Journal of Personality and Social Psychology, 73,* 91–103.

Phillips, N., & Lindsay, G. (2006). Motivation in gifted students. *High Ability Studies, 17,* 57–73.

Pleiss, M., & Feldhusen, J. (1995). Mentors, role models, and heroes in the lives of gifted children. *Educational Psychologist, 30,* 159–169.

Quimby, J., & DeSantis, A. (2006). The influence of role models on women's career choices. *Career Development Quarterly, 54,* 297–208.

Reis, S., Cobert, R., & Hébert, T. (2005). Understanding resilience in diverse, talented students in an urban high school. *Roeper Review, 27,* 110–120.

Smith, W., & Erb, T. (1986). Effect of women science career role models on early adolescents' attitudes toward scientists and women in science. *Journal of Research in Science Teaching, 23,* 667–676.

Sowa, C., & McIntire, J. (1994). Social and emotional adjustment themes across gifted children. *Roeper Review, 17,* 95–99.

VanTassel-Baska, J., & Kulieke, M. (1987). The role of community-based scientific resources in developing scientific talent: A case study. *Gifted Child Quarterly, 30,* 111–115.

Rural Gifted

There is a lack of agreement on exactly what is meant by the term *rural*. A single designation may be used for an entire school district, even though the district may cover hundreds of square miles and include population groupings of various sizes. According to the National Center for Education Statistics, more than half of all school districts in the United States are in areas designated as rural, serving nearly a quarter of all students.

Since *rural* can be defined as not near a metropolitan area, the issue in the education of gifted learners is a lack of proximity to a broad selection of cultural events, lack of available mentors, distance from institutions of higher education, and the limitations of small schools in offering a broad and rigorous curriculum. Tracy Cross and David Dixon noted that developing the talent of these gifted students may also be complicated by limited access to academic materials and extended travel time to attend after-school opportunities. Different models, distance learning, or more purposeful planning for high-level cultural experiences may be required for gifted students in isolated rural environments.

Virginia Burney and Tracy Cross found comparatively little research specifically on students from impoverished backgrounds in rural areas. The strength of the academic preparation at the high school level, however, is a stronger variable than family income in explaining what makes a difference in college completion. Yet rigorous academic programming is one of the challenges of small rural schools. It was found in rural schools in one midwestern state that school personnel were less likely to have the special training required to plan for services for gifted learners; fewer advanced opportunities were available at any level, K–12; and students in rural schools achieved relatively fewer high scores on Advanced Placement exams than students in other locales. This is consistent with what high school counselors from small rural schools reported in the Javits-funded Project Aspire: It was uncommon for these schools to have had a student achieving at levels resulting in advanced standing when compared with able peers nationally from all locales.

Counselors in the Cross and Burney study reported that some of their able students in these rural schools were reluctant to take courses involving significant outside-of-class preparation; many were highly involved in activities, responsibilities, or part-time jobs and did not see the value or resented additional demands on their time. In addition, if Advanced Placement courses did not have the benefit of a weighted grade, the race for valedictorian resulted in some able students electing an easier program of courses for the more certain "A."

Adults in rural areas are less likely to have graduated from high school than are adults in metropolitan areas, according to the U.S. Census, 2000. The educational level of the community was found to be a significant variable in explaining the variance in high academic performance of a high school. Not only does this impact overall support for advanced academics in the rural community,

but some parents without college experience are less supportive of the time required for advanced academics or going away for college and are less able to provide guidance for their students on the college-related processes or issues.

There are positives associated with rural areas for the gifted. A familylike atmosphere was described by gifted students in small rural schools. Gifted students in these rural high schools were less likely to experience the stigma of giftedness or to be categorized only as gifted, but to be appreciated for talents and their roles in multiple activities. The academic competition associated with the pursuit of being the valedictorian was viewed as positive in small rural schools and not as likely to be stressful, as reported by students in larger schools. Though gifted students may have fewer academic peers in small rural schools, they may have greater social latitude than might be experienced by gifted students in other environments because they are more likely to be treated as individuals. The challenge is to provide them with the rigor and breadth of opportunity needed to develop and nurture their giftedness. Online high school classes, Advanced Placement classes, and online college and university classes offer opportunities for gifted students to have appropriate education that was unavailable before the advent of widespread online teaching technology. In addition, summer camps and special gifted programs remain an important resource for youth isolated geographically to interact with their peers.

Virginia Burney

See also Online Gifted Education; Summer Camps; Summer Programs

Further Readings

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.

Burney, V. H., & Cross, T. L. (2006). Impoverished students with academic promise in rural settings: 10 lessons from Project Aspire. *Gifted Child Today, 29*(2), 14–21.

Colangelo, N., Assouline, S. G., & New, J. K. (1999). *Gifted education in rural schools: A national assessment*. Iowa City, IA: Belin-Blank International Center for Gifted Education and Talent Development.

Coleman, L. J. (1985). *Schooling the gifted*. Menlo Park, CA: Addison-Wesley.

Cross, T. L., & Burney, V. H. (2005). High ability, rural and poor: Lessons from Project Aspire and implications for school counselors. *Journal of Secondary Gifted Education, 16*(4), 148–156.

Cross, T. L., & Dixon, F. A. (1998). On gifted students in rural schools. *NASSP Bulletin, 82*(595), 119–124.

Cross, T. L., & Stewart, R. A. (1995). A phenomenological investigation of the "lebenswelt" of gifted students in rural high schools. *Journal of Secondary Gifted Education, 6*, 273–280.

National Center for Education Statistics. (2003). *Participation in education: Concentration of enrollment by race/ethnicity and poverty. Condition of education, 2003*. Retrieved December 12, 2005, from http://nces.ed.gov/programs/coe/2004/section1/table.asp?tableID=38

U.S. Census Bureau. (2000). *Adults with a high school diploma or GED* [Summary File 3 (SF3) GCT-P11. Language, School Enrollment, and Educational Attainment: 2000]. Washington, DC: U.S. Census Bureau.

S

SAT

The SAT, described in this entry, is one of two major tests designed to help colleges make admittance decisions. The other is the ACT. Although scores from either test are acceptable to college admission offices, there are regional patterns, with the SAT more commonly taken by students on the East and West coasts and the ACT by students in the middle of the country. In the 2006–2007 school year, the SAT Reasoning Test was administered to approximately 1.5 million students.

Purpose and Uses

The purpose of the SAT as stated by its sponsoring organization, the College Board, is to help "college admissions officers make fair and informed admissions decisions." The College Board stresses that the SAT should not be used by itself, but as one part of the entire admissions record. A closely related use is for awarding scholarships. For example, the PSAT, a preliminary version of the SAT administered primarily to high school sophomores and juniors, is used as the National Merit Scholarship Qualifying Test. Individual colleges often use the SAT as part of the process for determining merit-based scholarships.

The SAT is also used by guidance counselors as part of discussions regarding high school course readiness and career exploration. Colleges use SAT scores for recruiting and marketing purposes.

History

Content

The SAT started in 1926 as a very different test than its current version. The 1926 SAT consisted of 315 verbal reasoning and mathematics items administered in 97 minutes. Few if any of the 8,000 young men who took the test were expected to have enough time to answer all the questions.

In 1928, 1929, and 1936–1941, the SAT contained no mathematics items. Throughout the early years, the verbal reasoning items required examinees to select the correct response, but math items required examinees to produce a short answer. Beginning in 1942, all items used the multiple-choice format, allowing for more efficient scoring. In 1994, (machine scorable) short answer questions were reintroduced to the math section of the SAT.

The most recent changes to the content of the SAT were introduced in 2005 and are described in a subsequent section of this entry.

Name

Between 1926 and 1990, SAT was an acronym for Scholastic Aptitude Test. In 1990, the words associated with the acronym were changed to Scholastic Assessment Test. In 1994, the name of the test was changed to SAT, the letters no longer standing for any words.

Test Description

The SAT Reasoning Test consists of three measures: Critical Reading, Mathematics, and Writing.

Critical Reading

The critical reading measure consists of 48 passage-based reading items (traditionally called reading comprehension items) and 19 sentence completion items. Most of the items (approximately 70 percent) are used to assess the ability of a student to reason about the material read. The remaining items measure literal comprehension and vocabulary in context. Examinees have 70 minutes to answer the 67 items.

Mathematics

The mathematics measure consists of 44 multiple-choice items and 10 student-produced items. Examinees have 70 minutes to respond to the 54 items. The items cover a variety of mathematics topics—numbers and operations, algebra and functions, geometry and measurement, and data analysis, statistics, and probability.

Writing

The writing measure consists of an essay in response to an assigned topic and 49 multiple-choice items. Examinees have 25 minutes to write their essays and 35 minutes to respond to the multiple-choice items. The multiple-choice items require examinees to select ways to improve sentences, identify sentence errors, and improve paragraphs. The essay is scored by two readers, rating the essay based on the quality of the development and expression of a point of view on an issue. According to the College Board, a top score on the essay requires the student to demonstrate the following characteristics:

- Effectively and insightfully develops a point of view on the issue and demonstrates outstanding critical thinking, using clearly appropriate examples, reasons, and other evidence to support the student's position
- Is well organized and clearly focused, demonstrating clear coherence and smooth progression of ideas
- Exhibits skillful use of language, using a varied, accurate, and apt vocabulary
- Demonstrates meaningful variety in sentence structure
- Is free of most errors in grammar, usage, and mechanics

Score Scales

Each measure of the SATs is reported on a 200–800 score scale. Scores are rounded to the nearest 10. Several steps are performed to produce these scaled scores. First, the number of correct answers is counted for a section. Then, for multiple-choice items, one-quarter point is subtracted for each wrong answer (no points are subtracted for omitted responses). This adjustment, known as formula scoring, is performed to discourage random guessing in the hope of producing scores that more accurately reflect student achievement. Finally, the resulting formula score is mapped onto the 200–800 scale using a process called equating, which adjusts for any differences in the difficulty of the items in the form of a test given at a particular administration.

In addition to the scores for critical reading, mathematics, and writing, two subscores are reported for the writing measure—one 2–12 score for the essay that is the sum of the two reader scores, and a 20–80 score based on the multiple-choice items.

The current SAT critical reading and mathematics score scales were developed in 1995 so that the mean score of recent college-bound seniors was 500. A similar approach was used for the writing measure in 2005. The average scores will change every year based on differences in the population of students taking the test and the quality of the education and life experiences they have had. For college-bound students graduating in 2007, the averages were 502, 515, and 494 for critical reading, mathematics, and writing, respectively.

Percentile ranks (the percentage of students scoring the same or lower) are also provided for each scale score.

Technical Quality

The SAT is one of the most researched education tests in existence. Currently, the College Board

Web site provides more than 100 downloadable research reports on the SAT. A significantly larger number of research studies have been conducted by independent researchers.

The two most important characteristics of test scores are validity (does the test measure what it is purported to measure) and reliability (essentially, are test scores for individuals likely to be consistent across test editions and across time). Evidence regarding validity is complex and cannot be adequately summarized in the available space, but can be found in some of the reports provided by the College Board.

Reliability is typically measured on a scale that ranges from 0 to 1, with a 0 indicating scores are randomly inconsistent and a 1 indicating scores are perfectly consistent. For the test editions administered between March 2005 and June 2006, average reliability estimates were about .91, .92, and .90 for the critical reading, mathematics, and writing measures, respectively. When a composite score is used (either by summing the three measure scores or using statistically determined weights), the reliability of that composite would be higher.

Uses With Gifted, Creative, and Talented

Individually administered intelligence tests, such as the Wechsler Intelligence Test for Children, Stanford-Binet, or Das-Naglieri Cognitive Assessment Series, may be highly appropriate for identifying gifted children, but they must be administered by highly trained examiners and thus are much more expensive than are group-administered tests. On the other hand, most group-administered tests were not designed to differentiate among the most able examinees—designing a test to do so would weaken its discrimination power for the much larger group of test-takers in the middle of the distribution.

An alternative that can identify highly gifted students is to administer a test intended for older students. This approach has been used since at least 1972, when Julian Stanley initiated the Study of Mathematically Precocious Youth at Johns Hopkins University, using the SAT mathematics score as one of the criteria for selecting participants.

To maximize the efficiency of talent identification, several gifted and talented programs have chosen to use a two-tiered process. First students who *might* be among the most gifted are identified (for instance, based on norm-referenced school-administered tests or parent recommendations). As an example, the Center for Talented Youth (CTY) program at Johns Hopkins allows students in Grade 7 or 8 to apply if they have scored at or above the 95th percentile on an age or grade level appropriate nationally normed standardized test (the program also provides alternative ways to demonstrate equivalent merit). For these students the second stage requires taking the SAT or ACT, tests typically taken by students 4 or more years older who are in 11th or 12th grade. The CTY program only considers critical reading and mathematics scores from the SAT because these are most closely related to reasoning ability rather than educational achievement. In 2008, 7th-grade students must achieve a score of 550 in critical reading or mathematics, and 8-grade students must attain a score of 600 in critical reading or mathematics to qualify. The scores required of 7th-grade students are higher than those achieved by about 63 percent of all SAT test-takers. The scores required of 8th-grade students are higher than about 88 percent of all high school seniors.

In 1985, more than 80,000 children 13 or younger took the SAT. Based on data from 1999–2000 and 2000–2001, about 100,000 seventh graders and 33,000 eighth graders took the SAT each year. This number is continuing to grow. Most if not all of these tests are given as part of searches to identify highly talented youth.

Other academic talent search programs—such as the University of Iowa's Belin-Blank Exceptional Student Talent Search, Northwestern University Center for Talent Development, University of Denver Rocky Mountain Talent Search, and Duke University Talent Identification Program—all use a similar two-tiered approach.

In 1985, ETS performed a survey of these young test-takers and their parents. At that time, the sample was predominantly White (90 percent) with 2 percent identifying themselves as Black and 1 percent as Hispanic. The gender breakdown was approximately equal—48 percent boys and 52 percent girls. Their parents tended to be highly educated (for example, 65 percent of their fathers had attained at least a bachelor's degree, as opposed to 33 percent in a subsample of National

Assessment of Educational Progress (NAEP) test-takers who identified themselves as White.

Even at this young age, their aspirations were high, with 94 percent expecting to go to college and 43 percent expecting to attend graduate or professional school. Compared with the previously mentioned NAEP sample, this group spent more time doing homework and less time watching television, and had taken more advanced courses in their schools.

Neal Kingston

See also Study of Mathematically Precocious Youth; Talent Searches

Further Readings

College Board: http://www.collegeboard.com

College Board. *About the SAT*. Retrieved from http://www.collegeboard.com/student/testing/sat/about.html

Olszewski-Kubilius, P. (1994). Talent search: A driving force in gifted education. *Understanding Our Gifted, 6*(4), 1–3.

Saturday Programs

Considering the unique needs of gifted students, researchers and educators alike have supported the need for special academic programming for them. As schools are often unable to provide for these needs, special programs are routinely offered outside the normal school setting. One type of programming that remains popular with students and their parents is the Saturday enrichment courses offered through schools and universities. According to John Feldhusen, the founder of Purdue University's Super Saturday program, schools are often not equipped to offer gifted students the educational opportunities needed to meet their academic and social needs. However, because of the narrow focus afforded special Saturday programs, instructors are better able to match their curriculum to the specific needs and abilities of their gifted students. In addition, the ability to interact in these programs with intellectual peers enhances the gifted student's self-confidence, self-esteem, and motivation. This entry describes structures and benefits of Saturday programs, as well as professional development for teachers.

Program Structures

A search of Saturday program opportunities reveals a vast array of alternatives. The styles and structures offered are as varied as the organizations providing the opportunities. Individual schools and school districts often offer a menu of Saturday enrichment choices. Often these programs are not designed specifically for high-ability students but are available to the school's entire student body. As enrichment, they often are seen as fun, engaging activities with little consideration given to the unique needs of gifted students.

A second source for Saturday enrichment programs has come through colleges and universities (e.g., Georgia State University, Northwestern University, Purdue University, University of Cincinnati, University of Southern Mississippi). Most often offered through the university's school of education, there is a greater acknowledgment and understanding of the need for specific programming for gifted students including faster pacing of instruction and more complex materials (both in depth and breadth).

Many university programs attempt to identify students who are most in need of specific services because of their advanced abilities. This is generally done through standardized test scores, IQ scores, evidence of prior participation in gifted programs, and letters of recommendation. The stringency with which programs adhere to individual standards varies according to the program's goals and organization. Although most Saturday programs offer a wide variety of enrichment courses focused on individual student interests, others are targeted toward a specific academic area (e.g., mathematics) using curriculum at an appropriate pace for gifted students.

Saturday programs are presented in a wide range of formats. Some offer one class for a few hours for a single Saturday with individual classes on consecutive Saturdays offering several different enrichment options for the students. Other programs offer one course taken over a more expansive period, generally a few hours each Saturday for 6 to 8 weeks. As all programs are unrestricted by a standardized school curriculum, the instructors are

able to adjust their courses to meet the interests, ability, and pacing needs of their gifted students.

Benefits

Although research supports the positive effects in achievement for gifted students in other types of programs (e.g., pull-out and self-contained programs within the normal school setting and summer residential programs), a more limited body of knowledge is available concerning the specific benefits of Saturday programs. However, two recent studies, one that surveyed parents and the other that interviewed parents and students, indicated that students and parents felt students benefited from the challenge level of courses experienced in the Saturday programs. In addition, most parents believed the programs increased their children's motivation to learn as well as their academic confidence, especially as it applied to the specific subject matter studied. Parents also indicated that their children participated more in the Saturday classes than their regular classrooms and were more excited by the academic challenges offered. It was also noted that the variety of course offerings exposed the students to areas of study not found in the regular classroom.

Furthermore, many parents noted positive social and emotional outcomes of being with true academic peers. A small number of parents indicated that their children were not understood or accepted in the regular classroom, but identified with classmates in their Saturday programs. One parent went so far as to indicate that his daughter felt more "normal" in her Saturday classes. In addition, the students and parents emphasized the students' increased confidence in their academic abilities and the resulting increase in self-esteem.

Professional Development for Teachers

An added advantage to offering Saturday programming for gifted students is the practicum environment offered for teachers. Being exposed to the significant differences of gifted students as well as the opportunity to write curriculum that is appropriate for them affords teachers a strong professional development opportunity not found elsewhere. Some programs, such as the Purdue Super Saturday Program, offer this opportunity to preservice in addition to inservice teachers. The increased knowledge gained through the experience for the teachers is often translated into more appropriate experiences for gifted students in their standard classrooms.

Implications

High-ability students need access to curriculum that is appropriately challenging and paced. They also need to be exposed to peers who accept them and their abilities. Saturday programs afford a wealth of opportunities for students to grow academically as well as socially and emotionally. In addition, these programs offer practice in a unique environment in which teachers can become more aware of the needs of their gifted students.

Nancy J. Bangel

See also Academic Talent; Achievement Motivation; Creative Organizational Climate; Elementary Enrichment; Friendships; Middle School Enrichment; Parental Attitudes; Self-Efficacy/Self-Esteem; Teacher Training

Further Readings

Bangel, N. J., Enersen, D., Capobianco, B., & Moon, S. M. (2006). Professional development of preservice teachers: Teaching in the Super Saturday program. *Journal for the Education of the Gifted, 29,* 339–361.

Flack, J., & Friedberg, J. (1997). When children go to college on Saturday. *Teaching PreK–8, 27,* 44–46.

Olszewski-Kubilius, P., & Lee, S. (2004). Parent perceptions of the effects of the Saturday Enrichment Program on gifted students' talent development. *Roeper Review, 26,* 156.

Wood, B., & Feldhusen, J. F. (1996). Creating special interest programs for gifted youth: Purdue's Super Saturday serves as successful model. *Gifted Child Today, 19,* 22–25, 28–29, 40–42.

Savants

The term *savant* is borrowed from the French as a derivative of the verb *savoir,* which means "to know." *Savant* means "learned person" or "eminent scholar" and it has been in circulation in

English with a similar meaning since the 1800s. Its first use as part of the phrase *idiot savant* is jointly attributed to John Langdon Down, the physician who also identified the genetic disorder known as Down syndrome, and to Alfred Binet, the inventor of first intelligence test. Down first used the term *idiot savant* in 1887 to describe 10 cases of extraordinary individuals whom he encountered during his 30 years as the superintendent of London's Earlswood Asylum. In 1905, Alfred Binet also used the term *idiot savant* to describe cognitively impaired persons who showed an outstanding ability in a specific area. Even before the term *idiot savant* was used, however, there had been descriptions of savant skills in the scientific literature. As early as 1783, a German psychology journal published a case study of Englishman Jedediah Buxton's mathematical calculating skills, and in 1789, Benjamin Rush, founder of U.S. psychiatry, published a case study of the extraordinary calculating ability of his patient, Thomas Fuller.

Down used the term *idiot savant* to describe individuals of low cognitive functioning who carried a then-common clinical label "idiot," but who nevertheless possessed "savant" abilities in a certain area employing extraordinary memory. One of these cases was a cognitively disabled patient who could recite by heart Gibbon's enormous *Decline and Fall of the Roman Empire*. Down's original case studies have significance for our understanding of savant phenomena beyond their historical precedence; they also offer insight into the educational environment that may support savant talent. Earlswood Asylum under Down's leadership was an unusual place in an era when institutions served as holding facilities for the "feeble-minded," as cognitively disabled persons were called then. The residents of Earlswood were systematically educated, their special abilities nurtured, and they were treated by the staff with respect and were considered family members. Under these relatively favorable conditions, an extraordinary craftsman, James Pullen, called the "Genius of Earlswood," produced exquisite models and engravings of ships. In the United States, equally famous was Thomas "Blind Tom" Wiggins, a slave on a Georgia plantation, who in early childhood developed such an extraordinary musical talent that it brought him at age 11 to the White House to play the piano before President James Buchanan.

This entry describes the sociocultural context of savant ability, the nature and origins of savant skills, and future directions of savant research.

Sociocultural Context of Savant Ability

Until the Individuals with Disabilities Education Act of 1975 reshaped the treatment of persons with disabilities in U.S. life by requiring that they be educated in the least restrictive environment, most persons with cognitive disabilities spent their lives in institutions. Thus, the first cases of savant talent were usually described in an institutional context. Since 1975, the altered treatment context of disabled persons has had critical implications for understanding savant ability and developing educational approaches for individuals with savant talent. As children with savant skills grow up today as members of their families and the larger society, rather than as wards of institutions, educational approaches are much better suited to meet their complex special needs.

Nature and Origins of Savant Skills

Although the pejorative term *idiot savant* has given way to a more respectful *savant syndrome,* the definition continues to rely on a discrepancy-based model: to be diagnosed with a savant syndrome, one has to demonstrate intra-individual discrepancies in performance on standardized tests or common tasks across functional domains. For example, individuals are thought to have savant syndrome if they can carry out complex calendaric calculations but cannot solve simple arithmetic problems and have impaired communicative abilities. *Splinter skills* is another term used to describe such discrepancies in performance where functioning is dramatically uneven across different areas.

The five most common areas of savant skills are visual arts (drawing, painting, sculpture); music (composition and performance, most often on the piano); arithmetic (prime-number derivation); calendar (precise identification of the day of the week on which any date fell or will fall, regardless of the date's remoteness from the present); mechanics and space relations (special ability to memorize maps, directions, or to construct complex models or structures with great accuracy). The nonsymbolic,

concrete, and directly perceived nature of these skills has led neuroscientists to propose that savant skills are right hemispheric in type, compared with the left-hemispheric skills that are predominantly symbolic and linguistic. One currently debated theory of the origins of savant syndrome is that savant abilities are the result of an injury to the left hemisphere with the right hemispheric overcompensating. Additional insights into the left-hemispheric origins of savant skills come from studies of previously nondisabled persons who develop new extraordinary abilities after a brain injury. Individuals with frontotemporal dementia, for example, often have no history of artistic ability yet develop remarkable artistic talent as the dementia progresses.

Because autism is a condition that often involves a discrepancy between areas of functioning, most commonly between verbal and performance IQ, it is more often associated with savant syndrome than are other neurodevelopmental conditions. Survey studies suggest that approximately half of all persons with savant syndrome also have autism, and the other half have other forms of developmental disabilities and disorders or injuries to the central nervous system. This does not mean, however, that many persons diagnosed with autism possess savant skills. The misconception that persons with autism commonly have savant skills was reflected in the 1988 Hollywood film *Rain Man*. These cultural misconceptions influence the lives of gifted individuals who have been diagnosed with autism spectrum disorders.

For example, young jazz musician Matt Savage, who was diagnosed with a nonspecific pervasive developmental disorder at age 3, has been called a "musical savant" by specialists, whereas a young person who shows a similar extraordinary musical talent in the absence of a clinical diagnosis would be called a "musical prodigy." A leader of a jazz trio and a prolific composer with eight music CDs to his credit, Savage has performed with such world-famous jazz musicians as Dave Brubeck and Wynton Marsalis. Savage's path to musical giftedness started with hyperlexia, a condition characterized by spontaneous and precocious mastery of single-word reading that emerges in advance of reading comprehension. Hyperlexia has been receiving increasing attention from researchers because it seems to provide a key to understanding the special skills of those affected by autism.

The estimated prevalence of those with savant skills among individuals with autism is approximately 9.8 percent, but prevalence among those with cognitive impairments is approximately 0.06 percent. A challenge to these estimations has come with the expansion of diagnostic criteria for autism in the past decade, which may have led to a diagnostic migration from other disorders to the autism spectrum. In addition, standardized testing does not usually offer adaptations for difficulties in reading comprehension, semantic processing, and for sensory-motor challenges. Such impairments may significantly distort the estimates of intra-individual functioning for some individuals.

Future Directions

The question researchers continue to struggle with is "how are savants different from normally developing gifted persons!" especially when savant talents and skills prodigiously manifest in childhood. Another important question raised in the savant syndrome field is whether savant talent can lead to lifelong achievement. The music played by Savage's jazz trio and the remarkable achievements of others with extraordinary talents accompanied by developmental challenges suggest a positive answer to this question. Another question awaiting further research is whether and how savant talent is different from giftedness or even genius in people without developmental disabilities. These questions are consequential because they provide the ideological and ethical foundation for educational practices and for expansion of learning opportunities for those with savant skills. These questions address the core dilemmas of how educational institutions regard the potential contribution of students with special needs to the intellectual and cultural life of society.

Olga Solomon

See also Asperger's Syndrome; Autism; Genius; Prodigies

Further Readings

Heaton, P., & Wallace, G. L. (2004). Annotation: The savant syndrome. *Journal of Child Psychology and Psychiatry, 45*(5), 899–911.

Miller, L. K. (1999). The savant syndrome: Intellectual impairment and exceptional skill. *Psychological Bulletin, 125*(1), 31–46.

Treffert, D. A. (2006). *Extraordinary people: Understanding savant syndrome*. Lincoln, NE: iUniverse.

SCHOLARSHIPS

A *scholarship* is defined as a financial grant awarded to a student so the student can attend an educational program. This entry focuses on the wide variety of scholarships available across educational levels and across international, national, state, regional, and local geographical locations. Public and private scholarships are open to students across K–12, undergraduate, graduate, dissertation, postdoctoral, early scholar, and grant awards. Awards are tailored to academic, athletic, the arts, and specific-talent domain areas.

A variety of scholarships from small to large financial awards are options to which students can apply or be nominated. Savvy scholarship seekers are aware of opportunities on the local, state, and national arenas and actively stay abreast of changes by scanning the print and online environment.

Financial awards increase accessibility to educational programs beginning with early education programs for young children and continuing through middle and high schools and beyond for cocurricular activities. For applicants, past success may breed future success and a record of previous attainment of merit awards may positively affect an applicant's future attainment of other awards.

Preparations for Applications

Well-known scholarship awards such as the Truman, Goldwater, Fulbright, and Rhodes prizes should be planned for. Being competitive for a selective scholarship requires the same kind of preparation necessary to be competitive for admittance to a strong school. Such preparation requires that applicants recognize the domino effect of their actions and that by laying a strong foundation for the career that they intend to pursue, they will likely be good candidates for scholarships in that chosen field of study.

Preparation also includes the need to start early in preparing to compete for scholarships. Some scholarships require extra preparation, and applicants may need several months in advance of submitting the actual award application to complete the application package. Students should make appointments to meet with school counselors, teachers, administrators, past recipients, and college recruiters to discuss scholarship opportunities early in the school year and create a personal timeline for application preparation and submission for the academic calendar year.

To be an eligible scholarship candidate and maximize chances of receiving an award, it is necessary to develop and follow a plan for targeting and pursuing scholarships. Although most scholarships may be open to applicants, some scholarships require nominations for consideration. In these instances, interested applicants may want to consider approaching a teacher or administrator for consideration. To prepare for comprehensive scholarship applications, students may choose to start and keep up a "resume" folder that provides a place for them to store and reference their activities and reflective experiences that they may choose to cite in essays that ask applicants to write about their learning experiences. Applicants may also want to compose and regularly revise their personal written goals. This allows for ongoing reflection as well as inputs that may be used in creating essay responses.

Because some applications require references, applicants should think of three to five people with whom they have close relationships to serve as references for them. References should know the applicant well to write a letter that will be meaningfully revealing to the scholarship selection committee.

The following are some preparation tips for students who are considering applying for scholarships:

1. Research scholarship possibilities.
2. Develop career goals.
3. Organize existing knowledge base.
4. Identify knowledge gaps and educational needs to pursue career goals.
5. Describe immediate educational needs, discuss preparations for the future and how the student

will contribute through his or her career, discuss technical assistance needed, describe the student's plan for how to make change and communicate those ideas.

6. Integrate both short-term decision making and long-range planning.
7. Demonstrate excellence daily and illustrate that excellence in a well-crafted application packet.

Scholarship Opportunity Examples

A wide variety of scholarships are available for high-ability students across the K–12 spectrum for participating in educational programs. Scholarship awards have a variety of requirements. Although some are competitive based on merit excellence in a specific subject area, some are noncompetitive, and some are based on financial need. The following two examples of scholarships for gifted students are intended to provide a stimulus for researching other awards specific to the reader:

> Annual award for a Texas graduating high school senior who is gifted and talented. Applicants must demonstrate outstanding leadership.

> Davidson Fellows Award applications available for $50,000 and $10,000 scholarships. Applications for the Davidson Fellows Award are available for students under the age of 18 who have completed a significant piece of work in science, technology, mathematics, music, literature, or philosophy. Individuals named as Davidson Fellow Laureates receive $50,000 scholarships and those named as Davidson Fellows receive $10,000 scholarships. These scholarships may be used for tuition and related expenses at accredited institutions of learning. To be eligible, applicants must be under the age of 18 and be U.S. citizens or permanent U.S. residents. There is no minimum age for eligibility. Each submission must be an original piece of work recognized by experts in the field as "significant" and have the potential to make a positive contribution to society.

Becoming a Good Candidate

To be a good candidate for scholarships, applicants must strive for excellence in their activities. Many Web sites discuss tips or advice for putting forth the best foot in an application process. Expanding one's personal knowledge base through work, internship, and volunteer experiences in a specific field and across a variety of settings will enhance and inform a candidate's application. Applicants can develop relationships with people in their chosen career paths to discuss the details of preparing for a career in a specific area. These relationships provide opportunities for mentoring, networking, and potential references. Getting involved in interesting extracurricular activities that are personally meaningful will enrich personal and professional perspectives and can be described in scholarship essays. Seeking leadership opportunities within activities that are personally and professionally important provides opportunities for individual growth and transformation. Finally, to be competitive for scholarships, applicants should stay informed about the latest views and opinions in their field of choice and be able to discuss varying viewpoints.

Specific strategies to increase the chances of an individual student winning a scholarship may include the following:

- Apply for both large and small scholarships.
- Submit essays to contests.
- Know the eligibility requirements and deadlines for various scholarships. Students should always allow plenty of time to write and review their applications before the due date.
- Work on communication skills. Many scholarships require interviews.
- Students should not give up if they are turned down. Many highly qualified people are turned down at some point but go on to find other awards or opportunities that suit their interests.

Bronwyn MacFarlane

See also Academic Advising; Academic Talent; National Merit Scholarship Program; Presidential Scholars

Further Readings

Davidson Fellow Scholarships: http://www.davidsongifted.org/fellows
Hoagies Gifted Education Page, College Scholarships: http://www.hoagiesgifted.org/scholarships.htm

Jack Kent Cooke Foundation:
http://www.jkcf.org/scholarships
Karnes, F., & Riley, T. (2005). *Competitions for talented kids*. Waco, TX: Prufrock Press.

School Attitudes

Gifted and talented students grow up in a world of mixed messages where their gifted behavior is both expected, yet often, unaccepted. It's no wonder there is still a great mystery about why the attitudes of gifted and talented students differ. Much of the conflict gifted students experience in schools is a consequence of their advanced developmental rate and the emergence of more complex abilities and interests, which causes them to be "different" from the "expected" behavior of non-gifted students of the same age. Questions such as, "Why does one gifted and talented student achieve and flourish in most traditional educational settings, and yet another not?" remain unanswered. Sometimes educators encourage their students to be creative and show what they know, but other times such intelligence and creativity are ignored or met with negativity. Many characteristics of the gifted, including persistence, criticalness, and the tendency to master generalizations at the expense of detail, pose a number of difficulties for the classroom teacher. This entry explores the attitudes of schools, teachers, parents, and curriculum toward gifted and talented students.

School Attitudes

The culture and climate of the school needs to create a learning environment where the philosophy is that all students should be expected to develop their strengths and weaknesses to the fullest. Gifted students will need a nurturing school environment that respects differences among its students and strives to develop the "whole" student with every learning opportunity.

Appropriate expectations and learning experiences in school depend on accurate recognition of a child's performance level or potential. Schools often hold beliefs and attitudes that result in actions that can be damaging to the optimal growth of gifted children. There is a need for schools to value uniqueness and talent in all children and to nurture and respect giftedness wherever it is found. To make a positive difference in what all human beings can be and how much of their potential they can develop and enjoy, the limiting ideologies that include the notion that gifted students will survive because of their intelligence must be dispelled. Schools need to recognize that gifted and talented students think differently than do most students their own age and require modifications to curriculum, organizational structure, teaching methods, and social constructs to maximize their learning potential.

Currently, most schools provide programming for gifted students that includes enrichment, acceleration, or special grouping in settings, or a combination of these program organizations. For these program options to be successful, the gifted students' strengths need to be encouraged and developed; the learning environment needs to provide alternative learning opportunities for expanding knowledge cognitively, emotionally, and socially; individual differences such as interests, abilities, learning rates, and learning styles need to be addressed; and gifted students need to have contact with other gifted students to provide opportunities where they are challenged by the thoughts of their peers.

Teachers' Attitudes

One of the most important factors affecting the success of gifted and talented students in schools is the selection of high-quality teachers who understand the unique needs and characteristics of gifted students. These teachers, as well as all other teachers, need to view gifted students as they would any other valuable natural resource: to be conserved, developed, and used for the good of all. Teachers need to recognize that there are multiple kinds of giftedness and that there is no one preferred teaching method to teach gifted students.

Gifted and talented students want teachers who understand subject matter, make students feel significant by taking time to talk, provide access to additional learning, show a sense of humor, set high standards, provide constructive criticism, are sensitive to their social and emotional needs, and see students for who they are. In

addition, teachers who have no feelings of incompetence or failure if they do not know something about a gifted child's particular interests are more likely to be successful working with gifted and talented. The successful teacher is one who can allow the gifted student's intellect to fly higher than the teacher can ever hope to soar and take joy in playing a role in that effort. Being a continual learner is inescapable when teaching gifted and talented students.

Teachers of gifted and talented teachers also serve as the liaison between the school and the home. Many times when the school does not recognize the needs of gifted students, the teacher becomes the recipient of the parents' frustrations and quite often becomes the counselor for the parent with respect to recommending and suggesting what the parent should be doing at home to foster continued interest in school and encourage appropriate behavior in the classroom. Therefore, it is extremely important for teachers to become knowledgeable about coping strategies that can be applied both in school and at home to accommodate the behaviors and habits of gifted students that can become intolerable at times.

Parents' Attitudes

Parents have definite views on the learning needs of their children and understand that their child's learning needs are unique and different from the needs of their siblings. Parents also have opinions about how they can provide input into their child's education. This is why parents of gifted and talented students often become a strong "interest group" that applies pressure to local boards of education, school administrators, and teachers to provide what they believe are appropriate programs for their children and to have the opportunity to provide input before decisions are made that affect programs provided for gifted and talented students.

According to a study conducted by Nancy Hertzog and Tess Bennett, parents recognized that their children needed school environments that were challenging and stimulating and that their children needed opportunities to be creative. As a result, parents are often faced with having to make choices about their children's education (should the child attend the gifted pull-out program; should the child be accelerated, etc.). This same study also revealed that parents' perceptions of their child's needs are influenced by the availability of school and community resources, their values, and notions of giftedness. However, the data also showed that even though many programs for gifted and talented students focus on developing academics, parents were sensitive to the personal, emotional, and social needs of their child and would seek activities in art, music, drama, family trips and activities, and so on, outside the school to provide their child with well-rounded experiences.

Instructional Attitudes

The curriculum provides the framework for learning, and the curriculum shapes the organization and instruction that takes place in the classroom. The curriculum for gifted students must reflect what is happening in society and provide opportunities for students to apply what they are learning to real-life learning scenarios. Gifted students are often well read and are cognizant and knowledgeable about current events and what is happening in the world around them. Therefore, learning about current evens needs to be a part of the curriculum. Learning also needs to include the use of modern technology, reflecting what is being used in the "real world," so that students are prepared to acquire and evaluate information with expediency. Gifted students need to have a reason to become involved in the learning process or they will generally drift off on their own to find a purpose to pursue. Sometimes the curiosity of a gifted student enlisted by asking one essential question will be the driving force that takes the student far beyond the expectations of the learning scenario.

Successful teaching approaches for gifted students include activities where students must be creative, think critically, and be able to problem solve. Such activities should include the discussion of attitudes and values about self and social responsibility as well as incorporate research and study skills. Therefore, although many gifted students prefer to work independently of others in the class, they should at times work collaboratively with other students in cooperative learning groups. It is just as important for gifted students to develop

appropriate social skills as it is for them to be challenged academically. Teachers of gifted students must suspend judgment and practice generating essential questions that will cause gifted students to continue their exploration of viable solutions to the problem presented.

Outlook

The attitudes of gifted and talented students require teachers and schools to modify and adjust teaching techniques and the school learning environment to meet each student's individual needs. In addition to the cognitive needs of gifted and talented students, schools must address their emotional, social, and psychological needs. To do so, resources and a variety of programs for gifted and talented students need to be expanded and enhanced. Rather than believe that gifted and talented students will do just fine because they have an innate ability to be successful if they want to be, schools and educators must recognize that gifted and talented students will not reach their maximum potential unless their giftedness is cultivated.

JoAnn P. Susko

See also Academic Talent; Adolescent, Gifted; Asia, Gifted Education; Attitudes Toward Gifted; Canada, Gifted Education; Giftedness, Definition; Teacher Attitudes

Further Readings

Ambrose, D., Cohen, L., & Tannenbaum, A. (2003). *Creative intelligence: Toward theoretic integration*. Cresskill, NJ: Hampton Press.

Coleman, L., & Cross, T. (2003). *Being gifted in school* (2nd ed.). Waco, TX: Prufrock Press.

Hertzog, N., & Bennett, T. (2004, Winter). In whose eyes? Parents' perspectives on the learning needs of their gifted children. *Roeper Review, 26*(2), 96–104.

Tomlinson, C. (1999). *The differentiated classroom-responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

Tuttle, F., Becker, L., & Sousa, J. (1988). *Characteristics and identification of gifted and talented students* (3rd ed.). Washington, DC: National Education Association Press.

School Psychologists

School psychology is generally acknowledged as a general practice and health service provider specialty of professional psychology that is concerned with the science and practice of psychology with children, youth, and families; learners of all ages; and the schooling process. The basic education and training of school psychologists prepares them to provide a multitude of psychological services: psychological diagnosis, assessment, intervention, prevention, health promotion, and program development and evaluation services with a special focus on the developmental processes of children and youth within the context of schools, families, and other systems. School psychologists are prepared to intervene at the individual and system level, and to develop, implement, and evaluate preventive programs. In these efforts, school psychologists conduct ecologically valid assessments and intervene to promote positive learning environments within which children and youth from diverse backgrounds have equal access to effective educational and psychological services that promote healthy development.

School psychologists provide a variety of services for gifted, talented, and creative students. One of the most important is assessment. For schools that require intelligence testing for admission to gifted education programs, the school psychologist is usually the professional who administers and interprets the tests. In addition, school psychologists may be called on to consult with teachers and parents in designing individualized educational programs for gifted students who need special provisions to enhance their academic progress. Finally, twice-exceptional gifted students may need the services of school psychologists for the identification and treatment of and the referral for learning disabilities and psychological disorders.

This entry describes the background, education and training, and roles and functions of school psychologists.

Background

School psychology is not a new field. As early as 1898, the term *school psychologist* was used in print, with strong origins in Western Europe.

Alfred Binet's groundbreaking work on the development of mental ability in 1905, and the establishment of child development centers in the late 1890s and early 1900s in universities throughout Europe and North America spurred the emergence of school psychology as a discipline. In the mid-1950s, school psychology began to emerge as its own discipline, and in 1996, the International School Psychology Association (ISPA, founded in 1982) developed and adopted guidelines for the preparation of school psychologists.

International surveys of school psychologists reveal considerable diversity in how they are regulated and the orientation of their work. Recent data suggest that their diverse roles include focusing on a biologically based framework (providing basic care to children with severe mental or physical handicaps), efforts to socialize young children and provide vocational guidance to older individuals, educational and psychological assessments with an emphasis on special education issues, and the development and implementation of systems interventions (e.g., consultations, organizational development, research, and evaluation).

Education and Training

The academic and professional preparation and regulation of school psychologists varies considerably. In some countries, the equivalent of an undergraduate degree specializing in applied psychology is sufficient whereas in Canada and the United States more advanced graduate training is mandatory (there currently exists a controversy about whether a master's level or doctoral level certification should be required). Although the coursework and academic degrees needed to be recognized because school psychologists differ from country to country, the coursework and preparation has been quite similar. International guidelines for the preparation and certification of school psychologists have been proposed by the International School Psychology Association, the National Association of School Psychologists, and the American Psychological Association in the United States and the Canadian Association of School Psychologists and the Canadian Psychological Association in Canada.

The training of school psychologists draws from many different disciplines in both education and psychology: developmental psychology, psychopathology, personality, social psychology, biological and neurological bases of behavior, psychology of learning, clinical psychology, research and statistics, psychometry, psychiatry, early intervention, and curriculum design among others. Changes have occurred in diversity awareness, technological applications, increasing knowledge of cognitive science, and empirically based best practices in school psychology.

Roles and Functions

Much of the direct work and the roles and functions of school psychologists are often dictated by local job demands. Although most school psychologists work in educational environments (school systems with children and adolescents), others work in residential settings, mental health clinics, hospital or medical facilities, research units, universities, and state or federal departments of education.

A shifting of school-based psychological services appears to be occurring. In a recent report, the primary services provided by school psychologists included assessment (46%), consultation (16%), interventions (13%), counseling (8%), conferencing (7%), supervision (3%), parent training (3%), inservicing (2%), and research (1%). Today, most school psychologists appear to be engaged more often in consultation and other direct services than purely assessment work.

The changing roles and mandates of school psychologists parallel societal changes. Along with the emergence of special education services, school psychologists were required to play a diversified role. More than 70 percent of mothers of school-age children work outside the home and numerous parents of children of school age are divorcing; all of which are affecting the social and emotional development of their children. Technological and environmental changes have resulted in new childhood disorders (e.g., Internet addiction, gambling disorders). Significant legislative acts and ethical issues have similarly affected the roles and functions of school psychologists (especially in the applications of psychological assessments). All these changes have resulted in new challenges for school psychologists.

The school psychologist's role in helping serve students with special needs has not been diminished. Although the assessment function is abating in many jurisdictions, it nevertheless remains a principal role in identifying children with special needs. With respect to the gifted and talented, many school psychologists remain active in assessment strategies for placements, acceleration, or program development. Although the field of special education has witnessed a movement toward mainstreaming, children who are intellectually gifted and talented still require special services to optimize their educational, social, and emotional needs. School psychologists can play an important role in assessing intellectual giftedness, creativity, and talent as well as in providing support for the individual, the child's parent, and the educational system.

Jeffrey L. Derevensky

See also Administrative Attitudes; Guidance; Identification; Intelligence Testing

Further Readings

American Psychological Association. (2006). *Archival description of school psychology.* Retrieved from http:/www.apa.org/crsppp/schpsych.html

Cunningham, J. (2006). Centripetal and centrifugal trends influencing school psychology's international development. In S. R. Jimerson, T. D. Oakland, & P. T. Farrell (Eds.), *The handbook of international school psychology* (pp. 463–474). Thousand Oaks, CA: Sage.

Cunningham, J., & Oakland, T. (1998). International School Psychology Association guidelines for the preparation of school psychologists. *School Psychology International, 19,* 19–30.

Fagan, T. K., & Wise, P. S. (2007). *School psychology: Past, present and future* (3rd ed.). Bethesda, MD: National Association of School Psychologists.

Oakland, T. (2007). International school psychology. In T. K. Fagan & P. S. Wise (Eds.), *School psychology: Past, present and future* (3rd ed., pp. 339–365). Bethesda, MD: National Association of School Psychologists.

Reynolds, C. R., & Gutkin, T. B. (1999). *The handbook of school psychology* (3rd ed.). New York: Wiley.

Thomas, A., & Grimes, J. (Eds.). (2002). *Best practices in school psychology, IV* (Vol. 1 & 2). Bethesda, MD: National Association of School Psychologists.

Ysseldyke, J. E., Burns, M., Dawson, P., Kelley, B., Morrison, D., Ortiz, S., et al. (2006). *School psychology: A blueprint for training and Practice III.* Bethesda, MD: National Association of School Psychologists.

Schoolwide Enrichment Model

Joseph Renzulli and Sally Reis developed the *schoolwide enrichment model* (SEM) to encourage and develop creative productivity in young people. The SEM is based on Renzulli's *enrichment triad model* and it has been implemented in more than 3,000 schools across the United States and has continued to expand internationally. The effectiveness of the model has been studied during more than 30 years of research and field-testing about (a) the effectiveness of the model as perceived by key groups, such as principals; (b) student creative productivity; (c) personal and social development; (d) the use of SEM with culturally diverse or special-needs populations; (e) student self-efficacy; (f) the SEM as a curricular framework; (g) learning styles and curriculum compacting; and (h) longitudinal research on the SEM. This research on the SEM suggests that the model is effective at serving high-ability students and providing enrichment in a variety of educational settings, including schools serving culturally diverse and low socioeconomic populations. This entry describes the theoretical underpinnings of the SEM, identification of the talent pool, components of SEM, and Renzulli Learning.

Theoretical Underpinnings

The SEM is based on Renzulli's three-ring conception of giftedness that defines gifted behaviors rather than gifted individuals and the enrichment triad model. The SEM is currently used as the basis for many gifted programs, enrichment programs, magnet schools, charter, and theme schools. The original enrichment triad model is the core of the SEM. Type I enrichment is designed to expose students to a wide variety of disciplines, topics, occupations, hobbies, persons, places, and events that would not ordinarily be covered in the regular curriculum. Type II enrichment includes materials

and methods designed to promote the development of thinking and feeling processes. Some Type II enrichment is general, consisting of training in areas such as creative thinking and problem solving, learning how to learn skills such as classifying and analyzing data, and advanced reference and communication skills. Type III enrichment involves students who become interested in pursuing a self-selected area and are willing to commit the time necessary for advanced content acquisition and process training in which they assume the role of a firsthand inquirer.

The SEM focuses on the development of both academic and creative-productive giftedness. Creative-productive giftedness describes those aspects of human activity and involvement where a premium is placed on the development of original material and products that are purposefully designed to affect one or more target audiences. Learning situations designed to promote creative-productive giftedness emphasize the use and application of information (content) and thinking skills in an integrated, inductive, and real-problem-oriented manner. In the SEM, academic gifts are developed because the role of the student is transformed from that of a learner of lessons to one in which she or he uses the modus operandi of a firsthand inquirer to experience the joys and frustrations of creative productivity. This approach is quite different from the development of giftedness that tends to emphasize deductive learning, advanced content and problem solving, and the acquisition, storage, and retrieval of information. In other words, creative-productive giftedness enables children to work on issues and areas of study that have personal relevance to them and can be escalated to appropriately challenging levels of investigative activity.

Identification of Talent Pool

The SEM has three major goals that are designed to challenge and meet all of the needs of high-potential, high-ability, and gifted students and, at the same time, provide challenging learning experiences for all students. In the SEM, a talent pool of 10 to 20 percent of above-average ability/high-potential students is identified through a variety of measures including the following: achievement tests, teacher nominations, assessment of potential for creativity and task commitment, and alternative pathways of entrance (self-nomination, parent nomination, etc.). High-achievement tests or IQ test scores automatically include a student in the talent pool, enabling those students who are underachieving in their academic schoolwork to be included.

Components

The SEM has three components that provide services to students: the Total Talent Portfolio, Curriculum Modification and Differentiation, and Enrichment (see Figure 1). These three services are delivered across the regular curriculum, a continuum of services, and a series of enrichment clusters. Once students are identified for the talent pool, they are eligible for these services. First, interest and learning styles assessments are used with talent-pool students, in the development of a total talent portfolio for each student. Style preferences include projects, independent study, teaching games, simulations, peer teaching, programmed instruction, lecture, drill and recitation, and discussion.

Second, curriculum compacting and other forms of modification are provided to all eligible students for whom the regular curriculum must be adjusted. This elimination or streamlining of curriculum enables above-average students to avoid repetition of previously mastered work and guarantees mastery while finding time for more appropriately challenging activities. A form, entitled the Compactor, is used to document which content areas have been compacted and what alternative work has been substituted.

Third, a series of enrichment opportunities organized around the *enrichment triad model* offer three types of enrichment experiences through various forms of delivery, including enrichment clusters. Types I, II, and III enrichment are offered to all students; however, Type III enrichment is usually more appropriate for students with higher levels of ability, interest, and task commitment.

In the SEM, teachers are encouraged to work with students to help them better understand three dimensions of their own learning: their abilities, interests, and learning styles. This information, focusing on their strengths rather than on deficits, is compiled into a total talent portfolio that can be

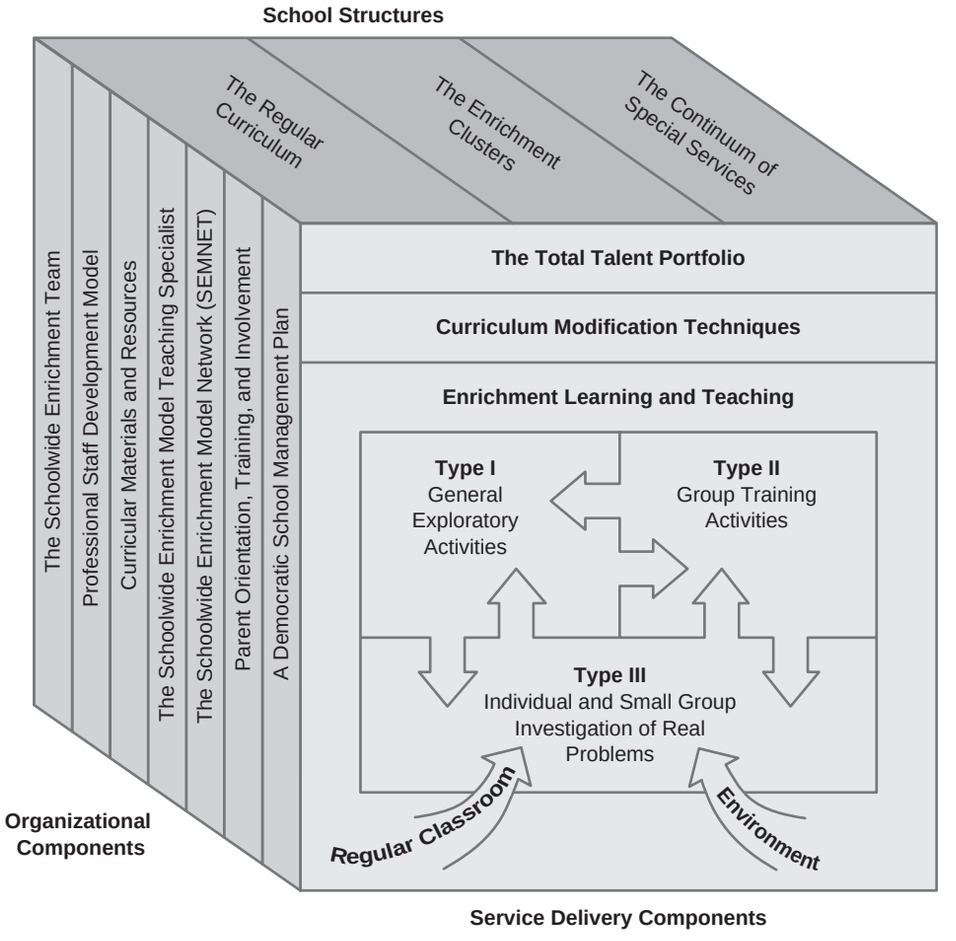


Figure 1 The Schoolwide Enrichment Model

Source: Renzulli, J. S., & Reis, S. M. Available from http://www.gifted.uconn.edu/sem/semexec.html

subsequently used to make decisions about talent development opportunities in regular classes, enrichment clusters, or in the continuum of special services. The ultimate goal of learning that is guided by these principles and the SEM is to replace dependent and passive learning with independent and engaged learning. The three service delivery components of the SEM (total talent portfolio, curriculum compacting, and enrichment teaching and learning) are applied to three school structures: the regular curriculum, enrichment clusters, and a continuum of services.

The Regular Curriculum

The regular curriculum consists of everything that is a part of the predetermined goals, schedules, learning outcomes, and delivery systems of the school. The regular curriculum might be traditional, innovative, or in the process of transition, but its predominant feature is that authoritative forces (i.e., policymakers, school councils, textbook adoption committees, state regulators) have determined that the regular curriculum should be the centerpiece of student learning. Application of the SEM influences the regular curriculum in three ways: through processes such as curriculum compacting and textbook content modification procedures; systematic content intensification procedures used to replace eliminated content with selected, in-depth learning experiences; and the types of enrichment recommended in the enrichment triad model that can be integrated selectively into regular curriculum activities.

The Enrichment Clusters

The enrichment clusters, a second component of the SEM, are nongraded groups of students who share common interests, and who come together during specially designated time blocks during school to work with an adult who shares their interests and who has some degree of advanced knowledge and expertise in the area. Enrichment clusters usually meet for a block of time weekly during a semester. All students complete an interest inventory developed to assess their interests, and an enrichment team of parents and teachers tally all the major families of interests. Adults from the faculty, staff, parents, and community are recruited to facilitate enrichment clusters based on these interests, such as creative writing, drawing, sculpting, archaeology, and other areas. Training is provided to the facilitators who agree to offer the clusters, and a brochure is developed and sent to all parents and students that summarizes student choices of enrichment clusters. Students select their top three choices for the clusters and scheduling is completed to place all children into their first or, in some cases, second choice. Like extracurricular activities and programs such as 4-H and Junior Achievement, the main rationale for participation in one or more clusters is that students and teachers want to be there. All teachers (including music, art, physical education) are involved in facilitating the clusters, and their involvement in any particular cluster is based on the same type of interest assessment that is used for students in selecting clusters of choice.

The Continuum of Special Services

A broad range of special services is the third school structure targeted by the SEM. Although the enrichment clusters and the SEM-based modifications of the regular curriculum provide a broad range of services to meet individual needs, a program for total talent development still requires supplementary services that challenge the most academically talented young people who are capable of working at the highest levels of their special interest and ability areas. These services, which cannot ordinarily be provided in enrichment clusters or the regular curriculum, typically include the following: individual or small group counseling, various types of acceleration, direct assistance in facilitating advanced level work, arranging for mentorships with faculty members or community persons, and making other types of connections between students, their families, and out-of-school persons, resources, and agencies.

Direct assistance also involves setting up and promoting student, faculty, and parental involvement in special programs such as Future Problem Solving, Odyssey of the Mind, the Model United Nations program, state and national essay competitions, and mathematics, art, and history contests. Another type of direct assistance consists of arranging out-of-school involvement for individual students in summer programs, on-campus courses, special schools, theatrical groups, scientific expeditions, and apprenticeships at places where advanced-level learning opportunities are available. Provision of these services is one of the responsibilities of the schoolwide enrichment teaching specialist or an enrichment team of teachers and parents who work together to provide options for advanced learning.

Renzulli Learning

Renzulli Learning is a new, interactive online program that helps the implementation of SEM by matching student interests, expression styles, and learning styles with a vast array of enrichment educational activities and resources, designed to enrich gifted and high-potential students' learning process. Using Renzulli Learning, students explore, discover, learn, and create using the SEM married to the most current technology resources independently and in a safe environment.

Renzulli Learning has simple online tools that relate to SEM. The Renzulli Profiler is an interactive assessment tool that identifies students' talents, strengths, interests, and preferred learning and expression styles to provide a comprehensive student learning profile. The Renzulli Enrichment Database is an information warehouse containing more than 35,000 carefully screened, grade-level appropriate, child-safe enrichment opportunities, which are regularly monitored, updated, enhanced, and expanded at a rate of more than 500 per month. The Wizard Project Maker is an online project tool that helps students create their own high-interest projects and store them in their own talent Portfolios. More than 100 Super Starter

Projects have been added to the Project Maker to enable students to begin the process of doing projects on a small-scale basis, and then after students have learned how to do short-term projects, they will be able to do projects more independently.

Collectively, the components of Renzulli Learning correlate with the SEM to provide both students and teachers with unique educational experiences, directly suited to their unique learning profiles, while giving parents insights about their child's enrichment needs. Renzulli Learning also helps all teachers better understand and know their students and meet their diverse needs. Perhaps the most significant aspect of the Renzulli Learning system is its emphasis on a student's strengths. Many adjunct educational programs focus on finding and correcting weaknesses and liabilities. Renzulli Learning celebrates and builds on students' strengths, abilities, and interests, in the tradition of SEM. This Web-based online program matches students' interests, learning styles, expression styles, abilities, and grade level to thousands of opportunities designed to provide enriched, challenging learning. It gives teachers a virtual equivalent of multiple "teaching assistants" in their classrooms—each and every day—to implement the SEM. Other resources to implement the SEM are available online at Creative Learning Press, where how-to books have been collected to make the implementation of SEM easier.

Sally M. Reis

See also Creative Productivity; Elementary Enrichment; Enrichment Triad Model; Talent Development

Further Readings

Creative Learning Press: http://www.creativelearningpress.com

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting: The complete guide to modifying the regular curriculum for high ability students*. Mansfield Center, CT: Creative Learning Press.

Reis, S. M., & Renzulli, J. S. (2003). Research related to the schoolwide enrichment triad model. *Gifted Education International, 18*(1), 15–40.

Renzulli, J. S., Gentry, M., & Reis, S. M. (2002). *Enrichment clusters: A practical plan for real-world, student-driven learning*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., & Reis, S. M. (1994). Research related to the schoolwide enrichment triad model. *Gifted Child Quarterly, 38*(1), 7–20.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Renzulli Learning: http://renzullilearning.com

Science, Curriculum

Science curriculum is the portal through which everyone achieves the basic science literacy required for life in our increasingly technological world. Curriculum, often defined as a course of study or set of courses, is the result of a design process that includes all of the methods, materials, and media used to transmute raw scientific knowledge, the content, into a set of learning experiences. As cognitive psychologists and neuroscientists have shown, learning is a change that occurs when people experience events that forge new neural pathways and change the structure of their brains in ways that enable them to accomplish tasks they were previously incapable of performing. Learning literally changes the physical structure of students' brains.

One of the most important breakthroughs in learning has been the research on experts and how they gain their expertise. The development of expertise serves as a good model for science curriculum for gifted students for two main reasons. First, the study of experts shows what successful learning looks like. Experts are, by definition, people who function at a high level within a domain of knowledge. Implicit within this idea is an emphasis on actively solving problems or designing new creations, rather than merely answering questions of the type that appear on standardized tests. After all, a scientist is someone who discovers something new.

Also, the expertise research lifts the focus of curriculum to the development of process skills and metacognitive skills (i.e., thinking about thinking), which form *procedural knowledge,* what cognitive psychologists term how-to-do-it knowledge.

Procedural knowledge, the cognitive backbone of expertise, is the knowledge of how to accomplish key tasks and goals, which has become so deeply ingrained as to become an automated and unconscious skill. Procedural knowledge, developed through years of challenging deliberate practice sessions, is estimated to account for 50 to 90 percent of the performance of experts. This is the skill of the major league outfielder who, hearing the crack of the bat, races for the fences and catches the ball over his shoulder on the run.

Most curriculum and most state standards focus on *declarative knowledge,* the term for the conscious knowledge of the facts, concepts, and principles of a domain, the knowledge that allows us to answer test questions. This is why many students who have scored highly on science tests in high school encounter serious difficulty in college lab courses that require facility with lab equipment and science process skills. Expertise is the development of extensive networks of procedural knowledge in a domain, guided by highly developed metacognitive skills or the executive control functions, and richly studded with extensive declarative knowledge and cross-linked to be available when needed. To be most effective, this declarative knowledge must be linked to the key points on the procedure where they will be applied. This expertise is exemplified in the movie *Apollo 13* by the skill of the NASA engineers, who were told, "Houston, we have a problem" and creatively solved the air quality crisis, along with many others, to bring the spacecraft home safely.

An ideal curriculum for gifted, creative, and talented students develops the ability to systematically test hypotheses and construct explanations, along with a solid grasp of the main theoretical frameworks of the physical sciences, the life sciences, and the earth sciences. For all students, this forms the basis of scientific literacy, a core of knowledge, skills, and attitudes that will enable them to function at a high level in a society built on scientific knowledge and the technological products of that knowledge. For other students, scientific literacy is the starting point in a career-long quest to add to scientific knowledge or to develop that knowledge in some way to meet the needs of humanity.

An ideal science curriculum organizes and sequences a powerful set of transformative learning experiences into an effective and efficient overarching architecture of cognition. Although there is much to say about good curriculum and good science curriculum, two key ideas form twin pillars, each supporting the other and both constituting a foundation for an ideal curriculum. One idea, differentiation, comes from exceptional teachers, curriculum developers, instructional designers, and leading educators. The other, inquiry science, emerges from the work of master science teachers, scientists, and science educators. Both are rooted in our scientific knowledge about human learning and exemplified by the learning of experts, which is not the goal for everyone, but a path all can follow as long as desired. This entry describes these aspects of an ideal science curriculum

Inquiry Science

Experienced science teachers, scientists, science educators, and science curriculum developers generally agree that the best way to learn science is by doing science. This general approach, called for in the National Science Education Standards, is called *inquiry science*. Inquiry science seeks to emulate the processes of investigation used by scientists and focuses on teaching students to use those processes, practices, principles, and tools. Although students read and write in inquiry science, the main emphasis is not on reading chapters of a textbook and writing the answers to the questions at the end of the chapter. Reading books about the strategies, techniques, rules, and history of basketball is useful to a player, but no substitute for the core of the game, which is playing. The same is true of science.

Inquiry science also goes beyond a merely hands-on approach to science, where students engage in science activities using the tools and materials of science, but do so with little critical or creative thought. Inquiry includes asking questions, creating tests to answer those questions, running those tests and collecting the data, analyzing the data, and proposing explanations for what has been discovered, all in the context of comparing ideas and findings to those of others within a framework of logic and evidence. Inquiry science is centered on conducting experiments and investigations to answer questions.

Inquiry may best be thought of as a continuum of scaffolded processes and habits of mind,

beginning with young children in preschool exploring how balls roll down ramps to see what happens, through middle school students investigating Newton's laws of motion by measuring velocity and a mass of balls rolling down ramps, to graduate students participating in original research projects with their professors mapping differences in the earth's gravity field. The key to inquiry science is a talented teacher who has both deep scientific knowledge in say, physics, for example, and extensive pedagogical content knowledge about how students learn physics, what their common misconceptions are, multiple content representations, cool demonstrations, and a ready supply of answers to frequently asked questions. Though inquiry science will be centered on the investigation, rather than on the textbook, the lecture, or the test, talented teachers may make use of textbooks, lectures, and tests as part of a broader approach to inquiry.

Differentiation

A differentiated science curriculum is designed to meet the range of needs and abilities of the students in the classroom. A differentiated curriculum offers an extensive and rich "network" of science content with variety in the level of difficulty of the content modules, pathways through that content, methods to explore that content, and means to assess learning outcomes. For example, a differentiated science curriculum unit might allow a student to move through the unit learning modularized chunks of content at his or her own pace, rather than moving in lockstep with every other member of the class.

Furthermore, different students might start in different places along the curricular path because their prior knowledge or experience would allow them to demonstrate their mastery of certain content modules. One hallmark of a differentiated curriculum is placing students at the appropriate level in the content material. Going farther still, this differentiated science curriculum might not be a simple linear set of content modules leading to mastery of a single set of learning goals, but it might be a true network of modules with more than one module covering certain content objectives in different ways and in different depths. This would open the possibility of different pathways through the curriculum; each student would not work in all the modules in the network, but would make choices based on her or his needs, abilities, and learning profile. For example, in a middle school chemistry curriculum unit, the base level expectation would be that each student would master the concept of *concentration of a solution* and would either work with that module or demonstrate mastery, perhaps by "testing out."

Some students, those who might want to delve as deeply as possible in chemistry, might work with a module introducing the Avogadro's number and the concept of the mole. These might be students who quickly worked through the base level module or those who skipped the base level module because they already knew the material. This also implies differentiation in learning outcomes. This would mean that although a base level of learning outcomes or standards for all students was defined for a grade level, different students would be free to achieve as far beyond that base level as their ability and interest could take them. Different students always learn different amounts of material in every classroom; a differentiated curriculum might make this different explicitly and plan for it, rather than ignoring it or pretending everyone learned exactly what the state or district standard said they should, no more and no less.

In conceiving a differentiated science curriculum as a large network of learning modules or lessons, the need for both articulation and integration are obvious. *Articulation* refers to the linkage between succeeding levels in the curriculum, as when the fourth-grade life science curriculum dovetails neatly with the fifth-grade life science curriculum, with just enough overlap to make the connection and no gaps where fifth-grade students are presumed to know something that has not been covered in earlier curricula. Textbook series often perform this role, but an inquiry-centric curriculum needs to make an independent check for articulation.

Likewise, a differentiated science curriculum can provide a sound basis for integrating learning areas. *Integration* can be thought of as the linkage among curriculum areas, such as the chemistry and biology, for example. Ultimately, integration seeks to link all the curricular areas, including language arts, social studies, and even physical education with the sciences. Some curricular areas are so

closely related that many programs build on those relationships, such as the science, technology, engineering, and mathematics (STEM) programs. Integrating the humanities with the sciences works well when exploring the logical connections between the disciplines, such as investigating the effects of families, communities, and governments on global climate change and vice versa. Integration requires much planning by curriculum developers and teachers, and requires much classroom time to make effective linkages. However, research on learning shows that although an alarming amount of what is taught in school is soon forgotten, one of the factors that increases the retention is packaging learning experiences to touch multiple knowledge areas or integration.

Inquiry and Differentiation: Complementary Practices

Inquiry and differentiation share many common features. Both require identifying learning goals and relevant educational standards for a range of student outcomes at the outset to guide instruction. Both require instructionally useful assessment methods that measure student progress not only at the end of instruction, but along the way to adapt instruction to meet student needs. An emphasis on mastery learning and a bias for depth of learning over thinly "covering" the "standard of the day" are philosophically compatible with both inquiry and differentiation.

Teaching with inquiry naturally tends to differentiate instruction for students, and differentiation naturally tends toward inquiry. Use of a wide range of media and computer technology, along with the authentic tools and techniques of science support both these practices. Both are challenging to implement and require effective classroom management practices, as well as strong, experienced teachers. Each of these systems exists along a continuum practice, and each is most successfully implemented in stages. Both inquiry and differentiation evolved to align with our knowledge of how people learn and about the most effective instructional techniques. Finally, working together, each will strengthen and improve the other, as well as better gifted, talented, and creative students.

Fred Estes

See also Brain-Based Research; Chemistry Curriculum, Gifted; Cognition; Curriculum Models; Declarative and Procedural Memory; Differentiation; Expertise; Inquiry; Learning; Parallel Curriculum Model

Further Readings

Bransford, J., Brown, A., & Cocking, R. (Eds.). (1999). *How people learn: Brain, mind, experience, and school.* Washington, DC: National Academy Press.

Estes, F. (2007). Inquiry science for young gifted students: The pleasure of finding things out. *Gifted Education Communicator, 38*(4), 3–5.

Flick, P., & Lederman, N. (Eds.). (2006). *Scientific inquiry and nature of science: Implications for teaching, learning, and teacher education.* New York: Springer.

Jarrett, D. (1997). *Inquiry strategies for science and mathematics learning: It's just good teaching.* Portland, OR: Northwest Regional Educational Laboratory.

Olson, S., & Loucks-Horsley, S. (Eds.). (2000). *Inquiry and the national science education standards: A guide for teaching and learning.* Washington, DC: National Academy Press.

Tomlinson, C., Kaplan, S., Renzulli, J., Purcell, J., Leppien, J., & Burns, D. (2002). *The parallel curriculum: A design to develop high potential and challenge high-ability learners.* Thousand Oaks, CA: Corwin Press.

VanTassel-Baska, J., & Little, C. (Eds.). (2003). *Content-based curriculum for high ability learners.* Waco, TX: Prufrock Press.

Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd ed.) Alexandria, VA: American Society for Curriculum Development.

Science Talent Search Winners

The Science Talent Search (STS), America's oldest and most prestigious nationwide precollege competition, was initiated in 1942 by the Society for Science and the Public (called Science Service until 2008). The Society for Science and the Public is a nonprofit organization dedicated to the advancement of scientific knowledge through publications and educational programs such as science fairs and scholarship competitions.

Watson Davis, former director of Science Service beginning in 1928 and publisher of *Science News,* wanted to bridge the gap between the scientific community and the general public. To do this, Davis collaborated with the American Institute of the City of New York in 1941 to organize 800 existing science clubs throughout the country. Science Service linked these science clubs with museums, and other educational and scientific institutions and societies, resulting in expansion to 25,000 clubs. Various national meetings of regional and local science fair winners evolved into the STS competition and the International Science and Engineering Fair, also organized by the Society for Science and the Public.

In 1998, Intel took over support of the competition from Westinghouse, and has now involved more than 120,000 students looking to pursue careers in science, mathematics, engineering, and medicine. Academically gifted high school seniors compete for more than 3.8 million dollars in scholarship funds as well as financial assistance for college tuition. This entry describes the selection process, outcomes, the role of STS in gifted education, and research conducted on winners.

Selection Process

In November, students submit an entry form consisting of advisor recommendations, high school transcripts and test scores, and a research report. The research report describes an independent research project that is designed to display students' creativity and enthusiasm for one or more of 16 selected areas of science: behavioral and social sciences, biochemistry, bioinformatics and genomics, botany and plant science, chemistry, computer science, earth and planetary science, engineering, environmental science, mathematics, medicine and health, microbiology, materials science, physics, space science, and zoology and animal sciences.

Students entering the STS must be seniors in high school in the United States, Puerto Rico, Guam, Virgin Islands, American Samoa, Wake, the Midway Islands, or the Marianas. Contestants can also be enrolled in a foreign school as an exchange student or because their parents are temporarily working or living abroad. Students cannot be the children of any STS employee, evaluators, or judges or have previously entered the STS.

The first round of STS involves selecting 300 semifinalists based on project reports evaluated by three or more scientists, mathematicians, or engineers. Those 300 papers are then narrowed down to 40 finalist papers. In March, the 40 finalists participate in a Science Talent Institute in Washington, D.C., all expenses paid. Finalists undergo an ultimate evaluation process that includes extensive interviews and a presentation of their research before judges that include top scientists from a variety of disciplines. Candidates are also given the opportunity to display their projects at the National Academy of Science in front of thousands of visitors, governmental heads, and scientific figures. In the past, contestants have met with the president as well as presidential candidates. At the conclusion of the contest, the top 10 finalists are announced at a banquet honoring the contestants.

Outcomes

STS winners have gone on to receive more than 100 honors in mathematics and science. By 2007, these included 6 Nobel Prizes, 2 Field Medals (the Nobel's equivalent in mathematics), 3 National Medals of Science, 56 Sloan Research Fellowships, and 12 MacArthur Foundation's genius awards. In addition, by 2007, 32 winners had been elected to the National Academy of Sciences as well as 5 to the National Academy of Engineering. According to data collected by Science Service, more than 95 percent of former finalists pursued careers in science, more than 70 percent go on to receive M.D.s and Ph.D.s, and many are engaged in research at top universities and colleges.

Roles in Gifted Education

Gifted education has three major strands. One is focused on addressing the school-based needs of students who are performing beyond their classmates in academic subjects. A second addresses the needs of students who score highly on tests designed to measure intellectual or academic potential. A third strand that has been of increasing interest in recent years is on talent development in specific domains. The talent development literature focuses on talent identified on the basis of a

challenging apprenticeship, coaching, or mentorship in a specific domain. The STS personifies this process by engaging young scientists to work in a mentored apprenticeship on a scientific paper. Some participants submit projects they have developed entirely on their own, but most work in a laboratory or other venue with professionals becoming socialized into the scientific enterprise. Even those who submit solo papers work with teacher assistance on the technical aspects of writing the paper. Another component of talent development is engaging with a challenging peer group. STS provides such a peer group to finalists by way of the Science Talent Institute week in Washington.

Research Conducted on Winners

Most of the research published on STS winners has been conducted by Rena Subotnik and her colleagues, and by Gregory Feist. The following paragraphs review briefly the outcomes of their work.

Subotnik and her colleagues, Karen Maurer and Cynthia Steiner, identified the variables that led to the retention and attrition in science of the 1983 winners of the Westinghouse Science Talent Search. The results of three earlier collection points established patterns of external and internal influences on participation in either the research sciences, into applied sciences (e.g., medicine, engineering), or out of the field altogether. At age 34, a disproportionate number of participants had left science altogether, especially the women. Some of the key reasons for the attrition, and conversely for retention, included these:

- Availability of mentors who could provide intellectual challenge, role modeling, professional connections, and tacit knowledge.
- View of the lifestyle associated with science as either one of isolation, brutal competition, and dead ends—or one of excitement, competition, and collegiality.
- Effects of time and place in history can ensure or prevent the existence of available positions in academe and industry that are challenging, creative, and well funded.

Feist conducted a comparison study of samples from four cohorts of Westinghouse winners and members of the National Academy of Sciences. As in the Subotnik study, women were more likely to leave science careers than were men. However, the cohorts that Feist reviewed were more likely to continue in science careers than the 1983 cohort investigated by Subotnik. In educational accomplishment, 91 percent of the men and 74 percent of the women earned doctoral degrees. Most intriguing is the association Feist found between immigrant status and scientific achievement in both prestigious study samples, with children of recent immigrant families disproportionately represented.

Rena F. Subotnik and Cari McIntyre

See also Scientifically Gifted; Scientists; Talent Development; Talent Searches

Further Readings

Feist, G. (2006). The development of scientific talent in Westinghouse finalists and members of the National Academy of Sciences. *Journal of Adult Development, 13,* 23–35.

Mlot, C. (1997). Is science talent squandered? How future scientists can come undone. *Science News, 51,* 338.

Society for Science and the Public: http://www.societyforscience.org

Subotnik, R. F., Maurer, K., & Steiner, C. L. (2001). Tracking the next generation of the scientific elite. *Journal for Secondary Gifted Education, 13,* 33–43.

Scientifically Gifted

In the post-*Sputnik* years of the 1960s and 1970s, a surge of interest in science education dominated, along with mathematics, the federally funded mandates in curriculum and pedagogy in the United States and by other governments internationally. Not entirely inconsequentially, the emergence of international comparison testing of student performance in mathematics and sciences has become an industry in and of itself. A nation's relative and absolute rankings on tests of math and science achievement carry the status level of award programs on a par with the entertainment industries. These rankings have become a fairly stable mechanism for predicting surges in fiscal

support for mathematics and science education expenditures by national governments. In the United States, issues of pipeline recruitment of high-ability, gifted, and talented, or highly interested science students has generated much interest, with institutions of higher learning and federal science agencies convening regular panels, councils, interagency working groups, or U.S. commissions to study and recommend solutions and treatments. Nevertheless, the study of, identification of, and response to the needs of students with high interest, ability, or talent in natural sciences remains critical and challenging. Among the challenges, merely defining scientific giftedness is a complex endeavor. This entry describes research relating to the scientifically gifted.

The research is increasingly clear that scientific giftedness is a complex phenomenon—distinct from problem-solving ability in, say, chemistry or physics, as it was frequently defined in the earlier years of study. Giftedness in scientific thought or activity is increasingly considered distinct from the mathematical-scientific continuum that was the hallmark of the earliest studies, which failed to disaggregate scientific curiosity and scientific aesthetics from the logico-empirical problem-solving approach to knowledge management. Moving away from achievement or IQ-driven definitions of scientific and scientific giftedness, most comprehensive efforts of the last 50 years suggest that scientific or scientific giftedness includes a variety of social, personal, behavioral, ethical, aesthetic, and complex identity components.

The seminal internally framed psychosocial treatment of scientific or scientific giftedness was Louis Fliegler's delineation in 1961. He carefully distinguished mathematical reasoning from scientific curiosity in gifted individuals. Fliegler developed a checklist of science domain-specific characteristics of gifted individuals that included early interest in science, curiosity, and early ability to understand abstract concepts, a love of collecting natural objects, and creativity in science projects in early school experiences. Further, as later researchers observed, Fliegler noted the ability of truly gifted individuals to assimilate marginally related ideas along similar concept and relational lines.

Among the recent characterizations of scientifically gifted individuals, one group of researchers has found that scientific accomplishment, leadership, creativity, morality, motivation, and cognitive experimentalism are measurable characteristics of scientifically gifted students. To these characteristics, other researchers add a heightened ability to transfer learning across concept sets, the ability to infer concepts from less specific and more loosely delineated objective data, and a heightened ability to make connections outside of the formal curriculum. Nevertheless, these studies continue to pose scientific giftedness nearly as a subset of problem solving and the ability to develop and apply complex conceptual information to linear problem resolution.

Perhaps the most important definitional paper of recent years was that of Gino Innamorato, who surveyed a broad summary of the components of scientific ability, inquiry, creativity, and identification issues. This paper adds analogical reasoning ability, creativity, independence, divergent thinking, efficiency in memory, genetics, intuition, and the ability to shift thinking across cognitive domains fluidly to the characteristics of the scientifically gifted student.

Outside the mathematical, problem identification/resolution framework, an additional foundational effort at defining the scientifically gifted individual was Howard Gruber's work on Charles Darwin and on Jean Piaget. Gruber describes the aesthetic experiences of scientific exploration and discovery, suggesting characteristics of the field of scientific inquiry or of the natural world, which may correspond in some manner to the gifted individual him- or herself. These characteristics included orderliness, universality, inevitability/law, simplicity, unity, balance, equilibrium, and invariability. These seemed to appeal, for Gruber, to an aesthetic psychological dimension embedded between the cognitive and emotional areas of the individual. Gruber's work was a substantive methodological improvement on many earlier studies (and many since) in that he used ethnography and detailed life study to describe the complex nature of scientific giftedness in individuals. And indeed, the life study, believed to capture both internal and external characteristics of the gifted individual in an embedded, environmental context, is broadly used in sociological and psychosocial research on gifted students today, such as in Jane Piirto's extended and unique treatment of creative individuals.

The most recent emerging set of characteristics related to scientific giftedness concerns the heightened sensitivity to environmental ethic, the interconnectivity of human life and the natural world, and the evolution of a global, environmental stewardship and self-concept. Beginning in the early 1990s and continuing, the construct of environmental stewardship as a worthwhile characteristic of scientifically literate citizens became a hallmark of the U.S. federal science agencies. Research conducted on high-ability science students in secondary-level educational competitions in the United States has consistently revealed a link between exemplary performance in science accomplishments at an early age with a heightened awareness of global environmental systems and environmental and ecological stewardship concepts and ethical systems. Further research in this area focused on the pipeline recruitment of scientifically gifted secondary students has further linked environmental ethic with persistence in science coursework and selection of science-related college majors. Although research is inconclusive regarding the balance of internal and external factors that either reveal or result in these scientific ethical systems in the individual, these ethical characteristics are both strong and unique concerns of scientifically gifted and oriented students.

Howard D. Walters

See also Creativity in Science; Science, Curriculum; Science Talent Search Winners; Scientists

Further Readings

Fliegler, L. A. (1961). *Curriculum planning for the gifted.* Englewood Cliffs, NJ: Prentice Hall.

Gruber, H. E. (1981). *Darwin on man: A psychological study of scientific creativity* (2nd ed.). Chicago: University of Chicago Press.

Gruber, H. E., & Voneche, J. J. (1977). *The essential Piaget.* New York: Basic Books.

Innamorato, G. (1998). Creativity in the development of scientific giftedness: educational implications. *Roeper Review, 21*(1), 54.

Ngoi, M., & Vondracek, M. (2004). Working with gifted science students in a public high school environment: One school's approach. *Journal of Secondary Gifted Education, 15*(4), 141–147.

Park, S-K., Park, K-H., & Choe, H-S. (2005). The relationship between thinking styles and scientific giftedness in Korea. *Journal of Secondary Gifted Education, 16*(2/3), 87–97.

Piirto, J. (1998). *Understanding those who create* (2nd ed.). Scottsdale, AZ: Great Potential Press.

Scientists

Scientist comes from the Latin root *scientia,* which means knowledge or understanding, and generally refers to one who helps build an organized system of thought about the nature of the world. Scientists study natural phenomena using disciplined and systematic methods. Through logical and objective application of these methods, they gain understanding about living or nonliving things, and often work to improve the human condition through careful application of what is known. Their work covers an enormous range of fields. The National Institutes of Health listed more than 125 major science careers. The huge range of careers is categorized into two major branches that vary depending on the source but generally include the natural sciences (study of living and nonliving things), and the social sciences (study of people and society). The branches are also categorized along lines of the formal sciences (mathematics, logic, and statistics) and the applied sciences (engineering and technology). In a conceptual sense, scientists use objective methods to observe and explain the world. More specifically, they use detailed prescriptive methods to outline a series of steps that consider prior knowledge and assumptions, ensure careful data collection and analysis, and result in meaningful reporting and further study. This series of specific strategies is commonly referred to as the *scientific method* and is the process that helps bind together a large number of people involved with disparate areas of science and wide-ranging expertise. This entry describes the scientific method and science performance.

Scientific Method

The scientific method is a set of objective processes by which scientists, collectively and over time, gain accurate insight about the world in

which we live. Most scientists rely on quantitative methods that generally include some variation of the following steps: (a) observe a phenomenon or a cluster of phenomena; (b) articulate a hypothesis that explains the phenomena; (c) design a study, including analyses to test the hypothesis; (d) conduct the study; (e) collect data; (f) analyze data; (g) draw conclusions regarding the hypothesis, particularly whether the results of the study support it or not; and (h) report the completed study, including all of these steps as well as limitations of the study and questions for further research. Scientists, however, are making increased use of qualitative methods that supplant or augment existing quantitative methods and in general rely on the following steps: (a) participate in the setting of inquiry and observe the context; (b) observe the phenomenon directly; (c) collect observational data and verbal data via interviews and focus groups; (d) analyze observations, verbal data, and other materials; (e) allow emergent themes to guide the next steps.

Scientists acknowledge that personal and cultural beliefs can alter both perceptions and interpretations of natural phenomena. Those with certain beliefs may sometimes see things as reinforcing their beliefs, even when they do not; this is called the confirmatory bias. Scientists must guard against this and other biases—for example, cultural bias—by using procedures specifically designed to minimize them when testing a hypothesis or formulating a theory. Such procedures are central to the scientific method.

Science Performance

The No Child Left Behind and other policy reports purport that the United States is behind other nations in science and that students from the United States lack the basic skills to become scientists and meet the needs of a technological society. Major institutions such as the U.S. National Academics, National Aeronautics and Space Administration, and the National Science Foundation have also expressed concern about declining performance of students in the United States on measures of science proficiency. Such institutions have called for improved K–12 education in science, technology, engineering, and mathematics (STEM); improved training for STEM teachers; and increased numbers of college graduates with STEM degrees. Those conclusions, however, have been challenged by Harold Salzman and B. Lindsay Lowell, who pointed out statistical errors with the comparison data. Their reevaluation of the data used for international comparisons led them to conclude that students in the United States perform as well as many of their international counterparts on average, but that STEM educational improvements should be aimed primarily at low performers.

Scientists directly affect the quality of life. To maintain or improve the world's economy, security, and health, it is important to prepare a diverse citizenry that is literate not only in scientific concepts and facts as well as in the scientific method as ethically executed.

Jan B. Hansen

See also Critical Thinking; Multicultural Creativity; Research, Qualitative; Talent Development

Further Readings

Bernstein, L., Winkler, A., & Zierdt-Warsha W, L. (1996). *Multicultural women of science.* Maywood, NJ: Peoples Publishing Group.

Donovan, S., & Bransford, J. D. (2005). *How students learn: History, mathematics, and science in the classroom.* Washington, DC: National Academies Press.

Horowitz, M. C. (Ed). (2003). *New dictionary of the history of ideas* (Vol. 1–6). Charlottesville, VA: Electronic Text Center.

Salzman, H., & Lowell, B. L. (2007). *Into the eye of the storm: Assessing the evidence on science and engineering education, quality, and workforce demand.* Retrieved from http://ssrn.com/abstract=1034801

Scope and Sequence

Within an educational context, *scope* refers to the expansiveness or comprehensiveness of a curriculum, and *sequence* refers to the order in which content standards, concepts, and skills of a comprehensive curriculum are taught. Thus, a curriculum scope and sequence is a framework that

school faculty and leaders may design and implement as a guide that systematically outlines when and which content, concepts, and skills are taught. A scope and sequence serves as an institutional map for educators and administrators to use as they plan appropriate instruction and curriculum options for their students. This entry provides an overview of scope and sequence, particularly as it relates to the gifted.

Overview

Historically, scope and sequence became popularized after Ralph Tyler published his seminal text entitled *Basic Principles of Curriculum and Instruction* in 1949. Tyler proposed that a curriculum must provide useful learning experiences, organized through appropriate learning objectives and consistently evaluated and revised based on data. In 1962, Hilda Taba also alluded to the need for organizing the curriculum into a cohesive system and outlined a need for sequencing how the curriculum should be taught. In 1971, Tyler further emphasized the need for defining which skills and information need to be taught to students and how those skills and information should be ordered as evidenced by a scope and sequence. School districts began to design scope and sequence frameworks that continue to be emphasized as maps for planning and guiding instruction throughout a child's PreK–12 school career.

Sometimes a scope and sequence is misinterpreted as a list of curricula to be taught in each subject area and at each grade level. Instead, a scope and sequence is a deliberate outline of goals and outcomes that build on others in a cohesive way so that at any given time within a child's school career, schools can confidently outline what a child should know and be able to do. Therefore, a scope and sequence must be articulated to school personnel and faithfully adhered to. Educators must have a conceptual understanding of how their current grade-level curriculum connects with the previous and future content standards students have mastered or will attain at varying grade levels. For example, a scope and sequence would outline what students are required to know at various stages in their school careers and how and when they should obtain that knowledge. Metaphorically, this is the same as planning a trip. One must know where one is going before one can arrive. Just as a map provides a conceptual guide for progressing from point A to point B, a scope and sequence provides an instructional guide for educators to use to help students move from one conceptual understanding to another, in a seamless, cohesive manner. Without a conceptual plan that spans all grade levels, curriculum and instruction becomes fragmented and hinders optimal learning opportunities.

Scope and Sequence for Gifted

Although scope and sequence designs are more common as part of an overall district framework for the general population of students, both June Maker and Joyce VanTassel-Baska have consistently outlined the need for a scope and sequence to be designed specifically for gifted students. In 1982, Maker suggested that gifted students be provided a differentiated scope and sequence based on their unique characteristics and ability to learn advanced content at faster rates. In 1988, VanTassel-Baska prescribed a process for designing a scope and sequence for gifted learners as part of curriculum development and differentiation standards. By designing a scope and sequence for gifted learners, educators have a method of relating curricula and instructional emphases to various stakeholders, ensure methods for demonstrating how districts are differentiating instruction for gifted learners, and outline the importance of specific content emphasis at various grade levels. In 1988, VanTassel-Baska explained the following key considerations as part of a scope and sequence development as follows: (1) Could all students meet this goal or objective or is it appropriately advanced for gifted learners? (2) How are the objectives more sophisticated as they move from each grade-level cluster (e.g., K–2, 3–5, 6–8, 9–12)? (3) Do the objectives include a broad scope of conceptual information and knowledge inclusive of the skills required of gifted students? (4) Are the objectives logically sequenced so that the goals of the scope can be attained? (5) Are the objectives developmentally appropriate for gifted learners?

Gifted students learn at faster rates and have the ability to understand abstract ideas at earlier

ages, so a scope and sequence for these special learners should introduce more complex conceptual understandings earlier in their school careers and include accelerated content standards at least one or two grade levels beyond their chronological ages. Moreover, the expected goals and outcomes should be higher levels in terms of expected content understandings and outcomes. For example, in mathematics, a typical scope and sequence objective may require students to perform simple computations such as adding, subtracting, multiplying, and dividing one-, two-, and three-digit numbers by the end of fifth grade. A scope and sequence for gifted learners would require students to solve complex problems by applying the appropriate computation(s) rather than simple calculations only, and at an earlier age.

Overall, scope and sequence is a useful tool that, when articulated and well-planned, will guide educators in teaching appropriate content at the appropriate times. By designing a scope and sequence, educators can determine what and when students are taught specific content. This reduces the overlap of goals and standards within and across grade levels and prevents gaps in instruction. When planning a scope and sequence for gifted learners, educators should be sure that the scope and sequence is fast-paced enough to challenge gifted learners, provides advanced outcomes such as reflective and critical thinking, and is developmentally appropriate.

Tamra Stambaugh

See also Curriculum Models; Giftedness, Definition; Instructional Management

Further Readings

Maker, C. J., & Nielson, A. B. (1996). *Curriculum development and teaching strategies for gifted learners* (2nd ed.). Austin, TX: Pro-Ed.

Taba, H. (1962). *Curriculum development: Theory and practice*. New York: Harcourt, Brace & World.

Tyler, R. W. (1962). *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.

VanTassel-Baska, J. (2003). *Curriculum and instructional planning and design for gifted learners*. Denver, CO: Love Publishing.

Secondary School, Literature Curriculum

Novelist Fyodor Dostoyevsky understood gifted adolescents as he wrote of the tremendous power given to those who are gifted. He did warn that the more power given, the greater the responsibility to use it wisely. Truly gifted adolescents at the secondary level seek, choose, and decide what to do and how to do it. If they are given appropriate choices in a constructivist classroom atmosphere, they can achieve great things, possibly reaching their potential. In English classes, these great accomplishments can occur in their writing, in their choice of reading material, and in their oral expressions—discussions, speeches, debates, and role-plays in class. Indeed, the power of the teacher in a secondary literature classroom, whether it is Advanced Placement or not, is a considerable power. The level of thought encouraged, the trust in the students to be more than passive recipients, and the choice of meaningful curriculum—all factor into the type of class the teacher decides to teach or organize. This entry focuses on secondary literature curriculum as a way to meet the needs of gifted adolescents.

In choosing a meaningful curriculum for gifted students, Judith Halsted suggested a list of activities designed to address the characteristics of high-ability students. To challenge verbal abilities, gifted students need to do the following:

- Use their full vocabulary and develop it further with intellectual peers.
- Read books at an appropriate intellectual and emotional level.
- Be introduced to books that represent a variety of literary conventions and styles and that use language gracefully.
- Express ideas verbally and in depth by writing or speaking with others who challenge and thus refine their views and concepts.

Gifted students must be challenged with rigorous content, process, and products designed to meet the students at their cognitive levels. Because classical literature focuses on the larger issues and themes of humanity, it provides good choices on

which to base curriculum for gifted adolescents. However, other issues prevail as well in choosing appropriate literature. For example, multicultural themes, interdisciplinary themes, and challenging vocabulary are essential in choosing appropriate reading material. Gender balance—both in protagonist in the novel and author of the novel—is important to consider. If a curriculum is constructed from works of all "dead White males" in this era, there is a problem, and gifted students will be the first to note and voice the problem. Current events or local issues may make particular works of literature more attractive and meaningful for gifted students. Required material for students to read and process must be carefully examined for the ideas conveyed, the language used to convey these ideas, and the discussion and thought levels tapped by this content. The English teacher should not censor material for gifted students. They are able to see through artificial barriers themselves and often are insulted by school systems that do not think they can understand sophisticated issues and language well advanced of their age. However, the message must always provide the rationale for the use of a controversial piece in any educational setting. Gifted students will read literature both inside and outside of school, so an assignment must consider the value and worth in that context of each piece of literature assigned.

Writing is absolutely essential and valued in a well-developed secondary-literature curriculum. Students must respond by writing in reflective journals, writing persuasive pieces, and writing long research pieces. In addition, creative choices offer students the chance to integrate their own ideas with forms that express these ideas both responsively and originally. Poetry, screenplays, interviews, and original drama are wonderful ways for gifted students to add their own voices to the literature they read.

In addition, secondary gifted students must be encouraged to have a voice in a literature class. Understanding a critical analysis of a work assigned and presented relative to the study of the original piece is a thought-provoking and challenging task. However, assigning students the task of constructing their own critical analysis, unraveling metaphor and working through the large issues presented in several works studied invites students to express ideas while forging connections between their own thoughts and those other voices in the texts read. Couple this with active discussion in which they listen to other active, gifted minds, and the secondary literature class becomes a language laboratory in which thought is encouraged to flourish.

The value of literature in a liberal education cannot be overstated. Dostoyevsky, who was mentioned at the beginning of this entry, noted the importance of the power of decision making. Wise teachers of gifted secondary adolescents must keep continually challenging students to make wise decisions. Barbara Taylor stated that we look to literature as a source of collective wisdom, for insights into our muddled human condition, to be reassured by the record of human heroism or restrained by the corrective drama of human folly. We look to literature for experience that enlarges understanding—understanding accessible only through experience. Indeed, understanding is supposed to be the desired end of all teaching, the goal of all learning.

As in all meaningful curricula for gifted learners, the assessment for the unit must make sense and be in concert with the activities assigned. Critical thinking reigns supreme in such curricula and assessment must match the task and strategies used. Writing persuasive essays is catalytic, as is assessing the level of discussion that transpires in the class. The discussion format for assessment—even in examinations—makes good sense for classes that are heavily discussion oriented. The use of the discussion examination requires the teacher to be knowledgeable in the assessment procedure used. Felicia Dixon advocates a rubric adapted from Bloom's Taxonomy. A knowledge of these levels of thought and ready access to listening and noting them is essential.

Finally, the well-educated person has a knowledge of important literature. The archetypes prevalent in enduring literature convey the essence of humanity for all times. Teachers must model reading and discuss what they are reading and what meaning it has for them along with the discussion of the assignments of the course. Leaving the curriculum all up to Advanced Placement or International Baccalaureate does not work well when working with secondary gifted adolescents. They need more than acceleration; they also need the enrichment that is inherent in a well-developed

humanities curriculum. Challenging reading and discussion that tap depth of thought, the opportunity to express connections in writing, and an environment that invites synthesis among all disciplines are characteristics of the curriculum that must be present in secondary literature classes for gifted students.

Felicia A. Dixon

See also Adolescent, Gifted; Secondary School, Writing Curriculum; Secondary Schools

Further Readings

Dixon, F. A. (2000). The discussion examination: Making assessment match instructional strategy. *Roeper Review, 23,* 104–108.

Dixon, F. A. (2006). Secondary English for high ability students. In F. A. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education* (pp. 363–391). Waco, TX: Prufrock Press.

Dostoyevsky, F. (1950). *The brothers Karamazov.* New York: Modern Library.

Halsted, J. W. (1994). *Some of my best friends are books.* Dayton: Ohio Psychology Press.

Taylor, B. A. (1996). The study of literature: Insights into understanding. In J. VanTassel-Baska, D. Johnson, & L. Boyce (Eds.), *Developing verbal talent* (pp. 75–94). Boston: Allyn & Bacon.

Secondary School, Mathematics Curriculum

Multiple definitions of *curriculum* contribute to the complexity in defining the secondary school mathematics curriculum. A simplistic definition of curriculum is a sequence of courses. Another definition is that which is taught in schools. A more comprehensive definition is the total set of experiences students encounter in schools. For purposes of this entry, the secondary school mathematics curriculum refers to the total set of mathematics middle and high school students experience in schools, including the content, sequence of courses, and extracurricular opportunities.

Mathematics is recognized as a gatekeeper for advanced courses and areas of study. The type of mathematical experiences gifted, creative, and talented students encounter in schools is of utter import, particularly considering continual efforts to enhance international competitiveness in the fields of science, technology, engineering, and mathematics (STEM). Examination of the secondary school mathematics curriculum can assist in determining how mathematics school experiences can be improved. This entry explores the basis for an appropriate mathematics curriculum for advanced learners, the secondary mathematics course-taking pipeline, and extracurricular mathematics opportunities.

Ideal Mathematics Curriculum for Advanced Learners

The mathematically gifted or talented learner is different from other students. These students are different in the pace with which they learn, the depth of their understanding, and the interests they hold. As such, an appropriate mathematics curriculum for advanced learners is one that is challenging, provides opportunities for extension, and connects to other disciplines. It also allows for depth and complexity, focuses on problem solving and higher-order thinking skills, and incorporates abstraction.

Appropriate experiences for advanced learners in mathematics should include compacting and differentiating the curriculum. Opportunities for acceleration and enrichment should be present, where acceleration refers to the faster pace with which the curriculum is covered and enrichment refers to the deeper level with which the curriculum is covered. Ideally, advanced learners should experience acceleration and enrichment, not one or the other.

Pre-assessment and diagnostic testing should be used for placement to ensure that advanced students have the opportunity to experience exciting and new curriculum. In addition, students should participate in regular, ongoing summative and formative assessments, some of which are authentic. Inquiry-based and open-ended problems should be incorporated that allow for multiple solutions and multiple methods of solution. Students should have the opportunity to integrate technology and manipulatives to enhance learning and support multiple representations. The type of secondary school mathematics curriculum described here is

rich, deep, and accelerative. This curriculum, however, is not the reality for many advanced mathematics learners.

Mathematics Course-Taking Pipeline

The reality of the secondary school mathematics curriculum differs greatly from the idealized one described. Most secondary schools address the mathematics curriculum for advanced learners through acceleration only. Students experience advanced mathematics through honors courses, the Advanced Placement program, or the International Baccalaureate program. Although honors, Advanced Placement, and International Baccalaureate courses represent the only option in some schools, these programs are not specifically designed for gifted, creative, and talented mathematics learners. In other districts, particularly urban and rural districts, schools are unable to offer students a variety of advanced or accelerative mathematics options.

Although course titles and the sequence of courses may differ from school district to school district, the typical mathematics course-taking pipeline includes Algebra 1, Geometry, Algebra II, Precalculus/Trigonometry, and Calculus. Before a student can complete calculus in high school, he or she must have taken Algebra I by the eighth grade. Students must take Algebra I even earlier if they are to experience more advanced mathematics courses such as a second year of calculus or linear algebra. Some students who are capable of successfully completing Algebra I in the earlier grades are not provided that opportunity. Some school districts lack a formal acceleration policy. Other school districts allow students to accelerate, but run out of courses to offer because of a lack of funding or adequately trained personnel.

Extracurricular Mathematics Opportunities

A viable outlet for advanced mathematics learners is participation in mathematical clubs, contests, and competitions. These activities expose advanced learners to rich mathematical experience and provide students the opportunity to work with peers of similar interests. Some of these competitions include American Mathematics Competition (AMC, AMC 10, and AMC 12), MATHCOUNTS, Mathematical Olympiad, and Mathematics Pentathlon.

With advancements in technology, students can access advanced mathematics course offerings through distance learning programs. This allows students attending schools with limited offerings to take advantage of advanced coursework offered in other cities and states. Many universities such as Carnegie Mellon, Duke, Johns Hopkins, Northwestern, and the University of Iowa offer talent search programs; some even offer distance learning courses. Through Massachusetts Institute of Technology (MIT) OpenCourseWare, students can access free, online materials to more than 1,800 MIT courses. These extracurricular and off-site opportunities can potentially enhance the mathematical experiences for many gifted, creative, and talented mathematics students.

Valija C. Rose

See also Advanced Placement; Honors Programs; International Baccalaureate; Mathematical Talent; Mathematics, Curriculum; Middle School, Mathematics Curriculum

Further Readings

Assouline, S., & Lupkowski-Shoplik, A. (2005). *Developing math talent: A guide for educating gifted and advanced learners in math*. Waco, TX: Prufrock Press.

Chamberlin, S. A. (2006). Secondary mathematics for high-ability students. In F. A. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education* (pp. 461–479). Waco, TX: Prufrock Press.

Johnson, D. T. (2003). Adapting mathematics curricula for high-ability learners. In J. VanTassel-Baska & C. A. Little (Eds.), *Content-based curriculum for high-ability learners* (pp. 161–190). Waco, TX: Prufrock Press.

Sheffield, L. J. (Ed.). (1999). *Developing mathematically promising students*. Reston, VA: The National Council of Teachers of Mathematics.

Secondary School, Social Studies Curriculum

According to the National Council for the Social Studies (NCSS), social studies curriculum

encompasses course offerings from an array of related disciplines. Although the primary focus at the secondary high school level is on history, civics, and geography courses, high schools also may offer courses in anthropology, archaeology, economics, philosophy, psychology, religion, and sociology. NCSS maintains that the purpose of social studies is to prepare students for active and effective citizenship in a democratic society and to preserve democratic traditions. Research and literature related to gifted education and secondary social studies curriculum focus also on the importance of meeting and challenging the intellectual, social, and emotional capacities of gifted students. The integrated nature of social studies courses and the practice of infusing social studies lessons with examples from the humanities and the arts make the courses a natural fit for many gifted adolescents. Gifted students, who aspire to leadership positions and to careers in one of the social studies professions, particularly benefit from high-quality social studies curriculum. Examination of the links between gifted, creative, and talented students and social studies; and current research on the teaching and learning of social studies through a gifted education lens further highlights the importance of social studies education in the intellectual and social development of gifted students. This entry describes characteristics of gifted students and the social studies, high school offerings, curriculum for future thinkers and leaders, and benefits of secondary-school social studies curriculum.

Characteristics of Gifted Students and the Social Studies

The interdisciplinary nature of the social studies mirrors the way many gifted students view the world. Michael Piechowski explored the importance that gifted adolescents place on discerning connections underlying concepts, and on pursuing, uncovering, and creating meaning in their lives. A relentless quest for and relishing of complexity mark the intellectual and emotional life of many gifted students. At the same time, heightened sensitivity to ethical questions, moral issues, and social justice concerns tend to develop at a young age and lead in the high school years to intense passions for humanitarian causes and justice concerns. The study of secondary-school social studies can outfit gifted students with practical knowledge and skills that will sustain their pursuit of meaningful political and social activities throughout their lives.

High School Offerings

Twenty-first-century high school reform movements are generating multiple options for advanced learning in all subject areas. In the social studies, opportunities range from honors classes, Advanced Placement courses, both virtual and on-campus, and International Baccalaureate courses, to dual enrollment options, that is, college courses taught in high schools by college instructors. In addition, historical and governmental institutions, such as the National Archives and the Library of Congress, offer online learning experiences, and institutions of higher learning, such as the Massachusetts Institute of Technology (MIT) and Yale University, offer courses without charge to all students with Internet access. In a more traditional vein, secondary schools continue to provide enrichment opportunities to engage students in active problem solving and real-world learning through the Future Problem Solving International Program (FPSIP), Community Problem Solving (CmPS), and simulated experiences, such as Model United Nations and Model Judiciary.

Social studies curriculum specifically designed for gifted students offers more than acceleration and advanced coverage of content. It also ensures that gifted students understand and can engage in skills that will help them frame their own questions and acquire research skills and tools in areas of the social sciences that are important to them. To build this expertise, students work with practicing historians, government officials, politicians, and other community members who exemplify the work of professionals in their disciplines, either in person, through their teachers, virtually through Web-based learning, or some combination of all three. Teachers of gifted students continually strive to increase their knowledge of scholarship in their fields. They engage with students as coaches, guides, and mentors of future scholars, leaders in democracies, and citizens. Social studies teachers understand that democratic leadership abilities are learned, not natural skills. Many gifted students by

virtue of their abilities to organize and inspire will become leaders in their professional and social lives. Hence, it is critical that they develop habits of personal reflection; engage in conscious practice of democratic skills, such as respect for minority views; observe good role models of democratic thought, discourse, and action; and appreciate the complexity of historic events. High-quality social studies curriculum for gifted students is key to the perpetuation of individual freedoms, rights, and responsibilities in democratic societies.

Curriculum for Future Thinkers and Leaders

Current social studies education research emphasizes the acquisition of inquiry and reasoning skills in the development of thoughtful and effective citizens. Many social studies resources are available to support this goal, in print and through the Internet. Several examples embody best practices in the teaching of social studies. Through the U.S. Department of Education Teaching American History grants program, teachers have opportunities to strengthen their power as bridges between professional historians and students. In collaboration with professionals from regional academic and arts institutions, teachers learn to model professional thinking about challenging social studies content. For those who prefer published curriculum for gifted and advanced learners, the William and Mary social studies units provide teachers and students with content and reasoning models that are applicable to a wide range of inquiry. Another option, historicalthinkingmatter.org, the result of a collaborative project between scholars at George Mason University and Stanford University, is an example of a high-quality online curriculum option. An examination of these offerings clarifies what good social studies curriculum for gifted students looks like.

Teaching American History Grants

Exposure to the disciplines of social studies from the perspectives of professionals in the field gives gifted students the kinds of school experiences that nourish natural interest and stimulate independent research. Since 2001, the Department of Education has awarded 660 Teaching American History grants to school districts in partnerships with universities, nonprofit history or humanities organizations, museums, and libraries to improve history teaching and student achievement. Rachel Ragland of Lake Forest College reported on the results of a program for teachers who participated in a collaborative project in a Midwest school district. Through the program, teachers significantly added to their repertoire of teaching skills and went from initially using lectures, worksheets, some music, and popular film to rethinking their own conceptualization of history and history teaching. Their understanding of history as a discovery process grew as they worked side by side with historians. Teachers incorporated the use of primary sources and artifacts, multiple perspectives, critical thinking and analysis, and conceptual and thematic questions into their lessons and conveyed to their students the experience of doing history that they enjoyed through the Teaching American History project. Although the Department of Education continues to fund the program for more teachers across the United States, curriculum units, such as the William and Mary units, are available that incorporate the principles of the programs and are ready for immediate classroom use.

The William and Mary Social Studies Units

The design of the William and Mary social studies units is based on the *integrated curriculum model* developed by Joyce VanTassel-Baska, the executive director of the Center for Gifted Education at the College of William and Mary. The integrated curriculum model is a framework that focuses on student outcomes related to advanced content and higher-level thinking processes of reasoning, inquiry, and document analysis developed in the context of rich, overarching concepts or themes. The units incorporate strategies recommended by both practicing professionals in the social studies disciplines and by educators of the gifted. Models of reasoning, research, vocabulary, writing, and concept development are illustrated and explained in detail in each curriculum. Because the models are used throughout all the William and Mary units, students have multiple opportunities, through practice during the school year, to develop expertise as thinkers, researchers, and writers.

At the heart of the William and Mary units are gifted students, with their particular intellectual, emotional, and social makeups. Students' natural curiosity and passion for questioning are refined through an interdisciplinary approach that recognizes the importance of documents and artifacts; incorporates important aspects of geography, psychology, economics, and other fields of intellectual pursuit; and builds appreciation for the contribution of the humanities to self-understanding and deeper knowledge of the social studies. Students learn how to think critically about social studies content and to practice reasoning skills while making personal connections to the material. The interplay of content, reasoning, and reflection on their thoughts and feelings gives students opportunities to deepen their understanding of themselves as effective citizens, democratic leaders, and emerging scholars.

Historicalthinkingmatters.org

Historicalthinkingmatters.org is another resource dedicated to the development of historical thinking. The Web-based resource presents units of study using a framework of analysis that again matches the way historians work as they construct historical narratives. Modules for teachers support the development and refinement of critical inquiry skills for those who are not practicing historians themselves and demonstrate scaffolding techniques using visual and auditory media that teachers can replicate in their teaching. Investigations begin with a provocative question, such as "Why did the Montgomery bus boycott succeed?" and provide students with opportunities to practice historical thinking skills. Students begin to think like historians as they identify the source of documents and artifacts, recognize and understand the time and place in which a document or artifact originated, read and question material closely with thoughtful attention to details, and corroborate information from different sources and different perspectives.

All the examples of good curriculum practice focus on students' growth as inquirers, thinkers, and active participants in the world, with the support of thoughtful and knowledgeable teachers. Although they understand gifted students' strong need for autonomy and independence, teachers recognize the importance of their own roles as mature guides to intellectual and social growth. Social studies teachers and those who support their development play important roles in the development of active citizens and scholars, and in the preservation of a nation's democratic ideals and practices.

Benefits

Secondary-school gifted students who experience the social studies through curriculum that is driven by universal concepts, thoughtful questions, and committed professionals become educated in much more than content knowledge. Through practice of careful reasoning, consideration of differing perspectives, reliance on document and artifact analysis, facility with conceptual thinking, construction of personal connections, and engagement in personal reflection, gifted, talented, and creative students develop skills and expertise as citizens and leaders in democratic societies. Together, researchers and practitioners, using contemporary resources and technology, create rich curriculum at the secondary level. In so doing, they contribute to students' appreciation of the social sciences in high school, assist students' entrée into the world of higher social studies education, and build habits of lifelong respect for the traditions of democratic societies.

Joanne Russillo Funk

See also Adolescent, Gifted; Advanced Placement; Brain-Based Research; Character and Moral Development; Creative Problem Solving; International Baccalaureate; Leadership; Social Studies, Curriculum

Further Readings

Bransford, J., Brown, A. L., & Cocking, R. R. (2000). Effective teaching: Examples in history, mathematics, and science. In J. D. Bransford, A. L. Brown, & R. R. Cocking (Eds.), *How people learn, brain, mind, experience, and school* (Expanded ed., pp. 155–189). Washington, DC: National Academy Press.

Center for Gifted Education. (2006). *Guide to teaching social studies curriculum*. Dubuque, IA: Kendall/Hunt.

Center for Gifted Education. (2006). *Primary sources and historical analysis*. Dubuque, IA: Kendall/Hunt.

Martin, D., Wineburg, S., Rosenzweig, R., & Leon, S. (2008). Historicalthinkingmatters.org: Using the Web

to teach historical thinking. *Social Education, 72*(3), 140–43.
Mayer, R. H. (1998). Connecting narrative and historical thinking: Research-based approach to teaching history. *Social Education, 62*(2). Retrieved May 7, 2008, from http://members.ncss.org/se/6202/620207.html
National Council for the Social Studies. (Updated 2008, February). *Curriculum guidelines (for social studies teaching and learning)*. Retrieved May 4, 2008, from http://www.socialstudies.org/positions/curriculum
Piechowski, M. M. (2006). *"Mellow out," they say. If I only could.* Madison, WI: Yunasa.
Ragland, R. G. (2007). Changing secondary teachers' views of teaching American history. *History Teacher, 40*(2), 221–246.
Stepien, W. J., & Stepien, W. C. (2006). "Pulling the cat's tail" in social studies and history classrooms. In F. A. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education* (pp. 393–426). Waco, TX: Prufrock Press.

Secondary School, Writing Curriculum

A challenge in designing a writing curriculum is that the writing process is a subjective area of teaching. Yet, the research on teaching writing offers insight into how student written improvement is best accomplished with an array of strategies for teachers to use with talented writers. These insights on writing can be coalesced into a curriculum scope and sequence at the secondary level that is appropriate for gifted students, as described in this entry.

The four dominant approaches to the K–12 vertical articulation of teaching writing include (1) *presentation:* the teacher explains what good writing is and gives examples; (2) *natural process:* the teacher has students engage in a great deal of free writing, individually and in groups; (3) *focused practice:* the teacher structures writing tasks to emphasize specific aspects of writing; and (4) *skills:* the teacher breaks down writing into its component parts and then provides practice, sometimes in isolation, on each part. Of the four approaches, the focused practice approach has produced the strongest learning effects among student writers whereas the remaining three approaches resulted in weaker effects.

Instructional Strategies

The three processes identified as being critical to effective writing instruction are planning, writing, and revision. It is important for teachers to have opportunities to learn more effective procedures for teaching writing to apply the most effective strategies in their classrooms. The direct teaching of focused and intensive writing techniques appears to be more successful than is relying on general process techniques. When the organizational skills necessary for successful writing were emphasized throughout a unit, increases in students' scores on the organizational quality of their essay writing from the pretest to the posttest assessments have been found especially for students who received low scores on the pretest.

Good writers apply a rich vocabulary and correct grammar to convey their written point to their readers. Before students can write descriptively, they must possess a rich vocabulary. An extensive vocabulary is one of the characteristics that is most highly correlated with intelligence. A comprehensive vocabulary development program should be integrated into a secondary writing curriculum and include regular emphasis on interesting words encountered, direct instruction of techniques or procedures to develop a varied vocabulary, connected learning, and practice and repetition. Vocabulary development is enhanced through excellent reading instruction and diverse reading resources.

Writing is an advanced language task and is taught naturally and most effectively when integrated with reading instruction. Interrelated activities organizing instruction into broad, thematically based clusters of work through which reading, writing, and speaking activities are integrated promotes understanding of ideas. Furthermore, a balanced teaching of critical reading and writing skills can be embedded in the context of total language learning through direct instruction. Writing journals have been found to be valued by teachers and students alike for helping in various other aspects of the English curriculum.

Another instructional emphasis that enhances writing is the use of metacognitive strategies.

Ample guided practice should be provided by having students use metacognition control strategies for as many appropriate tasks as possible, providing reinforcement and feedback on how students can improve their execution of the strategies. Students need to practice self-monitoring of their performance when using the strategies, and teachers need to encourage generalization of the strategies by having students use them with different types of materials in a variety of content areas. Moreover, all students need teachers to explain writing task expectations clearly and fully.

Writing fosters learning in all disciplines. It is a tool for thinking, which makes it integral to every subject at every scholastic level. Skill in writing is developed and refined through practice, which means students should have frequent opportunities to write across the curriculum. The integration of reading and writing tasks has produced learning benefits for students. Specifically, the combination of incorporating inquiry through advanced questioning, analyzing and responding in writing to literature, prewriting, and communicating specific criteria as expectations for learners have been found to be effective curriculum strategies that produce higher achievement gains in learners. Inquiry learning is particularly important for gifted students, who thrive on accelerated learning opportunities and on learning that requires greater depth and complexity of thinking.

A field study of eight high schools contrasted four schools that had a senior writing project that included the program components of a research paper, product, portfolio, and presentation with that of four schools that did not have a senior writing project. A variety of measures, including focus groups, writing assessments, achievement test scores, and surveys were used to examine possible differences between schools with the senior project and schools without. Results of the study indicated several significant differences between the two sets of schools. Students in schools that incorporated the senior writing project across the curriculum indicated a more positive association with the following specific skills than did their counterparts at the control schools: writing a research paper, preparing and presenting a speech, carrying out a plan, and conducting interviews. Moreover, students in schools with the senior writing project perceived the skills of preparing and presenting a speech, conducting research, and locating appropriate references to have been reinforced more in their classes than the students at control schools did.

Despite identified practices that have been investigated in empirical studies to measure increased student achievement, the effective teaching of writing at the secondary level has continued to be found lacking in the literature. Although national writing assessments have exhibited student gains at earlier ages, no significant change was detected in the performance of 12th graders between assessment years.

Varied packaged programs to teach writing are readily available for schools to use and have yielded impressive gains for consistent use. Research-based teaching units produced by the College of William and Mary Center for Gifted Education have been found to show significant achievement gains in both gifted and non-gifted students at the secondary level in the area of persuasive writing, using performance-based assessments, modeled after National Assessment of Educational Progress (NAEP) assessment measures.

The integration and use of technology into the writing curriculum should be expanded in developing young writers. Distance learning opportunities have dramatically increased options for meeting the needs of gifted students in writing with online high school and college courses that provide challenging curriculum opportunities for students who demonstrate proficiency with grade-level material. The use of laptop computers most directly affects writing skills followed by communication and presentation skills.

Writing is a metacognitive thinking process, so rigorous writing experiences provide gifted students with opportunities to develop competence in their ability to think as well as to write. Fundamental skills associated with a process writing approach that should be used with gifted learners at all stages of development include (a) prewriting, (b) paragraph development, (c) theme development (literary generalizations), (d) development of introductions and endings, (e) work on supporting details, (f) effective use of figures of speech, (g) editing, (h) teacher and peer conferencing, (i) revising, and (j) rewriting.

Consideration also needs to be given to the type of writing that gifted students are encouraged to master. There should be a planned balance between

creative writing forms and analytic expository writing forms, including persuasive writing. Writing with gifted students should include exposure to good writing through extensive reading, critique of others' writing, and many opportunities to practice their own writing skills.

Various studies have shed light on which teaching techniques specifically work well with teaching writing to gifted secondary students. The use of strategy instruction and self-regulation to improve gifted students' creative writing, following application of a writing instructional package, has been found to result in students writing longer stories, increasing their writing fluency, including more story elements, and writing higher quality stories. Students whose teachers had special training in writing instruction performed significantly better than do students with untrained teachers. When a graphic organizer was used to teach persuasive writing, explicitly using a rubric, and teacher feedback was consistently provided, gifted learners showed significant improvement in persuasive writing at secondary levels from Grades 6 through 11.

However, extensive studies examining the effective teaching of writing methods to gifted students at the secondary level is limited. Although use of packaged writing programs, technology tools, and having an abundance of opportunities to write using a structured model and receiving teacher feedback have all been found to be effective in increasing writing skills among all students, evidence does not suggest that teaching writing to the gifted should be perceived as a different enterprise from teaching it to all learners. Differentiation appears to be most needed in diagnosing the level of written proficiency at the beginning of instruction and providing follow-up assistance appropriate to that knowledge of functional level. Moreover, the personalization of the writing process through the feedback that teachers provide allows individual differences to be accommodated.

An emphasis on the writing process is a researched best practice strategy in improving writing. By stressing the processes of composing (planning, drafting, revising, sharing, and publishing), these sequential processes contribute to improved competence in writing ability among students. Twenty-five years of research on the compositional process has helped identify the various stages of writing. In the classroom, the complete process of written composition involves a series of recursive and interlocking stages, each of which should be discussed with students so they understand its value and place in the process. Longitudinal improvement in writing competence at the secondary level depends on students' understanding the processes they are involved. Furthermore, frequent practice in the classroom of the various stages of the writing process is necessary for student writing to improve. Such practice requires the devotion of regularly scheduled class time to the process. This time can be especially effective when structured as a writing workshop across a double period in which the teacher can provide guidance. Writing conferences have also been effective with developing written compositions. It is important for secondary gifted students to recognize and understand that written perfection is not achieved with the first draft of a manuscript but that rather, multiple drafts are standard and necessary to achieve a well-written document. This strategy matches the synthesis (high) cognitive domain as students create and compose using the writing process strategy.

The College of William and Mary Center for Gifted Education regularly assesses the effectiveness of instructional methods in curriculum research studies. The William and Mary teaching models that focus on developing student cognitive facility with higher-order thinking strategies have been found in multiple studies to be effective in increasing student performance in language arts. Use of the William and Mary teaching models strategy aligns cognitively with the analysis taxonomical domain, also at a high cognitive level, as gifted students analyze relationships and categorize relevant and irrelevant information using and automatizing critical thinking processes with specific graphic organizers.

The *hamburger model* uses the familiar metaphor of a sandwich to help students construct a paragraph or essay. The *Dagwood model* is the extended version of the sandwich metaphor that is especially appropriate for use with secondary students developing their persuasive writing skills. Richard Paul's *elements of reasoning* model for critical thinking emphasizes eight elements to process an idea: the issue, purpose, point of view, assumptions, concepts, evidence, inferences, and implications or consequences. The graphic organizer

"Reasoning About a Situation or Event," is also based on the elements and concept of the Paul model, this reasoning model should be used when analyzing a specific event where two or more people or groups of people are in conflict with one another and have a vested interest in the outcome of the event. Teachers should encourage students to actively use the terms and the model in approaching problems and issues to develop an understanding of reasoning through a situation and apply these elements to their written compositions.

Writing Assessment

A survey of writing assessment activities found a mix of traditional paper-and-pencil activities and formal writing assignments. Although paper-and-pencil activities appeared to dominate the classroom in regular and routine use, writing activities carried more weight when teachers computed course grades. Writing portfolios were not found to be in general use. In an NAEP survey for teachers and students, the technique of peer review was reported to be a common writing assessment practice in more than two-thirds of eighth-grade classrooms.

Researchers have known for a long time that testing drives the school curriculum and that writing is not immune to this reality. An analysis of writing assessments across five states through the use of interviews with educators, examination of materials related to assessment used at the local and state levels, and writing assessments across 43 states found that writing assessments stipulate the kinds of writing that should be taught, set standards for what counts as good writing, and set the conditions under which students must demonstrate their proficiency and what they should learn. Also found was the great variability in writing assessments used, from 40-minute assessment prompts in one state to portfolio assessments in another state. Although testing ensures that what is tested is taught, the tests cannot ensure that things are taught well. For teaching of writing to improve, states will have to intervene to provide teachers more opportunities to learn effective procedures for teaching writing.

The importance of teacher feedback about student writing on student learning does not correlate with the degree of feedback offered to students. Data collected from 55 middle school English classes indicated that incidents of high-quality instructional feedback and individualized instruction occurred in a small number of smaller classrooms and never occurred in larger classrooms. Teacher qualifications (years of experience and credential status) were unrelated to this teaching practice, nor did reduced class sizes directly affect the use of this teacher practice in secondary classrooms.

Gifted Students

Writing instruction for gifted students must be tailored to their unique needs. Using both collaborative and direct instructional approaches, writing programs should include the writing conventions of various disciplines, writing for the general public, writing across the curriculum, technical writing, expressive writing, and persuasive writing. Writing competitions are readily available for secondary students online and in reference materials.

Teachers need opportunities to learn more effective procedures for teaching writing. High-stakes testing can shift instruction away from the all-important feedback and revision aspects of writing, thereby leading to a reductive approach to writing in the curriculum. Key enabling structures and standards for implementation of the instructional strategies discussed include increased professional development training for teachers on the effective delivery of the strategies, increased time (scheduling of double-blocks) for student writing with valuable teacher feedback built in, and the increased use of flexible grouping strategies when peer review strategies are used with students to heighten the degree of meaningful peer feedback. These elements of effective writing instruction must be integrated in a systemic and regularly consistent manner across the secondary writing curriculum.

Bronwyn MacFarlane

See also Literary Creativity; Verbal Ability; Writers

Further Readings

Appleman, D. (2000). *Critical encounters in high school English: Teaching literary theory to adolescents' language and literacy series*. New York: Teachers College Press.

Black, S. (1999). Alternate doorways: Teaching writing to children with varied gifts. *Gifted Child Today Magazine, 22*(3), 18–22.

Carlin-Menter, S., & Shuell, T. (2003). Teaching writing strategies through multimedia authorship. *Journal of Educational Multimedia and Hypermedia, 12*(4), 315–335.

College of William and Mary Center for Gifted Education: http://www.cfge.wm.edu

Hillocks, G. (2002). *The testing trap: How state writing assessments control learning*. New York: Teachers College Press.

Hillocks, G. (2003). Fighting back: Assessing the assessments. *English Journal, 92*(4), 63–70.

Ketter, J., & Pool, J. (2001). Exploring the impact of a high-stakes direct writing assessment in two high school classrooms. *Research in the Teaching of English, 35*(3), 344–393.

Langer, J. A. (2001). Beating the odds: Teaching middle and high school students to read and write well. *American Educational Research Journal, 38*(4), 837–880.

Marzano, R. J., Pickering, D., & Pollack, J. (2001). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.

Scherff, L., & Piazza, C. (2005). The more things change the more they stay the same. *Research in the Teaching of English, 39*(3), 271–304.

Schunk, D. H., & Swartz, C. W. (1993). Writing strategy instruction with gifted students: Effects of goals and feedback on self-efficacy and skills. *Roeper Review, 15*(4), 225–230.

VanTassel-Baska, J. (2002). Assessment of gifted student learning in the language arts. *Journal of Secondary Gifted Education, 13*(2), 67–72.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted learners* (3rd ed.) Boston: Pearson, Allyn & Bacon.

VanTassel-Baska, J., Zuo, L., Avery, L. D., & Little, C. A. (2002). A curriculum study of gifted-student learning in the language arts. *Gifted Child Quarterly, 46*(1), 30–44.

Secondary Schools

Secondary schools can be defined as broadly as Grades 6 through 12, or as narrowly as Grades 10 through 12, depending on the placement of students during early adolescence in middle schools, junior high schools, or K–8 schools. In this entry, secondary schools mainly refer to 3- or 4-year high schools because middle schools generally have different approaches to nurturing academic giftedness. Secondary-school programs include honors courses, Advanced Placement (AP) courses, and the International Baccalaureate (IB), all of which are geared toward college-bound students. In addition, some high schools provide special seminars for gifted students that focus on further enrichment with such things as special topics, social and emotional issues, and career development. Such programs in secondary schools can play a key role in preparing students with the academic skills they will need to be competitive for college admission and scholarships, as well as preparing them for success in college, as this entry describes.

The difference between primary and secondary education is that most students begin to take courses with teachers who specialize in specific content areas (e.g., mathematics). Consequently, students begin to rotate among teachers, allowing students to structure individual schedules and enroll in courses different than their peers.

In Grades 6 through 8, gifted students begin to show their interest and aptitude in different content areas more clearly. They may start taking courses on a precollege preparatory track that prepares students to be competitive for college admission in a variety of areas. In mathematics, this may mean that students complete Algebra I by the end of eighth grade to ensure they have taken calculus before graduating high school. For those wanting to attend elite universities (e.g., Ivy League schools), this may also mean completing Geometry or Algebra II before entering high school and several AP mathematics courses (such as AP statistics, AP calculus) before graduation.

In addition to advanced course completions, honors courses are one way students receive enriched curriculum beyond the standard curriculum. Secondary schools vary in the honors courses they offer, but they often cover all core content areas (English, mathematics, science, and history). These courses, designed for students who can work at a fast pace, typically cover a broader range of topics compared with nonhonors courses. In

many high schools, honors courses are weighted so that they count extra toward a student's grade-point average (GPA). This weighted grade provides students in honors courses an opportunity for a higher GPA than the standard 4.0 scale. This higher GPA increases a students' likelihood of earning top rankings in their graduating classes, thus making them more appealing to highly selective 4-year colleges or universities.

Like honors courses, AP courses at the secondary level also include rigorous curriculum across all content areas as developed by the College Board. Although some sixth- through eighth-grade programs offer honors or faster-paced courses, AP courses are only offered in high school. These courses can also be weighted, and in some schools, the weighting for AP courses is greater than for honors courses. The primary difference between honors and AP courses is that AP courses can count toward college credit. Students in AP courses take exams at the end of the course, and a score of 3 or better is accepted in most colleges as general education credit. Taking and passing AP exams gives students an academic advantage when starting college—they can move on to more advanced courses because they have already received credit toward their basic college requirements through AP.

Another secondary program offered is the International Baccalaureate (IB), a program that prepares students for competitive university life outside of the United States. There are only 750 schools in the United States offering IB programs at the secondary level. There is an IB program for middle years (defined as ages 11–16, or equivalent to sixth grade through sophomore year), and the diploma program, which can be mapped to the last 2 years of high school. Students study eight different subjects in the IB middle-year program, including two languages, mathematics, humanities, technology, science, arts, and physical education. In the diploma program, students study six different subjects, including two languages, mathematics and computer science, individuals and societies, experimental sciences, and the arts. Students may be enrolled concurrently in honors, AP, and IB programs as long as the school can overlap the courses.

Special seminars for gifted students often round out their education with emphasis on developing a sense of identity and purpose. Discussions of literature, philosophy, or current events help students to discover personal meaning in classroom material, and guidance activities help students with career and personal development.

Secondary-school students enrolled in honors, AP, or IB are involved in a college preparatory curriculum that will exceed the minimum requirements for high school graduation. As such, courses in secondary schools play a prominent role in how well students are prepared for college. Students may begin coursework that allows them to complete advanced courses, such as AP and honors, before high school graduation. Weighted grades allow them to have a higher academic ranking within their high school. They may receive college credit even before students enroll in college. For some, this rigorous academic path makes them highly competitive for coveted scholarships and admission into top universities. For others, gifted education in high school provides an opportunity for personal challenge, engagement with learning, and guidance for the academic paths they choose.

Pamela L. Paek

See also Achievement Motivation; Advanced Placement; Honors Programs; International Baccalaureate

Further Readings

Adelman, C. (1999). *Answers in the tool box: Academic intensity, attendance patterns, and bachelor's degree attainment*. Washington, DC: U.S. Department of Education.

Adelman, C. (2006). T*he toolbox revisited: Paths to degree completion from high school through college*. Washington, DC: U.S. Department of Education.

Ewing, M. (2006). *The AP program and student outcomes: A summary of research*. New York: College Board.

Self-Actualization

Although popularized by Abraham Maslow, the concept of "self-actualization" was originally introduced by Kurt Goldstein, a physician specializing in neuro-anatomy and psychiatry in the early half of the 20th century. As conceived by Goldstein,

self-actualization is the ultimate goal of all organisms. It is the process of an organism fulfilling all of its capacities to become what it is biologically intended to be. Goldstein saw all behaviors and drives as manifestations of this overarching motivation.

Maslow defined self-actualization more narrowly and diverged from Goldstein in his conception of when and how self-actualization can emerge as a motivator. Similar to Goldstein, Maslow sees self-actualization as the fulfillment of one's greatest potential. In his discussions of self-actualization, however, he is referring solely to people, rather than all organisms. In addition, his theory asserts that the drive to self-actualize will only emerge as a motivator once a variety of more basic needs are met. This entry describes Maslow's hierarchy of needs and self-actualization.

Maslow's Hierarchy of Needs

As noted, other needs must be met before self-actualization becomes a dominant motivator of behavior. Self-actualization is at the pinnacle of what Maslow defined as a hierarchy of human needs. In this hierarchy, lower needs (described as "pre-potent" needs) typically must be met before higher needs emerge. Physiological needs are the most primary in this hierarchy. Although Maslow himself declined to make a list of physiological needs, citing the nearly endless contributors to physical homeostasis, "food" is his prime example of this type of need. Maslow suggests that if an individual is starving or near starving, he or she is essentially defined by that hunger. In most cases, an individual with extreme hunger will eschew higher needs, such as love and belonging, to fulfill the body's need for nourishment.

Once physiological needs are met, the next level of need—safety—immediately rises to consciousness and begins to drive behavior. Interestingly, Maslow suggests that these new needs arise and that physiological needs, once fulfilled, are nearly forgotten. Thus, the need for food may suddenly seem trivial compared with the need for physical protection—provided the individual continues to have a steady food supply. This cycle of need, fulfillment, and forgetting occurs at every stage of the hierarchy.

Maslow asserts that average adults in affluent, organized societies have few safety needs under typical conditions. Most have little need to worry about physical attacks, fires, and so forth. Thus, safety needs in these individuals are expressed in subtle ways, such as the desire for savings accounts and steady jobs. However, Maslow notes that safety needs drive individuals in less stable conditions, such as those living in low-socioeconomic conditions, or under wartime conditions. He also suggests that certain mental health conditions reflect, in part, safety needs. He argues that individuals with neurotic or compulsive tendencies are psychologically similar to children in their sense of danger. However, although children truly are dependent on others for safety, the neurotic individual only feels as if this is the case. Likewise, just as children seek to avoid unpredictable events because of the danger they might present, people with compulsive behaviors try to make the world orderly and predictable to avoid perceived danger.

Love needs are next in Maslow's hierarchy. These include friendship, family, and sexual love, as well as the desire to be accepted by peer groups and to receive affection. To meet our love needs, we must be positioned to both give and receive love. Maslow, like many theorists, psychologists, and psychiatrists, suggests that the failure to fulfill love needs is at the root of much psychopathology seen today. Near the top of Maslow's hierarchy are esteem needs. These needs include the desire for competence, high self-regard, respect, a sense of strength, and general self-worth. Maslow notes that if these needs are not met, an individual either becomes deeply discouraged or develops maladjusted methods for coping with feelings of inferiority and worthlessness. Only after these needs—physiological, safety, love, and esteem—are met can an individual begin to be motivated by the need for self-actualization.

Maslow's Concept of Self-Actualization

Maslow argues that, to be truly happy, painters need to paint; writers need to write; musicians need to play. This is self-actualization. However, he also notes that even if all other needs are met, self-actualization does not emerge as a motivator in all cases. When it does, it can take many forms, depending on individual talents, values, and so on. Often the urge is creative, as in the case of artists or writers; however, it might also take the

form of maximizing the quality of one's relationships, or to perfect the physical form through athletics and good health. Maslow notes that self-actualization is one of the least studied and understood needs, because of its relative rarity. It is the exception, rather than the rule, he states, for an individual's other needs to be so sufficiently met that self-actualization can emerge as a motivator.

In considering Maslow's conception of self-actualization, certain arguments spring readily to mind. There are numerous examples of individuals living in states of poverty, loneliness, low self-esteem, and so forth, who nonetheless seem to self-actualize through their work. Examples include Vincent Van Gogh, whose life and suicide suggest a deep well of unmet needs, and Anne Frank, whose universally acclaimed diary was written in, and facilitated by, conditions of extreme danger. Maslow's theory is not insensible to these obvious exceptions. He notes that in certain people the creative urge is so strong that it outweighs other needs, including those considered to be pre-potent in most individuals. He does not go so far as to say that in some cases self-actualization occurs because of hardship, but admits that it may occur despite unmet needs. Questions remain, then, about individuals who seem to self-actualize in direct response to need-threatening conditions. Researchers in the psychology of giftedness and positive psychologists have much to explore in future work in the area of self-actualization.

Erin Sullivan

See also Creativity, Definition; Optimal Development; Spirituality

Further Readings

Daniels, M. (1982). The development of the concept of self-actualization in the writings of Abraham Maslow. *Current Psychological Reviews, 2*(1), 61–75.

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review, 50,* 370–396.

Maslow, A. H. (1967). Self-actualization and beyond. In J. F. T. Bugental (Ed.), *Challenges of humanistic psychology* (pp. 279–286). New York: McGraw-Hill.

Self-Contained Classroom

Philosophy and pragmatism are two determinants used to initiate, sustain, or negate self-contained classrooms for gifted students. References to self-contained classrooms are defined as programmatic models or organizational structures and are labeled in a variety of ways: special day classes, full-time ability groups, homogeneous classrooms, and accelerated or enriched classrooms. Traditionally, self-contained classrooms were associated with secondary education by subject to achieve particular goals or outcomes. Regardless of the specific label attributed to this teaching and learning environment, the common features across all the terms is that a self-contained classroom provides for special grouping of students with like ability or aptitude within or across grade levels. This entry describes the history, curriculum and instruction, affective and social outcomes, and debate regarding self-contained classrooms.

History

Assigning gifted students with like abilities to the same classroom has been met with controversy throughout history. Abraham Tannenbaum stated, "No other specific grouping of children have been alternatively embraced and repelled by so much negativism by educators and laypersons alike" (p. 16). In an interview, A. H. Passow confirmed that if grouping gifted students was administered as a means to avoid assuming responsibility to attend to the issues of general education for all students, it was elitist. Across the eras, James Kulik identified educational, national, and social issues that have caused educators and communities to posit positive or negative reactions to grouping patterns. Issues noted by Kulik that have influenced the establishment or dissolution of self-contained classrooms over time can be defined to include the following: the development of sophisticated measurement instruments, technological and economic global competitiveness, and concerns for social justice denied by equity and access. Statements by Jeannie Oakes that juxtaposed ability grouping and tracking caused strong negative reactions among educators and laypersons and caused policymakers to reconsider providing

self-contained classrooms. Robert Slavin's work that articulated the need for students to work cooperatively with peers, representing economic, cultural, linguistic, and academic diversity also created concern for the implementation of self-contained classrooms. The shifts in perspectives regarding the self-contained classroom consistently brought about national and local changes in curriculum, instruction, professionalism, class size, and allocation of resources for gifted students.

Curriculum and Instruction

The self-contained classroom has been legitimized by the concept that it provides the opportunity to respond to the needs, interests, and abilities of gifted students. The dual demands of the classroom wherein the teacher must respond to the specialized and general needs of students continues to affect decisions about grouping. Carol Ann Tomlinson described heterogeneous classes as a "one-size-fits-all" unless differentiation of instruction has taken place within the context of that classroom. Tomlinson stated that advanced learners were intellectually thwarted by work that they already had accomplished and were possibly "ignored" because they had achieved their designated proficiency levels. However, just grouping students of like ability is insufficient, according to Barbara Clark. Karen Rogers supported this idea by stating that one of the flaws in the studies regarding full-time grouping has been the emphasis placed on grouping rather than on analyzing teaching differences.

In his meta-analytic review of grouping programs, Kulik stipulated key distinctions among grouping programs that were related to curriculum adjustments. Whether the self-contained classroom was for purposes of acceleration or enrichment, the curricular adjustments within these classes were fundamental to their outcomes. Accelerated classrooms adjusted the pace of the presentation of the curriculum; the enrichment classrooms provided learning experiences that extended the basic or core curriculum. Kulik found that there was a relationship between the degree of curriculum adjustments in both the accelerated and enrichment self-contained classroom configurations and the gifted students' academic performance; the more the curriculum was modified, the greater and more positive the impact on gifted students' achievements. Marcia Delcourt, Brenda Loyd, Dewey Cornell, and Marc Goldberg also found that gifted students' academic performance was rated higher than that of gifted peers who were not enrolled in separate day classes. According to the Delcourt study, gifted students in separate classes achieved at a higher level than did their gifted peers assigned to any type of within class or other grouping pattern.

Basic to the curriculum modifications in self-contained classrooms are issues relevant to the following: assessment of the gifted students to define the curriculum most developmentally appropriate; culturally responsive curriculum to meet the diverse needs of the student population; acknowledgment of variations of abilities within the gifted population; and sufficient differentiation. Joyce VanTassel-Baska outlined a set of key characteristics that are important to the differentiated tasks gifted students should be taught: use a variety of resources, study topics from multiple perspectives, engage in open-ended learning experiences, meet more complex and conceptually oriented content, and engage in analytic and interpretative thinking opportunities.

Sidney Moon, Melanie Swift, and Ann Shallenberger studied a fourth- and fifth-grade self-contained classroom and articulated the following features that were important to the attainment of academic success and goal attainment in this setting: challenging environment, differentiated instruction, and development of learning skills.

Affective and Social Outcomes

Rogers identified the attributes of gifted students who benefited most in full-time grouping situations: students who were academically motivated, students who functioned above grade level, students who had a preference to be challenged and to learn at a faster rate of speed, and students who enjoyed academic endeavors or work. Delcourt reported that the gifted students' perceptions of themselves in self-contained classrooms were lower than those of their peers involved in other types of grouping patterns. The students were also more teacher-dependent than were their gifted peers in other classroom settings.

The Debate

The long-standing arguments of the efficacy and effectiveness of self-contained classrooms most likely will continue. Ellen Winner addressed the case against and for ability grouping. She noted support for ability grouping has been built on lowering standards and omitting challenge whereas the case against ability grouping focuses on the emergence of elitism and arrogance. Kulik stated that the advantages of self-contained classrooms include such items as better preparation for advanced classes in high school and a single teacher continuously assigned to instruct the same class. Also noted by the same author were the disadvantages of the self-contained classroom including funding, depriving the heterogeneous classroom of gifted student to "enrich" the class, and parents who resist the traveling that might be necessary to transport student to the school where self-contained classes are housed. The controversies surrounding self-contained classrooms have not been resolved and continue to be debated.

Sandra N. Kaplan

See also Controversies in Gifted Education; Curriculum Models; Group Dynamics

Further Readings

Clark, B. (2008). *Growing up gifted*. New York: Merrill Prentice Hall.

Delcourt, M., Loyd, B., Cornell, D., & Goldberg, M. (1994). *Evaluation of the effects of programming arrangements in student learning outcomes*. Storrs, CT: National Research Center on Gifted and Talented.

Kirschenbaum, R. J. (2004). Interview with Dr. A. Harry Passow. In J. VanTassel-Baska (Ed.), *Curriculum for gifted and talented students*. Thousand Oaks, CA: Corwin Press.

Kulik, J. A. (1992). *An analysis of the research on ability grouping: Historical and contemporary perspectives*. Storrs, CT: National Research Center on the Gifted and Talented.

Kulik, J. A., & Kulik, C. C. (1992). Meta-analysis findings on grouping programs. *Gifted Child Quarterly, 36,* 73–77.

Moon, S., Swift, M., & Shallenberger, A. (2002). Perceptions of a self-contained class for fourth- and fifth-grade students with high to extreme levels of intellectual giftedness. *Gifted Child Quarterly, 46*(1), 64–79.

Oakes, J. (1986). *Keeping track: How schools structure inequality*. New Haven, CT: Yale University Press.

Rogers, K. (2002). *Reforming gifted education*. Scottsdale, AZ: Great Potential Press.

Slavin, R. (1995). *Cooperative learning: Theory, research and practice* (2nd ed.). Boston: Allyn & Bacon.

Tannenbaum, A. (1983). *Gifted children*. New York: Macmillan.

Tomlinson, C. A. (1999). *The differentiated classroom: Responding to the needs of all learners*. Alexandria, VA: Association for Supervision and Curriculum Development.

VanTassel-Baska, J. (2003). *Curriculum and instructional planning and design for gifted learners*. Denver, CO: Love Publishing.

Winner, E. (1996). *Gifted children: Myths and realities*. New York: Basic Books.

Self-Efficacy/Self-Esteem

"I want to do it myself!" "I can do it!" Anyone who has been around young children has heard these two statements. Statements such as these reflect children asserting their independence and reflect children's sense of self. Children believe in themselves. Only as they grow older and interact more with their environment and with others do children start to have self-doubts that challenge their self-esteem and self-efficacy. *Self-esteem* is a global concept that has been defined as one's general feelings of self-worth, and Albert Bandura coined the term *self-efficacy* to describe one's belief in his or her ability to do a specific task. This entry describes self-efficacy in relation to gender and race/ethnicity, positive self-esteem, talented and gifted students, and fostering positive self-beliefs.

Gender and Race/Ethnicity

A landmark study by the American Association of University Women examined the self-esteem of a large, national sample of boys and girls from childhood through adolescence. As young children, both boys and girls were positive about themselves; however, as they matriculated from

4th grade to 12th grade, girls experienced a dramatic decline in their self-esteem, whereas the self-esteem of boys seemed to get stronger. Carol Gilligan suggested that girls enter adolescence feeling strong, wise, and capable, yet during adolescence they start to hide their "true self," which leaves them feeling less confident and having more negative views of themselves. Indeed, this negative view of self is also reflected in girls, regardless of giftedness, starting to develop negative self-perceptions with respect to their body images, another aspect of self-esteem. Another possible explanation for the negative shift in girls' self-esteem is that girls experience an increase in depressive affect during adolescence. By late adolescence, girls experience more depression than do boys their age. Sex-role development and the socialization for females to be communal and for males to be competitive also affects self-esteem. As noted in the National Council for Research on Women report, *The Girls Report & What We Need to Know About Growing Up Female,* twice as many girls as boys are depressed, and self-esteem is a strong correlate of depression.

In a longitudinal study, researchers found that change in self-esteem among women was related to interpersonal characteristics that included nurturance and warmth, whereas changes in self-esteem among men was strongly linked to self-focused qualities such as managing social anxiety. Self-esteem is important in that it is positively related to an individual's ability to cope with stress and is negatively associated with depression, stress, and suicidal ideation. Furthermore, race/ethnicity interacts with self-esteem with Hispanic, Asian American, and Native American adolescents, particularly girls, having lower self-esteem than do Euro-American adolescents.

Positive Self-Esteem

Positive self-esteem has been consistently linked with creativity, talent, and giftedness. An important aspect of creativity is motivation. Intrinsic motivation (being driven by personal interest, gratification, challenge, or fulfillment) is associated with increases in self-esteem and creativity; however, extrinsic motivation (being driven by external rewards, evaluation, and competition) negatively affects creativity and self-esteem. Creative students who did not receive rewards or evaluation during or after completing a task have been found to be more creative than are the students who received rewards or evaluations. Also, persons with high self-esteem are not as vulnerable to environmental factors as those with low self-esteem. Thus, self-esteem is a protective factor against the negative external influences that constrain creativity.

Talented and Gifted Students

Talented and gifted students perceive and are affected by their abilities differently. For example, when asked to compare self-esteem levels with those of their non-gifted peers, gifted students report having an average or above average self-esteem. There are also gender differences in how the self-esteem of gifted boy and girl students is influenced. Higher mathematical ability is positively associated with the self-esteem of girls, but not of boys. In contrast, the self-esteem of gifted boys has been linked to their having higher levels of athletic and skill expectations. Despite the environmental factors that can negatively influence gifted students' self-esteem, talented young people enjoy their enhanced academic or athletic abilities, which fosters increased self-esteem and self-efficacy.

Although both self-esteem and self-efficacy are self-beliefs, they are different concepts. *Self-efficacy* is typically discussed as one's confidence that one can do behaviors related to accomplishing a specific task, such as school self-efficacy or career self-efficacy. Among bright, talented girls, school self-efficacy was found to be positively related to course taking, particularly math and science courses, and to future aspirations. Those who had higher self-efficacy also were more likely to be willing to pursue careers in math, science, or engineering. As Bandura stressed, those individuals who are higher in self-efficacy make heightened and sustained efforts in the face of failure to reach their goals. Rather than quitting, they are more likely to blame setbacks on lack of necessary knowledge or skills or insufficient effort. This is particularly true when gifted children are faced with challenging school tasks. They typically do not quit but instead problem solve to figure out what they need to accomplish the task. They have high self-efficacy (or self-confidence) that they will

succeed. This belief, combined with their intrinsic motivation, propels them to continue until they accomplish their goal. Gifted children expect to succeed and when they do, this reinforces their self-efficacy as well as their self-esteem.

Fostering Positive Self-Beliefs

Support from others fosters positive self-beliefs. Mothers and fathers, when they provide a healthy family environment that is caring and structured with boundaries for behaviors, can enhance and reinforce children's and adolescents' self-beliefs. Teachers who provide gifted and creative students with challenges appropriate to their abilities and then let them struggle to be problem-solvers foster self-esteem and self-efficacy. Individuals who have positive self-beliefs, who believe in themselves, have the potential to become our future leaders.

Sharon E. Robinson Kurpius, Sarah K. Dixon, and Erin M. Carr Jordan

See also Resilience; Social Development; Social-Emotional Issues

Further Readings

Amabile, T. M., Goldfarb, P., & Brackfield, S. C. (1990). Social influences on creativity: Evaluation, coaction, and surveillance. *Creativity Research Journal, 3,* 6–21.

American Association of University Women (AAUW). (1991). *Short-changing girls, short-changing America.* Washington, DC: Author.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28,* 117–148.

Block, J., & Robins, R. W. (1993). A longitudinal study of consistency and change in self-esteem from early adolescence to early adulthood. *Child Development, 64,* 909–923.

Ellis, C. J., Riley, T. L., & Gordon, B. (2003). Talented female athletes: Are they going for the gold? *Journal of Secondary Gifted Education, 14,* 229–242.

Field, T., Harding, J., Yando, R., Gonzalez, K., Lasko, D., Bendell, D. C., et al. (1998). Feelings and attitudes of gifted students. *Adolescence, 33,* 331–343.

Garber, J., Robinson, N., & Valentiner, D. (1997). The relation between parenting and adolescent depression: Self-worth as a mediator. *Journal of Adolescent Research, 12,* 12–33.

Solano, C. H. (1983). Self-concept in mathematically gifted adolescents. *Journal of General Psychology,* 33–42.

Wilburn, V. R., & Smith, D. E. (2005). Stress, self-esteem, and suicidal ideation in late adolescents. *Adolescence, 40,* 33–45.

Service-Learning

Connecting schools to community service is known as *service-learning*. Service-learning, described in this entry, is a method by which students learn and develop through curriculum integration and active participation in thoughtfully organized service experiences that address actual needs in the community. Providing structured time for students to think, talk, and write about their experiences during a service activity, service-learning provides students with opportunities to use their skills and knowledge in real-life situations in their own communities. These experiences enhance learning, especially for the gifted, by extending student learning into the community and helping to foster a sense of caring for others. Service-learning, tracing its roots to community service, has been shown to be an effective, differentiated methodology in the education of the gifted by encouraging creativity and collaboration, enhancing critical thinking skills, and further developing students' character and individual talents.

People helping others in their community is a tradition in the United States. Over the generations, Americans have answered the call to service offering their time, their efforts, and, most importantly, their compassion. In the early years when the United States was primarily an agrarian society, people helping others was an integral part of the social fabric. Young people were aware of their roles and learned early to contribute to their communities. In 1933, President Franklin Roosevelt launched the Civilian Conservation Corps (CCC), which helped pull the country out of the Great Depression. Millions of the unemployed served their country building bridges, national parks, and buildings in this country until 1942.

Progressives such as John Dewey encouraged schools to include the value of social reform and emphasize social and cooperative activities.

Connecting schools to community service was also encouraged by William Kilpatrick during World War II when he suggested that learning should take place in settings outside classroom walls and should include experiences to meet real community needs.

The first service-learning legislation was signed into law in November 1990 by President George H. W. Bush. This legislation, the National and Community Service Act of 1990, created the Commission on National and Community Service. In 1993, President Bill Clinton championed the National and Community Service Trust Act creating the Corporation for National and Community Service, which continues to support service-learning through its Learn and Service America program. Supported by liberals and conservatives alike, service-learning continues to generate much interest and support.

Classifications of Service-Learning

Jann Bohnenberger and Alice Terry developed the K–12 Developmental Service-Learning Typology, which identifies three levels of service-learning: community-service, community-exploration, and community-action. In Community-Service service-learning, students participate primarily in volunteerism; they perceive issues that are individual rather than societal. Although tied to the school curriculum and involving a high degree of service, this level involves a lesser degree of learning. Activities at this level include activities such as tutoring and serving in soup kitchens. Community-Service service-learning is appropriate for younger gifted students as a way to experience service to others, as an entry-level service-learning experience.

The next level of service-learning is Community-Exploration. At this level, the students explore, research, and connect a classroom topic to their community. Community-Exploration service-learning includes activities such as internships, high-level community research, and outdoor and environmental education.

Community-Action service-learning is the highest and most appropriate level for gifted students, especially adolescents. In Community-Action service-learning, students analyze a challenge in their communities, generate new ideas, and implement a plan of action to address the community challenge. They work in self-selected collaborative groups based on their interests, skills, and talents. At this level, the students develop complex problem-solving skills, advanced communication skills, the ability to connect knowledge across the disciplines, and the perseverance to overcome obstacles. Activities can include civic reform and community enhancement. Community-Action service-learning encourages gifted students to explore societal concerns; it involves a high degree of service, producing a broader community impact and the highest degree of learning.

Service-Learning in the Education of Gifted Students

Involving gifted students in service-learning is beneficial to the students and to the communities they serve. Participation in high levels of service-learning is advantageous for gifted youth because of their potential for advanced social, emotional, moral, and ethical development. The gifted tend to have a more highly developed sense of social justice, fairness, ethics, concern for others, and interest in global issues than do their non-gifted peers. Service-learning has the potential to help gifted students become more sensitive to community concerns and to develop socially, emotionally, and ethically.

In addition, high-level service-learning experiences can help gifted students develop advanced problem-solving skills, critical and creative thinking skills, and leadership skills. Service-learning has the potential to help gifted students reach their creative potential as they seek creative solutions to society's ever-increasing problems. It is also an effective, differentiated methodology for the gifted that can help gifted students develop greater self-esteem and self-efficacy as well as help them stretch toward self-actualization. Advanced levels of service-learning have been shown to provide gifted students with opportunities to demonstrate high levels of creativity, responsibility, reflective judgment, self-awareness, empathy for others, and autonomy of thought and action, in addition to other characteristics of self-actualization. The Future Problem Solving program's Community Problem Solving component has proven to be an excellent avenue for helping teachers incorporate

effective Community-Action service-learning into their classrooms.

Alice Wickersham Terry

See also Character and Moral Development; Creative Problem Solving; Critical Thinking; Differentiation; Future Problem Solving; Problem Solving; Self-Actualization; Self-Efficacy/Self-Esteem

Further Readings

Corporation for National and Community Service, Learn and Service America: http://www.learnandserve.gov

Renzulli, J. S. (2002). Expanding the conception of giftedness to include co-cognitive traits and to promote social capital. *Phi Delta Kappan, 84,* 33–58.

Terry, A. W. (2003). Effects of service learning on young, gifted adolescents and their community. *Gifted Child Quarterly, 47,* 295–308.

Terry, A. W., & Bohnenberger, J. E. (2003). Service learning: Fostering a cycle of caring in our gifted youth. *Journal of Secondary Gifted Education, 1,* 23–30.

Terry, A. W., & Bohnenberger, J. B. (2007). *Service-learning . . . by degrees: How adolescents can make a difference in the real world.* Portsmouth, NH: Heinemann.

Sex Differences in Creativity

Most research conducted on creativity and productivity in adult life has concentrated on men. It has been noted in the research on sex differences in creativity that men produce more creative work in research publications than women do and that cumulatively, men earn more degrees, produce more works of art, and make more contributions in professional fields. Even in areas such as literature, in which both younger boys and girls believe that women excel, adult men are more productive in their professional accomplishments. For many years, for example, more men than women have been recipients of grants from the National Endowment Fellowships in Literature.

Recently, a few researchers including Jane Piirto and Sally Reis have questioned why so few eminent women creators exist. Little research has been completed and little is known about creative women, their creative processes, and the decisions they face about their own creative productivity, and therefore how creativity can be developed and promoted in diverse girls and women. The social and political movement focusing on women during the past five decades has provided some understanding of women's creative processes as well as the creative roles that women have played in our society and the forces that shape those roles. When one reflects on what has been learned about creativity during the last 50 years, one is forced to acknowledge that a gap exists in one major area. Little research has been completed and little is known about diverse, creative women, the choices they make, and the decisions they face about creative productivity in their lives.

Despite limited research on highly creative women, some explanations have been offered for the small number of women recognized as highly creative in certain domains. Piirto suggests that one reason for the absence of many famous women artists is how intensely they pursue their passions for art. But how intensely do creative women pursue other fields? Isaac Asimov's *Biographical Encyclopedia of Science and Technology* is subtitled "The Lives and Achievements of 1510 Great Scientists From Ancient Times to the Present, Chronologically Arranged." Of the 1510 scientists included in the book, only 14 are women. When Barbara McClintock won the Nobel Prize in Physiology and Medicine in 1983, she was only the fifth woman to receive this award in the eight decades since it was established. Research by Reis on the creative processes and personalities of creative girls and women has demonstrated that gender stereotyping throughout their lifetimes, as well as both internal and external barriers in their education, marriage, and family lives, affect their creative productivity. The choices that some highly creative women make willingly, or are forced to make, profoundly affect both the quantity and direction of their creative output. These choices affect the focus of their creativity, either as applied to work or to other essential components of their lives, including family, relationships, personal interests, and work related to family and home.

The social and political movement focusing on women during the past five decades has provided some understanding of women's creative processes

as well as the creative roles that women have played in society and the forces that shaped those roles. Research focusing on the development of women's creativity can be classified into three major themes, which are presented in the remainder of this entry.

Theme One: Personality Characteristics of Creative Women and Their Barriers to, and Supports for, Creative Work

The first theme relates to the personality characteristics of highly creative women, the internal blocks that may prevent them from creating, and the study of these characteristics as a means of helping other women with creative potential to develop their creativity. Research in this area generally falls under the umbrella of either historical views or more modern explanations. To explore historical issues, researchers use retrospective analyses to investigate how creativity evolved in eminent women. Studies have been conducted, for example, on famous writers, scientists, and artists to attempt to identify factors characterizing the lives of talented, creative women of the time. These have generally included the following: the ability to overcome challenges or problems, the need for or absence of support, the opportunity to learn independently in the absence of formal education, and the willingness to live a different life from their peers or counterparts.

Rena Subotnik and Karen Arnold investigated women in science, generally finding what has been noted in previous research, that creative women scientists appear to be motivated largely by deep intellectual engagement and the recognition associated with influential discoveries. The degree to which women scientists resemble or differ from this largely male-derived profile has not been extensively researched. Subotnik and Arnold found, however, that a potential mismatch existed between the single-minded devotion to science, characteristic of eminent researchers, and the desire to balance family and career that appears so prevalently in reports of professional women. Ravenna Helson compared a sample of highly creative women mathematicians with a sample of other women mathematicians. The two groups differed only slightly on measures of intelligence, cognition, and masculine traits, but the creative mathematicians had more research activity, were highly flexible, original, and rejected outside influence. Half of the creative women were foreign born, and most had professional men as fathers. Compared with creative men mathematicians, the creative women had less assurance, published less, and occupied less prestigious positions. Helson also found differences between creative and comparison subjects in background and personality, perhaps indicating that their personality characteristics were powerful determinants of creativity of women mathematicians. The traits most characteristic of these creative women were (a) rebellious independence, introversion, and a rejection of outside influences; (b) strong symbolic interests and a marked ability to find self-expression and self-gratification in directed research activity; and (c) flexibility, or lack of constriction, both in general attitudes and in mathematical work. Helson attributed differences in creative productivity between men and women after graduate school to social roles and institutional arrangements.

Research with creative women has demonstrated that internal personal barriers often exist in the process of completing creative work. The way women have been raised and the cultural messages they encounter seem to result in these internal barriers and failure to develop the belief in self that is necessary for a commitment to highly creative work. Instead, Reis has found that some creative women remain in the background, in a less "center stage" position, as implementers of the ideas of others. Creative potential in some women may be directed to lower-profile work. Although their male counterparts produce plays, write articles or books, undertake large deals, and are viewed as creative high achievers, many highly creative women make conscious or unconscious decisions to work in a more facilitating role, often implementing the creative ideas of others.

Many women do not perceive themselves as creators, follow their interests into career preparation, or place importance on the works they produce. For example, one study of men and women at the School of the Art Institute of Chicago, one of the premier schools of art, found that men more often referred to themselves as "artists" and women referred to themselves as "students," indicating differences in identity development. The problem may be further exacerbated when women do produce

original, creative works, as some researchers have found that women are more conscious of criticism than men and find it more difficult to deal with negative perceptions of their work.

Highly creative women who are able to capitalize on their creative potential often display single-minded purpose, make difficult choices about personal lives, and have support systems to enable their creativity to emerge. These support systems include supportive spouses, or choices made about personal life that have been considered nontraditional in the past, such as remaining unmarried, choosing not to have children, living alone or with a partner, or any combination of these. A recent National Science Foundation Study found that neither talent nor achievements but, rather, the nature, size, and timing of marriage and childbirth distinguished between women who achieved tenure, promotion, and highest ranks. Highly creative women make decisions that support the adaptation of a life style conducive to the production of highly creative work.

Theme Two: Societal Factors That Facilitate or Impede the Development of Women's Creativity

A second theme in research relates to the societal factors that facilitated or became an impediment to the development of women's creativity. Research in this area is generally divided into either historical or more modern explanations, focusing on why there were so few eminent women creators (scientists, composers, and artists). Researchers who study the history of women's achievement have shown that creative works produced by women are often underrated or ignored in history. Historical research indicates that although intellectual stimulation in the home seems to play a major role in the development of creative ability, many girls were typically not encouraged or even allowed to engage in intellectual pursuits by their families or peers. They traditionally received less education than did boys, and society often denied women access to certain cultural materials and teachers. In the past, women, and especially culturally diverse women, undoubtedly received little encouragement, stimulation, and access to tools necessary for building intellectual skills and developing the ability to create something of cultural value. Moreover, women were regarded as less able than were men to use their intellectual skills creatively. Women who have the need to create may also experience constraints on their personal lives.

Other explanations of why there are so few eminent women creators have to do with time commitments. Researchers who have offered "historical" explanations about the limited number of women creators argue that women were burdened with family responsibilities, child bearing, and limited educational opportunities. Contemporary researchers argue that creative women may have too many demands on their time, feel guilty if they attempt to do creative work in time that should be spent with their family, or in some cases, dislike working alone for the periods necessary for creative accomplishment. Some researchers have noted that the same years in which Harvey Lehman found the height of men's creative productivity to coincide with the peak period of women's responsibilities to children. Some contemporary researchers have noted that in our society, exceptionally able women experience considerable stress related to role conflict and overload, which may reduce creative urges.

Theme Three: Gender and Cultural Differences in the Creative Process and Product

A third theme relates to the notion that gender differences exist in creativity and the creative process. A growing number of researchers have called for changes in the paradigm of how women and creativity are viewed, and the need for changes in society that could facilitate the development of creativity in women. Women have made, and continue to make, many creative contributions that are different from the creative accomplishments made by men, yet men's creative accomplishments seem to be valued more by society. The creative accomplishments of women are regarded as more modest and do not reflect the types of creative productivity that result in awards, prizes, books, articles, art, patents, professional stature, and financial gain. Rather, as Reis pointed out, their creative efforts were diversified over several initiatives, and their creative products were different than those listed.

Several researchers have argued that gender differences exist in creativity among men and women. Some researchers perceive that at least some women perceive creative phenomena differently from men. Women's experiences and situations in society have been vastly different from men's, so one would expect differences in perception to emerge, for perception cannot be separated from learning and experience. Perhaps the most controversial issue related to women and the creative process is the claim that there may be a potential mismatch between the single-minded devotion necessary for creative accomplishment and the desire to balance family and career that appears so frequently in research about creative women. Actually, many women do have the potential to display single-minded devotion to their work, but they also choose to diversify their creative efforts.

The creative process in women may emerge differently than in men, and in some people, it may not exist. Women's perceptions of the creative process in art as well as other areas have been filtered through male perspectives and the cultural roles developed for women but not by women. Therefore, women writers, artists, scientists, and creators in all domains deal with men's conceptions of creativity and a creative process that has been accepted as the standard within that domain, but may only be standard for men creators. Again, more research is needed in this area.

Sally M. Reis

See also Creative Productivity; Eminence; Girls, Gifted; Talent Development

Further Readings

Helson, R. (1996). In search of the creative personality. *Creativity Research Journal, 9*(4), 295–306.

Kerr, B. A., & Larson, A. (2008). How smart girls become talented women. In S. Lopez (Ed.), *Positive psychology: Exploring the best in people* (pp. 131–167). Westport, CT: Praeger.

Ochse, R. (1991). Why there were relatively few eminent women creators. *Journal of Creative Behavior, 25*(4), 334–343.

Piirto, J. (1991). Why are there so few? (Creative women: Visual artists, mathematicians, musicians). *Roeper Review, 13*(3), 142–147.

Reis, S. M. (1998). *Work left undone.* Mansfield Center, CT: Creative Learning Press.

Reis, S. M. (2002). Toward a theory of creativity in diverse creative women. *Creativity Research Journal, 14*(3 & 4), 305–316.

Subotnik, R. F., & Arnold, K. D. (1995). Passing through the gates: Career establishment of talented women scientists. *Roeper Review, 18*(1), 55–61.

Sex Differences in Mathematical and Spatial Ability

In the United States, there is a dearth of women at the top of mathematically intensive fields. Is this an indicator of a lack of aptitude, perhaps because of biological causes? Or are there fewer women because of sociocultural or historical reasons? This entry describes cognitive sex differences among the highest performers and explores biological and sociocultural explanations. Evolutionary, brain-based, and hormone-based accounts of sex differences in mathematics are inconclusive. Differences in interests clearly exist, but their etiology is unclear. The current sex difference in representation at the top of math-based fields in the United States may not reflect the difference in the number of men and women who are innately gifted in math. It may, instead, largely reflect a combination of a pipeline effect and differences in interests (whether driven by genetic or sociocultural factors).

Background

Camilla Benbow and Julian Stanley in 1983 created a controversy when they published their findings concerning the top-scoring students in their mathematics talent search, who were disproportionately men. Benbow and Stanley suggested men's superiority in mathematical reasoning as one hypothesis to explain their findings. Indeed, at the top 50 universities, the proportion of full professorships held by women in math-intensive fields (engineering, mathematics, physics, computer sciences, chemistry) ranges between 3 percent and 15 percent. Does this underrepresentation

reflect innate differences in some kinds of ability, or are nonability accounts such as culture, differential interests, or discrimination to blame? This entry, based on the past few decades of analyses of sex differences research, explores the issues pertinent to answering these questions.

In 1995, Larry Hedges and Amy Nowell examined six studies, each based on a national probability sample of adolescents and young adults. They found that the cognitive ability distributions for men and women differed substantially among the top and bottom 1, 5, and 10 percent: Men excelled over women in science, math, spatial reasoning, and social studies as well as in various mechanical skills. Women excelled over men in verbal abilities, associative memory performance, and perceptual speed. The means for men and women were usually similar, but men's scores had greater variability, which led to large asymmetries at the highest and lowest tails of the distribution. As one of Hedges and Nowell's more dramatic findings, despite only small differences at the midpoint of the distribution, men outnumbered women in the top 1 percent of mathematics and spatial reasoning by a ratio of seven to one.

These findings were consistent with those of many other studies. For example, Benbow and Stanley had reported men–women ratios among the top 0.1 percent of adolescents (i.e., one in a thousand) on the SAT–Mathematics of approximately 10-to-1 and in Stanley's seminal work with 12- to 14-years-olds who were recommended for a gifted program at Johns Hopkins University (the Study of Mathematically Precocious Youth, or SMPY), the highest-scoring girl's score was surpassed by 43 boys.

Biological Explanations

There are some grounds for positing a biologically based account for this apparent sex difference in mathematical giftedness, whether caused by innate differences in ability or other factors such as interests.

Evolved Ability

David Geary suggested that evolutionarily important behaviors such as male–male competition involve greater reliance on the ability to represent three-dimensional space geometrically; thus, 3-D spatial ability may underlie advanced mathematics.

Brain Structure and Functioning

Many studies by neuroscientists demonstrate sex differences in brain structure and functioning. Ruben Gur and Raquel Gur argued that men's brains are optimized for enhanced connectivity *within* hemispheres, whereas women's brains are optimized for communication *between* the hemispheres, especially in language processing and posterior brain regions, as indicated by the larger callosal splenia. Relatedly, Karin Kucian and colleagues found that, for spatial tasks, better performance of men when solving the harder problems was associated with more focal activation of right visual association areas of the brain whereas women recruited additional regions bilaterally for these tasks. Also, Richard Haier and his colleagues used magnetic resonance imaging to investigate whether brain structure, especially the amount of gray and white matter in different brain areas, was related to general intelligence, as determined by standard IQ tests. Apparently, it is. There are structures distributed throughout the brain where the amount of gray matter or white matter predicts IQ scores. Specific areas associated with language in the frontal and parietal lobes seem especially important. Other researchers have shown that the volume of these same brain areas appears to be under genetic control. The amount of gray and white matter in the frontal areas seems more important in women, and the gray matter in the parietal areas seems more important in men, suggesting that men and women achieve the same cognitive capability using different brain architectures.

Hormones

Prenatal and postnatal hormones may play a role, particularly in spatial cognition: numerous studies show that male hormones—up to a certain level—benefit spatial reasoning. Doreen Kimura reviewed this evidence and suggested that prenatal androgen levels are a major factor in the level of adult spatial ability, and even in adulthood variations (across the menstrual cycle in women and across seasons and time of day in men) are

associated with variations in cognitive abilities. She further noted that such sex differences are seen early in life, before the environments of boys and girls diverge. In addition, she noted that sex differences in humans parallel differences found in nonhumans, where social influences are minimal (e.g., male rats are superior to female rats in learning spatial mazes, and these sex differences can be reversed by hormonal manipulation or castration of male rats).

Interests

Simon Baron-Cohen argued that girls come into the world with an orientation toward people whereas boys come with an orientation toward objects, which leads them down differing paths of interests. As adults, men and women tend to prefer different careers and lifestyles that are said to be based on these early tendencies. Sex differences exist in occupational preferences occuring along a "people-to-object" dimension: Women are more likely to pursue people-oriented or organic fields, whereas men with similar mathematics and science abilities tend to pursue object-oriented fields. Sex differences on the people-to-object dimension are quite large, and they are longitudinally stable, according to Richard Lippa. Sex differences in occupational preference are more predictive of later careers than is the SAT-M or GRE-Q: in their tracking study of 1,100 high-mathematics aptitude students who expressed a goal of majoring in mathematics and science in college, many students later switched to nonmathematics majors, and they were more likely to be women. Although all of these 1,100 students came from the top 1 percent in mathematics aptitude, they manifested both ability and interest differences that were evident long before they began taking different courses that led to different college majors. One determinant of who switched out of math and science was the asymmetry between their verbal and mathematics abilities. Women's verbal abilities were nearly as strong as their mathematics abilities (only 61 points difference between their SAT-V and SAT-M), leading them to enter professions that prized verbal reasoning (e.g., law), whereas men's verbal abilities were 115 points lower than their mathematics ability, possibly leading them to view mathematics as their only strength. Numerous surveys show that women, regardless of their mathematical aptitude, prefer careers that emphasize living things (e.g., medicine, biology, veterinary medicine, law) over mechanical phenomena (computer science, engineering, chemistry, physics).

Environmental Explanations

There are also persuasive grounds for explaining the math sex differences by nonbiological causes. This research takes issue with claims of biological causation, and points to environmental bases of sex differences.

Evolved Ability

Nora Newcombe criticized evolutionary accounts of sex differences in 3-D reasoning on numerous grounds, and Diane Halpern and colleagues pointed out that the available evidence is insufficient to determine the impact that evolutionary pressures have had on sex differences in cognitive ability, although they present intriguing suggestions. Such explanations are further challenged by Jacqueline Eccles's model of early socialization differences that lead to adult differences, and by findings by Janet Hyde and others showing that sex differences can be sensitive to context, and that women from some nations outperform U.S. and Canadian men on mathematical aptitude tests, often by greater margins than U.S. men outperform U.S. women. If ability differences are the result of evolution, they should not be affected by culture. On the other hand, if cultural beliefs about men's superiority are a major cause of women's underperformance, then men's overrepresentation in mathematics and science should be greater in countries low on egalitarian gender beliefs, such as Turkey and Korea, than in the United States and United Kingdom, and this is indeed generally the case. Consistent with this, the math gender gap disappears among 15-year-olds in countries viewed as highest on gender equality: for example, answering negatively questions such as "When jobs are scarce, should men have more right to a job than women?" Countries high in equality such as Iceland, Sweden, and Norway have virtually no math gap, even among those scoring above the 99th percentile—whereas countries such as Turkey, that rank low on gender equality, have math gaps in favor of men. In

addition, the ratio of men-to-women in the gifted mathematics range has changed dramatically over time, from 10 to 1 in the early 1980s to less than 3 to 1 in 2008, illustrating malleability, and thus arguing against genetic causation. Further, the meaningfulness of test scores as an accurate indicator of ability has been challenged by stereotype threat research that suggests that it can undermine test performance for some women, perhaps especially those who are mathematically talented. Paul Davies and Steve Spencer found that women who marked the box corresponding to their gender *after* completing the SAT Advanced Calculus test scored significantly higher than did their women peers who checked their gender *before* starting it, presumably because directing attention to women's gender at the start of the exam causes anxiety that impedes performance, a phenomenon known as stereotype threat. Identifying their gender *after* the AP Advanced Calculus exam would add nearly 3,000 women eligible to begin college with advanced credit for calculus.

Brain Structure and Functioning

Brain differences may indeed exist, but some brain differences may be experience-based rather biologically based. For example, juggling practice can increase gray-matter density in the temporal cortex. Similarly, taxi driving experience has been found to correlate with hippocampal volume.

Hormones

Interpretation of the extensive and complex literature on the effects of sex hormones on spatial abilities is not straightforward. Positive findings are often offset by studies representing challenges or problems. Animal studies show the most pronounced hormone effects, but they are less applicable to humans. Lacking are large-scale, representative human studies of individuals at the right tail of the ability distribution that unequivocally demonstrate the predicted pattern. Clinical studies of individuals of unknown representativeness are fascinating bases for generating hypotheses, but must await randomized experiments and large-scale population studies that report data for right-tail groups. Also, inconsistencies need to be reconciled.

Interests

Elizabeth Spelke refuted the claim that there exist sex differences in infants' people-versus-object orientation, based on a review of extensive evidence. Therefore, she suggests, the observed post-infancy sex differences in interests are more likely to be caused by sociocultural forces and, hence, malleable.

Others have addressed the issue of sex differences in math ability by observing that there may not be as much to explain as some suggest. First, the number of women at the top now may be an outdated indicator, given historical changes and the pipeline effect. When individuals now at the peak of their careers were growing up, there were fewer high-math-scoring women, presumably because of sociocultural factors. The proportion of women earning bachelors degrees in scientific and engineering fields has increased without interruption every year since 1966. Women are also attaining doctoral degrees in scientific and engineering fields in growing numbers: By 2001, women earned 37 percent of Ph.D.s in scientific and engineering fields, up from just 8 percent in 1966. Second, given the data showing a dearth of women scoring in the top 1 percent on mathematics tests even today, one might imagine that few women would succeed in mathematically intensive baccalaureate and graduate programs, but this is not the case. By 2001, the number of women earning degrees in the United States actually exceeded the number of men earning degrees in some science, technology, engineering, and medical fields. There are no longer gender differences in the number of demanding mathematics courses taken in U.S. high schools, and girls do better than boys in these courses. Men and women get equal grades in U.S. college math classes that are of comparable difficulty, and women now earn 48 percent of bachelor's degrees in mathematics. If the ability to master new, challenging mathematical material over extended periods is the criterion for ability, then U.S. college men and women show equal aptitude for mathematics. Further, in transnational comparisons, sex differences in mathematics and science performance are sometimes nonexistent or even favor women. Men's superiority is not ubiquitous.

Research Results

Evolutionary, brain-based, and hormone-based accounts of sex differences in mathematics are inconclusive. Differences in interests clearly exist, but their etiology is unclear. The current sex difference in representation at the top of math-based fields in the United States may not reflect the difference in the number of men and women who are innately gifted in math. It may, instead, largely reflect a combination of a historical factors and differences in interests (whether driven by genetic or sociocultural factors). Other noncognitive factors common to all fields, such as time spent raising families, likely also play a role.

Stephen J. Ceci, Wendy M. Williams, and Susan M. Barnett

See also Boys, Gifted; Girls, Gifted; Mathematical Talent; Men, Gifted; Sex Differences in Creativity; Women, Gifted

Further Readings

Achter, J. A., Lubinski, D., Benbow, C. P., & Eftekhari-Sanjani, H. (1999). Assessing vocational preferences among gifted adolescents adds incremental validity to abilities. *Journal of Educational Psychology, 91,* 777–786.

Baron-Cohen, S. (2007). Sex differences in mind: Keeping science distinct from social policy. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 159–172). Washington, DC: American Psychological Association.

Benbow, C., & Stanley, J. (1983). Sex differences in mathematical reasoning ability: More facts. *Science, 222*(4627), 1029–1031.

Ceci, S. J., Williams, W. M., & Barnett, S. M. (2009). The underrepresentation of women in science: Sociocultural and biological considerations. *Psychological Bulletin.*

Geary, D. C. (1998). *Male, female: The evolution of human sex differences.* Washington, DC: American Psychological Association.

Guiso, L., Monte, F., Sapienza, P., & Zingales, L. (2008). Gender, culture, and math. *Science, 320,* 1164–1165.

Halpern, D. F., Benbow, C. P., Geary, D., Gur, R., Hyde, J. S., & Gernsbacher, M. A. (2007). The science of sex differences in science and mathematics. *Psychological Science in the Public Interest, 8, 1–51.*

Hedges, L. V., & Nowell, A. (1995). Sex differences in mental test scores, variability, and numbers of high-scoring individuals. *Science, 269,* 41–45.

Hyde, J. S. (2005). The gender similarity hypothesis. *American Psychologist, 60,* 581–592.

Lubinski, D. S., & Benbow, C. (2007). Sex differences in personal attributes for the development of scientific expertise. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 79–100). Washington, DC: American Psychological Association.

Spelke, E. S. (2005). Sex differences in intrinsic aptitude for mathematics and science: A critical review. *American Psychologist, 60,* 950–958.

Sibling Relationships

In an effort to help parents encourage the development of their gifted child, research and literature has been aimed at the parental relationship of a gifted child, giving advice and support and showing the link between the parents' actions and the child's ability to capitalize on his or her gifts. But little attention has been paid to the role of the sibling relationship on a gifted child's development. More recent research on sibling dynamics has highlighted the importance of the sibling relationship throughout the life span.

Siblings are our closest genetic matches; they are with us from either birth or very young and will likely remain in our lives longer than any other family relationship, including our spouse. In childhood, siblings spend more time with one another than with either peers or parents. It is no surprise that they have an influence on our lives. The nature of the influence is still being examined. Specifically the nature of sibling influence on gifted children has been under-examined. This entry describes sibling relationship as they relate to the gifted.

Gifted Family Description

Although giftedness is an individual label, researchers have sought to understand the family background of precocious children. Studies have shown that giftedness runs in families. Often when a gifted child is labeled, parents realize their own giftedness that may not have been identified when they were

children. Therefore, a child is more likely to be surrounded with gifted siblings and parents than to be the sole gifted person in the family.

Gifted Sibling Relationships

Labeling a child gifted can have some implication for the adjustment of siblings that may later affect the sibling relationships within the household. There are incidents of individual children being labeled gifted but another is not, and many studies focus on the relationship consequences of this disparity. The problems that manifest when one child is labeled gifted and another is not likely stem more from the parents' reactions to this. If parents pour attention and energy into the labeled child at the expense of other children, sibling rivalry and resentment will more likely occur. Other research indicates that relationships among gifted siblings are more adjusted than are their counterparts across the general populations. Nicholas Colangelo and his colleagues discovered that although there is an initial, slightly negative reaction of siblings to one of them being labeled gifted, this effect diminishes with time, with attitudes becoming positive or neutral.

Current Research of Personality and Interests of Siblings

Although birth order is an often-researched area when looking at individual differences in personality and interests, results have been inconclusive and inconsistent. Variables such as age spacing between siblings and intermarriage of families confound the generalizability of any birth-order relationship with personality that has been garnered.

Several theories of learning and development may inform subsequent research; two of these are *social learning theory* proposed by Albert Bandura and *sibling de-identification,* attributed to several different theorists including Alfred Adler.

Social Learning Theory

Social learning theory is often used to describe similarities in attitude, personality, and interests, and most especially behavior within families. Bandura explains that children will model behavior when they have the following assumptions about the person and activity they are modeling: The modeled behavior will result in outcomes that the child values, and the child must identify the person they model as similar to themselves and as having valued status. It would make sense, then, that an older sibling would commonly be an identified model for a younger child. This would be especially true when the older sibling is exhibiting socially valued behaviors, and not true when the older sibling is exhibiting antisocial behaviors.

Sibling De-Identification

Sibling de-identification theory is another developmental theory that attempts to explain differences in personality and interests among siblings. This theory states that siblings compete to gain parental love and attention. In an effort to minimize sibling conflict and competition and to gain independence and parental favor, each child endeavors to establish his or her own valued niche within the family. Specifically, the theory states that the differentiating process appears to be strongest when siblings are more similar in qualities such as sex, age, and appearance.

Sibling Influence on Creativity

In an effort to address the question of sibling influence on creativity, Mary Givens conducted a preliminary investigation into the subjective experience of sibling influence on creative adolescents. Eighty-six participants in a career development workshop for creative adolescents were surveyed about the influence of a sibling on their interests, personality, and creativity. Responses to the survey questions were analyzed using grounded theory.

Themes that emerged for older siblings indicated they were experiencing no influence by younger siblings on their interests and being a leader or role model. Themes for younger siblings included the following: introduction by an older sibling to an activity or interest, learning social skills from an older sibling, and encouragement and support of creative gifts from an older sibling.

A second analysis was conducted to determine if social learning theory or sibling de-identification theory better described the phenomenon of creative sibling influence. Social learning theory emerged as the single predominant theory for this sample.

Implications

The contradictory findings of studies on sibling influence and birth-order comparison indicate that sibling relationships are complex and cannot be summed up easily, nor have they been fully researched. Much of the research has focused on the gifted family as a whole or on interfamilial conflict surrounding the labeling of giftedness. A review of the research literature written during the last 20 years indicates that researchers continue to focus on negative aspects of sibling relationships, such as sibling rivalry. Few researchers focus on the influential relationship siblings can have on the development of creative lives. There is much yet to be discovered about the intricacies of a relationship that will span the lives of many of our creative students. The hope is that the information garnered about these relationships that shape the lives of creatively gifted children can be used to create more effective interventions and dialogue with these students.

Mary Givens

See also Family Creativity; Mentoring Gifted and Talented Individuals; Personality and Intelligence

Further Readings

Chamrad, D. L., Robinson, N. M., Janos, P. M. (1995). Consequences of having a gifted sibling: Myths and realities. *Gifted Child Quarterly, 39*(3), 135.

Cicirelli, V. G. (1967). Sibling constellation, creativity, IQ, and academic achievement. *Child Development, 38*(2), 481–490.

Colangelo, N., & Brower, P. (1987). Labeling gifted youngsters: Long-term effects on family. *Gifted Child Quarterly, 31*(2), 75–78.

Givens, M. (2008, August). *Siblings of creatively gifted*. Paper presented at American Psychological Association, Boston.

Yewchuk, C. R., & Schlosser, G. A. (1996). Childhood sibling relationships of eminent Canadian women. *Roeper Review, 18*(4), 287–292.

Single-Sex Schooling

Single-sex schooling refers to the provision of education to children in an environment consisting solely of members of the same gender, that is, all-boy or all-girl classes or schools. Renewed interest in single-sex schooling revisits questions of appropriate curriculum for students according to their performance, abilities, and talents as well as their gender. Since 2002 and the implementation of the No Child Left Behind Act, single-sex schooling has emerged as a potential means of enhancing student performance. Understanding the potential implications of single-sex schooling for gifted students requires a grasp of the historical background of the reform, as well as an awareness of research that has explored the effectiveness and the perceived benefits of creating single-sex classes and schools, as described in this entry.

Historical Background

Coeducational classes are a relatively new development in U.S. education and education in general. Throughout the early days of U.S. education, single-sex schools were the norm in secondary schools. At that time, however, only students of above-average ability and above-average income attended secondary schools, that is, primarily upper-class White boys. During the 1920s, Progressive policymakers created comprehensive coeducational high schools to offer a wide range of courses and theoretically to provide access to the entire curriculum to all students, particularly girls, who had previously been afforded limited opportunities, particularly in math and science. Then, in 1975, Title IX legislation specifically forbade single-sex physical education classes because of inequitable resources and facilities for women athletes. Title IX did not include academic classes, but, confused over both the spirit and the letter of the law, schools then steered clear of single-sex classes in all subjects until Title IX was essentially changed by the implementation of the No Child Left Behind Act.

Rhetoric about the effectiveness of single-sex classes dominated the early years of the 21st century, with conflicting opinions about whether boys or girls benefited, if at all, by the arrangement. In 2002, an amendment to No Child Left Behind legislation opened the door for schools to experiment with single-sex classes as a means of improving educational outcomes for all students, with no special emphasis on those who readily achieved or

exceeded mastery. Education policymakers looked to single-sex classes as a solution for declining achievement in specific content areas, such as mathematics and science for girls and language arts and reading for boys. Schools that attempted to implement single-sex classes frequently experienced conflicts between policymakers and educators over ideology and resources, as well as concerns about equity and stereotypical attitudes

In 2006, the U.S. Department of Education confirmed the legality of single-sex arrangements. This decision emerged in the midst of the proliferation of such classes in school districts that had already begun experimenting with the model. Since 2006, the number of single-sex classes and schools has increased exponentially. Many of these arrangements have been ideologically driven without the benefit of research-based foundations. Limited attention has been paid to the efficacy of single-sex schooling for gifted students, although the particular learning needs of gifted girls have merited scrutiny.

Effectiveness

In the United States, the debate about gender differences continues to fuel interest in single-sex classes and schools. In the 1990s, research focused on inherent inequities for girls in mixed classrooms and that girls often choose, with permission and even encouragement from school authorities, to take less demanding courses. The American Association of University Women originally endorsed single-sex classes, but ultimately reversed its stance because of the slippery slope that might result in inequitable curriculum offerings for girls, reversing the gains of the past 50 years. At the beginning of the 21st century, attention turned to underachievement among boys across all ethnicities. Some proponents of brain-based differences argue that the specific needs of boys and girls are best addressed only in single-sex classes and schools. More temperate brain-based theorists strongly suggest that the professional development of teachers must focus on specific strategies for teaching each gender, regardless of whether they are segregated from each other.

Assessing the effectiveness of single-sex classes is problematic. In the United States, single-sex arrangements are often part of multifaceted educational reform, including changes in curriculum delivery. Therefore, it is difficult to attribute student success to any one variable. Educators in the international arena have also weighed in on the effectiveness of the single-sex classes, but their findings have been largely inconclusive. As single-sex schools and classes have increased in number, so have the efforts of researchers to examine the phenomenon. A large meta-analysis of studies on single-sex education was commissioned in 2005 by the U.S. Department of Education. After excluding the many studies that lacked appropriate research design and controls, researchers found moderately positive or neutral impact of single-sex schools on student achievement in concurrent programs and neutral effects on social and emotional development.

Perceived Benefits

The benefits of single-sex schooling for gifted students remain open to discussion. For example, no conclusive evidence exists that single-sex classes increase girls' participation in Advanced Placement calculus classes, but some evidence indicates that girls' academic engagement does increase in single-sex classes. Sex differences in mathematics and science among the gifted and talented continues to dominate discourse about appropriate curriculum for gifted students. Most importantly, differences have surfaced in teacher and student interactions in single-sex and mixed classes, specifically in student competition for both boys and girls in single-sex classes, with different manifestations for boys versus girls. Some studies have shown that women who have attended single-sex schools have had more opportunity for leadership and more mentoring than have women in coeducational programs.

The question remains whether single-sex classes should be offered as a viable choice for gifted students and their parents. Some teachers strongly favor single-sex schooling and want to teach in all-girl or all-boy classes. Given adequate professional development of such teachers, both in appropriate strategies for boys and girls, as well as in differentiated instruction for the gifted students, single-sex classes can potentially provide one way of addressing the cognitive and social development of students who choose them.

Frances R. Spielhagen

See also Boys, Gifted; Classroom Practices; Girls, Gifted; Parental Attitudes; Sex Differences in Creativity; Sex Differences in Mathematical and Spatial Ability

Further Readings

Datnow, A., Hubbard, L., & Conchas, G. (2001). How context mediates policy: The implementation of single-sex public schooling in California. *Teachers College Record, 103*(2), 184–206.

Gurian, M. (2002). *Boys and girls learn differently! A guide for teachers and parents.* San Francisco: Jossey-Bass.

Reis, S. M., Callahan, C. M., & Goldsmith, D. (1996). Attitudes of adolescent girls and boys toward education, achievement, and the future. In K. Arnold, K. D. Noble, & R. F. Subotnik (Eds.), *Remarkable women* (pp. 209–224). Cresskill, NJ: Hampton Press.

Salomone, R. (2003). *Same, different, equal: Rethinking single sex schooling.* New Haven, CT: Yale University Press.

Siegle, D., & Reis, S. M. (1998). Gender differences in teacher and student perceptions of student ability and effort. *Gifted Child Quarterly, 42,* 39–47.

Spielhagen, F. (Ed.). (2007). *Debating single-sex education: Separate and equal.* Baltimore: Rowman & Littlefield Education.

U.S. Department of Education. (2005). *Single sex versus coeducational schooling: A systematic review.* Washington, DC: Author.

Social Development

As one examines the social development of a gifted child, it is important to remember that each child is unique, respect the basic nature of the child, and remember that cognitive abilities are just one part of the child's identity influencing social development. Erik Erikson's theory of psychosocial development suggests that all individuals, including those with exceptional abilities, must move through eight developmental stages, five of which occur before adulthood:

1. Infancy: trust versus mistrust
2. Toddler: autonomy versus shame and doubt
3. Preschooler: initiative versus guilt
4. Elementary school age: industry versus inferiority
5. Adolescence: identity versus identity confusion

Within each of these stages, the child will face a crisis that must be resolved. If the child is successful in meeting these challenges, then basic strengths or virtues will emerge. However, if the child is unsuccessful in negotiating the different stages effectively, these issues will be carried forward as the child seeks to establish his or her social identity. How gifted children learn to explore their environments during these formative years will affect how successful they are in moving through these developmental stages, described in this entry. Lack of proper identification may, in turn, impede a gifted child's social development because the child will not be receiving appropriate educational services.

One of the greatest challenges to a gifted child's social development is an ill-fitting environment. Gifted children are often bombarded with mixed messages. This is particularly true when the child reaches school age. Gifted students who were thriving as very young children may suddenly be faced with a host of new contradictory expectations. Parents and teachers may place expectations on the child based on what they perceive the child's strengths to be. However, some gifts take time to develop and may only surface if the child is allowed to experiment and explore different possibilities. Furthermore, each of the adults is observing the child through a distinctive lens. Therefore, the child's perception of himself or herself may be remarkably different from those of the adults.

Other factors in a child's environment may have a profound effect on the child's social development as well. Children from low socioeconomic backgrounds are at the greatest risk for underachievement. Gender may play an important role in social development. Some gifted girls report concern that there will be negative social consequences as a result of their academic successes. In a 1999 study by Sylvia Rimm of 1,000 successful women, many reported paying a further social price for their academic success; many reported feeling isolated from their peers as children. Cultural expectations can also influence a gifted child's social development and peer expectations can have an intense impact as well.

Many gifted children develop asynchronously, so that their cognitive development quickly surpasses their development socially. This unevenness sometimes makes it more challenging for gifted students to find friends who share their interests and perspectives. Hence, some gifted kids feel that they do not quite fit with either their cognitive-related peers or age-related peers.

In *Schooling the Gifted,* Laurence Coleman offers a *stigma of giftedness paradigm,* as follows:

1. Gifted children want to have normal social interactions.
2. They believe that others will treat them differently if they learn of their giftedness.
3. Gifted students learn that they can manage information about themselves in ways that enable them to maintain greater social latitude. (p. 36)

Gifted kids should feel valued and have the opportunity to complete meaningful and challenging work both inside and outside the classroom. Without these opportunities, gifted children may never acquire perseverance, empathy toward peers, or sound learning strategies to cope with life's challenges. Participating in activities such as band, theater, or sports can help foster a gifted child's social development. It is important that the activity is self-selected and the child is doing something where relative success is likely. Such activities, which allow gifted students to follow their passions, can act as stress relievers and provide opportunities for the gifted youth to grow in new ways.

Children learn best from those with whom they have a positive caring relationship; every gifted child needs at least one caring adult to help navigate life's challenges. There are many divergent views concerning how a gifted child should behave. Having someone who will allow gifted children to consider those differing views and express their opinions honestly can be beneficial to the child in their social development. This adult mentor can also help the gifted child build positive relationships with others. Because gifted children tend to see the world from a slightly different perspective, gifted children should be given opportunities to interact with a wide variety of people from diverse backgrounds. This will enable them to learn to understand and appreciate their own gifts and talents, as well as appreciate what can be learned from the diversity of others.

Patricia Gillespie

See also Emotional Intelligence; Social-Emotional Issues; Socioeconomic Status

Further Readings

Coleman, L. J. (1985). *Schooling the gifted.* Menlo Park, CA: Addison Wesley.

Cross, T. L. (2004). *On the social and emotional lives of gifted children* (Academic ed.). New York: Bantam Dell.

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Santrock, J. W. (2004). *Life-span development* (2nd ed.). Boston: McGraw-Hill.

Social-Emotional Issues

Affective qualities play an important role in realizing extraordinary potential. In his groundbreaking study of highly intelligent children and youth, Lewis M. Terman discovered that although intellectual potential was relatively homogeneous among his subjects, life achievements were much more variable among the men in the study. He pinpointed affective qualities that differentiated between (relatively) high- and low-achieving men: "persistence in the accomplishment of ends, integration toward goals, self-confidence, and freedom from inferiority feelings. In the total picture the greatest contrast between the two groups was in all-round emotional and social adjustment, and in drive to achieve" (p. 148). An extensive body of longitudinal or retrospective analyses of factors that distinguish between extraordinarily able individuals who perform highly throughout their lives and others who falter and often fail to actualize their abilities now supports his conclusions. These studies, albeit descriptive, indicate that social-emotional issues must be addressed before individuals with high intellectual ability can navigate

the shoals of personal development and successfully sail the seas of high performance.

Three issues complicate professionals' ability to identify social-emotional issues and related affective needs unique to gifted and talented learners: the talent-blindness of current research, measurement concerns, and developmentally insensitive research on high-potential individuals. Specifically, it is generally accepted that a key developmental task for all youngsters is to know, understand, accept, and value oneself, but it is unclear relative to the degree to which high intellectual or creative abilities affect this task. Empirically defining social-emotional issues, manifested in affective needs that accompany high potential has been elusive. Instruments related to affective variables such as self-concept, self-esteem, and motivation are not built on theories that include giftedness, and they are too easily "faked" in that test-wise respondents can create profiles that indicate higher functioning than is actually the case. Last, much of the talent-focused research in the affective domain has been conducted with adults. Their retrospective descriptions are filtered through decades of experience. Developmental theorists agree that the child is not a precise predictor of the adult, yet only a handful of studies are longitudinal.

Despite these limitations, four areas of affect appear important to address with youngsters having high intellectual potential: understanding giftedness (self-concept), disengaging self-worth from achievements (self-esteem), initiating tasks and persevering until the work is completed at an appropriate level of accomplishment (motivation), and functioning in a variety of contexts (using resources effectively). This entry describes these areas, then methods for addressing affective needs.

Self-Concept

Gifted/creative/talented young people need to understand their abilities as a multidimensional phenomenon that changes over time and in different contexts. Thus, youngsters can develop the ability to analyze their profiles of strengths and needs and thereby set goals based on realistic self-assessments. A solid sense of self permits more flexibility and less compulsiveness to achieve at all costs. A differentiated strengths profile is also associated with perceiving oneself as less ipsative. An ipsative view of ability would mean that one's abilities are a fixed sum. To be highly able in one arena would necessarily mean that there is less ability available for other arenas of endeavor. A less ipsative self-concept has profound implications for self-esteem and motivation.

Self-Esteem

When bright, sensitive youngsters learn to separate self-worth from extraordinary achievements valued by others, they permit themselves the opportunity to learn from setbacks as well as successes, a hallmark quality of successful, highly able adults. The core self also maintains its mental health through the uncontrollable ups and downs of life. A higher self-esteem results in a more internal standard of assessing one's work and less sensitivity to peer pressure in academic as well as social realms.

Motivation

The two aspects of self profoundly affect how individuals explain success and failure and their willingness to attempt tasks that carry some risk of failure and to persevere through a learning period. When gifted and talented youngsters see themselves as unable to improve through effort, they exhibit less resilience, a greater inclination to underperform, and more self-sabotaging behaviors such as procrastination, cheating, and undershooting goals. Bright youngsters who see themselves as improving their skills and abilities through deliberate practice are more optimistic, more likely to undertake tasks that carry some risk of failure, more able to regroup and persevere after a setback, and more able to work patiently in stages to achieve goals.

Using Resources

Children born in high-risk environments who learn even as infants to elicit caregivers' positive attention demonstrate the ability to use resources effectively. Accessing resources such as helpful adults, and intellectual peers who promote self-valuing and the acceptability of being bright is crucial to the life success of high-potential youngsters. In contrast, children who receive attention

and assistance only when they act out or display helplessness are much more likely to underachieve, to engage in risky behavior, and to fail to actualize their potential. The ability to recognize and either select or modify the social context to provide needed resources (identified on the basis of realistic self-knowledge) is demonstrated repeatedly in the lives of successful, high-achieving adults.

Methods for Addressing Affective Needs

Two categories of interventions promote meeting affective needs: methods that address needs directly, and methods embedded in curriculum. Teaching bright students about their abilities, about the effects of self-concept, self-esteem, motivation, and resources on one's ability to "think and act smart"—in short, the qualities that make key differences in the lives of high-potential individuals—can demystify giftedness and promote a more realistic sense of control over important goals. This kind of teaching can take place in special seminars for gifted students, as part of an enriched curriculum, or in out-of-school opportunities as part of gifted education conferences, camps, or summer learning programs.

Narrative approaches are somewhat less direct and could be more engaging for a complex thinker. These methods characteristically draw on social learning principles such as vicarious reinforcement through learning from the lives of symbolic models and are typified in bibliotherapy, cinematherapy, and drama therapy. Contact with exemplary models through interviews, shadowships, or internships also allow the gifted learner to identify with the talented adult in real time as that individual articulates setting goals, tackling difficult tasks, persevering through setbacks, and so on.

Curriculum-based approaches are the most indirect. Project-based learning in which the gifted and talented students learn to think, act, and feel as the adult creative, talented individual producing high-level, unique work provides a real-life context for the youngster to process more abstract constructs such as motivation or self-esteem. Creating open dialogues about the affective foundations of intellectual work is important to fully plumbing the potential of this approach.

Finally, counseling and guidance that is targeted for gifted students is available in a number of university-based settings, such as the counseling program at the University of Iowa's Belin & Blank Center or the Counseling Laboratory for the Exploration of Optimal States at the University of Kansas. In addition, the Social and Emotional Needs of the Gifted (SENG) program maintains a list of counselors, psychologists, and other practitioners with a special interest, specialized knowledge, and a special concern for gifted students.

In considering the qualities identified as critical in the successful development of talented individuals, it is important to consider the social effects of addressing particular social-emotional issues for all youngsters. Perhaps the needs mentioned in this entry are universal, but they are critical to life success and fulfillment for individuals with extraordinary ability.

Reva Friedman-Nimz

See also Emotional Development; Emotional Intelligence; Motivating Gifted Students; Personality and Intelligence; Self-Efficacy/Self-Esteem

Further Readings

Amabile, T. M. (1989). *Growing up creative: Nurturing a lifetime of creativity.* Buffalo, NY: Crown.

Bain, S. K., & McBell, S. M. (2004). Social self-concept, social-attributions, and peer relationships in fourth, fifth, and sixth graders who are gifted compared to high achievers. *Gifted Child Quarterly, 48*(3), 167.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist, 37*(2), 122–147.

Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Random House.

Gottfried, A. E., & Gottfried, A. W. (2004). Toward the development of a conceptualization of gifted motivation. *Gifted Child Quarterly, 48*(2), 121–132.

Hoge, R. D., & Renzulli, J. S. (1993). Exploring the link between giftedness and self-concept. *Review of Educational Research, 63*(4), 449–466.

Kerr, B. A. (1991). *A handbook for counseling gifted and talented*. American Association for Counseling and Development. Retrieved from http://www.cleoslab.org

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56*(3), 227–238.

Neihart, M. (1999). The impact of giftedness on psychological well-being: What does the empirical literature say? *Roeper Review, 22*(1), 10–17.

Sternberg, R. J., & Spear-Swerling, L. (1998). Personal Navigation. In M. D. Ferrari & R. J. Sternberg (Eds.), *Self-awareness: Its nature and development* (pp. 219–245). New York: Guilford Press.

Terman, L. M. (1959). *Genetic studies of genius* (Vol. 5). Stanford, CA: Stanford University Press.

Yong, F. L. (1994). Self-concepts, locus of control, and Machiavellianism of ethnically diverse middle school students who are gifted. *Roeper Review, 16,* 192–194.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25,* 82–91.

Social Studies, Curriculum

The primary goal of social studies curriculum is to equip students with the knowledge and skills to become active participants in society. Citizenship education is a common thread transcending different perspectives on social studies curriculum, though there has been long-standing disagreement on the definition of the phrase as it relates to curriculum and instruction. The Goals 2000: Educate America Act passed by Congress in 1992 called for the development of national standards in many areas of education but omitted social studies from its list. The National Council for the Social Studies (NCSS), founded in 1921, and a group of educators responded by advocating for and eventually adding social studies to the agenda for the development of national standards. A task force of social studies curriculum and instruction experts assembled and developed the 1994 publication *Expectations of Excellence: Curriculum Standards for Social Studies*. The 10 main themes that serve as the basis for the national standards outlined in this publication are as follows:

- Culture
- Time, continuity, and change
- People, places, and environment
- Individual development and identity
- Individuals, groups, and institutions
- Power, authority, and governance
- Production, distribution, and consumption
- Science, technology, and society
- Global connections
- Civic ideals and practices

The development of national standards in the educational content areas has been viewed by many as a response to the 1983 publication *A Nation at Risk*. This publication drew attention to the mediocre status of curricula in the United States and indicated that the percentage of students taking general courses instead of college-track courses had increased dramatically from 1964 to 1979. Gifted learners in particular are affected by such nonrigorous curricula and are capable of learning more material, often at accelerated rates than those of their peers. Even with national standards in place, social studies curriculum and instruction must be adapted and modified to meet the needs of these high-end learners.

NCSS defines the academic purview of social studies as "the integrated study of the social sciences and humanities to promote civic competence" (National Council for the Social Studies, 2008, p. 211). This broad context incorporates an array of subjects, stemming from the traditional topics of history, geography, and political systems to less prominent fields such as economics, philosophy, religion, psychology, and anthropology. Armed with such a vast body of material to explore and to process, the social studies curriculum offers the gifted learner a wealth of intellectual stimuli and fertile opportunities for research, evaluation, and application. In addition, the social studies curriculum carries the NCSS mandate to guide the development of young people by fostering their abilities to make informed decisions and to participate actively in culturally diverse societies. With this aim of building informed and proactive global citizens, the gifted learner is challenged by social studies to develop an enlightened mind-set and to attain a collection of strategies and skills to achieve a high level of citizenship and real-life engagement in world affairs. This entry describes textbooks and other curricular resources along with curricular adaptations and modifications for gifted learners.

Textbooks and Other Curricular Resources

Despite the adoption of NCSS standards at the national level, the social studies curriculum of each school district is often primarily influenced by the content of current textbooks, which are not necessarily based on national standards. Analyses of social studies textbooks have demonstrated

that each book's content is subject to authors' biases and often reflects the values of consumers rather than providing accurate, multicultural perspectives of events. In addition, the difficulty level of textbooks has steadily declined during the past few decades, a process referred to as "dumbing down" by former Secretary of Education Terrel Bell. Textbooks are designed to give broad content overviews, and some have been criticized for their biased viewpoints of events of historical and cultural significance. To provide in-depth, detailed accounts from multiple perspectives, social studies curriculum experts suggest the inclusion of additional resources and materials.

According to subject experts, a key component of any social studies curriculum is the investigation of primary source material. For the gifted learner, it is essential that ample opportunities be provided to explore, contemplate, interpret, debate, and respond to primary documents and other authentic objects and artifacts. The advanced learner can develop higher-order reasoning, abstract conceptualization, and an awareness of bias and alternate perspectives through the dissection and explanation of primary materials and their themes. Gifted learners, who are often capable of absorbing and processing content at a faster pace and more sophisticated level than are their peers, should be engaged with primary source materials as an effective way of addressing this pedagogical challenge. Working independently under the supervision of the teacher, the gifted learner can establish his or her own plan of research, pursue individual interests, generate written pieces and other forms of assessment, and develop essential social studies skills such as critical thinking, document analysis, and the synthesis of multiple sources and perspectives.

Curricular Adaptations and Modifications for Gifted Learners

Though research on effective implementation of social studies curricula with gifted learners is limited, the theories and recommended practices from gifted and talented educational researchers can often be applied across content areas. The National Association for Gifted Children (NAGC) recognizes the special needs of gifted learners and has developed standards designed to help schools meet the needs of these students. In its standards, the NAGC calls for each content area to have well-defined national standards spanning prekindergarten through Grade 12. This goal is often neglected in social studies as districts sacrifice this subject in the early grades to provide additional time for the more heavily tested areas of mathematics and reading. Early school engagement with a vibrant social studies curriculum can meet the challenges of developing the intellectual curiosities and defining the academic capacities of the gifted learner. The wide variety of subject areas encompassed by the social studies curriculum provides teachers with an assortment of topics for evaluating and developing core skills while generating meaningful discovery activities. The practice of exposing students to multiple subject areas within social studies and basing activities and experiences on their strengths and interests is supported by gifted education theory, including Joseph S. Renzulli's work on the enrichment triad model. The young gifted learner should be offered opportunities for self-directed exploration and the chance to pursue individual fields of interest. From the hands-on research and open-ended speculation offered by the areas of anthropology and archaeology, to the authentic interaction with primary source materials contained in the study of history, geography, politics, and economics, the social studies curriculum can expose the gifted learner to a wealth of intellectual stimulation and valuable skill development. Particularly within the gifted and talented student population, the young learner must be presented with opportunities to explore and to define his or her personal interests and to investigate material in an independent but supported manner. Natural curiosity, especially prominent in the gifted learner, should be fueled by a rigorous and diverse social studies curriculum.

The social studies curriculum provides the gifted learner with multiple opportunities for authentic research. Through engagement in inquiry activities, the gifted learner can pursue investigations into historical topics and contemporary issues on a self-directed and individually paced basis. During inquiry projects, the complexity of content and level of expectations can be monitored and adjusted by the teacher to accommodate different learning styles and abilities, an essential concern of gifted education. Although employing technology to access a variety of primary and secondary source

materials, the gifted learner can achieve the key social studies goals, including student investigation of original documents, critical analysis of multiple sources, and consideration of bias, fact versus opinion, and alternate viewpoints. Finally, independent inquiry can enable the gifted learner to engage in higher-order reasoning, to tailor intellectual pursuits to personal interests and proclivities, and to consider historical themes balanced against modern interpretations and culturally diverse perspectives.

In addition to inquiry research, the social studies curriculum provides the gifted learner a variety of ways to explore historical topics and contemporary issues, to demonstrate the accumulation of knowledge and skills, and to explore real-world applications of content. The gifted learner should be given the chance to express knowledge of social studies materials in personalized formats and through cooperative learning experiences. For example, the gifted learner often interprets material in unusual and unpredictable fashion because of his or her advanced intellectual abilities. Suitable outlets for demonstrating knowledge should consider these individual differences. Instead of simply writing a generic letter to a congressperson, a standard approach employed in the average social studies classroom, alternate assessments such as drafting authentic legislation, creating a Web site to promote a social cause, or interviewing local politicians to produce an informational video can be employed. Gifted learners are often isolated because of their advanced abilities in misguided efforts to meet their special needs. This approach can alienate students and stigmatize both a gifted learner and his or her classmates. A stated purpose of social studies education is to build citizenship, so the gifted learner should be given appropriate opportunities to build leadership skills and to work collaboratively with peers. Through presentations, multimedia productions, mock trials, debates, and other classroom activities, the gifted learner can develop strong citizenship and leadership abilities while learning to work effectively with peers.

Product differentiation and inquiry research are typical methods of differentiating social studies curricula for gifted learners, but may not be sufficient for students who have already mastered the content of a particular course or unit. Research on curriculum compacting done by the University of Connecticut's National Research Center on the Gifted and Talented (NRC/GT) found that as much as 50 percent of content can be eliminated for high-ability students in different content areas. The curriculum compacting process consists of identifying the subject area objectives and selecting a pretest that matches the stated objectives. Based on pretest results, the curriculum can be modified and compacted for students who have mastered some or all of the objectives. These students work independently on projects and assignments focused on the nonmastered objectives, and then pursue enrichment or acceleration activities on successful completion of the unit test. Of the five subject areas examined in the research study, social studies was compacted least frequently.

The PreK–12 social studies curriculum for the gifted learner demands challenge, customization, and effective teaching. With appropriate adaptations and modifications, it provides avenues to meet all of these goals. The diversity of content within the social studies orbit provides ample material for authentic research and numerous opportunities for real-world applications. Through inquiry and other social studies approaches, the gifted learner's academic pursuits can be tailored to his or her personal interests, intellectual levels, and particular learning styles. Differentiation strategies from gifted education curricular experts can be used to modify existing social studies curricula to meet the needs of advanced learners.

Shelbi K. Cole and Conan A. Schreyer

See also Curriculum Models; Differentiation; Elementary School, Social Studies Curriculum; Individualized Instruction; Secondary School, Social Studies Curriculum; Service-Learning

Further Readings

Little, C. A., & VanTassel-Baska, J. (1991). *Content-based curriculum for high ability learners*. Waco, TX: Prufrock Press.

National Commission on Excellence in Education. (1983, April). *A nation at risk*. Retrieved June 13, 2008, from http://www.ed.gov/pubs/NatAtRisk/index.html

National Council for the Social Studies. (1994). *Expectations of excellence: Curriculum standards for social studies*. Washington, DC: Author.

National Council for the Social Studies. (2008). Curriculum guidelines for social studies teaching and learning: A position statement of National Council for the Social Studies (NCSS Position Statement). *Social Education, 72*(4), 211–212.

Parker, W. C. (1991). *Renewing the social studies curriculum.* Alexandria, VA: Association for Supervision and Curriculum Development.

Reis, S. M., & Renzulli, J. S. (1992). Using curriculum compacting to challenge the above-average. *Educational Leadership, 50*(2), 51–57.

Ross, E. W. (2006). *The social studies curriculum: Purposes, problems, and possibilities* (3rd ed.). Albany: State University of New York Press.

Thornton, S. J. (2004). *Teaching social studies that matters: Curriculum for active learning.* New York: Teachers College Press.

Troxclair, D. A. (2000). Differentiating instruction for gifted students in regular education social studies classes. *Roeper Review, 22*(3), 195–198.

Socioeconomic Status

The abilities of privileged children can appear magnified beyond actual proportions, whereas the abilities of many economically deprived children can be suppressed or never recognized. The fertile advantages and social networks of privilege account for much undue magnification, and oppressive, socioeconomic barriers to aspiration, talent discovery, and achievement account greatly for suppression and disregard. Most people assume that free-market, democratic societies are meritocracies in which the gifted and talented rise in status, wealth, and achievement according to their individual abilities. This is true to some extent. Nevertheless, "merit" can be misunderstood because face-value merit, reflecting the advantages of birth into privileged socioeconomic status, often is confounded with the broader, truer merit of one's actions in the world. As a result, upper-middle class and elite children tend to enjoy much more undue credit and reward, or undeserved merit, at the outset of life's journey than do children of low socioeconomic status.

There is some disagreement about the extent, and even the existence, of socioeconomic barriers to achievement. For example, sociologists investigate the nature of social, cultural, and economic contexts and the barriers they pose to the poor. In contrast, neoclassical economists and the social scientists they influence tend to ascribe success or failure to individuals themselves because these individuals are assumed to be self-interested actors in a level, free-market playing field. Nevertheless, evidence accumulates on the pernicious effects of impoverishment, although neoclassical economic theory faces stronger challenges for overlooking socioeconomic inequality. This entry describes socioeconomic barriers, international differences, and true merit.

Socioeconomic Barriers

Sociologists and educational researchers have revealed troubling dimensions of the barriers that can suppress ability and crush aspirations. Material deprivation, segregation, and stigmatization in racist and classist societies represent the most serious barriers. Among other sources, deprivation can arise from the following problems: (a) weak educational experiences in underfunded, inner-city and rural, school systems; (b) poor nutrition, (c) inadequate early child care; (d) a U.S. health care system that leaves many children and their families without basic health care; (e) lack of employment opportunity for impoverished parents; and (f) economic globalization's undermining of lower-class wages and employment security, which enables corporations to move capital around the globe for cheap wages and weak employment regulations.

As for segregation, contrary to popular belief, the U.S. Civil Rights Movement did not solve the problem of partitioning populations by race and class. Despite progress made in de-institutionalizing racial segregation, de facto segregation by race, ethnicity, and class persists. Deprived children who are segregated sometimes lack the cultural capital and social networks that are especially needed by the gifted, as they discover high aspirations and develop talents for pursuing lofty dreams. Advantaged children's cultural capital provides them the insider knowledge and dispositions that are associated with the approving linguistic and cultural labels, such as "giftedness." Segregation can also lock children into dangerous, violent, and toxic environments where the gifted and talented,

for lack of legitimate opportunities, may turn toward criminal pursuits and gang leadership.

One other barrier posed by segregation is environmental racism, the location of toxic industries in poor neighborhoods that lack the political clout to resist. Bright children growing up in industrial areas may face the burden of environment-borne illnesses, making their aspirations far less attainable than are those of their more fortunate peers.

Stigmatization is an even less-appreciated barrier to the development of high ability. Poor children often face indirect, sometimes even blatant, vilification through media outlets and through everyday social interactions. Psychologists also have revealed detailed accounts of the denigration faced by poor rural populations. Derogatory terms such as *cracker, linthead, ridge runner,* and *white trash* often appear in the popular culture. Compared with a child from a privileged background, a gifted child whose identity group is persistently denigrated is less likely to view lofty life goals as reasonable.

International Differences

International comparisons of socioeconomic contexts for child development reveal some additional dimensions of these issues. Economists have compared nations according to social distance, which is the extent to which nations are willing to tolerate income gaps between the rich and poor. The United States and the United Kingdom have the largest income-based social distance measures of the developed nations. Further aggravating this inequality is the gap between the asset accumulation of the poor and the asset accumulation of the rich, which differs greatly in highly stratified nations such as the United States.

The severe deprivation associated with income and wealth inequality damages deprived children's life opportunities. But there is an additional dimension of the problem. Nations vary considerably in the extent to which they invest in public goods that support child development. Public goods are government-provided resources made available to all. Examples include government-funded universal health care, free and equitable public education, early child-care programs, and other social safety nets. Compared with other developed nations, highly unequal nations, such as the United States, invest relatively little in public goods. Consequently, in highly stratified nations, bright young children in lower socioeconomic strata face the dual liability of minimal access to public goods and severely limited private income and asset accumulation.

Seeking True Merit

True merit, as opposed to unearned, inherited, face-value merit, will emerge more often when citizens and policymakers recognize the effects of socioeconomic deprivation, stigmatization, and segregation on gifted and talented children's development. However, educators can seek out and implement promising educational intervention programs aimed at recognizing talent discovery and development among deprived populations.

Don Ambrose

See also Achievement Motivation; Aspiration Development and Self-Fulfillment; Classroom Practices; Rural Gifted; Self-Efficacy/Self-Esteem; Underachievement; Underrepresentation

Further Readings

Ambrose, D. (2002). Socioeconomic stratification and its influences on talent development: Some interdisciplinary perspectives. *Gifted Child Quarterly, 46*(3), 170–180.

Arrow, K., Bowles, S., & Durlauf, S. (Eds.). (2000). *Meritocracy and economic inequality.* Princeton, NJ: Princeton University Press.

Borland, J. H., Schnur, R., & Wright, L. (2000). Economically disadvantaged students in a school for the academically gifted: A postpositivist inquiry into individual and family adjustment. *Gifted Child Quarterly, 44,* 13–32.

Fischer, C. S., Hout, M., Jankowski, M. S., Lucas, S. R., Swidler, A., & Voss, K. (1996). *Inequality by design: Cracking the bell curve myth*. Princeton, NJ: Princeton University Press.

Rainwater, L., & Smeeding, T. M. (2003). *Poor kids in a rich country: America's children in comparative perspective*. New York: Russell Sage Foundation.

VanTassel-Baska, J., & Stambaugh, T. (Eds.). (2007). *Overlooked gems: A national perspective on low-income promising learners*. Washington, DC: National Association for Gifted Children.

Specialized Secondary Schools

One possibility for meeting the unique educational needs of gifted secondary students is through specialized schools. These schools may be private or public. Public school services may be provided at the district or the state level. They may be magnet schools, charter schools, and residential schools. These schools may provide a specialized curriculum focusing on one academic area, or they may provide a more general educational background. These schools typically focus on acceleration of content areas, but may also provide enrichment and greater depth of learning in combination with acceleration of instruction.

There are a variety of options in the form of specialized schools for gifted learners, although magnet schools are typically under the guidance of a school district and may provide specialized and advanced instruction in talent areas of gifted students, such as technology, sciences, or the fine arts. Charter schools are not under the direct guidance of a school district but, rather, operate under their own "charters" and are accountable to the sponsoring organizations. Some charter schools specialize in the unique needs of gifted and talented secondary students. Finally, state-sponsored schools for the gifted typically offer advanced coursework and accelerated curriculum for talented students. There is, however, a paucity of research available on the efficacy of these programs for gifted learners. This entry describes these types of specialized secondary schools.

Magnet Schools

Many local school districts choose magnet schools as a way to offer greater choice to students and parents. Rather than the typical assignment to a secondary school based on geographic location, students may choose to attend a magnet school that specializes in an area of interest or instructional strategy or pedagogical theory. Unlike the other types of specialized schools, magnet schools remain under the supervision of a school district. They operate bureaucratically in the same fashion as typical high schools in the school district, but magnet schools differ from typical high schools in their instructional strategies, course offerings, and specialized programming. For example, some magnet schools focus on Montessori techniques, and other magnet schools focus on mathematics and science, the performing or visual arts, or gifted programming. Admission to magnet schools is varied, some have strict admissions criteria, and others operate on a first-come, first-serve policy or a lottery system.

Magnet schools have their origins in the late 1960s and early 1970s to promote academic desegregation. Their goal was to open enrollment to students from diverse geographic locations to increase diversity in school populations by offering high-quality instruction in specialized areas. Therefore, diversity is often an explicit goal of many magnet schools.

Many magnet schools have additional funding that allows them to spend more money per student than traditional high schools spend. This may allow the school to provide additional resources such as lab equipment, art studios, or technology. Magnet schools report higher attendance, higher graduation rates, more professional development opportunities for teachers, and greater levels of parent involvement.

Magnet schools vary in their appropriateness for gifted learners. Although some magnet schools are specifically developed for gifted and talented students, not all programs have such a focus. Admission criteria, programming choices, and curricular options provide the foundation for appropriate curriculum for gifted learners. Specialized schools in the sciences, fine arts, or gifted programming often have more selective admission criteria and target talented students for enrollment.

Charter Schools

Charter schools are typically more innovative schools that operate independently from traditional school district policies. These schools submit a "charter" to their sponsoring organization (typically either state or local school system) that documents their purpose, goals, assessment, and measurement of success. Thus, they have autonomy in how they implement educational policies, but remain accountable for progress. Typically, charters last from 3 to 5 years, at which time they may be renewed by the sponsoring agency.

Some evidence indicates that charter schools may increase student achievement and close the achievement gap between low-income and culturally diverse students. However, there is little research on the effectiveness of charter schools for the gifted population. Specifically, relatively few charter schools focus on the unique needs of gifted learners or learners talented in a particular content area.

State-Sponsored Schools

State-sponsored schools, sometimes called governor's schools, for the gifted are another option for gifted students. These schools are currently operating in 13 states and include both residential and nonresidential programs. Residential schools typically recruit students from across the state and diverse geographic locations, but nonresidential schools may be located throughout the state to draw local students in several geographic locations. The Virginia system is one example of nonresidential governor's schools.

The state-sponsored schools may have a content area focus, such as science and mathematics or humanities, or they may have a more general focus on advanced content in many areas. These schools may offer a prescribed curriculum, or they may offer greater choices for students. Some of these schools are housed on university campuses, whereas other schools operate on independent campuses. Several of the schools on university campuses use the university faculty and courses as the courses for their students, but others operate more independently.

The admissions processes at the schools typically have selective guidelines. These schools typically require SAT or ACT scores that are competitive with those of entering college students, even though the students applying are between 2 and 4 years younger than graduating seniors. In addition, students are typically required to submit essays and teacher recommendations along with the application materials. Admissions officers look for advanced academic achievements and for emotional maturity to handle the residential school setting and task commitment needed to be successful with the additional course requirements. In addition to written materials, many state-sponsored schools also require on-campus interviews to secure a place at the school.

The curriculum at state-sponsored schools for the gifted is varied. The curriculum at all of these schools, however, is focused on advanced content and acceleration for the state's most academically talented students. In addition, many of these schools offer enrichment opportunities such as mentorships and research opportunities for students. In addition, the curriculum is more closely aligned with a college model, rather than a typical high school. For example, student schedules for classes may be on a college schedule, rather than a typical eight-period schedule of a high school.

In the cases of some schools, such as the Texas Academy of Mathematics and Science, the courses are entirely offered at the college campus. Students at the academy are enrolled in classes at the University of North Texas, and are required to take specific courses to meet the requirements for graduation, including chemistry, biology, and physics. Students may also take a variety of elective courses from the university, provided that they have the requisite grade-point average set by the academy. Thus, students graduate from the academy with a high school diploma as well as 2 years worth of college credits.

Other state-sponsored schools operate under different models. Some schools offer high school credit along with an associate's degree. Other schools housed at university campuses use many of the facilities of the university, but the classes are specifically for academy students, and thus students do not necessarily earn college credits. These classes are typically at the college level of content and offer students opportunities to explore content at an advanced level and in greater depth than in typical high schools.

The faculty at the state-sponsored schools have varying levels of expertise and qualifications. Many of these teachers hold advanced or terminal degrees in their content areas. At schools such as the Texas Academy, teachers are university faculty and thus typically hold terminal degrees in their subject area. Typically, state-sponsored schools for the gifted do not require teaching certification or advanced coursework in gifted education, maintaining the focus of recruitment of teachers on advanced knowledge of the content area. Some schools, however, do request previous teaching experience and work with gifted learners.

One major concern of these schools is the student life. These schools work to provide extracurricular activities for students in addition to the advanced level of content in the curricular domains. These schools offer academic clubs, such as Mu Alpha Theta and Literary Society, service organizations such as Key Club, leadership opportunities such as Student Council, and opportunities in the fine arts. In addition, many of these schools continue to provide typical high school activities such as prom and homecoming. There are also numerous athletic organizations on campus, either as intramural sports or as competitive teams. However, these organizations might not provide the same level of opportunities as the typical high school.

Various research has documented the academic, social, and emotional outcomes of attending specialized schools. Research has shown that there are few psychosocial differences between students who attend state-sponsored schools and typical high school students, using the Minnesota Multiphasic Personality Inventory for Adolescents (MMPI-A) and the Myers-Briggs Type Indicator (MBTI). Qualitative research, as well, has shown that students are able to adapt to the differing social complexities of the environment. Some research, however, indicates that students may have difficulty adjusting to the increase in academic rigor of the coursework. Social structures of family, school, and peers help students to adapt to the new environment.

The academic benefits of attending a state-sponsored school have also been examined by the research. Graduates from these schools report satisfaction with their academic experience, as well as continued academic gains as a result of their attendance. However, many of these studies do not include an adequate control group, so conclusions based on this research are difficult to interpret. A large number of graduates from these schools go on to obtain graduate and advanced degrees in majors related to their areas of academic expertise.

Hope E. Wilson

See also Adolescent, Gifted; College Gifted; Governor's Schools; Secondary Schools; Summer Programs

Further Readings

Boothe, D., Sethna, B. N., Stanley, J. C., & Colgate, S. D. (1999). Special opportunities for exceptionally able high school students: A description of eight residential early-entrance programs. *Journal of Secondary Gifted Education, 10,* 195–202.

Cross, T. L., Adams, C., Dixon, F., & Holland, J. (2004). Psychological characteristics of academically gifted adolescents attending a residential academy: A longitudinal study. *Journal for the Education of the Gifted, 28,* 159–161.

Jarwan, F. A., & Feldhusen, J. F. (1993). *Residential schools of mathematics and science for academically talented youth: An analysis of admissions programs.* (Collaborative Research Study, CRS93304). Storrs: National Research Center on the Gifted and Talented, University of Connecticut. (ERIC Document Reproduction Service No. ED379851)

Jones, B. M., Fleming, D. L., Henderson, J., & Henderson, C. E. (2002). Common denominations: Assessing hesitancy to apply to a selected residential math and science academy. *Journal of Secondary Gifted Education, 13,* 164–172.

Magnet Schools of America: http://www.magnet.edu/modules/content/index.php?id=88

National Association of Schools of Art and Design: http://nasad.arts-accredit.org

National Consortium of Specialized Secondary Schools in Mathematics, Science and Technology: http://www.ncsssmst.org

U.S. Charter Schools. (2006). *Overview of charter schools.* Retrieved April 26, 2008, from http://uscharterschools.org

What is a magnet school? (2003). *Public School Review.* Retrieved April 25, 2008, from http://www.publicschoolreview.com/articles/2

Spiritual Intelligence

What is spirituality? What kinds of experiences are considered to be spiritual? What does it mean to "be" spiritual? Are there neurological sites of spiritual activity? Is spirituality a form of intelligence? If so, how might it be defined and measured? Does it enhance emotional and physical health, psychological development, and moral and ethical awareness? These and related questions are at the heart of a burgeoning conversation among psychologists, religious scholars, and neuroscientists who are

seeking to understand the role of spirituality in human evolution.

Spiritual experiences are complex phenomena with cognitive, emotional, biological, cultural, and religious components. These kinds of experiences are ubiquitous and have been reported in every culture and era. They are extremely diverse and unavoidably subject to individual interpretation. Some involve contact between individuals and the sacred, or what they perceive to be God, the Creator, or ultimate reality. Others are more prosaic, and include extrasensory perceptions, dreams, and altered states of consciousness, such as shamanic and out-of-body experiences. These phenomena arise in a plethora of ways and contexts, including meditation, contemplation, listening to music, being in nature, attending religious services, psychological and physical trauma, sensory deprivation, and the ingestion of psychoactive plants or drugs.

Spiritual experiences are precursors to spiritual intelligence, which is described in this entry. Two contemporary psychologists, Robert Emmons and Kathleen Noble, have argued that spiritual intelligence has both theoretical validity and practical implications. Emmons delineated five characteristics that he considers to be at the core of spiritual intelligence: the capacity for transcendence; the ability to enter into heightened spiritual states of consciousness; the ability to invest everyday activities, events, and relationships with a sense of the sacred; the ability to use spiritual resources to solve problems in living; and the capacity to be virtuous and to engage in virtuous behavior. Noble added two additional features: the conscious recognition that physical reality is embedded within a larger, multidimensional reality, and the choice to develop psychospiritual awareness to promote the health of both the individual and the global community. Her research suggests that in order for spiritual experiences to evolve into spiritual intelligence, an individual must seek to understand the meaning of those experiences and mindfully integrate them into the totality of his or her personal and community life. Intelligence, she argues, is critical to this process because the experiences can have profound effects biologically, psychologically, intellectually, and interpersonally. Further, individuals must learn to tolerate uncertainty and paradox, and recognize that all religions, wisdom traditions, and spiritual experiences contribute important and unique insights into the larger phenomenon of ultimate reality.

The theory of spiritual intelligence is controversial. Two psychologists, John Mayer and Howard Gardner, disagree with the concept albeit for different reasons. Mayer proposes that spirituality is a heightened consciousness rather than an intelligence, and that the paradigm of intelligence is too limiting because spirituality is more than abstract reasoning, a core feature of intelligence. Further, he does not distinguish spiritual intelligence from spirituality itself. Gardner, however, disputes the concept of spiritual intelligence partly because it cannot be supported by experimental psychological investigations or psychometric findings, two of his criteria for distinguishing an independent intelligence.

Can spiritual intelligence be empirically measured? At this time, the answer is no. Part of the difficulty lies in defining what a spiritual experience might be. Different cultural and religious traditions have unique vocabularies for depicting what could be identical experiences, and there is much disagreement about what constitutes a spiritual experience. Quantitative measures of the incidence and prevalence of spiritual experiences have been developed, although each uses its own definitional and metaphorical language. Numerous studies that have used one or more of these instruments suggest that significant numbers of people, both children and adults, have had what they consider to be a spiritual experience. Other studies have used qualitative methods, such as phenomenology, grounded theory, and narrative history, to explore the ways in which individuals experience spirituality and how these experiences inform their daily lives. Unfortunately, research in this area is limited by the small number of investigators who study these questions. Spiritual experiences and the concept of spiritual intelligence are irreconcilable with the materialist models of reality employed by contemporary Western science. Consequently, researchers who explore these questions are often subjected to marginalization and derision within their professional arenas. Building on Noble's work, Barbara Kerr has suggested a way out of this dilemma by operationalizing spiritual intelligence as the deliberate management of consciousness states in the service of one's own growth and that of others. This definition, however, leaves out some of the

richness of qualitative conceptualizations and may be only useful when psychophysiological instruments such as fMRI are sophisticated enough to capture the suppleness of the consciousness of spiritually intelligent people.

Nonetheless, neither the experiences nor the questions they inspire are likely to go away. The possibility of spiritual intelligence has great relevance to the study of creativity, consciousness, and human psychological development. Emmons, for example, wonders whether there is an optimal level of spiritual intelligence, whereas Noble hypothesizes a continuum of spiritual intelligence such as those that exist for other forms of intelligence and suggests that an individual could be developmentally delayed or advanced in spiritual terms. How to account for the fact that spiritual experiences can be and have been used in the service of heinous and destructive human behavior is also of grave concern. The study of spiritual intelligence is a theoretical nodal point at which many disciplines meet. It has profound implications for biomedical research and neuroscience, peace studies, deep ecology, and the training of professionals in the health and educational professions. It also has great potential for helping address the seemingly intractable problems of ethnic and religious strife and the unending quest for social justice.

Kathleen D. Noble

See also Attitudes Toward Religion and Spirituality; Existentially Gifted; Multiple Intelligences; Spirituality; Spiritual Leaders

Further Readings

Emmons, R. A. (2000). Is spirituality an intelligence? Motivation, cognition, and the psychology of ultimate concern. *International Journal for the Psychology of Religion, 10*(1), 3–26.

Halama, P., & Strizenec, M. (2004). Spiritual, existential or both? Theoretical considerations on the nature of "higher" intelligences. *Studia Psychologica, 46*(3), 239–253.

Kerr, B., & McAlister, J. (2001). *Letters to the medicine man: The shaping of spiritual intelligence.* Cresskill, NJ: Hampton Press.

Mayer, J. D. (2000). Spiritual intelligence or spiritual consciousness? *International Journal for the Psychology of Religion, 10*(1), 47–56.

Murphy, M. (1992). *The future of the body: Explorations into the future evolution of human nature.* Los Angeles: Jeremy P. Tarcher.

Noble, K. D. (2001). *Riding the windhorse: Spiritual intelligence and the growth of the self.* Cresskill, NJ: Hampton Press.

SPIRITUALITY

The origins of spirituality are found in our evolutionary history, starting from shamanistic and animistic traditions in numerous societies, to pantheistic and monotheistic religious traditions that characterize the world today. According to Robert Bellah, a prominent U.S. sociologist, the term *spirituality* was always a subdomain of religion and the two are historically compatible. However, Bellah claims that since the 1970s, societal use of the word *spiritual* is used to connote something other than being religious. A common remark one hears today is, "I am not religious, but I am spiritual," which is a relatively new sociological phenomenon. The late 20th century was a time of renewed interest in spirituality around the world, with many people exploring indigenous spiritualities of Native Americans, Aboriginals, and West Africans as well as the mystical practices linked to the world religions. This entry discusses the many meanings and expressions of spirituality, as well as its importance in the lives of gifted and creative individuals.

The adjective *spiritual* has a long list of meanings, the most common of which are pertaining to (a) spirit; (b) soul; (c) moral, devotional, or religious nature; (d) ethereal or supernatural; (e) mind or consciousness; (f) sacred; and (g) ecclesiastical. In other words, being spiritual means trying to reach a higher plane of consciousness, having a heightened self-awareness, having empathy for humanity, or achieving oneness with a deity or the universe. Spirituality is an important dimension of giftedness given the research-based evidence that the social-emotional characteristics of gifted individuals includes a heightened awareness of existential questions, inequities, fairness, and moral and ethical dilemmas, as well as concern for larger societal and planetary problems such as world hunger, exploitation of workers by multinational

corporations, fair trade policies, third world debt, poverty, and world peace. The spiritual development of gifted young people takes place mainly outside of school, where wise and caring adults are needed to provide guidance on reading, experiences, and spiritual practices that can enhance the young person's understanding of self and capacity for self-transcendence.

The dominant religious traditions of the world today, such as Christianity, Hinduism, Islam, Buddhism, and Judaism, have consisted of individuals universally agreed to be spiritual leaders because of their ability to receive insights or revelations beyond the cognitive, sensual, and affective capacities of normal human beings. Examples of such spiritually gifted individuals are Jesus of Nazareth, the Rishis of the Vedas, the prophet Mohammed, Gautama Buddha, and the prophets in the Old Testament. All these religions also consist of strands or offshoots viewed as mystical traditions, such as the Sufism in Islam; Kabbalism in Judaism; Victorines, Rhineland, and Flemish mystics within Christianity; the Vedic tradition in Hinduism; and Taoism, Zen, and Tibetan Buddhism. These mystical traditions are similar in their quest to seek oneness with God or unity with the cosmos through yogic practices, meditation, dance, poetry, or chanting to transcend dualistic dilemmas, reductionism, and infinite regressions that characterize logic, language, and empiricism.

The branch of philosophy known as metaphysics is an intellectual tradition that attempts to transcend the limitations of science and the empirical traditions within science. Metaphysics concerns itself with the study of notions such as existence, ontology, causality, space, and time, and consists of contributions from the eminent thinkers within theology and philosophy of religion (the Buddha, Adi Shankara, St. Augustine of Hippo, Hildegard of Bingen, Jiddu Krishnamurti), philosophy (Plato, Spinoza, Nietzsche, Kant, Sartre, Levinas), and science and mathematics (Descartes, Newton, Leibniz, Russell), among others.

Spirituality is closely linked with a highly evolved sense of ethics, altruism, and morality, so it is natural to question whether there are any evolutionary explanations for our spiritual tendencies. Charles Darwin, in *The Descent of Man,* posed the question whether the phenomenon of moral behavior in humans could be explained in evolutionary terms, namely, natural selection. However, the evolution of social systems (religious, ideological, political) of various kinds is not explainable strictly in Darwinian terms. One of the most interesting but controversial theories proposed to explain social evolution is that of Herbert Spencer, better known for his population-pressure theory. Spencer paid attention to the phenomenon of warfare and its role in shaping human progress, namely raising the consciousness of organizations to a higher more evolved plane. History shows examples of this evolution of consciousness after conflicts; for example, Asoka's embracing of the peaceful doctrines of Buddhism after the carnage at Kalinga; the Icelanders' conversion to Christianity as a means to end internal strife among warring clans in the year 1000 and to work toward the common good of their isolated society. The Icelandic Parliament is in fact more than 1,000 years old. August Comte proposed a stage theory for our social evolution in which humanity moves from a theological stage onto a metaphysical stage onto a "positive" stage, where we reject absolutism of all kinds.

Pierre Teilhard de Chardin, an early 20th-century paleontologist and a Jesuit priest, believed humanity is collectively moving toward a shared collective consciousness and spirituality via socialization, personalization, and *planetization* despite recurring international political conflicts and socioeconomic strife. Teilhard de Chardin defined *planetization* in three phases, the first of which consists of population expansion and *divergence* of human species followed by a phase where humanity undergoes differentiation characterized by racial, social, and cultural differences, followed by a third phase of planetization in which global *convergence* occurs where people share their knowledge and ideas. In his view, past socioeconomic strife and political ideologies are simply evolutionary "birth pangs" of a coming new age of collective global organization and consciousness. Stephen White writes that Teilhard de Chardin's global vision is grounded on the realization that just as humans have a common biological and psychic history, likewise they have a common collective future. Future progress is dependent on the collective consciousness of a common planetary citizenship.

Bharath Sriraman

See also Aspiration Development and Self-Fulfillment; Consciousness; Spiritual Intelligence; Spiritual Leaders

Further Readings

Bellah, R. (1970). *Beyond belief: Essays on religion in a post-traditional world,* New York: Harper & Row.

Comte, A. (1972). Das Drei-Stadien-Gesetz. In H. P. Dreitzel (Ed.), *Sozialer Wandel* (pp. 95–111). Neuwied and Berlin: Luchterhand.

Darwin, C. (1871). *The descent of man.* London: John Murray.

Dawkins, R. (1976). *The selfish gene.* Oxford, UK: Oxford University Press.

Spencer, H. (1857). Progress: Its law and cause. In J. D. Y. Peel (Ed.), *Herbert Spencer and social evolution* (pp. 38–52). Chicago: University of Chicago Press.

Spencer, H. (1873). *Descriptive sociology.* New York: Appleton.

Sriraman, B., & Adrian, H. (2004). The use of fiction as a didactic tool to examine existential problems. *Journal of Secondary Gifted Education, 15*(3), 96–106.

Sriraman, B., & Benesch, W. (2005). Consciousness and science: An Advaita-Vedantic perspective on the theology-science dialogue. *Theology and Science, 3*(1), 39–54.

Teilhard de Chardin, P. (1995). *The future of man.* New York: Harper & Row. (Original work published 1959)

Teilhard de Chardin, P. (1999). *The human phenomenon* (S. Appleton-Weber, Trans.). Brighton, UK: University of Sussex Press. (Original work published 1955)

White, S. R. (2008). Multicultural visions of globalization: Constructing educational perspectives from the east and the west. *Interchange, 39*(1), 95–117.

Spiritual Leaders

Spiritual leaders are spiritual pathfinders who aspire to achieve the highest measure of what it means to be human, and use their spirituality in the service of others. Spiritual leaders demonstrate behaviors and beliefs that Dorothy Sisk and E. Paul Torrance in *Spiritual Intelligence: Developing Higher Consciousness* proposed as spiritual intelligence. These individuals speak and act in accordance with perceptions and values that reflect a larger perspective, and their words and actions awaken in others the recognition of universal truths. They demonstrate the power of one person being able to reinvigorate a community or a nation to restore hope and raise expectations. Through lives of service, spiritual leaders transform biological reality into a transformation of the spirit. They transform the conditioning forces of ethnicity, gender, socialization, or political that constrain them. One major characteristic of spiritual leaders is their sense of purpose and otherworldliness, being in the world, but not of it.

Spiritual leadership is manifested in the wisdom of the ages, and their lives leave footprints on the sands of time. Spiritual leadership is imbedded in spirituality, but there is a distinction between spirituality and religion. The Dalai Lama in *Ethics for the New Millennium* offered this clear distinction:

> Religion I take to be concerned with faith in the claims of one faith tradition or another, an aspect of which is the acceptance of some form of heaven or nirvana. Connected with this are religious teachings or dogma, ritual prayer, and so on. Spirituality I take to be concerned with those qualities of the human spirit—such as love, compassion, patience, tolerance, forgiveness, and contentment. A sense of responsibility, a sense of harmony—which brings happiness to both self and others. (p. 22)

A number of spiritual leaders manifested spirituality at an early age, and many were in hopeless situations; yet, they were able to find ways to make a difference. The spiritual leaders presented in this entry represent people of integrity who inspired others with their ideals. They made things happen that others thought were impossible and created new ways for society to be.

Nelson Mandela

Nelson Mandela was born in 1918 in a small village in the Transkei region. His birth name was Rolihlahla, meaning pulling the branch of trees. At age 7, he enrolled in a local Methodist school, and had to change his name, spoken language, and even the clothes he wore. Early on, he became convinced that education was the road to success, and later enrolled in the all-Black University College of Port Hare with 150 students

representing the brightest youth of South Africa. He dedicated himself to work for racial equality in South Africa using peaceful protests through the African National Congress (ANC). Mandela finished a law degree, and he started his own law firm with Oliver Tambo. In 1955, the ANC drafted a Freedom Charter stating, "the people shall govern, all national groups shall have equal rights, the people shall share in the country's wealth, and the land shall be shared among those who work it."

Mandela was invited to the Pan African Freedom Movement meeting in Algeria, and spent 7 months of travel outside South Africa. During that time, he was viewed as a symbol of resistance and dangerous to the South African government. When he returned, Mandela was charged with inciting people to strike and with leaving the country illegally. During his trial, Mandela aired the grievances of Black Africans.

Mandela was given a sentence of life in prison, and spent 27 years in prison. On his release, he praised the heroism of students who had resisted, and the international community for its sanctions against South Africa. He was elected president of the ANC, and showed little or no revenge, focusing on what was best for the future of the country. Mandela and President Frederik de Klerk of South Africa were awarded a joint Nobel Peace Prize for their efforts in South Africa. In 1992, Mandela became the first Black president of South Africa. Mandela demonstrated spiritual leadership in instilling a sense of peace and forgiveness in the people of South Africa.

Mother Teresa

Mother Teresa was born Agnes Gonxha Bojaxhiu in Skopje, Albania, in 1910. As a young girl, Agnes demonstrated strength, character, and purpose; joined a student group in her local parish; and became interested in the work of missionaries. At age 18, she joined the Irish order of the Sisters of Loreto, taking the name of Teresa after St. Theresa, a Carmelite nun. Mother Teresa's dream was to go to India, and after learning English, she transferred to Calcutta to teach English at St. Mary's high school, eventually becoming the principal. During World War II, she contracted tuberculosis. She went to the Himalayas to convalesce, and during the trip, heard a voice directing her to leave the school and live among the poorest of the poor.

Mother Teresa identified six steps in creating peace: Silence, Prayer, Faith, Love, Service, and Peace. She called this the simple path. Over the years, thousands of people have been inspired by her work, and these people take the vows of poverty, chastity, obedience, and service to the poor, and undergo rigorous training to become members of the order established by Mother Teresa, the Missionaries of Charity.

The Children's Home in Calcutta feeds more than 1,000 people daily, mostly beggars from the street, and cares for more than 2,500 patients in one week. Mother Teresa's leadership continues even after her death in 1997, with requests for opening new homes all around the world. The Missionaries of Charity have AIDS homes in Spain, Portugal, Brazil, Honduras, and the United States, including the cities of New York, Washington, D.C., Baltimore, Dallas, Atlanta, and San Francisco. Mother Teresa won the Nobel Prize for compassion without condescension. Mother Teresa tirelessly worked for peace and was an exemplar of spiritual leadership, living a life of service to others, based on love and compassion.

Mohandas Gandhi

Mohandas Gandhi was born in 1869 in Porbandar, India. As a child, he was quiet and contemplative, and early on, read the *Bhagavad Gita*, which became his calling to undertake his "battle of righteousness." Two major beliefs directed Gandhi's life: holding firmly to the deepest truth and soul force, and nonviolence to all living things.

He graduated from law school and went to South Africa to practice law, where he experienced considerable discrimination. These experiences helped him resolve to fight for social justice. Gandhi spent 23 years in South Africa fighting injustice, and returned to India in 1930. When he was age 61, he and his followers marched 240 miles in 24 days to make their own salt from the sea, an act in defiance of British colonial laws. When they reached the sea, thousands of people had joined in the march, and more than 60,000 people were arrested, including Gandhi.

Gandhi was a powerful political force in India, and a spiritual leader for people throughout the

world. Gandhi was convinced that mass noncooperation could achieve independence, and that one cannot be dominated unless one cooperates with one's dominators. His vision of independence was never realized during his lifetime, for two nations; Pakistan and India were formed out of colonial India. Civil war broke out between the Hindus and Muslims, and Gandhi was killed by a Hindu fanatic. Gandhi's spiritual leadership influenced other spiritual leaders. Gandhi is held in universal esteem as a spiritual leader, and a living model of nonviolence.

Martin Luther King, Jr.

Martin Luther King, Jr., was born in 1929 in Atlanta, Georgia. He became motivated to fight racial prejudice as a boy of 6, when the mother of his two best friends who were White, told King that when they began school, he could no longer play with her sons. This stimulated his conviction that people should not be judged by the color of their skin. King was a gifted student, accelerated three grades, and graduated from high school at age 15. He followed in the footsteps of his father and grandfather and was ordained as a minister at the age of 18. He earned a doctorate at Boston University where he studied nonviolent leaders, particularly Gandhi.

During the 1950s, King became a powerful leader in the Civil Rights Movement, and during that time, he received numerous threats to his life. In 1963, a civil rights demonstration was held in Washington, D.C., and King spoke to more than 250,000 people, delivering his "I Have a Dream" speech. In 1964, he was awarded the Nobel Peace Prize, the youngest person to win the prize, and he donated the prize of $54,000 to the Civil Rights Movement.

King was convinced change comes from within, from believing in one's self, and one's strength and courage. He was shot in 1968 while working with a group of Blacks protesting in Memphis concerning the rights of workers. His tombstone reads, "Free at Last, Free at Last, Thank God Almighty I'm Free at Last."

Dorothy Sisk

See also Spiritual Intelligence; Spirituality

Further Readings

Dalai Lama. (1999). *Ethics for the new millennium*. New York: Putnam.

Isaacon, W. (1999, December 31). Who mattered and why. *Time,* 52.

King, C. (1983). *In the words of Martin Luther King, Jr.* New York: Newmarket Press.

Mandela, N. (1986). *Long walk to freedom: The autobiography of Nelson Mandela*. Boston: Little, & Brown.

Mother Teresa. (1967). *In the heart of the world*. Novato, CA: World Library.

Sisk, D., & Torrance, E. P. (2001). *Spiritual intelligence: Developing higher consciousness*. Buffalo, NY: Creative Education Foundation Press.

Time-Life. (2000). Martin Luther King Jr., consciousness of a nation. In *People who changed the world* (p. 50). Alexandria, VA: Time-Life Publications.

Vardey, L. (1995). *Mother Teresa: A simple path*. New York: Ballantine Books.

Stanford-Binet

Stanford-Binet refers to a widely used intelligence test that dates back to 1905. Although other intelligence tests are available, the Stanford-Binet is preferred in high-ability testing because it can differentiate the degree of giftedness at a very high level (IQ > 160) compared with other intelligence tests. The history; the theoretical foundation; the general descriptions; the psychometric properties; the strengths and weaknesses; and the clinical application for gifted assessment of the Stanford-Binet are discussed in this entry.

History

In France, the Stanford-Binet started life as the Binet-Simon Intelligence Test in 1905, a test developed by psychologist Alfred Binet and physician Theodore Simon to diagnose schoolchildren with mental retardation for placement in special education classes. At Stanford University in 1916, with the publication of *The Measurement of Intelligence: An Explanation of and a Complete Guide for the Use of the Stanford Revision and Extension of the Binet-Simon Intelligence Scale,* by Lewis Terman, the original test gained a new life as the Stanford-Binet.

The translations and adaptations of the original French test items, along with the addition of new items by Terman plus the use of normative studies and rigorous methodological research contributed to the continued success of the Stanford-Binet today. Terman and colleagues conducted research on the Stanford-Binet with the specific intention of identifying extremely gifted children who would earn the label *genius*. This research is well-documented in Terman's five-volume, *Genetic Studies of Genius*, making the Stanford-Binet the intelligence test of choice to identify highly gifted (145–159 IQ), exceptionally gifted (160–179 IQ), and profoundly gifted (180+ IQ) children. In the years from the first edition Stanford-Binet in 1916 to its current fifth edition revision, which was completed in 2003, there have been continued changes made to both the norms and the subtests.

Theoretical Foundation

The Stanford-Binet Fifth Edition (SB5) has a strong theoretical foundation; it uses the Cattell-Horn-Carroll (CHC) theory of cognitive abilities to guide its test development. SB5 uses five factors—Fluid Reasoning, Knowledge, Quantitative Reasoning, Visual-Spatial Processing, and Working Memory—of the list of 8 to 10 factors of the CHC theory to derive a general intelligence (*g*) factor. These five factors were selected based on research on school achievement and on expert ratings of the importance of these factors in intellectual assessment drawn from advisory panels of prominent researchers and practitioners; from contracted consultants; from workshops on assessment of gifted individuals and from key experts in the field of intelligence theory such as John Carroll, John Horn, Richard Woodcock, and Kevin McGrew. These five factors also emphasize the reasoning abilities of the CHC model that can be easily administered within a 1-hour assessment period without the use of specialized timing or test apparatus such as the tape recorder.

General Description

The SB5 is an adaptive test, with the examiner using information about the examinee to determine the appropriate testing point to reduce the time to administer the test and to decrease the frustration that may be experienced by the examinee when tested with items that are either too easy or too hard. The test provides norms for examine between ages 2 through 85 or more years for the Verbal IQ (VIQ) and Nonverbal IQ (NVIQ) scores as well as the Full Scale IQ (FSIQ) scores. The test items cover items in both the nonverbal and verbal domains that allow the test to be accurate and fair for assessing a range of intelligence from low-end functioning, to normal intelligence, all the way to high levels of giftedness.

Psychometric Properties

The SB5 standardization involves extensive studies of reliability, validity, and fairness. The internal-consistency reliability ranged from .95 to .98 for IQ scores and from .90 to .92 for the five Factor Index Scores (e.g., Fluid Reasoning and Knowledge). Test-retest and interexaminer reliability studies that were conducted showed the stability and consistency of SB5 scoring. The SB5 has correlations of .84 with the Wechsler Intelligence Scale for Children–Third Edition (WISC-III) FSIQ, correlation of .83 with the Wechsler Preschool and Primary Scale of Intelligence–Revised (WPSSI-R) FSIQ, and correlation of .90 with the Woodcock-Johnson III Tests of Cognitive Abilities (WJ III COG; five factors), showing that the SB5 is valid for intelligence testing. In addition, positive correlations between the SB5 and two major achievement batteries—the Woodcock-Johnson III Tests of Achievement (WJ III ACH) and the Wechsler Individual Achievement Test–Second Edition (WIAT-II)—provides strong evidence for comparing intellectual and achievement scores of examinees. For norming purposes, 4,800 subjects aged 2 to 96 years old, chosen from a stratified sample approximating the U.S. Census Bureau 2000 population served as a norm group that includes gender, geographic region, ethnicity (African American, Asian American, European American, Hispanic or Latino/Latina American, Native American, and Other), and socioeconomic levels (years of education completed or parents' education level) were used. The SB5 was developed with the goal of creating a fair test with little bias related to religious perspectives, ethnic, gender, and disability groups such as deafness.

Strengths and Weaknesses

The strengths of the SB5 relevant to giftedness assessment includes being a culture-fair test for minority gifted populations; use of content-validity studies of CHC-aligned factors; use of standard deviation of 15 instead of 16 in alignment with other intelligence test for easy comparison; optional new scoring with Change-Sensitive Scores (CSSs) that allows for better tracking purposes when individuals are tested multiple times across the years; inclusion of extended IQ scores; and use of colorful toys, blocks, and illustrations to test young gifted children. The weaknesses of the SB5 relevant to giftedness includes not covering all possible factors in the CHC model, limited gifted population samples data, conventional scaled scores and IQ ceiling of 160 IQ on the non-extended test, and use of the Nonverbal Knowledge (Picture Absurdities) subtest and other nonverbal subtests that require some level of language abilities and expressive abilities that may be unfair to minority gifted individuals who have limited language abilities.

Clinical Application

Selected clinical applications of the SB5 for gifted evaluation allow the examiner to evaluate examinees for giftedness while considering gifted individuals' characteristics such as being deliberate in reasoning. Special composite scores such as the "Intellectual Giftedness" composite, derived from selected SB5 subtests allow the examiner to evaluate individuals who are referred for gifted evaluation. This composite score also allows identification of twice-exceptional gifted individuals, individuals who are both gifted and diagnosed with attention-deficit hyperactivity disorder, learning disabilities, or autism-spectrum disorders. In addition, the new feature of Extended IQ (EXIQ) scoring (permits scores between 161 and 225 IQ) allows the examiner to assess exceptionally and profoundly gifted examinees, providing an FSIQ score of up to 225.

The Stanford-Binet Fifth Edition bears little resemblance to its original, the Binet-Simon Intelligence Test (1905). However, the original test created an important foundation for the development of an intelligence test that allows for testing of high-ability individuals. The continued revision of the Stanford-Binet highlights the importance of continued development and testing of an intelligence test to serve the needs of those who are of high-level intellectual functioning, as well as low-level intellectual functioning individuals, to accurately identify and serve their needs.

Kai Kok "Zeb" Lim

See also Cognitive Abilities Test; Fluid and Crystallized Intelligence; History of Gifted Education in the United States; Intelligence Testing; IQ; Kaufman ABC Tests; Terman's Studies of Genius; Wechsler Intelligence Scale for Children–Fourth Edition; Wechsler Preschool and Primary Scale of Intelligence–Third Edition

Further Readings

Alfonso, V. C., Flanagan, D. P., & Radwan, S. (2005). The impact of the Cattell-Horn-Carroll theory on test development and interpretation of cognitive and academic abilities. In D. P. Flanagan & P. L. Harrison (Eds.), *Contemporary intellectual assessment: Theories, test and issues* (2nd ed., pp. 185–202). New York: Guilford Press.

Becker, K. A. (2003). *History of the Stanford-Binet intelligence scales: Content and psychometrics.* (Stanford-Binet Intelligence Scales, Fifth Edition Assessment Service Bulletin No. 1). Itasca, IL: Riverside Publishing.

Roid, G. H., & Barram, R. A. (2004). *Essentials of Stanford-Binet intelligence scales (SB5) assessment.* Hoboken, NJ: Wiley.

Roid, G. H., & Carson, A. D. (2003). *Special composite scores for the SB5.* (Stanford-Binet Intelligence Scales, Fifth Edition Assessment Service Bulletin No. 4). Itasca, IL: Riverside Publishing.

Ruf, D. L. (2003). *Use of the SB5 in the assessment of high abilities.* (Stanford-Binet Intelligence Scales, Fifth Edition Assessment Service Bulletin No. 3). Itasca, IL: Riverside Publishing.

State Associations

State associations for the gifted are collaborative efforts of parents, educators, and other interested parties, usually as nonprofit organizations. Many associations were originally established in the

1950s and 1960s, when gifted education as it is known today was in its infancy. These associations typically have a mission of advocacy and support for educators and parents of gifted children. Forty-seven state associations are currently members of the National Association for Gifted Children (NAGC). The focus in this entry is on consistencies across most state associations, while acknowledging the individuality of each association, based on the state's size, history, needs, and resources.

Many state associations provide self-published educational materials, such as statewide or regional newsletters, or professional journals. Newsletters provide educational materials in the form of articles and research reports and communicate information about upcoming events and legislative actions. Associations also act as dissemination sites for other resources concerning gifted education, through online connections, publishing of white papers and fact sheets, or providing an access point for journals and books on gifted education. Most state associations have Web sites that serve as clearinghouses of local resources as well as connections to national information regarding gifted education.

Influencing public policy as it applies to gifted education is an ongoing goal of virtually all state associations. The state associations have members in advisory groups for state departments of education, collegiate programs for gifted education, and local school districts. Members of state associations work with local and state legislators in developing and supporting public policy to benefit gifted children and educators. Each association sets its own legislative priorities and strategies. Legislative concerns addressed through state association advocacy work can include funding of gifted education; teacher training, including prelicensure and postlicensure; and meeting the programming needs of gifted children, including acceleration and identification policies. In addition, some state associations have been instrumental in establishing public policy on educational options for students that reflect current trends in gifted education, such as programs or schools for science, technology, engineering, and mathematics, or for fine art.

State associations also provide educational experiences in the form of conferences, workshops, online courses, or continuing education courses for educators. Typically, each state or regional area provides an annual conference for educators and parents with up-to-date information on the best practices in gifted education. Workshops and seminars may focus on specific topics of importance in gifted education and provide timely presentation of research. Many state associations provide continuing education credits to meet the certification requirements of their state for teachers and gifted specialists and coordinators. Lists of speakers on current topics in gifted education who have expertise in those topic areas are generally distributed by the state associations.

Support for parents, educators, and students takes many different forms among the state associations. In addition to providing information and guidance on topics of gifted children, associations work to promote the development of innovative programs at the school and regional levels. Scholarships are often provided for educators and students, and in many cases, educators are supported through mini-grant opportunities to refine their knowledge base regarding best practices in gifted education. Students are frequently supported to attend academic classes and summer programs designed specifically for gifted students. In addition, in some states, students may apply for mini-grants for personal research, or creative projects that reflect their gifts and talents. Outstanding contributions by educators, parents, and students are recognized through a variety of awards, providing opportunity to identify excellence or creativity in teaching or exhibition of student talent. The Nicholas Green Award through the NAGC is a common form of recognition for student achievement by a state association.

State associations are primarily designed to provide leadership in advocating for changes in public policy, developing a knowledge base in best practices for teaching gifted students, and promoting understanding of the complex and specialized needs of the gifted child. Although varied in their approaches and accomplishments, all associations share a commitment to improving the learning opportunities and lives of gifted children.

Teresa Argo Boatman

See also Asia, Gifted Education; Canada, Gifted Education; Europe, Gifted Education; State Offices of Gifted

Further Readings

National Association for Gifted Children, NAGC State Affiliate Associations: http://www.nagc.org/index.aspx?id=609&gbs

State Offices of Gifted

State offices of gifted education oversee state involvement in the education of learners whose exceptionally high abilities or potentialities require differentiated instruction and systems of support beyond those provided in traditional classrooms to ensure appropriate instructional opportunities. Because there is no federal mandate to serve gifted and talented students, there is a wide range of policies and practices affecting gifted students implemented and overseen by the state offices. This entry describes national standards, local control, the state of the states, and further indicators of differences.

Although the federal definition of gifted and talented students is not binding on the states, many state definitions are modeled after a federal definition that first came into used in the 1970s. The No Child Left Behind Act of 2002 modified previous federal definitions of gifted and talented students, children, or youth as those "who give evidence of high achievement capability in areas such as intellectual, creative artistic, or leadership capacity, or in specific academic fields, and who need services or activities not ordinarily provided by the school in order to fully develop those capabilities."

National Standards

Prekindergarten through Grade 12 Gifted Program Standards, published by the National Association for Gifted Children (NAGC) in 1998, addresses standards in seven program areas for gifted learners, and Teacher Preparation Standards in Gifted Education, published by NAGC and the Council for Exceptional Children, define teacher candidate knowledge and skill competencies determined by the field of gifted education. NAGC, working with the Council for Exceptional Children, has revised the standards, which are used by the National Council for the Accreditation of Teacher Education to accredit college and university teacher preparation programs in gifted education. National standards have not been developed for state offices of gifted.

Local Control

State and local entities are responsible for gifted and talented education funding initiatives. With neither a national mandate nor a federal funding stream, the depth and breadth of services varies greatly throughout the United States. Sole responsibility rests upon each state to develop policies and procedures that recognize and respond to the needs of this unique population. Differences in laws and regulations regarding the definition of giftedness, mandates to identify and serve gifted learners, programs and services, personnel preparation, accountability, allocation of funding and human resources reveal a considerable diversity of state perspectives. Numerous states assign the responsibilities for key decisions of these areas to local education agencies.

In 1993, all 50 states had policies recognizing the needs of gifted learners, according to A. Harry Passow and Rose A. Rudnitski as reported in a 1993 collaborative study with the National Research Center on the Gifted and Talented. By 2007, nearly all states had a state office of gifted providing information, consultation services, and some level of advocacy on behalf of gifted learners residing in their state. Additional roles and responsibilities of state offices of gifted differ and are significantly influenced by the structure of their state education agency.

Local education agency control prevails in many states, such as California, Connecticut, Delaware, Illinois, and Minnesota. Florida, Indiana, Kentucky, Oregon, and Virginia are among the states that have highly prescriptive legislation, which defines identification, service, educational placement, procedural safeguards, and support services for gifted and talented learners.

State of the States

In the 2006–2007 biannual report, *State of the States in Gifted Education,* a joint publication by the NAGC and the Council of State Directors of Programs for the Gifted, respondents were asked to

identify their reporting structure for gifted and talented education. Of the 43 respondent states, most housed gifted and talented with curriculum and instruction, followed by special education, exceptional students, and general education. Arizona and Massachusetts were the only states with a special section or department for gifted education.

The *State of the States in Gifted Education* report identifies the provision of technical assistance as the single most time-consuming activity performed by state education agency personnel. Technical assistance by phone was named in the top three activities by 30 of the 43 states. Additional high-ranking activities included responding to parental questions, providing technical assistance to local education agencies in the field, providing professional and staff development, monitoring program compliance, and grants management.

At least one full-time education agency person was allocated in more than half of the responding states. A part-time person devoted to gifted education was common in the remaining states. Most directors of state offices of gifted had responsibilities including special programs or other projects not specifically related to gifted education.

Further Indicators of Differences

Though a paucity of evidence exists regarding the role of state offices of gifted, most states locate the offices of gifted and talented education within other areas of educational focus. Additional data was gleaned from a 2008 independent survey of state directors of gifted programs conducted by the Minnesota Department of Education (MDE). Thirty-eight states responded to the MDE survey, identifying agency placement, personnel preparation, roles, collaboration, and data collection.

The survey revealed a correlation between the director's personnel preparation and the office of gifted education's placement within the agency. Most state directors held gifted education certificates, master's degrees in gifted education, or doctorates in gifted education. Many held advanced degrees in educational leadership or a specific content area, and several had degrees in special education. All had substantive knowledge and experience in curriculum and instruction.

Respondents named the provision of on-site technical assistance, administration of grants, or monitoring as their primary and secondary roles. Creation of resources and staff development followed.

State directors collaborate most often with content specialists in elementary and secondary education. Advanced Placement/International Baccalaureate/College Level Examination Program specialists and the office of Special Education were listed third and fourth. Outside the agency, the top-ranked organizations listed for collaboration were advocacy groups, followed by districts/schools and postsecondary institutions. Collaboration with charter schools and psychologists occurred in a few of the states surveyed.

Joyce VanTassel-Baska defines educational policy as an adopted course of action by a governing board, motivated by the existence of an educational problem or issue. The MDE survey found that state directors had various roles of influence in state policy. When asked to identify their role in state policy, creation in collaboration with stakeholder groups, revision of policy, and creation on behalf of the agency were the most common roles cited. Seven of the respondents reported their offices had no role and influence in the creation or revision of policy.

Data collection was common among state offices with responsibilities for monitoring elements of gifted education. The survey results revealed the number of gifted learners, program demographics, and academic performance in school by gifted learners as the most frequently culled components of state data-collection systems.

Wendy A. Behrens

See also Differentiation; Giftedness, Definition; National Association for Gifted Children

Further Readings

National Association for Gifted Children and Council of State Directors of Programs for the Gifted Programs. (2007). *State of the states in gifted education 2006–2007*. CD-ROM. Washington, DC: NAGC.

National Association for Gifted Children Standards. Retrieved February 12, 2008, from http://www.nagc.org/index.aspx?id=546

No Child Left Behind Act, P.L. 107–110 (Title IX, Part A, Definitions (22) (2002); 20 U.S.C. Sec.7802 (22) (2004).

Passow, A. H., & Rudnitski, R. A. (1993). *State policies regarding education of the gifted as reflected in legislation and regulation* (No. CRS 93302). Storrs, CT: National Research Center on the Gifted and Talented, Collaborative Research Study.

VanTassel-Baska, J. (2006). State policies in gifted education. *Designing services and programs for high-ability learners* (pp. 249–261). Thousand Oaks, CA: Corwin Press.

Stereotype Threat

Stereotype threat situations occur when one is in jeopardy of confirming a negative self-referent stereotype in an achievement context. Often, preoccupation with a threat results in dampened performance, and repeated threat situations theoretically can lead to disassociation from the relevant domain. The effects of stereotype threat may exacerbate the aptitude-performance gap and relatively lower attainment observed among African Americans in intellectual domains and U.S. women in math and science domains, for example. Thus, unmitigated stereotype threat can interfere with the development and expression of talent, particularly the talent of underrepresented group members. However, educators can take steps to prevent stereotype threat from affecting performance, as described in this entry.

The first description and studies of stereotype threat came from Claude Steele and Joshua Aronson who were concerned with the underperformance of African Americans in academic contexts. These researchers found that African American students and their White counterparts performed equally well except when the stereotype of African Americans' intellectual and academic inferiority to Whites was made salient. African Americans' underperformance occurred when a task was described as diagnostic of intellectual ability (rather than nondiagnostic) or when participants were asked to report their race before the task. Stereotype threat effect evidence has been collected with stereotypes based on gender, race, age, socioeconomic status, sexual orientation, and academic major; in a variety of contexts including general intelligence, memory, math skills, verbal skills, political knowledge, child care ability, and athleticism; and with student populations from elementary through graduate school. However, researchers warn against interpreting stereotype threat theory as the cause for achievement gaps and a few investigations have resulted in a lack of support for the theory.

Underperformance on a task is one outcome of stereotype threat; however, other outcomes have been detected. Performance on subsequent tasks may suffer when those tasks draw on cognitive resources similar to those required for the initial task. Also, under stereotype threat conditions, individuals tend to downplay their interest in the domain and their interest in other relevant areas. For example, African Americans under stereotype threat conditions will report lower levels of interest in stereotypically African American interests such as basketball and jazz music, compared with African Americans under neutral conditions. Another outcome of stereotype threat is stereotype lift—salience of positive stereotypes along with social identity can bolster performance. For example, when men are reminded of the gender and math stereotype, they experience slightly improved math performance.

Several conditions influence whether stereotype threat affects performance. Stereotype threat affects people who care about and identify with the domain of interest or who value the social identity of interest. Women math majors are more likely to be susceptible to stereotype threat than are women humanities majors because of their motivation to disprove the stereotype. Stereotype threat can occur at all levels of attainment but requires tasks that challenge individuals' abilities. The quantitative SAT will not prompt a math graduate student to question the veracity of the stereotype. However, the same test may prompt a mathematically gifted middle school girl to wonder whether the difficulty she is facing is because boys really are better at math.

Finally, personal endorsement of the relevant stereotype is not required; rather, there must be an awareness of the relevant stereotype in the culture. As stereotypes differ between cultures, the groups of people vulnerable to stereotype threat as well as the domains in which the threat may occur also differ between cultures. For example, Asian American women are less vulnerable to stereotype threat in the math domain because although U.S.

residents hold a stereotype that women are inferior in math, U.S. residents also hold a stereotype that Asians are superior in math. In contrast, Canadians do not hold a stereotype about Asians and math so Asian Canadian women are as vulnerable to stereotype threat as are any other Canadian women.

Stereotype threat is frequently studied in laboratory experiments and numerous triggers of stereotype threat have been identified through this work. These triggers vary in their degree of subtlety but all can occur in natural achievement settings. Blatant reminders of the stereotype can induce threat conditions. In experimental studies, such reminders have included video perpetuating the stereotype and research articles supporting the veracity of the stereotype. However, even subliminal priming has been shown to create stereotype threat effects. Many laboratory stereotype threat conditions are derived from typical testing conditions. Test description can create stereotype threat conditions when a test is described as diagnostic of ability or as having shown differences in scores along group lines in the past. Also, stereotype threat effect can occur when test-takers are asked to report their group membership (gender, race) before the test.

Several hypothesized mechanisms of stereotype threat effect have been tested with few clear results. For example, anxiety has been shown to mediate stereotype threat effect through biological measures (blood pressure and heart rate variability) and through behavioral measures (observed fidgeting), but not through self-report of anxiety. Some evidence supports the hypothesis that stereotype threat increases intrusive negative thoughts, which decreases working memory capacity. Stereotype threat may also induce prevention focus, increasing risk aversion, whereas positive stereotypes induce promotion focus, increasing creativity. Neurological investigations have provided support for a combination of these factors as stereotype threat mediators. Compared with positive stereotypes, stereotype threat activates the right amygdala, which is associated with emotional arousal and fear conditioning, as well as the ventral prefrontal cortex, which is associated with simple working memory. Positive stereotypes activate complex working memory processing regions (anterior prefrontal cortex) as well as regions related to task procedures.

Although stereotype threat creates biological effects, improving performance expectancies can ameliorate the performance effects of stereotype threat. One way to diminish stereotype threat is to weaken the strength of group membership. This has been accomplished by discussing the social construction of social groups such as race, listing similarities between groups in the performance domain, and individuating—describing one's personal traits or opinions. Alternatively, the applicability of the stereotype can be challenged. This can be accomplished by highlighting achieved subgroup membership through a counterstereotype. An example of a counterstereotype is that students at elite colleges are less vulnerable to stereotype threat than are those at less prestigious colleges. This may or may not be true, but the sentiment can protect students from stereotype threat effects if they have attained acceptance to an elite college. The stereotype can also be challenged by the presence of role models who debunk the stereotype (e.g., a high-achieving woman mathematician). Finally, individuals can be convinced that the evaluator will not be swayed by stereotypes if the evaluation criteria are clear and objective and if the evaluator conveys a belief that all the students can succeed at the task regardless of group membership.

Anne S. Beauchamp

See also Academic Self-Concept; Classroom Practices; Intelligence Testing; Underrepresentation

Further Readings

Jordan, A. H., & Lovett, B. J. (2007). Stereotype threat and test performance: A primer for school psychologists. *Journal of School Psychology, 45,* 45–59.

Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology, 69,* 797–811.

STIGMATIZATION

The psychosocial experience of giftedness is also a rich area of inquiry. There are a myriad of messages and expectations about giftedness in the

general population. Gifted youth can be buffeted by these sometimes unrealistic, incompatible messages. What's more, the paradox of being both lauded and spurned for the same behaviors is a source of conflict for these children. They are left to wonder how best to please themselves and others. Tracy Cross and Laurence Coleman have suggested that the social cognition of gifted youth deserves attention.

Social cognition is manifested in the integration of social experiences with behavior. Social cognition describes the way people think and reason about social situations as they observe the social world around them. People use social cognitive processes to gather information about the social setting. This information can influence social interactions with others. It is important to attend to the social cognition of gifted youth in school because school environments teach gifted youth what their giftedness means.

Many gifted children and adolescents speak of feeling different from their peers. Often this feeling of differentness is a result of being labeled *gifted*. In the course of navigating the social world of schools, this differentness can cause gifted youth to feel they stand out so much that their uniqueness is stigmatizing. Erving Goffman, the creator of stigma theory, defined stigma as the process whereby a person deemed deviant is subject to global devaluation. He further contends that stigma resides in the gap between a person's virtual reality and actual identity. Cross and his colleagues reason that this discrepancy between virtual and actual identity is a subjective judgment of a privileged in-group. A person comes to be stigmatized upon the failure to live into expectations of suitability and normalcy, as this entry describes.

However, giftedness is not a "visible" stigma, like gender or ethnicity or physical ability. So, rather than compete with "myths" others create about giftedness, gifted youth may choose to control the information others have of them. According to Goffman's theory, this is a way of managing the influence of stigmatization. Though children in elementary school make such decisions, the lived reality of gifted adolescents encourages them to be especially judicious about information about them in circulation in a school setting. This is largely because of the importance of peer groups and identity development during adolescence. Adolescents can be hypervigilant about how they are perceived. Erik Erikson notes that teens are heavily invested in how they appear to others and give less credence to a personal sense of individuation.

Not all gifted youth feel they need to censor what others learn about them. Moreover, giftedness as a social stigma is situation-specific. Readers should not overgeneralize about the stigmatization of giftedness presented here to such a degree that they divorce this aspect of a gifted youth's social cognition from context. In addition, not all gifted youth are surrounded by peers and adults who make them feel giftedness is so strange or worrisome that it affects them socially. That being said, Cross and Coleman suggest that the *stigma of giftedness paradigm* can be a constructive frame for the school-based social cognition of gifted youth. The three tenets to the paradigm are as follows:

1. Gifted and talented students want to have normal social interactions.
2. They believe that people treat them differently when aware of their giftedness.
3. They can influence how others interact with them by manipulating the information others have about them through various coping strategies.

By being aware of how gifted students might feel stigmatized and the coping strategies they use to deal with stigmatization, counselors, teachers, and parents can assist gifted students in finding constructive and positive ways of thinking about their giftedness and interacting with others.

Tracy L. Cross and Andrea Dawn Frazier

See also Academic Advising; Anti-Intellectualism; Attitudes Toward Gifted; Cultural Conceptions of Giftedness

Further Readings

Coleman, L. J., & Cross, T. L. (2005). *Being gifted in school* (2nd ed.). Waco, TX: Prufrock Press.

Cross, T. L., & Coleman, L. J. (1993). The social cognition of gifted adolescents: An exploration of the stigma of giftedness paradigm. *Roeper Review, 16*(1), 37–40.

Cross, T. L., & Coleman, L. J. (1995). Psychosocial diversity among gifted adolescents: An exploratory study of two groups. *Roeper Review, 17*(3), 181–185.

Cross, T. L., Coleman, L. J., & Terharr-Yonkers, M. (1991). The social cognition of gifted adolescents in school: Managing the stigma of giftedness. *Journal for the Education of the Gifted, 15*(1), 44–55.

Erikson, E. H. (1979). *Dimensions of a new identity: The Jefferson lectures in the humanities.* New York: W. W. Norton.

Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity.* Englewood Cliffs, NJ: Prentice Hall.

Manor-Bulock, R., Look, C., & Dixon, D. N. (1995). Is giftedness socially stigmatizing? The impact of high achievement on social interactions. *Journal for the Education of the Gifted, 18*(3), 319–338.

Swiatek, M. A. (1998). Helping gifted adolescents cope with social stigma. *Gifted Child Today, 21*(1), 42–46.

STORYTELLING

Storytelling is a communication process in which at least one person tells a story to at least one listener using oral or signed language. Storytellers usually narrate stories in person directly to an audience although they can also do so indirectly through media such as radio, TV, computer, CD, and DVD. Storytelling calls into play visual, cognitive, and emotional content in the minds of both storyteller and audience, giving teachers a flexible tool for engaging students and allowing gifts, creativity, and talent to surface.

The word *storyteller* can designate a teller of a people's history or a performer who seeks to elevate narration to an art form by using verbal and nonverbal communication skills and carefully chosen language, sometimes improvised. The nonverbal communication aspects (gestures, postures, sounds, facial and vocal expression) play a large part in communicating meaning interpreted by the teller for an audience. For these reasons, a writer who writes for a reader is a storywriter rather than a storyteller. This entry describes the roots and renaissance of storytelling, and discusses storytelling in education

Roots of Storytelling

Stories can be true or fictional, exaggerated, humorous, fantasies, personal accounts, and traditional tales such as legends, myths, epics, fables, folktales, and fairy tales from various cultures. Elders across the ages have relied on oral tradition to transmit from one generation to the next the collective learning, wisdom, and histories of their people. Religions of the world have relied on stories and parables told by their shamans, priests, healers, rabbis, and ministers to convey deeply held spiritual roots. Rural villagers still gather to listen to tales that entertain and convey important information and moral codes, which have guided people throughout the ages. Traditionally, in Ghana, West Africa, a griot, the storyteller-historian, helps villagers preserve storytelling. Teachers and parents everywhere use storytelling to help children develop empathy and to recall content by using stories in various formats.

But in 20th-century United States, with the advent of television and access to books, the live storyteller lost prominence, except for some librarians and rural tellers. Storytelling appeared destined to become a quaint folk art. In the 1970s and 1980s, however, storytelling began a rebirth.

Storytelling Renaissance

Jimmy Neil Smith, a teacher of journalism, grasped the value of storytelling as an art form and as a tool for literacy and cultural transmission. In 1973 in Jonesborough, Tennessee, Smith organized the first National Storytelling Festival, which signaled a national movement to preserve and perpetuate the art of storytelling. During the 1990s and 2000s, festivals and competitions expanded rapidly and included more diverse voices. Although storytelling was considered a form of theatrical arts, professional storytellers along with the help of the National Storytelling Network and the International Storytelling Center claimed storytelling an art form in its own right. The oral tradition began to be included in school-enrichment clusters, artist-in-education programs, and several graduate college curriculums. A National Youth Storytelling Showcase gave students a stage on which to perform their stories. Yet, the larger promise of storytelling as a fertile resource for identifying and supporting students' creativity, talent development, and learning was only beginning to be studied and understood.

Storytelling in Education

The national definition of gifted and talented students includes categories for talent in leadership, specific academic areas, creativity, intellect, and artistic abilities. Storytelling allows students to find and develop talents in the performing arts, creative use of language, and leadership. Students use visual-spatial intelligence in mapping or sketching scenes to aid retelling without reading aloud. In the process of performing a story, students explore communication and thinking skills they will use in their careers. For example, students learn to adapt their range of vocal and physical expressiveness for various audiences. The process of storytelling also invokes higher-order mental activities such as analysis, synthesis, evaluation, visualization, improvisation, prediction, inferential thinking, humor, perspective taking, and problem solving. For creative, gifted, and talented students disenchanted with schooling, the art of storytelling can serve to capture attention and, in some cases, keep students in school.

There are no ceilings on the creativity, vocabulary, amount of detail, or expressiveness, so teachers can use storytelling as an alternate way to discover students' gifts and talents. Teachers observe students as they engage their kinesthetic, musical, and linguistic intelligences to find the best words, sounds, and gestures to convey the meaning of their stories. In addition, the human reservoir of stories is so vast and diverse that virtually any subject can be enriched by a teacher's modification of the curriculum through the artistic use of storytelling. From the physical and mathematical to the social sciences and humanities, to professional studies such as business and law, most subjects are enriched through stories that teachers and students tell to engage minds and memories.

Joseph Renzulli and Sally Reis, researchers from the National Research Center on the Gifted and Talented, encourage teachers to create interest-development centers and enrichment clusters, which promote students' exploration of the literature, methods, and materials of practicing professionals. Student storytellers participate by collecting oral histories or stories, performing, teaching, and helping organize festivals and competitions. Regional, state, and national forums exist that offer aspiring tellers venues to share stories and interact with peers and professionals. In this way, creative, gifted, and talented youth become engaged and challenged inside and outside the classroom, achieving excellence in accordance with professional standards and their own interests.

Gail N. Herman

See also Enrichment Triad Model; Multiple Intelligences; Performing Arts; Talent Development

Further Readings

Hamilton, M., & Weiss, M. (2005). *Children tell stories: Teaching and using storytelling in the classroom* (2nd ed). Katonah, NY: Richard C. Owen.

Mello, R. (2001, February). The power of storytelling: How oral narrative influences children's relationships in classrooms. *International Journal of Education & the Arts, 2*(1). Retrieved July 1, 2008, from http://ijea.asu.edu/v2n1

National Storytelling Network: http://www.storynet.org, http://www.storynet.com

Norfolk, S., Stenson, J., & Williams, D. (2006). *The storytelling classroom: Applications across the curriculum.* Westport, CT: Libraries Unlimited.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A how-to guide for educational excellence* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Structure of Intellect

The *structure of intellect* (SI) model of intelligence, described in this entry was developed by J. P. Guilford and his associates in the Psychological Laboratory at the University of Southern California. Guilford disagreed with the makers of the major intelligence tests that intelligence was one broad unitary ability. Guilford defined intelligence as a collection of abilities for processing different kinds of information in a variety of ways. Using factor analysis to isolate various components of intelligence eventually led to a three-dimensional model of intellectual abilities called the *structure of intellect* (SI). Guilford's SI model extended Louis Thurstone's theory of 7 primary abilities of intelligence, into 120 separate components or factors.

The three dimensions (operations, content, and products) of the SI model form the various factors of intelligence. Guilford believed every mental task always involved one kind of operation performed on one type of content resulting in one kind of product. Therefore, each factor within the model is characterized by one element from each area: one operation, one kind of content, and one product.

The operations dimension of the original SI model involved five kinds of intellectual operations: cognition, memory, divergent production, convergent production, and evaluation. Guilford considered cognition to be the first and most basic of the operations. Cognition is the ability to discover, comprehend, and understand information. The memory process is used to store information in the brain. Memory is one of the oldest and best known of the intellectual operations. Memory involves the storage of information as well as the ability to retrieve the information later. Guilford characterized the process of retrieval as either narrow or broad and called the broad retrieval process divergent production because one is searching for a variety of alternative ideas and building on information to create new ideas. Divergent production is knowledge generation or construction. The narrower retrieval process is called convergent production—the search to find a particular item. In convergent production, the goal is to locate the "best" idea or the idea that meets the criteria. Convergent thinking is a rigorous activity that moves beyond memory retrieval. In convergent thinking, one has to search systematically and follow principles when converging for the "right" solution. The last of the operations is evaluation—the determination of the accuracy, validity, or suitability of information.

The content dimension illustrates the broad types of information to which the operations are applied. There are four types of content: figural, symbolic, semantic, and behavioral. Figural content is information in its visual form. This type includes shapes, objects, and forms. Symbolic content is information in the forms of letters, numbers, or the use of codes as in music. Semantic content is information in the form of words or ideas that are associated with abstract meaning. Finally, behavioral content refers to content in the form of actions and expressions.

The product dimension describes how content is organized. The six product areas listed in order of increasing complexity are units, classes, relations, systems, transformations, and implications. A *unit* is a single piece of information—a letter, a word, a number. *Classes* is used to describe how items of information belong together, the grouping together of units that share common characteristics and knowing why each item belongs in the group. *Relations* is the finding of connections or associations between items of information, differentiating information based on differences, linking information into a sequence, or creating analogies to describe the information more clearly to others. *Systems* is a sense of ordering information for a specific purpose such as putting words together to build sentences or language structures. Mathematical symbols and numbers are put together to form equations or represent problems that need to be solved. *Transformations* is an abstract ability. A transformation task involves redefining and modifying original information to create new information. The last product is implications, the most abstract of the abilities. *Implications* is the ability to see consequences, to make inferences, and to generalize and apply learned information to new situations.

In the early 1980s, Guilford separated figural content into the two areas of visual, information gained through seeing, and auditory, information gained through hearing. This separation brought the number of factors of intelligence to 150. A year later, he separated memory into memory recording (encoding) and memory retention (recall), increasing the number of different intellectual factors in the SI model to 180.

Guilford's contribution goes beyond redefining intelligence more broadly. He also brought a focus to the understanding of creativity. Guilford saw creativity as a part of intelligence, so it had a prominent place in his SI model. His model for divergent thinking within the SI model is quite comprehensive. When one combines the process (operation) of divergent production across the model with different content categories and different products, 24 different factors emerge. Then, add in the additional combinations built on the product area of transformation, which Guilford felt was essential to creative thinking, and the number of factors increases. Several creativity tests are built on Guilford's conception of divergent production.

By 1969, Mary Meeker had taken on the task of applying the Guilford SI model to educational problems ranging from a better understanding of learning disabilities to improving reading comprehension in the classroom. Her work refers to the *structure of intellect model* as the SOI model.

Guilford's work is not without critics of both his initial theory and his method for determining the factors of intelligence. However, the SI model did open the field of intelligence to thinking about newer models of intelligence

Joyce E. Juntune

See also Divergent Thinking; Intelligence Theories; Relationship of Creativity to Intelligence

Further Readings

Guilford, J. P. (1977). *Way beyond IQ*. Buffalo, NY: Creative Education Foundation.

Meeker, M. N. (1969). *The structure of the intellect: Its interpretation and uses*. Columbus, OH: Charles Merrill.

Sternberg, R. J., & Grigorenko, E. L. (2000–2001). Guilford's structure of intellect model and model of creativity: Contributions and limitations. *Creativity Research Journal, 13*(3 & 4), 309–316.

Student Attitudes

Attitude is the gifted student's visible manifestation of inner adaptation to the environment. Although much research describes factors that can lead to gifted students' negative attitudes toward school, there is also a great deal of evidence that many gifted students are well adjusted and, therefore, quite likely to demonstrate positive attitudes toward school. This entry describes characteristics and attitudes of gifted students, factors that influence attitude, and implications.

Characteristics and Attitudes

Lewis Terman, in his 1925 classic longitudinal study of gifted individuals, found that 60 to 80 percent of his research subjects had qualities of humor, truthfulness, conscientiousness, and leadership. Furthermore, these characteristics carried into adulthood. In a review of research in gifted education that spans 70 years, Linda Silverman found that in addition to positive characteristics similar to Terman's findings, as a group, gifted children show diminished tendencies to boast, engage in delinquent activity, aggress, withdraw, or be domineering.

In research with gifted students in rural areas and small towns, Virginia Burney and Tracy Cross found that despite the challenges these students encountered with limited academic course offerings and few academic peers, many had positive attitudes toward school. Gifted students often described their small schools as having a family-like atmosphere. They experienced little stigma from being academically gifted and they had many opportunities for extracurricular activities that allowed them to be seen as more than a single dimension of giftedness.

Others find evidence of a positive attitude even when it is partially hidden in underachievement. Betsy McCoach and Del Siegle researched the differences between high- and low-achieving gifted high school students using the School Attitude Assessment Survey-R. They assessed five factors that include academic self-concept, attitudes toward school, attitudes toward teachers, motivation/self-regulation, and goal valuation, which means the value students' place on academic goals or school assignments.

In four areas, attitudes toward school, attitudes toward teachers, self-regulation, and goal valuation, McCoach found significant differences between the achieving and underachieving students. However, there was no significant difference in the academic self-concept factor. Regardless of differences found in the other factors, these students demonstrated a positive attitude about their learning abilities. Both groups were equally confident in their own intellectual abilities and inwardly maintained positive attitudes toward themselves as learners.

In Maureen Neihart's review of the literature on social adjustment in gifted students, she found most studies revealed high to normal levels of adjustment among the subjects. In reviewing discreet categories of adjustment, however, she found a correlation between the thinking processes of those with certain psychiatric disorders and highly creative adults. However, she

cautioned against extrapolating the results obtained with adults to creatively gifted children in the midst of development. Neihart pointed out that the psychological well-being of a gifted child is related to the type of giftedness, the educational fit, and the child's personal characteristics such as self-perceptions, temperament, and life circumstances.

Factors That Influence Attitude

Attitudes of the gifted toward school are as diverse as gifted children. Some of the factors that can influence the attitudes of gifted students toward school include age, type and level of giftedness, disability, gender, race, teachers, and curricula.

Age, Type, Level of Giftedness, and Disability

Attitude depends on the student's intellectual and emotional interaction with factors within the environment. Age, type, and level of giftedness can influence the attitude of gifted students from the youngest through the college level. In gifted children, mental age can be seriously out of sync with chronological age, causing frustration for the child in a classroom where the content, processes, and pace are not commensurate with his or her capabilities.

Silverman points out that there are many variations within the construct of asynchrony. The discomfort of asynchrony is more acutely felt by the most highly gifted children with IQ 160 and higher. Leta Hollingworth noted that children between the ages of 4 and 9 feel the social isolation most intensely, but when they were allowed to move to an appropriate grade level, the loneliness and social isolation disappeared. Neihart cautions, however, against assuming that children with IQs at 160 and above will necessarily experience social and emotional difficulties. She points out that, as with highly creative children, appropriate educational placement is essential.

Children who are both highly gifted and have learning and emotional disabilities experience a more extreme form of asynchrony that can affect attitude. Although these students show high ability in abstract verbal reasoning outside the classroom, they may exhibit difficulties within the classroom with auditory and visual processing, handwriting, perceptual motor problems, dyslexia, or emotional challenges. When emotional and learning disabilities mask giftedness, the student acutely feels the frustration caused by the discrepancy between expectations, both personal and external, and actual achievement.

Gender and Race

There is a large amount of research on how gender influences the gifted throughout school and into adulthood. Barbara Kerr explored gifted girls' shifting attitudes toward their own giftedness in Smart Girls. Kerr and her colleagues also found that girls perceived giftedness to be more of a social liability than boys did, but that boys and girls were both positive about the academic benefits of being labeled as gifted. Yet, for gifted minority students, especially young Black men, complex issues of racial identity further confound attitude in the area of academic performance. John Ogbu suggests that underachievement in school is related to peer influence. Some young African Americans interpret academic achievement as a betrayal of their cultural group and adopt an oppositional social identity in a response to racism and prejudice. Shaun Harper, however, found in his interviews with 32 high-achieving Black men undergraduates at six major predominantly White universities that they felt supported in their leadership and academic pursuits by other Black men students.

Educational Fit

Gifted children's cognitive needs are closely and visibly interwoven with emotional well-being, so attitude in school is most often a function of appropriate educational fit. Full-time self-contained gifted classrooms, part-time pull-out programs, and curriculum differentiation within the general education classroom are all structures used to provide gifted students with more appropriate educational environments.

Recent research on acceleration shows that acceleration is a valuable option in serving the needs of gifted students. A wide variety of acceleration alternatives have been examined including early school entry, grade skipping, and early entrance to college with a variety of ways each

method can be carried out. Concerns about the social-emotional effects of acceleration were found negligible in comparison with the positive academic effect.

A better educational fit is often needed to alleviate the boredom in an unchallenging classroom that can lead to underachievement. Lannie Kanevsky and Tacey Keighley investigated what boredom meant to 10 underachieving gifted students who were selected by school counselors in a suburban Canadian school district. These researchers uncovered pedagogical practices that these underachieving students felt would provide a better educational fit within their classrooms.

Like McCoach and Siegle, Kanevsky and Keighley found that these students were confident in their academic learning abilities. The students articulately described their learning needs in terms of five C's that represent control, choice, challenge, complexity, and caring. The students wanted choices about the content they were required to study and more experiences grounded in the real world. They wanted hands-on assignments and processes that included high levels of thinking and involved their emotions and interests. The students wanted an increased pace of learning with fewer repetitions and more choice in the learning environment. They wanted choice in assignments, flexible time to explore a topic in depth, and an opportunity to select members for group work. The students wanted caring teachers who showed respect for them as learners.

Implications

Gifted children are diverse and complex individuals. Many are well-adjusted hard-working students who achieve their academic and personal goals. Some are, as James Delisle describes, gifted nonproducers who are confident of their abilities but choose not to do schoolwork that they consider inappropriate and irrelevant. Still others underachieve because of low self-esteem, lack of independence, and physical, emotional, or cognitive circumstances that affect learning. Yet, research studies that concern attitudes of gifted students toward school consistently point to a universal need for classrooms with knowledgeable, caring, observant teachers. Such teachers are aware of the learning needs of all students, including gifted students. These teachers are able to design curriculum that meets both the intellectual and social-emotional needs of students and can recognize the need for appropriate placements that support each student in reaching his or her full potential.

Christy T. Folsom

See also Academic Self-Concept; Asynchrony; Emotional Development; Guidance; Teacher Attitudes

Further Readings

Burney, V. H., & Cross, T. (2006). Impoverished students with academic promise in rural settings: 10 lessons from Project Aspire. *Gifted Child Today, 29*(2), 14–21.

Folsom, C. (2008). *Teaching for intellectual and emotional learning: A model for creating powerful curriculum*. Lanham, MD: Rowman & Littlefield Education.

Gibson, M. A., & Ogbu, J. U. (Eds.). (1991). *Minority status and schooling: A comparative study of immigrant and involuntary minorities*. New York: Garland.

Harper, S. R. (2006). Peer support for African American male college achievement: Beyond internalized racism and the burden of "acting White." *Journal of Men's Studies, 14*(3), 337–358.

Hollingworth, L. S. (1942). *Children above IQ 180: Their origin and development*. New York: World Book.

Kanevsky, L., & Keighley, T. (2003). On gifted students in school: To produce or not to produce? Understanding boredom and the honor in underachievement. *Roeper Review, 26*(1), 20–28.

Kerr, B.A. (1997). *Smart girls: A new psychology of girls, women, and giftedness*. Scottsdale, AZ: Great Potential Press.

McCoach, D., & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high-achieving gifted students. *Gifted Child Quarterly, 47*(2), 144–153.

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2002). *The social and emotional development of gifted children*. Washington, DC: National Association for Gifted Children.

Robinson, N. M. (2004). Effects of academic acceleration on the social-emotional status of gifted students. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students*

(Vol. 2, pp. 59–67). Iowa City, IA: Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Silverman, L. K. (1997). The construct of asynchronous development. *Peabody Journal of Education, 72*(3/4), 36–58.

Study of Mathematically Precocious Youth

The Study of Mathematically Precocious Youth (SMPY), described in this entry, is a large-scale longitudinal project devoted to understanding the characteristics and needs of talented individuals—as children and adults—and the determinants of their varying paths of development and achievement throughout the life span. (Indeed, "SMPY" is something of a misnomer because the project has always focused on abilities in mathematics and science and has come to include verbal and spatial abilities, as well. Nevertheless, the project's name was maintained for the sake of consistency.) SMPY was begun in 1971 by Julian C. Stanley at Johns Hopkins University and is currently directed by Camilla P. Benbow and David Lubinski at Peabody College of Vanderbilt University. When completed, the study will span 50 years and include 5,000 individuals in five cohorts, individuals who were identified between the years 1972 and 1997.

SMPY is premised on the idea of *appropriate developmental placement,* in which students are presented with a curriculum tailored to their rate of learning and intellectual curiosity. Most precocious students prefer an accelerated curriculum and one with greater breadth and complexity to maintain their interest and motivation to learn. Of course, precocious students are not a single type; they exhibit great variability in cognitive and noncognitive characteristics. Like other students, their talents fall in some areas but not in others, and the level and pattern of their abilities need to be assessed, as well as their particular constellation of interests and values. SMPY has introduced and provided empirical support for a model showing how abilities and personal preferences can be used together to understand the student's developmental path and achievements.

Four of SMPY's five cohorts were created by talent searches of students at age 13 that were conducted in the periods 1972–1974, 1976–1978, 1980–1983, and 1992–1997. The talent searches were conducted using *above-level testing,* in this case, by administering college entrance examinations, such as the SAT, to seventh and eighth graders who scored in the top 3 percent, approximately, on conventional achievement tests administered in their schools. Individuals in these cohorts vary between the top 3 percent and the top .01 percent in quantitative or verbal reasoning ability. A fifth cohort consisted of first- and second-year graduate students in top U.S. mathematics or science programs in 1992. This cohort is used primarily to assess the generalizability of SMPY's model for identifying mathematic and scientific potential. Benbow and colleagues and Lubinski and colleagues conducted 20-year longitudinal follow-ups on SMPY's first three cohorts, as part of the larger plan to follow up the first four cohorts at ages 18, 23, 33, 50, and 65. The fifth cohort has been followed up at age 35 and will be again at ages 50 and 65. So far, seven books and more than 400 articles have been based on SMPY; many recent articles are found on the SMPY Web site.

SMPY findings have shown that students' accelerated learning is associated with both achievement and satisfaction in later life. The findings attest particularly to the importance of assessing individual differences *within* the top 1 percent of ability. Individual differences at this level affect the prediction of significant achievement (e.g., publishing a novel, achieving tenure at a major U.S. university, earning a patent). Not surprisingly, individual differences in ability *pattern* (e.g., salient verbal abilities relative to quantitative and spatial abilities manifested in early adolescence) affect the prediction of the specific nature of achievements in later life (e.g., excelling in the humanities versus science). Thus, those with comparatively greater talent in mathematics or science are said to have a *mathematic* or *scientific tilt* and tend to seek educational and career experiences in science, technology, engineering, and mathematics (STEM), and those with a *verbal tilt* seek corresponding experiences in the humanities. In 2007 and 2008, Greg Park, Lubinski, and Benbow provided empirical examples of the importance of ability level and pattern in predicting achievement.

SMPY's longitudinal findings during the past 35 years point to the importance of specific abilities beyond IQ. But they also suggest that traditional intellectual assessment in quantitative and verbal reasoning can be improved. The current view is that there are *three* content domains in the intellectual repertoire: verbal, quantitative, and spatial reasoning. This suggests that spatial reasoning measures should be added to talent search assessment procedures. It is estimated that approximately half of those in the top 1 percent in spatial ability are missed by talent searches restricted to verbal and quantitative reasoning. This neglected student population could be much better identified and served. The school curriculum could be expanded beyond its current verbal and quantitative emphases, to prepare students better for specialized training and careers in such fields as architecture, engineering, and the physical sciences. This is quite possibly the largest resource of unidentified human capital in the United States, such that the area is in need of investigation.

SMPY will soon begin conducting its first follow-ups of 50-year-olds. As its cohorts mature, SMPY will focus increasingly on the development of eminence, as well as on what experiences are needed to promote achievement in adulthood. This is a relatively unexplored time of life, especially for intellectually talented women who until recently were excluded from many educational and career opportunities. The developmental patterns of intellectually talented women have not been fully explored, and SMPY plans to contribute in this area.

David Lubinski and Camilla P. Benbow

See also Acceleration/*A Nation Deceived;* History of Gifted Education in the United States; Learning Styles; Mathematical Talent; Talent Searches; Verbal Ability

Further Readings

Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability: Their status 20 years later. *Psychological Science, 11,* 474–480. Retrieved from http://www.vanderbilt.edu/Peabody/SMPY/SexDiffs.pdf

Benbow, C. P., & Stanley, J. C. (1996). Inequity in equity: How current educational equity policies place able students at risk. *Psychology, Public Policy, and Law, 2,* 249–293. Retrieved from http://www.vanderbilt.edu/Peabody/SMPY/InequityInEquity.pdf

Lubinski, D., & Benbow, C. P. (2000). States of excellence. *American Psychologist, 55,* 137–150.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years: Uncovering antecedents for the development of math-science expertise. *Perspectives on Psychological Science, 1,* 316–345. Retrieved from http://www.vanderbilt.edu/Peabody/SMPY/DoingPsychScience2006.pdf

Lubinski, D., Benbow, C. P., Webb, R. M., & Bleske-Rechek, A. (2006). Tracking exceptional human capital over two decades. *Psychological Science, 17,* 194–199. Retrieved from http://www.vanderbilt.edu/Peabody/SMPY/PsychScience2006.pdf

Park, G., Lubinski, D., & Benbow, C. P. (2007). Contrasting intellectual patterns for creativity in the arts and sciences: Tracking intellectually precocious youth over 25 years. *Psychological Science, 18,* 948–952.

Park, G., Lubinski, D., & Benbow, C. P. (2008). Ability differences among people who have commensurate degrees matter for scientific creativity. *Psychological Science, 19*(10), 957–961.

The Study of Mathematically Precocious Youth: http://www.vanderbilt.edu/Peabody/SMPY

Wai, J., Lubinski, D., & Benbow, C. P. (in press). Spatial ability for STEM domains: Aligning over fifty years of cumulative psychological knowledge solidifies its importance. *Journal of Educational Psychology.*

Webb, R. M., Lubinski, D., & Benbow, C. P. (2007). Spatial ability: A neglected dimension in talent searches for intellectually precocious youth. *Journal of Educational Psychology, 99,* 397–420.

Substance Abuse

Substance abuse among young children and adolescents has proven to be a rapidly changing phenomenon. Beginning in the 1960s, the use of illicit drugs and alcohol significantly increased among adolescents. From a public health perspective, the rise and incidence of substance abuse (e.g., amphetamines, methamphetamines, hallucinogens, barbiturate sedatives, cocaine, opioids, ecstasy, heroin, crystal methamphetamine, cannabis, inhalants, and excessive use of over-the-counter and prescription drugs),

cigarette smoking, and alcohol use among teens has been the focus of considerable international attention. Such behaviors often begin during adolescent and young adulthood. Beginning in 1975, the use of a variety of substances among adolescents has been systematically tracked. Both the U.S. National Institute on Drug Abuse and National Institutes of Health has tracked this behavior through the *Monitoring the Future* annual survey of high school students. The increased use of substances by adolescents has been noted in many countries throughout the world. Significant policy changes and programs have been implemented as a result of the rising problems associated with substance use. This entry provides an overview and discusses risk factors and consequences of substance abuse, along with its implications for highly creative and talented individuals.

Overview

The most recent Monitoring the Future Study published in 2006 in the United States provides a disturbing picture of adolescent drug use. Historically, although there has been a decline since the 1970s in the percentage of adolescents reporting experimentation and ingestion of a variety of substances, there seems to be a relative plateauing of the use of many substances during the past few years. However, new recent findings suggest an increase in some substances, including hallucinogenic drugs such as psilocybin (mushrooms), mescaline, and crystal methamphetamine. Equally disturbing are the findings of an increase in binge drinking among young adults, although recent data from the Monitoring the Future study has suggested alcohol use and binge drinking may have leveled off for adolescents and are significantly below the levels of the 1980s.

The Monitoring the Future study also points to the high numbers of young people using prescription-type medications. The increase in use of sedatives, antidepressants, and other nonheroin-based narcotics has been associated with an increase in the use of other psychotherapeutic drug use.

Although a large percentage of youth report experimentation with drugs and alcohol and are not likely to have substance abuse problems, certain groups are more likely to report heavy excessive use, multidrug use, and social and economic problems resulting from substance use, with some experiencing substance abuse and dependence. Emerging evidence seems to indicate that adolescents may be engaging in regular substance use as a self-medicating means of coping with untreated trauma, to change one's level of consciousness, and to help relieve underlying psychological disorders or stress.

Risk Factors

Strong empirical support indicates that substance use increases with age during adolescence, peaks during the mid- to late-20s, and then gradually declines during adulthood (inhalant use is the exception—typically decreasing during adolescence). Gender is also an important risk factor, with men typically engaged in more substance use and abuse. However, several recent empirical studies suggest that girls are similar to boys in their drinking of alcohol, binge drinking, getting intoxicated, smoking, and use of illicit drugs. The trends with respect to smoking among teens are encouraging in that there was a significant decrease in daily use. Nevertheless, nearly half of all adolescents have reported smoking cigarettes with approximately one-fifth of adolescents being current daily or occasional smokers.

Substance abuse and dependency among many adolescents remains sufficiently widespread to merit serious attention. Almost half of all teens (48 percent) are reported to have experimented with an illicit substance by the time they complete high school. Risk factors include inaccurate perceptions of the perceived risks and benefits associated with substance use; impulsivity and sensation- seeking behaviors; psychological disorders; poor parental and familial bonding; past or current sexual, physical, or psychological abuse; poor academic performance and failure; an inability to live up to expectations of others; ease and accessibility of substances; and societal values and cultural norms.

Consequences

Alcohol use among adolescents remains extremely widespread. The Monitoring the Future study suggests that approximately three-quarters of high school students have consumed alcohol by

the time they leave school, with 56 percent of adolescents in Grade 12 and 20 percent of eighth graders reporting getting drunk. Repeated intoxication resulting from excessive alcohol consumption often results in significant self-injury, school truancy, and legal, familial, and academic problems.

Ample evidence indicates that substance abuse and dependency often lead to a multiplicity of physical, neurological, psychological, interpersonal, and social problems. Prolonged cigarette, alcohol, and substance abuse have been associated with a wide variety of diseases including cancer, respiratory problems, cardiovascular diseases, cognitive problems, liver disease, hypertension, neurological problems, and self-injurious behaviors.

Highly Creative and Talented Individuals

Although no strong data suggests that intellectually gifted adolescents deviate from typical teen norms in either direction with respect to substance use, individuals identified as highly creative and talented have often been associated in the public mind with a culture of drug use, rehabilitation, and in some cases, overdosing on a variety of substances. Hollywood is replete with promising young stars succumbing to the allure of the fast fix, excessive alcohol and substance use, and the need for instant gratification and exhilaration. Some evidence indicates that European and North American pop stars are at increased risk for a substance overdose related to a chronic drug or alcohol problem (25 percent of music stars' deaths were caused by excessive drug or drug-related behaviors).

The history books are replete with musicians, actors, authors, scientists, astronauts, and politicians having admitted to having significant alcohol or drug problems at some point in their lives. Nevertheless, a study of writers at the leading Iowa Writers Workshop, of artists at the School of the Art Institute of Chicago, midwestern popular musicians, and a comparison group of community college adults found that creative adults did not differ significantly in their use of substances from noncreative adults, and that students and apprentices in the arts were much more likely to abuse substances than were practicing creative writers, artists, and musicians.

Additional Considerations

Prevention and treatment programs targeting substance-abusing adolescents have resulted in variable success. A greater understanding of the risk factors associated with multiple forms of substance abuse will help clinicians, parents, and educators develop more effective strategies. Substance abuse among teenagers is an evolving phenomenon with new forms of drugs replacing old ones and remains an important public health and public policy problem. Substance use among gifted and creative students may lead to many of the problems that other twice-exceptional gifted experience—isolation, underachievement, and failure to fulfill dreams and goals.

Jeffrey L. Derevensky

See also Adolescent, Gifted; Adult, Gifted; Twice Exceptional

Further Readings

Adalf, E. M., & Paglia-Boak, A. (2005). *Drug use among Ontario students: Detailed OSDUS findings, 1977–2005*. Toronto: Centre for Addiction and Mental Health.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders: DSM-IV-TR* (4th ed.). Washington, DC: Author.

Bellis, M. A., Hennell, T., Lushey, C., Hughes, K., Tocque, K., & Ashtan, J. R. (2007). Elvis to Eminem: Quantifying the price of fame through early mortality of European and North American rock and pop stars. *Journal of Epidemiology & Community Health, 61,* 896–901.

Johnston, L. D., O'Malley, P. M., Bachman, J., & Schulenberg, J. E. (2007). *Monitoring the future national results on adolescent drug use: Overview of the key findings, 2006* (NIH Publication No. 07–6202). Bethesda, MD: National Institute on Drug Abuse.

Kerr, B. A., Shaffer, J., Chambers, C., & Hallowell, C. K. (1991). Substance use patterns of talented adults. *Journal of Creative Behavior, 25,* 145–154.

Paglia-Boak, A., & Adlaf, E. (2007). Substance use and harm in the general youth population. In Canadian Centre on Substance Abuse, *Substance abuse in Canada: Youth in focus.* Ottawa, Ontario: Canadian Centre on Substance Abuse.

Romer, D. (Ed.). (2003). *Reducing adolescent risk: Toward an integrated approach*. Thousand Oaks, CA: Sage.

Schuckit, M. A. (2000). *Drug and alcohol abuse: A clinical guide to diagnosis and treatment* (5th ed.). New York: Kluwer Academic.

Suicide

Are gifted and talented children and adolescents more prone to suicide than their non-gifted peers are? Presently, this question has proven difficult to answer. Tracy Cross and his colleagues have found that this is because of the complexity in defining giftedness, the lack of a designation of giftedness in data colleted on suicide, confidentiality diminishing access to information, psychological autopsies being expensive and time consuming, and the lethality of suicide causing certain information to be collected after a suicide completion. That being said, it can be assumed that gifted youth complete suicide at rates commensurate with the general population, at the minimum. Suicide is listed as the third leading cause of death in adolescents between the ages of 15 and 24. For youth ages 10 to 14, suicide rates increased by 51 percent between 1981 and 2004, according to the American Association of Suicidology. Internationally, suicidal rates are 0.5 for girls and 0.9 for boys per 100,000 in children between the ages of 5 and 14. It increases to 12.0 for girls and 14.2 for boys per 100,000. No matter what country a young person may call home, suicide is listed as a common cause of death in adolescents. This entry discusses suicide risks and warning signs, along with theories of suicide and possible interventions, with regard to youth in general and gifted youth in particular.

Risks

The typology of suicide behavior includes ideation, gesturing, attempts, and completions. Youth who ideate think about killing themselves. Gesturors engage in nonserious suicide attempts. Attemptors involve themselves in bona fide, but unsuccessful, suicide attempts, and completers take up behaviors that end their life. Gifted adolescents who may be at a heightened risk for attempting suicide are youth with prior history of a psychological disorder. Other risks identified by Lucy Davidson and Markku Linnoila include a history of drug or alcohol use, lethal weapons in the home, genetic factors, gender (boys are four times more likely to complete suicide than are girls; girls are three times more likely to attempt suicide than are boys), homosexuality, impulsiveness, and aggressiveness. Risk factors that may be particular to gifted youth consist of perfectionism, sensitivity, social isolation caused by extreme introversion, Kasimierz Dabrowski's five overexcitabilities, and inappropriate educational accommodations.

Philip Rutter and Andrew Behrendt warn that overemphasizing demographic variables in discussions of suicide risk can obscure who truly in the population is in peril. For example, current studies about suicide in young people focus on White youth. Consequently, intervention strategies may be tailored to this population. Suicide rates for African American, Native American, and Latino youth have mushroomed during the past decade. Focusing on demographic variables may misidentify some and underidentify others from these populations. Moreover, the intervention strategies proposed may be inappropriate or ineffective. Rutter and Behrendt thus urge the consideration of the combination of hostility, a negative self-concept, isolation, and hopelessness as conducive to accurately identifying which youth may be at risk for suicide.

Warning Signs

Young people who evince warning signs for suicide can be said to be ideating about suicide at the minimum. Some warning signs include prior attempts to take one's life; an increase in the use of alcohol and drugs; loss of interest in work, school, and personal hobbies; giving away cherished possessions; and preoccupation with death and dying. Several warning signs particular to gifted students may include an abrupt change in school performance; complete engrossment in schoolwork; lack of social participation; difficulties in relationships with significant others, especially when these peers are similar in ability; and a difficulty delineating the difference between fiction and fact. One should not assume a list will be

created that captures all the ways young people may communicate that they are considering suicide. Moreover, Cross, Karyn Gust-Brey, and P. Bonny Ball cautioned against equating giftedness with being troubled. It would be better to err on the side of caution and assume that troubles in a gifted young person's life require attention.

Theories

Several theories by suicidologists, or researchers who study suicide, have been advanced that explain how a person comes to consider suicide as a viable alternative. Two theories highlighted here are Edwin Schneidman's four elements of suicide and Judith Stillion and Eugene McDowell's suicide trajectory model. Schneidman argues that the path to suicide begins with intensified inimicality or an increase in the ways that a person can be self-punishing. A feeling of being ill at ease is worsened. Thinking becomes highly constrained and polarized. Young people can ignore how others may be affected by their suicide and block memories from their pasts. The fourth element to Schneidman's theory about suicide is cessation. Young people come to feel that the only way they can end their pain is to end their life.

Stillion and McDowell combined work from several schools of thought about suicide as the basis for their suicide trajectory model. The model posits that there are four primary areas of risk: cognitive (rigid thinking, poor problem solving), biological (manic depression, gender), environmental (weapons in the home, life stressors), and psychological (feelings of hopelessness, low self-concept). The risk areas play a role in young people coming to ideate about suicide, and they affect each other, such that a young person who does not solve problems well may come to feel hopeless. Stillion and McDowell conclude that to understand suicide as an ultimate decision, one must understand how life experiences manifest the previously mentioned risk areas.

These theories encourage a holistic approach to understanding why youth commit suicide, as Rutter and Behrendt so urge. Psychological autopsies of youth who commit suicide serve just such a function. Though intended for investigating mysterious deaths, psychological autopsies have come to be used to explain suicides. Cross, Gust-Brey, and their colleagues used this data-gathering procedure to explore, posthumously, the environmental, psychological, and social influences in the suicide of Reed Ball, a gifted college student. The researchers hoped that the story of Ball would help reduce the likelihood of suicide in gifted adolescents and young adults.

Cross, Gust-Brey, and colleagues concluded that risk factors and warning signs for suicide in youth in the general population can serve as risk factors and warning signs for gifted youth. Cross and colleagues urge parents, teachers, friends, and counselors to not equate giftedness with aberrant behavior and belief systems. Moreover, relationships can serve as safeguards in the face of the tendency by suicidal youth to isolate themselves.

Interventions

The preceding analysis of the literature allows one to conclude that suicide is far from being the result of an invisible progression of events or circumstances. There are many places of entry, and thus intervention and prevention, to reduce suicide completions in gifted youth. As expected, parents and schools can serve pivotal roles.

Mirjami Pelkonen and Mauri Martunen report that youth sought help from parents and friends rather than counselors before a potentially deadly suicide attempt. Indeed, it is imperative for parents to heed talk of suicidal thoughts when their children share them. As a parent, is it seductive to pacify oneself with the rationales that a child is too young to take his or her life or the child is not serious? Parents who chose this path rather than action on behalf of their child and as a consequence lost their child to suicide were deeply remorseful and were eloquent in their plea that parents not do as they did. As mentioned previously, a persistent parent can stand in the way of a suicidal youth seeking to isolate herself or himself, and parents are often the ones most likely to connect their child with the requisite counseling. Finally, parents may need to decode behavior as a precursor to having conversations with their child about suicide. Therefore, parents should make themselves aware of the warning signs and risks of suicide in children and youth, according to Cross, Gust-Brey, and colleagues.

Schools can serve this educative function for parents, teachers, and peers. Though school

officials are urged to proceed cautiously with suicide awareness programs, they have been proven effective interventions in certain cases. Schoolwide intervention programs incur the risk of normalizing suicide. Educators are encouraged to emphasize the message that suicidal thoughts are an abnormal way of grappling with life stressors to allay this risk.

School environment can also serve as an intervention. Denise de Souza Fleith encourages the development of school environments that facilitate rewarding social relationships, honest discussion of fears and dreams, and the bolstering of student strengths, abilities, and interests. Moreover, Laurence Coleman and Cross argue that schools need to establish holistic guidance program at the elementary and secondary levels for gifted youth. These guidance programs would have as their theoretical basis an understanding of universal child development and domain-specific atypical growth and change. The guidance program would also help gifted youth apprehend their environment in such a way that they can think their way through their worries. This aspect of the guidance program recognizes that thinking and emotion are interconnected.

Tracy L. Cross and Andrea Dawn Frazier

See also Emotional Development; Guidance; Life Satisfaction; Stigmatization

Further Readings

Coleman, L. J., & Cross, T. L. (2005). *Being gifted in school* (2nd ed.). Waco, TX: Prufrock Press.

Cross, T. L., Cook, R. S., & Dixon, D. N. (1996). Psychological autopsies of three academically talented adolescents who committed suicide. *Journal of Secondary Gifted Education, 7*(3), 403–409.

Cross, T. L., Gust-Brey, K., & Ball, P. B. (2002). A psychological autopsy of the suicide of an academically gifted student: Researchers' and parents' perspectives. *Gifted Child Quarterly, 46*(4), 247–264.

Davidson, L., & Linnoila, M. (Eds.). (1991). *Risk factors for youth suicide*. New York: Hemisphere.

Delisle, J. R. (1982). Striking out: Suicide and the gifted adolescent. *Gifted Child Today, 13,* 16–19.

Fleith, D. S. (1998). Suicide among talented youngsters: A sociocultural perspective. *Gifted Education International, 13*(2), 113–120.

Fleith, D. S. (2001). Suicide among gifted adolescents: How to prevent it. Retrieved March 5, 2007, from http://www.gifted.uconn.edu/nrcgt/newsletter/spring01/sprng012.html

Hayes, M. L., & Sloat, R. S. (1989). Gifted students at risk for suicide. *Roeper Review, 12*(2), 102–107.

Rutter, P. A., & Behrendt, A. E. (2004). Adolescent suicide risk: Four psychosocial factors. *Adolescence, 39*(154), 295–302.

Schneidman, E. (1996). *The suicidal mind*. New York: Oxford University Press.

Stillion, J. M., & McDowell, E. E. (1996). *Suicide across the life span*. Washington, DC: Taylor & Francis.

Summer Camps

The defining element of a summer camp is outdoor adventure. Although all of the camps described in this entry are open to academically gifted students, most are not solely focused on the academically gifted. For the adventurous student, a multitude of locations around the continental United States, as well as in Alaska and Hawaii, are available. There are also outdoor summer adventure camps in countries such as Canada, Norway, Costa Rica, Panama, Ecuador, British Columbia, Mexico, and many others. Each of these camps provides opportunities for students to grow and develop in unique ways.

The Gifted Question

Gifted abilities involved in adventure camps are both physical and mental. Some of these adventure camps focus almost entirely on physical development, but others emphasize intellectual as well as physical development. Most of these camps do not have specific intellectual requirements, such as high grades or high-IQ scores. Many camps work with students on team building, as well as on social and leadership skills. Service-learning projects are also a large part of some of the camps, particularly those that are based in foreign countries. Adventure camps often focus on developing a sense of community responsibility among participants, as well as developing physical abilities, leadership capabilities, artistic talents, and mental acuity. These camps generally aim to

maximize all aspects of student potential. In the list later in this entry, camps that have a gifted and talented criterion, that information is listed in italics on the line with grade or age parameters.

Adventure Camp Activities

The adventure camps feature a wide range of highly physical land and water activities. In some camps, students may spend large amounts of time in water activities such as white-water rafting, swimming, snorkeling, kayaking, canoeing, sailing, scuba diving, and photographing undersea life. There are equally as many, if not more, land activities such as mountain climbing, backpacking, rock climbing, mountain biking, archery, ropes courses, and fishing. In addition to this array of physical activities, some camps offer arts and crafts, language immersion, leadership training, the study of marine animals, and conservation service projects.

Age Requirements

Most of the highly physical adventure camps require students to have completed sixth grade. However, a few adventure camps tailor their activities to allow children in first or second grade to attend.

Questions to Ask

Before choosing a summer experience, one should carefully consider the aspects of several programs, and the attending student should assist in the decision-making process. For example, people who are considering what summer experience is best for their students should consider the following questions:

1. What do I want my student to gain from this experience?
2. What does my student hope to gain?
3. Does my student want to go?
4. Has my student had some enjoyable and successful experiences with outdoor activities?
5. Might my student need some other kinds of outdoor experience before this one?
6. Do I want my student to go?
7. What is the student to instructor ratio?
8. How long has the camp been in operation?
9. What is the experience level of the staff?
10. Does the camp give me sufficient evidence of monitoring the safety of students?
11. Is the length of the experience right for my student?
12. What are my student's strengths?
13. What might my student need to develop?
14. What kinds of supervision are in place at different times of the day and evening?
15. Is the potential benefit of this experience worth the financial cost?
16. Is my student mature enough to handle this experience?
17. Do I feel comfortable that the camp is a good match for my student?

Specific Outdoor Summer Adventure Camps

Listed alphabetically is a sample of summer adventure camps. The list is far from exhaustive but does give an overview of the location of the camp, special camp features, specific activities, age groupings, and contact information. Only further searching and questioning will help determine if an outdoor adventure camp is right for a particular student.

Adventure Treks

Dates: June–August

Ages: 13–18

Locations: Northern California, Alaska, Pacific Northwest, British Columbia

Special features: Camping out each night, teamwork, and community building

Activities: Backpacking, white-water rafting, sea kayaking, mountain climbing, rock climbing, canoeing, sailing, mountain biking

E-mail: info@adventuretreks.com

Web site: www.adventuretreks.com

Aquatic Sciences Adventure Camp

Date: June–August

Ages: 9–15

Location: Texas State University–San Marcos, Texas

Special features: Learning basic principles of water chemistry and aquatic biology in a university setting

Activities: Scuba diving, rafting, tubing, swimming, snorkeling, and trips to Sea World

E-mail: LG16@txstate.edu

Web site: www.eardc.txstate.edu/camp.html

Camp Broadstone's Summer Enrichment Program for Gifted Youth

Dates: June and July

Grades: 4–8 *Gifted*

Location: Appalachian State University, North Carolina

Special features: Blend of morning enrichment classes and afternoon adventures

Activities: Canoeing, rappelling, high-ropes course, hiking, and camping trips

E-mail: bevanjk@appstate.edu

Web site: www.campbroadstone.com

Camp Nor'wester

Dates: June–August

Ages: 9–16

Location: Roche Harbor, Washington

Special features: Experience designed to build a spirit of community by learning camping and outdoor skills such as living in tents and building fires

Activities: Nature studies, archery, sailing, kayaking, canoeing, arts and crafts, music, bicycling, northwest native focus, singing, and drama

E-mail: norwester@rockisland.com

Web site: www.norwester.org

Camp Yunasa

Dates: July–early August

Ages: 10–14

Location: Camp Copneconic on Lake Copneconis, Fenton, Michigan

Special feature: Aimed at integrating intellectual, emotional, social, physical, and spiritual aspects of students

Activities: Swimming, canoeing, campfires, archery, ropes courses, and arts and crafts

E-mail: IEAgifted@educationaladvancement.org

Web site: www.educationaladvancement.org

Catalina Sea Camp

Dates: July–August

Ages: 8–12, 1 week; ages 12–17, 3 weeks

Location: Catalina Island, California

Special feature: Exploration and study of the marine science and island ecology of Catalina Island including seafood cookery and arts and crafts

Activities: Scuba diving, sailing, surfing, wall climbing, snorkeling, ocean kayaking, underwater video and photography, plus the study of fish, sharks, plankton, algae, marine mammals, and island biology

E-mail: info@guideddiscoveries.org

Web site: www.catalinaseacamp.org

Cottonwood Gulch Foundation

Dates: June–August

Ages: 10–18

Location: New Mexico

Special features: Wilderness expeditions that explore the natural sciences and cultural history of the Southwest and explore the 540-acre ecological preserve where the camp is located

Activities: Backpacking, canoe trips, animal tracking, Native American history and art, plus the study of ornithology, geology, anthropology, and archaeology

E-mail: amy@cottonwoodgulch.org

Web site: www.cottonwoodgulch.org

Crow Canyon Archaeological Center

Dates: Summer

Grades: 6–12

Location: near Cortez, Colorado, in one of the richest archaeological regions in the United States

Special features: Scenic 170-acre campus

Activities: Study of archaeology in the large wilderness area near Mesa Verde National Park

E-mail: ttitone@crowcanyon.org

Web site: www.crowcanyon.org

Deer Hill Expeditions

Dates: June–August

Grades: 7–12

Locations: U.S. Southwest, including Colorado, Utah, Arizona, and New Mexico, and Costa Rica,

Special features: Interaction with native cultures, cross-cultural community service projects with Navajo, Hopi, Zuni, or the Tico people of Costa Rica

Activities: Rafting, canoeing, kayaking, backpacking, mountain biking, leadership development, Spanish language immersion, and conservation service projects

E-mail: info@deerhillexpeditions.com

Web site: www.deerhillexpeditions.com

Grand Canyon and Four Corners Adventure—Travel Quest

Dates: Summer

Grades: 7–12 *Academically Gifted*

Location: Begins in Albuquerque, New Mexico, and ends in Las Vegas, Nevada

Special features: Historic tour includes Santa Fe, Mesa Verde, Grand Canyon, Hoover Dam, Durango, and Crow Canyon Archaeology Center in Cortez, Colorado

Activities: Hands-on approach to learning, and the study of archaeology

E-mail: tours@ailteam.com

Web site: www.ailtours.com

Green River Preserve

Dates: June, July, August

Grades: 2–12

Location: Near Brevard in Western North Carolina

Special Features: A natural sciences and environmental camp in a nature preserve. Activities: Hiking, exploring, swimming, canoeing, backpacking, kayaking, rock climbing, crafts, fishing, natural arts, archery, pottery, and creative writing

E-mail: missy@greenriverpreserve.org

info@greenriverpreserve.org

Web site: www.greenriverpreserve.org

Marine Quest Summer Camps at University of North Carolina at Wilmington

Dates: Summer

Ages: 5–16 *Gifted and Talented*

Locations: Bimini, Bahamas, and Curacao, Netherlands Antilles, off north coast of Venezuela

Special features: Hands-on ocean and marine life educational programs

Activities: Age-appropriate exploration of barrier islands, where all U.S. Coast Guard safety requirements are enforced

E-mail: marinequest@uncw.edu

burnettj@uncw.edu

Web site: www.uncw.edu/marinequest

Mercersburg Academy Adventure Camps

Dates: June–August

Ages: 7–16

Location: Mercersburg, Pennsylvania

Special features: Amusement park trips

Activities: Kayaking, horseback riding, overnight campouts, baseball games, and river rafting

E-mail: summerprograms@mercersburg.edu

Web site: www.mercersburg.edu

Outward Bound Wilderness

Dates: Summer

Ages: 12 and older

Locations: Various locations across the United States

Special features: The program emphasizes personal growth and challenge in a variety of wilderness situations such as leading a mountain-peak ascent or navigating a boat through rapids

Activities: Students may attend who have had no previous wilderness experience, as they gain skills, they move through a series of progressively more difficult challenges; students also learn to communicate, to lead, and to work as a team

Web site: www.outwardboundwilderness.org

The Road Less Traveled

Dates: 1- to 6-week sessions in summer

Ages: 13–19

Locations: Western United States, Alaska, Norway, Costa Rica, Panama, Guatemala, Peru, Spain, Hawaii, Azores Islands, France

Special features: Wilderness expeditions, community service, and language immersion

Activities: Rafting, kayaking, rock climbing, backpacking, ice and snow mountaineering

Web site: www.theroadlesstraveled.com

Sail Caribbean

Dates: June–August

Ages: 13–18

Locations: British Virgin Islands, Leeward and Windward Islands

Special features: The Eleuthera program combines marine biology study with youth outreach and environmental conservation projects in the British Virgin Islands

Activities: Sailing instruction, marine biology camps, wide variety of scuba diving courses, teen sailing adventures, cultural immersion, marine biology, and community service projects

E-mail: info@sailcaribbean.com

Web site: www.sailcaribbean.com

Science Camp Watonka

Dates: June–July, July–August

Ages: 7–15 for boys only

Location: Paupack, Pennsylvania

Special features: Daily science laboratory experiences in astronomy, robotics, chemistry, physics, and earth sciences

Activities: Climbing, windsurfing, ropes, swimming, riflery, mini-bike riding, sailing, crafts, woodworking, archery, arts and crafts, magic shows, overnight camping, rocketry, and waterfront safety

E-mail: mail@watonka.com

Web site: www.watonka.com

Seacamp–Seacamp Association Incorporated

Dates: June, July, August

Grades: rising 7–12

Location: Big Pine Key, Florida

Special features: Opportunities to explore the sea plant and animal life of the coral reefs, mudflats, tidal pools and grassy areas of the waters of the Lower Florida Keys under the guidance of marine science instructors

Activities: Basic and advanced courses in scuba diving, sailing, windsurfing, camp newspaper, arts, and crafts

E-mail: info@seacamp.org

Web site: www.seacamp.org

SEACAMP San Diego

Dates: June–August

Grades: 7–12

Location: San Diego, California

Special features: Innovative, hands-on, interactive marine education in three unique camps—SEACAMP I, SEACAMP II, and SEACAMP III—that study invertebrates, fish adaptations, night adaptations, marine mammals, and shark ecology

Activities: Snorkel excursions, kayaking, boogie boarding, boat trips, from a private supervised beach

E-mail: seacamp@seacamp.com

Web site: www.seacamp.com

Sea Camp—Texas A&M University at Galveston

Sea Campus Kids

Dates: Summer

Ages: 6–11

Location: Galveston, Texas

Sea Camp for Older Students

Dates: Week-long summer adventures June–August

Ages: 10–18

Locations: Texas coast, Belize

Special features: Marine biology and ecology, study of marine mammals in their habitats, coastal camping, ecotourism in Belize

Activities: Use of oceanographic equipment and laboratories, firsthand encounters with reef fish, coral, and mangroves

E-mail: seacamp@tamug.edu

Web site: www.tamug.edu/seacamp

Student Hosteling Program—American Camping Association

Dates: June–August

Grades: 8–12

Location: Conway, Massachusetts

Special features: During these teenage biking tours, students stay in campsites, hostels, and other modest facilities

Activities: Small groups of 8 to 12 students make bike touring trips in the countryside and in cultural centers

E-mail: shpbike@aol.com

Web site: www.bicycletrips.com

YMCA Camp Flaming Arrow

Dates: June–July

Ages: 8–15

Location: Hunt, Texas

Special features: A variety of camp clubs, such as Saddle Club, Crafts Club, Varsity Club, and others from which to choose

Activities: Wall climbing, fishing, hiking, nature studies, archery, canoeing, arts, and crafts, horseback riding, river swimming, overnight campouts, high and low-ropes course, basketball, volleyball, campfires

Web site: www.ymcacampflamingarrow.org

Online Information

A vast amount of adventure camp information is available online. Many of those are well-established commercial enterprises, others are university-based programs, and others are nonprofit.

Patricia L. Hollingsworth

See also International Schools for Gifted; Saturday Programs; Summer Programs

Further Readings

Duke University Talent Identification Program, Educational Opportunity Guide Online: http://www.duketipeog.com

Duke University Talent Identification Program, Summer Programs: http://www.tip.duke.edu/summer_programs

MySummerCamps.com: http://www.mysummercamps.com

Simmons, E. J. (2006). *Educational opportunity guide: A directory of programs for the gifted*. Durham, NC: Duke University Talent Identification Program.

Summer Programs

Summer programs for the gifted are broad in scope, content, focus, and format. These include talent searches, summer institutes, workshops, and conferences. They tend to be more focused on reaching the specific academic needs of gifted students than are summer adventure camps. Many of these programs are specifically designed for gifted and talented students, and several of them are described in this entry.

More than a decade ago, researcher Donna Enerson found that summer programs had positive effects on gifted students. More recent investigations by Paula Olszewski-Kubilius have similar positive findings. Gifted students find challenging course work with a group of intellectual peers to be satisfying and meaningful. For gifted and talented students, being able to attend a summer program with a group of intellectual peers can be a life-changing experience. They are in classes with other gifted students and are given the opportunity to pursue the subject matter of their choice. For some students, this will be the first time that they have found a group where they belong.

Talent Search Programs

Talent search programs provide qualified seventh-grade students with the opportunity to take either the ACT or SAT college entrance exams. These scores are then used to qualify them for an array of exceptionally interesting and challenging summer school programs, as well as, some outstanding school-year programs. There are four regional talent search programs in the United States: Duke University Talent Identification Program; Johns Hopkins Center for Talented Youth; Northwestern University Center for Talent Development; and University of Denver—Rocky Mountain Talent Search.

These talent search programs identify academically talented students and offer them an assortment of summer programs. Students may select to apply to the summer programs in any of these regions.

Test scores are often listed as part of the requirements for Talent Search Summer Programs. These generally refer to ACT, SAT, or PSAT exam scores, but some programs may require others. Going to specific Web sites will provide more specific information regarding all the requirements.

Duke University Talent Identification Program

Requirements: Test scores, gifted and talented

Grades: 4–12

Special features: The Duke program is a long-standing leader in programming for gifted students. Programs include workshops in creative writing, drama, film studies, and scientific field studies in a wide variety of locations, such as the Smoky Mountains, New Mexico, Costa Rico, and Italy.

E-mail: QandA@tip.duke.edu

Web site: www.tip.duke.edu

Johns Hopkins University—Center for Talented Youth (CTY)

Requirements: Test scores for 7th–12th grades

Grades: 2–12

Special features: Programs are offered for 2nd through 6th graders in the Baltimore and Washington, D.C., area as well as in West Los Angeles and Pasadena, California. For 7th through 12th graders, a variety of CTY courses are offered, including Civic Leadership for 10th–12th graders, and programs in Madrid, Spain, and Monterrey and Puebla, Mexico, for 7th–12th graders. There is also a program in historic Nanjing, China, for 10th–12th graders.

E-mail: ctyinfo@jhu.edu

Web site: www.cty.jhu.edu

Northwestern University—Center for Talent Development

Requirements: Application, transcript, recommendations, test scores, GPA, writing sample, gifted and talented

Grades: 4–12

Special features: Students going into 5th and 6th grades may be in the Apogee enrichment program. Spectrum is for students completing 7th, 8th, or 9th grades. Equinox is a 3-week

program for academically talented students completing 9th through 12th grades. The Civic Leadership Institute is a service-learning program for high school students.

E-mail: ctd@northwestern.edu

Web site: www.ctd.northwestern.edu/summer

University of Denver—Rocky Mountain Talent Search

Dates: June and July

Requirements: Test scores, portfolio of student work

Grades: 7–10

Special features: Students from 4th through 6th grades are in the 1-week residential program called Discovery that focuses on enrichment and exploration. Students from 6th though 8th grades are in a 2-week residential program called Frontier that helps students move from enrichment activities to more intense studies. The Pioneer Program is a 3-week residential program for mature 8th through 10th graders who focus on one intense course of study for 7 hours a day.

E-mail: rmts-info@du.edu

Web site: http://www.du.edu/city/programs/academic-year-programs/rocky-mountain-talent-search/; www.du.edu/city/programs/summer-programs

Duke Talent Identification Program Institutes

The Duke Talent Identification Program (TIP) Institutes are designed to meet the needs of academically exceptional high school students who want real-world experiences. The Leadership Institute helps students develop their leadership potential. The Pre-Law Institute is designed to aid students in the understanding of the criminal justice system in the United States. The Computational Science Institute provides students with outstanding teachers and many hands-on experiences.

Duke University Talent Identification Program International Field Studies

There are at least three staff members in each group of 20 to 25 students who are selected to participate in individual international field studies. The following field studies are available for 10th- through 12th-grade students:

- China: *A Leader in the Global Economy,* held in Shanghai, Xian, and Beijing
- England: A Diplomat's Perspective on World Politics, held in London
- France: *Paris through the Eyes of Its Greatest Minds*
- Italy: *Architecture and Art History,* held in Rome and Florence
- Costa Rica: *Tropical Ecology,* held in La Selva, Monteverde, and Palo Verde
- Costa Rica: *Tropical Medicine and Ethnobiology,* held in Las Cruces

Examples of Specific Talent Search Camps

Language Immersion Programs, Hampshire College, Amherst, Massachusetts

Dates: June–July

Requirements: Test scores

Grades: 6–9

Special features: 4-week language immersion programs in Arabic, Chinese, French, and Spanish

Activities: Cultural events, trips, and activities available in the cultural context of the language being studied

Web site: www.cty.jhu.edu/summer/immersion

Reel Expressions: Filmmaking—Chapman University, Orange, California

Dates: June–July

Requirements: Test scores

Grades: 9–12

Special features: Students learn the basics of filmmaking and complete two original films during their 2-week stay at film school.

Activities: Learning the basics of storytelling, filmmaking, and editing; trips to movie studios, visiting famous sites in Hollywood

Web site: http://www.tip.duke.edu/summer_programs/arts/index.html#film

Summer Institute for the Gifted (SIG)

The SIG summer programs are sponsored by outstanding colleges and universities around the

country. Amherst College, Bryn Mawr College, Emory University, University of California at Berkeley, University of California at Los Angeles, University of Michigan–Ann Arbor, University of Texas at Austin, and Vassar College provide residential programs for 4th- through 11th-grade gifted students. Princeton provides a residential program for 7th though 11th graders.

Day programs for kindergarten through sixth-grade students are provided by Bryn Mawr College, Fairfield University, Manhattanville College, Moorestown Friends School, and Stuart Country Day School. All of these programs are for students with high academic ability and achievement.

Web site: http://www.giftedstudy.com

Southern Methodist University Talented and Gifted Summer Programs, Dallas

Southern Methodist University located in Dallas, Texas, provides summer programs for middle and high school students with high academic potential. Courses are offered in science, art, and the humanities. Students live on campus and may earn college credit for their summer work.

E-mail: gifted@smu.edu

Web site: www.smu.edu/ce

Writer's Art: Creative Writing— Ghost Ranch, New Mexico

Dates: June

Requirements: Test scores

Grades: 9–12

Special features: The site of this camp is the former home of painter Georgia O'Keeffe. Professional writers work with students to help them develop their own writing styles and abilities.

Activities: Journal writing, creative writing, swimming, hiking, and field trips to cultural centers

Web site: http://www.tip.duke.edu/summer_programs/arts/index.html#film; http://ghostranch.org/index.php?Itemid=&option=com_search&searchword=wri

Other University-Based Academic Programs

California State University, Fresno, Summer Animation Workshop

The animation workshop will focus on creating digital characters that can perform as a real actor with attitude, style, and appeal. Students will learn to scan and rig a three-dimensional character. They will study motion technology and learn to apply this movement to their 3-D characters.

E-mail: rvertolli@csuchico.edu

Web site: http://www.animationnation.com

Goucher College, Baltimore, Maryland, Summer Arts Institute

The Goucher College Summer Arts Institute provides opportunities for serious young artists (ages 12–18) to study with professional artists. Students may choose from computer music, dance, jazz music, or drums and percussion. Computer music students will use the latest technology to write and orchestrate their own original compositions. Dance students may have instruction in ballet, jazz, tap, and modern dance. Jazz students will play in small and large ensembles as well as having individual instruction. Students studying drums and percussion will be exposed to such instruments as African and Brazilian drums, as well as dance accompaniment.

E-mail: linda.garofalo@goucher.edu

Web site: http://www.goucher.edu/x7545.xml

University of California at Berkeley— Lawrence Hall of Science Summer Camps

The Lawrence Hall of Science Camps are for students from ages 10 to 18. There are two residential camps, each 1 week in length. In each camp, students may take either the wildlife biology, marine biology, or mountain ecology while backpacking in the Sierras.

E-mail: lhsinfo@uclink,berkeley.edu

Web site: www.campchannel.com/camps/1925.html

University of Nevada, Reno—THINK Summer Institute

The THINK Summer Institute, sponsored by the Davidson Institute, is a 3-week residential program for exceptionally gifted students from ages 13 to 16. Courses are taught by college professors, and students may earn as many as seven college credits.

E-mail: Think@ditd.org

Web site: www.ditd.org

University of Northern Colorado, Boulder—Summer Enrichment Program

The Summer Enrichment Program (SEP) is a 2-week residential program that has provided enrichment courses for gifted students for 30 years. Courses that may be offered are art, creative writing, debate, dance, mathematics, music, technology, cultures, drama, history, and science. After class, students may be involved in sports, recreation, crafts, and library research.

E-mail: sep@unco.edu

Web site: www.unco.edu/sep

Washington University in St. Louis

Current high school juniors, who are 16 or older, may attend Washington University to get a head start on earning college credits and learning about college life. They may study a wide variety of courses including biology, ecology, foreign languages, literature, journalism, mathematics, history, and visual and performing arts. Students may earn as many as seven college credits during the summer.

E-mail: mhussung@wustl.edu

Web site: http://summerscholars.wustl.edu

Western Kentucky University, Bowling Green—The Center for Gifted Studies

The Summer Program for Verbally and Mathematically Precocious Youth (VAMPY) is a 3-week academic program sponsored by the Center for Gifted Studies that provides students with the opportunity to learn from a wide variety of academic disciplines. Classes that have been taught are ancient civilizations, chemistry, Civil War, genetics, humanities, mock trial, physics, Shakespeare, and psychology.

E-mail: gifted@wku.edu

Web site: www.wku.edu/Dept/Support/AcadAffairs/Gifted

Summer Arts Programs

Blue Lake Fine Arts Camp, near Muskegon, Michigan

Blue Lake Camp is in the middle of 1,300 acres of preserved forest in the Manistee National Forest on the shore of Little Blue Lake just north of Muskegon, Michigan. There are more than 275 buildings, shelters, and cabins on the campus. Annually the camp serves more than 5,000 gifted elementary, middle, and high school students. Students study music, art, drama, and dance and give more than 175 performances during the Summer Arts Festival. Other activities include dances, talent shows, concerts, carnivals, campfires, and recitals, as well as sports such as basketball, soccer, volleyball, and swimming.

Web site: www.bluelake.org/programs.html

Idyllwild Arts Summer Program, Idyllwild, California

The Summer Program provides intensive workshops in the visual arts for students from ages 9 to 18. There are 2-week workshops in ceramics, computer animation, drawing, painting, jewelry-making, photography, and portfolio preparation.

E-mail: summer@idyllwildarts.org

Web site: http://www.idyllwildarts.org

Choosing a Summer Program

Making a choice from so many options may be difficult. One of the big decisions is between residential and nonresidential programs. A few summers spent at programs close to home can make a smooth transition to a residential program.

Attending a residential program requires student maturity, some experience in living away from home, and desire by the student to try this adventure. If a student and the student's parents are comfortable at all these levels, then a residential program can be an extremely positive experience. Having the student involved in all steps of the decision making will more likely make it a positive experience.

Patricia L. Hollingsworth

See also International Schools for Gifted; Saturday Programs; Summer Camps

Further Readings

Duke University Talent Identification Program, Educational Opportunity Guide Online: http://www.duketipeog.com

Duke University Talent Identification Program, Summer Programs: http://www.tip.duke.edu/summer%5Fprograms

Enersen, D. L. (1993). Summer residential programs: Academics and beyond. *Gifted Child Quarterly, 37*(4), 169–176.

MySummerCamps.com: http://www.mysummercamps.com

National Association for Gifted Children: http://www.nagc.org

Olszewski-Kubilius, P. (2007). The role of summer programs in developing the talents of gifted students. In J. VanTassel-Baska (Ed.), *Serving gifted learners beyond the traditional classroom: A guide to alternative programs and services* (pp. 13–32). Waco, TX: Prufrock Press.

Simmons, E. J. (2006). *Educational opportunity guide: A directory of programs for the gifted*. Durham, NC: Duke University Talent Identification Program.

Supporting Emotional Needs of Gifted

As the field of giftedness education grows, educators and parents are getting better at meeting the academic needs of the gifted children under their care; however, the social and emotional needs of the gifted are still lacking understanding and support. The prevailing myth that gifted children are smart and are able to take care of themselves is a major reason gifted students flounder socially and emotionally. This entry addresses the social needs and emotional needs of gifted students and provides some tips for educators, parents, and professionals on how to support the gifted. Supporting Emotional Needs of the Gifted (SENG), a nonprofit organization established in 1981, is highlighted as an organization in which educators, parents, and professionals band together to better facilitate the exchange of research and best practices to help both gifted children and adults cope with their social and emotional needs.

Social Needs

To meet the social needs of the gifted, concerned adults need to be aware of the role of introversion, availability of mental-age peers, and image control of gifted students that could affect the social development of these students.

Introverts are individuals who prefer the internal world of ideas and concepts within their heads, get their energy by being alone, and become drained when surrounded by others. This is different from being lonely, where one does not have any friends to belong to or share experiences with. Therefore, one should not push introverted gifted students to socialize unnecessarily because this may hamper the pursuit of interest and talent refinement during the student alone time.

Gifted students who were not in accelerated programs may lack the companionship of high-ability peers who are able to comprehend and understand the interests and abilities that they possess. Being more intellectually advanced than their same-age peers, gifted students may be seen as different and be rejected. Opportunities for social involvement exist in many avenues beyond the classroom, however, development of the natural talents of the gifted students should not be stopped for concern of lack of social interactions with the same-age peers.

The macho culture that is highly valued during adolescence may influence gifted boys to underachieve because academic success does not rank highly among their peers. Gifted girls similarly may play down their intelligence, dress and act in a manner consistent with the adolescent female

culture to belong with their peers at the expense of their gifted and talented area performances. To overcome these cultural expectations, gifted students need successful role models who overcame similar situations to help them.

Emotional Needs

To meet the emotional needs of the gifted students, concerned adults should watch for the role of perfectionism, self-esteem issues, moral sensitivity and emotional intensity, and gifted learners feeling different from their same-age peers.

Many gifted learners have a perfectionist streak, expecting A's and superior performance in the tasks that they undertake to the point of not challenging themselves in academic or extra cocurricular activities that they believe or know that they are not superior in. This fear of failure may help these students to excel at a high level of performance compared with their cohort, but the extreme of this behavior could cause students to lose sight of what is important in their lives and spend inordinate amounts of time pursuing unattainable perfection. Consistent superior performance in one's life without the occasional failure that affects everyone could make the gifted students less resilient in facing normal challenges in life. Gifted students may already suffer from a loss of their social self-esteem, because of the inability to connect well with their same-age peers and to conform to the cultural norms of their peers; when compounded with a fear of academic or talents failure, this could lead to a sharp drop in self-esteem and self-confidence in gifted students. Self-esteem increases from one's ability to rise above challenges; therefore, experiencing failure from everyday life experiences is also essential so these gifted students can lead normal lives.

Moral sensitivity refers to the heightened sense of honesty, fairness, morality, global concerns, and sensitivity toward others, and *emotional intensity* refers to the different ways of experiencing the world that is more vibrant, gripping, intense, encompassing, multifaceted, and powerful than what would be experienced by the non-gifted. Moral sensitivity and emotional intensity add another layer of complexity to the experiences of the gifted learners who are already superior in their talent areas compared with their cohorts. This feeling of being different from the rest of their peers could alienate or isolate the gifted from the everyday experiences of their same-age peers, further compounding the difficulty of the gifted to socialize with others, leaving these students emotionally dejected. This problem is further compounded if gifted students do not understand that moral and emotional sensitivity may be natural for them.

Finally, twice-exceptional gifted students—those who are gifted and also must deal with Asperger's syndrome, attention deficit hyperactivity disorder, bipolar disorder, obsessive compulsive disorder, or other psychological disorders—are often misdiagnosed and underserved in gifted education programs. Concerned adults must learn how to identify and seek appropriate guidance for twice-exceptional students.

Serving Gifted Students

Some ways that educators, parents, and professionals can help gifted students include (a) providing validation of students' social and emotional struggle and offering appropriate support, (b) using bibliotherapy and cinematherapy to help gifted students find role models in the media, (c) teaching coping strategies such as calming techniques, (d) offering social skills training to those who need it, (e) enrolling students in summer and out-of-school gifted programs that have peers with similar abilities and interests, (f) seeking professionals who have experience working with the social and emotional needs of the gifted, (g) helping students learn creative problem-solving skills to tackle their challenges, (h) presenting appropriate modeling on how to cope with life's challenges and setbacks, and (i) teaching mood management skills for coping with troubling feelings.

Although this list is not a comprehensive list of what to do to help gifted students cope with their social and emotional needs, it does provide some basic ideas about how to support gifted students. Gifted students are naturally smart and talented; helping them leverage their innate abilities and skills to overcome their own problems helps them build their self-esteem and self-confidence and overcome obstacles in their lives. A little support and feedback from wise adults in their lives are still invaluable for these students.

SENG was formed in 1981 as a reaction to the lack of programming available to serve the social and emotional needs of gifted children at that time. SENG was founded by James T. Webb as part of the School of Professional Psychology at Wright State University but was reestablished as a nonprofit organization in 2001. Although establishing SENG was discussed in 1980, the 20,000 calls and letters from audience members confirming the ongoing myths and misunderstanding about gifted children and their families that resulted from a discussion on an episode of *The Donahue Show* between host Phil Donahue, Webb, and a few parents of gifted children who had committed suicide reinforced the need for SENG.

SENG's mission is "to inform gifted individuals, their families, and the professionals who work with them about the unique social and emotional needs of gifted persons with the goal of empowering caring families and communities to influence more positively and effectively the development of giftedness in those individuals entrusted to their care." Supporting programs that empower gifted individuals to develop and express their innate abilities and talents fully are part of SENG's mission. To this end, SENG has been convening with its own SENG Conference yearly where the programming primary focus is on the social and emotional development and needs of the gifted. The recent 25th Silver Anniversary SENG Conference—held July 18 through July 20, 2008 in Salt Lake City, Utah—shows, through its longevity, the importance of such a conference to educators, parents, and professionals who serve the gifted. SENG also provides continuing education courses; facilitates the establishment of SENG–Model Parent Support Groups; provides suggested reading lists on various topics on giftedness; maintains an electronic article database on giftedness drawn from professionals in the field; and offers a free monthly e-mail newsletter to help parents, educators, and professionals keep abreast of new resources and issues affecting the social and emotional needs of the gifted.

Educators, parents, and professionals all have important roles in providing for the social and emotional needs of the gifted students. The highlighted social and emotional concerns of the gifted are interchangeable and represent a subset of the concerns that are exhibited by the gifted. Smart and talented students need just as much support and guidance from experienced elders in their lives to flourish in their academic and personal lives as other students do. Most people would consider it a great waste of talent if the gifted are groomed to excel in their aptitude areas but left to struggle alone socially and emotionally. The existence of SENG provides much awareness, hope, and empowerment for educators, parents, and professionals to offer much needed social and emotional support to the gifted students based on established research and practice.

Kai Kok "Zeb" Lim and Adeline Low

See also Asynchrony; Attitudes Toward Gifted; Emotional Development; Friendships; Perfectionism; Positive Disintegration; Problem Solving; Resilience

Further Readings

Cross, T. L. (2005). *The social and emotional lives of gifted kids: Understanding and guiding their development*. Waco, TX: Prufrock Press.

Delisle, J., & Galbraith, J. (2002). *When gifted kids don't have all the answers: How to meet their social and emotional needs*. Minneapolis, MN: Free Spirit Publishing.

Moon, S. M., & Reis, S. M. (Eds.). (2004). *Social/emotional issues, underachievement, and counseling of gifted and talented students (Essential readings in gifted education series)*. Thousand Oaks, CA: Corwin Press.

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (Eds.). (2001). *Social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Supporting Emotional Needs of the Gifted (SENG). Retrieved July 29, 2008, from http://www.sengifted.org

SYNECTICS

Synectics, described in this entry, belongs to a broad set of techniques that help users produce new ideas and new idea combinations as part of creative thinking or problem solving. It is an approach for generating ideas through use of unusual connections uncovered in metaphor and

analogy. One explanation of the term *synectics* is that it comes from the Greek *syn,* which means to bring together, and *ectos,* or external things. Consequently, the idea of synectics is to join different and often diverse items in ways that explore or solve a problem. To use a synectics approach to a problem, the individuals involved identify a problem owner and use direct, personal, fantastic, or symbolic analogies to develop insights into creative solutions. These are then applied to the problem at hand, and solution paths are identified. The problem owner makes the evaluative judgments about the usefulness of the solutions along the way.

The synectics method was created by William Gordon and his colleagues beginning with their work on a psychology of problem solving in the 1940s. In 1961, he published *Synectics,* in which he described its central concept as trusting things that are alien and alienating things that are trusted. These iconoclastic juxtapositions open the individuals involved to ideas that might not have emerged otherwise and help them avoid premature closure or settling for the first or more obvious answers or approaches.

Synectics used as a complete process is useful as an approach to creative thinking or problem solving. The component parts from the overall synectics approach are individually applicable in many creative-thinking or problem-solving situations. Synectics resembles brainstorming and other techniques that generate fluent, flexible, original, and elaborative ideas. Synectics, though sharing commonalities with the other brainstorming techniques, brings to the creative problem-solving session its own unique approaches to the generation and combination of ideas. Brainstorming or other generative techniques may bog down after the obvious ideas are expressed. Synectics is a way to move beyond the obvious or to jump-start the creative process and allow fresh or unusual ideas to emerge and be tested.

Sometimes the synectics process is described as making the strange familiar or making the familiar strange. The synectics process begins with a group analysis, definition, and description of the issues involved. This part of the process is described as making the strange familiar. It is an analytical phase where participants try to better understand the problem and its nuisances. Those participating might recall how each has experienced the issues, the background, what has been tried, and the possible scope of action. The group then sums up their discussion by expressing the problem in one or more definitions or wishes.

When generating a lot of ideas through brainstorming, attribute listing, idea checklists, and so forth, in a classroom or with a team, each person who has put forth an idea feels some ownership of the final solution. This lack of a single evaluator of the goodness of any solutions may cause trouble at those points in the creative process when a judgment or evaluation is required. In synectics, this problem is avoided by identifying one problem owner before the session begins. The other class or team members are there to help the owner solve his or her problem. Several individuals can take ownership at different times in the synectics process. Typically, the members do not know as much about the issue or problem as the owner does; although this lack of knowledge might appear problematic, it is useful in synectics. The relative lack of knowledge or experience in the problem area encourages the suggestions of wild or crazy ideas that people might otherwise unconsciously avoid because the ideas may appear silly or distracting. On closer examination, however, these wild ideas might not be so ridiculous or they might suggest to others new ideas that prove more effective.

Next, one or more analogies are used to explore the problem or wishful statements. Here, participants take an excursion or begin to make the familiar strange. Through use of analogy, they distort, invert, transpose, and rearrange the everyday elements and ways of looking and responding. In using direct analogies, participants discuss and explore ways similar problems are solved. For example, how do animals solve a similar problem? How would the problem be solved in the Old West? How might an astronaut in space solve a similar problem?

Another analogical approach is to identify the problem with oneself. In personal analogies, the respondents imagine they are some component of the problem or wished-for situation. How would you feel if you were a rabbit who was trying to get away from a fox? What would you do? Where would you go? Who could help you? How does it feel to be an abstract piece of art? An impressionist

painting? A Goya print? Personal analogies often provide new perspectives as the users become part of the problem or desired outcome.

Fantasy analogies have the users explore the images that come into their minds as they would solve the problem in some wild fantasy or within some fantastical world. Gordon claimed fantasy analogies worked because they fulfilled a deep unconscious wish by the participant. Questions that stimulate fantasy ideas are many. Can this problem be made to solve itself? How do the Jetsons keep their house clean? How would the big-bad wolf get dressed in the morning? How could Frodo or Bilbo use the magic ring to help them get their work done quickly and efficiently?

Symbolic analogy, sometimes called book titles, use pairs of words that seem to be contradictory or opposite for making the familiar strange. Examples include "steaming cold," "gorgeous ugliness," or "peaceful rebellion." These strange combinations of common things or ideas are sometimes useful in looking at problems in new ways and coming up with unusual solutions. "Steaming cold" might be used as an analogy for a hot beverage that does not require a stove or heat source to warm it and that could be used while walking in a cold winter forest.

Synectics succeed partly by slowing down the creative process, like a stream that comes to a wide spot. Its excursions and analogies provide time to linger in the outrageous stages before the class or team needs to create practical solutions about which the owner can make choices as to which are the most feasible today.

Michael F. Sayler

See also Creative Problem Solving; Creative Process; Creativity Training; Divergent Thinking

Further Readings

Gordon, W. J. J. (1961). *Synectics*. New York: Harper & Row.

Nolan, V. (2003). Whatever happened to synectics? *Creativity and Innovation Management, 12,* 34–38.

Prince, G. M. (1970). *The practice of creativity: A manual for dynamic group problem solving*. New York: Harper & Row.

Talent

Talent, like *giftedness,* is a term that lacks common understanding and agreed-upon meaning. *Talent*'s original meaning was that of a weight, especially of gold or silver. Talent's original meaning is ancient and describes a unit of mass, value, weights, or money. The word derives from the Latin *talentum,* which in turn comes from the Greek τάλαντον, meaning scale or measuring balance. Usually *talent* was used to describe a talent's worth of gold or silver, which was about that of an average person's weight in one of these precious metals. This term for large quantities of monetary riches became associated with human performance later in history.

In common usage, talent and giftedness mean essentially the same thing. The national definition is an example of this commingling of the terms. Other conceptions of talent distinguish it from gifts in terms of the domain where the high-level performance occurs. For some, *talent* refers to artistic, creative, intellectual, or athletic excellence whereas *giftedness* in this conception is defined as the overall ability of the person. Talent then would develop in areas of specific aptitude that were valued and rewarded by society and where significant practice occurred to develop high-levels of specific performances. Others see talent as the outcome of developed natural abilities regardless of the talent domain. Talent has been proposed as a more useful and less offensive concept than giftedness. Talent seems to reflect hard work over time, whereas giftedness suggests unearned largess. Talent in this understanding can be defined in terms of performance criteria whereas giftedness is seen as a personal characteristic. This entry describes various aspects of talent, especially in comparison with giftedness.

Talent and Genius

Louis Terman's first work on understanding human genius began by seeking individuals who excelled in specific talent areas such as music, art, mechanical ingenuity, and inventiveness. In his initial search, he did not first test these individuals for high intelligence test scores. Terman eventually gave up the search for talent independent of ability because he could not find viable instruments to distinguish between levels of talent. Also, those children he found who excelled in talent performance also had high intelligence scores when measured later.

At about the same time, Leta Hollingworth distinguished talent from genius. She initially defined *genius* as having a wonderful capacity for mental perfection and *talent* as a remarkable ability, but falling short of genius. Later, she modified this definition and suggested that the term *talent* be used to describe specialized aptitudes such as music or art. In this conception, she was defining *talent* as similar to high levels of Charles Spearman's specific (*s*) factors and giftedness as similar to high levels of Spearman's general (*g*) factor.

National Definition

In 1972, a national definition of talent and giftedness was created in the Marland report and then repeated in P.L. 103–382. This definition did not make clear distinctions between the two words. "The term 'gifted and talented' when used in respect to students, children, or youth means students, children, or youth who give evidence of high-performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities" (P.L. 103–382, Title XIV, p. 388).

Classifications and Differentiations

In 1983, Abraham Tannenbaum suggested more specific meanings with four categories or classifications of talent: scarcity, surplus, quota, and anomalous talents. *Scarcity talents* are those in short supply, but that benefit and are needed by society and all peoples. Scarcity talents include high-level performances in areas such as innovations that make the world safer, healthier, easier, and more understandable. *Surplus talents* are those talents that are desired by society, but not essential to its survival. Musicians, artists, actors, and writers fit in this category. Tannenbaum was not calling surplus talents unimportant or superfluous; they made significant contributions to society. Their contributions, though, were not at the same critical level as medical breakthroughs, solving world hunger, or curing mental illness. *Quota talents* are those somewhere between surplus and scarcity talents. They are specialized, high-skill-level performances for which the market is limited. In quota talent performance, it is clear how the individual attains top-level performance and no creative breakthroughs are required. Physicians, teachers, lawyers, engineers, business leaders, and public officials work in quota talent areas. Tannenbaum's final talent area is *anomalous talent*. These talents are exceptional feats that sometimes have a practical value but in other cases only provide entertainment or amusement. Anomalous talents include speed readers, mountain climbers, Broadway singers, gourmet chiefs or cooks, and anachronistic manual craftsmen.

The uncertainty about the differences between gifts, aptitudes, talents, and performances is understandable because all are closely related. Francoys Gagné suggested a differentiation that clarified the differences between gifts and talents. Aptitudes can be thought of as capacities to learn, underlying potential, or natural ability. Giftedness can be thought of as high levels of aptitude.

These could be seen as gifts to the individual because only small increases were possible after conception and birth. *Talents,* however, were defined as high levels of developed abilities or performances. The assessment of talent must be defined and measured in real-world terms and performances. This is not true of aptitude measures that are assessed indirectly with field performance tasks unique to the assessment and not directly measuring any real-world performance.

Catalysts

Talents or high-level performance do not follow automatically from gifts. An individual may be born with high-level aptitudes, which are latent talents, but without the proper dispositions, education, and environments the talents may remain latent. Gagné proposed two broad categories of catalytic factors that sped up or slowed down the transformation of gifts into talents. One category of catalysts is those things internal to the person. These intrapersonal catalysts include things such as motivation and temperament. There are also catalysts external to the person, or environmental catalysts. These environmental catalysts include their surroundings, the people, places, events, and opportunities that exist for them. Gagné also includes chance factors that are more random and uncontrollable but, like intrapersonal and environmental catalysts, may speed up or slow down the individual's talent development.

Talent Searches

Other uses of the term *talent* are common. Since the mid-1970s, millions of young people have participated in talent searches sponsored by various regional talent search centers. Individuals who are in middle school and sometimes younger qualify for participation through high performance on

standardized tests or with parent nomination. These then sit for the SAT or the ACT program exams. Both of these assessments are normally given to college-bound high-school seniors. Data from the above-level tests are used to identify high levels of talent and suggest appropriate educational interventions.

Talent Development

Benjamin Bloom defined and studied talent in the 1980s by looking for world-class performance in relatively young individuals from a variety of talent domains. Although not limiting talent only to world-class performance, this research paradigm provided opportunities to talk to talented individuals and their mentors, coaches, teachers, and parents to better understand the process of talent development. The results suggested world-class talent performance required significant investment of time and efforts by individuals and their families along with experiences of success and acclaim, increasingly longer and harder practice, and mentoring, teaching, or coaching at ever more sophisticated levels.

More recently, talent has been proposed as a more useful and less offensive concept than giftedness is. Giftedness suggests a single intellectual capacity over which the individual, parent, and educator have little or no control. Talent implies performance that is the result of hard work, good education, appropriate opportunities, and personal motivation; things individuals, parents, and educators or mentors and coaches can influence. One concern with the current distinction is that it can lead to the inaccurate assumption that anyone can become anything if they just work hard enough or have the right training. In reality, talent development is the result of a match between above-average natural abilities and a talent domain with the interventions and catalytic effects of education, training, resources, hard work, motivation, and a sense of purpose.

Michael F. Sayler

See also Academic Talent; Eminence; Expertise; *Genetic Studies of Genius;* Talent Development; Talented Girls, Mathematics; Talented Readers; Talent Identification Programs

Further Readings

Bloom, B. (1985). *Developing talent in young people.* New York: Ballantine Books.

Gagné, F. (2005). From gifts to talents. In R. Sternberg & J. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 98–119). New York: Cambridge University Press.

Hollingworth, L. S. (1926). *Gifted children: Their nature and nurture.* New York: Macmillan.

Marland, S. P., Jr. (1972). *Education of the gifted and talented: Vol. 1. Report to the Congress of the United States by the U.S. Commissioner of Education.* Washington, DC: U.S. Government Printing Office.

Renzulli, J. S., & Reis, S. M. (1998). Talent development through curriculum differentiation. *NASSP Bulletin, 82*(595), 61–74.

Tannenbaum, A. (1983). *Gifted children's' psychological and educational perspectives.* New York: Macmillan.

Terman, L. M. (1925). *Genetic studies of genius: Mental and physical traits of a thousand gifted children.* Stanford, CA: Stanford University Press.

Treffinger, D. J., & Feldhusen, J. F. (1996). Talent recognition and development: Successor to gifted education. *Journal for the Education of the Gifted, 2,* 181–193.

Talent Development

The process of talent development within specific domains is one that has fascinated teachers, parents, and psychologists during the last century. How is it that some extremely smart children end up dropping out of high school and failing to realize their promise and potential? Why is it that some prodigies grow up to be quite average in the fields in which they showed such promise when they were young children? Why do other traits—described by Joseph Renzulli as cocognitive traits—appear to be so important in talent development when combined with potential in a particular domain? This entry discusses these questions.

Researchers have long studied these questions and others related to talent development in an attempt to identify factors that contribute to high achievement in adulthood. For example, Benjamin Bloom and colleagues closely examined 120 individuals who excelled in academic, artistic, or athletic pursuits before age 35. The researchers conducted

interviews with these accomplished individuals, exploring both how home and school contributed to the resulting international success demonstrated by participants. They found that the development of talent occurred most often when family members had a personal interest in the talent field and gave strong support, encouragement, and rewards for developing the talent. Parents, in particular, provided both high levels of support and resources. Most families assumed that the talent would be developed as part of the family's life. Individualized instruction in the talent field both at home and at school also correlated with later success.

Other researchers interested in talent development include Rena Subotnik who interviewed master creators in a variety of fields and Howard Gardner who studied the lives of pivotal figures through the lens of his life's work in multiple intelligences.

Longitudinal Studies

It is undeniable that retrospective studies, such as those discussed earlier, have contributed substantially to our knowledge of talent development. However, this type of research is subject to bias. Memory is notoriously unstable and subject to interpretation and reinterpretation based on current circumstances and beliefs. Thus, accomplished people may remember early influences on talent development differently than they might if they had not ultimately succeeded in their chosen domains.

Longitudinal research, which is free from this type of bias, is therefore crucial to the exploration of talent development. Longitudinal studies have been part of gifted education for decades. The most famous of these is Lewis Terman's seminal longitudinal study of gifted students, which still affects research. Subotnik and colleagues, for example, conducted a follow-up of the graduates of Hunter College Experimental School and compared their accomplishments and life choices with those of Terman's subjects.

In other longitudinal research, Barbara Kerr studied the participants in a *Sputnik*-era program for academically gifted students to investigate gender differences in outcomes. Marcia Delcourt studied students who had formerly participated in a pull-out program based on Renzulli's enrichment triad model. Although the students in this study were still in college and had not yet started their careers, they had identified long-term goals that dovetailed with their "passions" as identified and developed in the enrichment program. In addition, all but one of the students reported completing at least one in-depth project in the 3 years since leaving the program.

In addition to these studies of general academic ability, longitudinal studies have targeted programs that develop specific gifts and talents in areas such as math and science. Two of the most well-known programs in this category are the Westinghouse (now Intel) Science Talent Search and the Study of Mathematically Precocious Youth (SMPY). Subotnik and her colleagues investigated graduates of the Westinghouse Talent Search to discover the means by which students talented in science persisted or failed to persist in science. The SMPY is ideal for a longitudinal study because it is a national program with a clearly defined definition of giftedness and a specific methodology for meeting the needs of qualifying students. The SMPY embeds longitudinal research within its program design by sending periodic follow-up questionnaires to participants, and numerous longitudinal studies have been conducted on this project. Collectively, these studies have found that acceleration worked well for participants and caused neither gaps in knowledge nor burnout in the field of study. Most accelerated students report that they were satisfied with their experience of being accelerated.

Both SMPY and the Westinghouse competition found that most of the winners from the 1983 Westinghouse competition and SMPY students chose to remain in science and math following their participation in the program. Moreover, most of those who had "left science" as a discipline reported that they did so because they had found a mentor in another domain, not because they lost interest in the original field. This finding of the importance of a supportive environment or presence as key in the development of talent echoes findings by Mihaly Csikszentmihalyi and Bloom, both of whom have noted the importance of cultural values on the development of talent.

A number of interesting implications emerged in examining the outcomes of these talent development and enrichment programs. For example, most of the former participants in the programs

reported success and satisfaction in a chosen discipline, but not at the level that may have been expected, given their early potential. Subotnik addressed this issue directly in comparing the responses of the graduates of the first 12 classes of Hunter College Experimental School with those of Terman and Melita Oden's subjects on the midlife questionnaire instrument used by Terman and Oden. Although many individuals in both groups did achieve midlife stability and success in both their personal and professional lives, none of them had made original contributions in a domain, perhaps because they had not found anything they loved enough to jeopardize the stability and well-rounded conventional success they enjoyed.

Other Studies

In their study of talented teenagers, Csikszentmihalyi, Kevin Rathunde, and Samuel Whalen conducted a 5-year longitudinal study addressing how and why some teenagers become committed to the development of their talent but others become disengaged from their talent. The authors found that children must first be recognized as talented before they can fulfill their potential. Thus, students who committed to their talents tended to have skills valued by their culture. They also demonstrated personality traits such as concentration, endurance, openness to experience, awareness, and understanding. In addition, teens who had habits conducive to cultivating talent, such as spending time in challenging pursuits with friends, focusing attention, and spending time alone, instead of wasting time, were more likely to have developed their talents. Talented teens were also more conservative in their sexual attitudes and aware of the possible conflict between productive work and relationships.

Similar to the Bloom study, this group of researchers found that talented teens had families that provided both support and challenge to enhance the development of talent. Talented teenagers were also positively influenced by teachers who were supportive and modeled enjoyable involvement in a field. Talent development, according to this study, was found to be a process that requires both expressive (evoking positive feelings) and instrumental (useful to future goals) rewards. The last finding in this study related to how talents developed, and the researchers found that talent development is more likely to occur if it produces optimal experiences in teenagers. Memories of peak moments motivated students to continue to work to improve in the hopes of achieving or replicating the same intense experience again.

What Teachers and Parents Can Do to Develop Talents

Parents and teachers can and should actively help students to develop their gifts and talents. Unfortunately, traditional methods of schooling often fail to provide the types of broad, rich experiences that encourage talent development in young people. Renzulli believes that the field of gifted education has been a laboratory for the many innovations that have become mainstays of the U.S. educational system. Practices promoted in gifted education suggest that, rather than merely being sources for the acquisition of information, schools can and should be places where students learn who they are and how to make the most of the gifts they have been given.

How can educators help develop the talents of gifted, creative, and talented children? In a period in which fast is good and faster is better, how can educators help children to learn to think creatively and to value opportunities for quiet reflection and creative work of their choice? Some previous evidence suggests that gifted education programs help children to develop their abilities, creativity, and task commitment. A central premise of gifted education is this: If educators give children opportunities to become involved in talent development opportunities in school, these experiences will increase the likelihood that students will emerge as talented and creatively productive adults in whatever area they select for their future work.

The research reviewed on studies of talent development suggests several factors that contribute to this complicated process. Research suggests that recognition of talent promotes talent and that cultural values affect whether a talent is rewarded. Certain personality traits also seem to accompany talent development. These factors coupled with individualized instruction in the talent field, both at home and in an educational setting, seem to produce good results. Talent development is also more likely to occur if the process results in optimal experiences.

Memories of peak, exciting experiences such as starring in a drama production or publishing a story or book can help motivate students to replicate the intense experience again. Perhaps the most important finding of research on talent development is that there is no common path that enables individuals to fulfill their potential. Fate, support, environment, family climate, the right teachers, and the desire to work hard all play important roles in determining whether talents can and will be developed.

Sally M. Reis

See also Eminence; Giftedness, Definition; Intelligence; Talent

Further Readings

Bloom, B. S. (Ed.). (1985). *Developing talent in young people*. New York: Ballantine Books.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. Cambridge, UK: Cambridge University Press.

Delcourt, M. A. B., Loyd, B. H., Cornell, D. G., & Goldberg, M. D. (1994). *Evaluation of the effects of programming arrangements on student learning outcomes*. Storrs: National Research Center on the Gifted and Talented, University of Connecticut.

Feldman, D. H., with Goldsmith, L. T. (1991). *Nature's gambit: Child prodigies and the development of human potential*. New York: Teachers College Press.

Gardner, H. (1993). *Creating minds*. New York: Basic Books.

Kerr, B. A. (1997). *Smart girls: A new psychology of girls, women, and giftedness*. Scottsdale, AZ: Great Potential Press.

Subotnik, R. F., & Arnold, K. D. (Eds.). (1994). *Beyond Terman: Contemporary longitudinal studies of giftedness and talent*. Norwood, NJ: Ablex.

Talented Girls, Mathematics

Although the field of mathematics, a traditionally men-dominated field, has seen an increase in participation by women, research continues to document differences in performance and participation for mathematically talented women. As minorities in the field, mathematically talented women are confronted with issues that relate to their domain-specific talent, to gender issues, and to the interactions of their mathematical talent with biological, physiological, and societal aspects of being women. This entry describes some of these issues.

Discrepancies for Men and Women

Although mathematics performance before high school is comparable for boys and girls in the general population, this is not the case for mathematically talented boys and girls. Even in elementary schools, more boys than girls earn top scores on standardized mathematics assessments, particularly on above-level assessments that reduce the ceiling-effect for mathematically talented students. Similarly, significantly more boys than girls are identified as "mathematically precocious" through national talent-search programs, such as the Study for Mathematically Precocious Youth (SMPY), which reported a 17-to-1 ratio of preadolescent boys to girls scoring above 700 on the mathematics section of the SAT.

Several claims about biological bases of these discrepancies have been made. More attention in recent years has fallen on spatial abilities. Although research results are conflicting and inconclusive on gender differences in spatial abilities, evidence showing a connection between gender differences in mathematical achievement and gender differences in *certain* spatial skills is accumulating. Although in the early years of schooling the focus is on encoding and retrieving information from long-term memory, the later years include more visual-spatial problems that require constructing and transforming visual-spatial representations within one's working memory. Because girls excel at cognitive processes like those on which the early schooling years focus, they have the advantage in the early years. However, gender differences in visual-spatial working memory favoring boys can be found as early as preschool, and boys have the advantage later in school. In fact, mechanical and visual-spatial skills are a stronger contributor to gender differences on Trends in Mathematics and Science Study (TIMSS) items than mathematics self-confidence is. Infant studies, however, have shown for more than three decades that there are no sex differences at birth in orientation toward spatial skills.

Another claim for the existence of sex differences in mathematics ability has involved the evidence that boys outperform girls is mathematics fact retrieval. By fourth grade, boys in the top half of the speed distribution are faster at mathematics fact retrieval than are similar girls, and they are equally accurate. This is significant because speed of mathematics fact retrieval is a statistically significant predictor of mathematics test performance in middle school and college, affecting later scores and decisions to pursue higher-level mathematics. This may be one reason that overall gender differences on the mathematics portion of the SAT are eliminated when the time limit is removed. On the other hand, it has been found that many categories of items that favor girls have been removed from the SAT–M, and that when SAT–M scores are considered with regard to their power to predict college achievement in advanced mathematics, gifted girls' achievement is significantly under-predicted by these tests. This, and the fact that findings of extreme gaps in SAT–M performance at the highest levels are based on samples in which boys represent a much more selective sample than girls do, leads Elizabeth Spelke and other researchers to believe that the SAT–M may not be an appropriate measure of talented girls' true abilities to achieve the highest levels of mathematics performance; the SAT–M's tendency to overestimate boys' abilities and underestimate girls' abilities makes it suspect as evidence of biologically based sex differences.

A third claim was that the attainment of fewer degrees in mathematics by women than men at all levels (bachelors, masters, and doctorates) was evidence of sex differences in ability. Research, however indicates that psychological and sociological influences as well as biological influences affect these performance and participation discrepancies in mathematical talent development. In fact, the mathematics achievement gap is rapidly closing, with as many women as men taking calculus and achieving high scores, majoring in college mathematics, and graduating with degrees in mathematics. Even among the girls of the original study of mathematically precocious youth, those who were encouraged by accelerated instruction in mathematics attained the same proportion of high-level positions in mathematics and science as boys did.

Influences on Discrepancies for Men and Women

More commonly studied and accepted than biological influences are the psychological influences on the discrepancies between men's and women's mathematics talent development. Many researchers have argued that men and women have equal aptitude for mathematics and equal cognitive ability, although with somewhat different profiles, so there is no genetic basis for cognitive sex differences. However, confidence in one's mathematical abilities is strongly correlated with mathematics performance and achievement. Men consistently exhibit more confidence in their mathematics abilities than women do, and women's lack of confidence has a negative impact both on their mathematics achievement and on their decisions to take further mathematics courses.

Men and women also differ in their locus of control. Although men tend to attribute their success in mathematics to their mathematical ability and their failure in mathematics to a lack of effort, women are more likely to attribute their success in mathematics to hard work and their failure in mathematics to lack of mathematics ability. This holds true for all achievement levels, including for mathematically talented populations. Although men's locus of control enhances their academic self-efficacy, this does not appear to be true for women. Instead, women's locus of control may decrease their persistence in mathematics, which has been shown to be necessary for mathematics talent development.

Talented and eminent women struggle for self-esteem, and they struggle against the societal influences on their mathematical talent development, including the conflict they experience between their gender roles and career options, particularly in the domains of mathematics and science. Research has shown that because mathematically talented women have less belief in their intellect and mathematics abilities and more concern about balancing family and career than men do, they do not aspire to achieve at the highest levels in their professions. These struggles within mathematically talented women and with societal expectations cause many women to devalue their mathematics abilities and achievements. Thus, women's psychological and

biological profiles interact with societal expectations, and together these influence women's decisions to or not to develop their mathematical talent and the career path they choose.

Besides influencing women's decisions about which career to pursue, societal expectations and gender roles also influence young girls as they make decisions about which courses to participate in and whether to display their mathematics talent or not. Teenagers associate mathematics with masculinity, causing some mathematically talented women to hide their talent, to choose not to perform well in mathematics, or to choose not to pursue mathematics studies further.

In addition to their peers, mathematically talented women also are influenced by the perceptions and expectations of their parents and teachers. Unfortunately, research has shown that parents exhibit gender stereotypes, such as mathematics being for boys, when conveying their expectations to their children and that teachers provide boys more attention and opportunities for participation. These behaviors are particularly damaging to girls' mathematical talent development because they are more influenced by and more likely to pay attention to the expectations and advice of their teachers and parents than boys are.

Future Outlook

Researchers in gifted education, mathematics education, and gender studies continue to study mathematically talented women, providing new insights into their performance and participation in mathematics as well as the interaction of the domain-specific nature of their talent and their gender on their talent development. Resources are available to parents and educators interested in encouraging mathematically talent girls, helping them address and overcome the conflicts they are presented with, and realizing their potential.

Jill L. Adelson

See also Girls, Gifted; Mathematical Intelligence; Mathematically Precocious; Mathematical Talent; Self-Efficacy/Self-Esteem; Sex Differences in Mathematical and Spatial Ability; Study of Mathematically Precocious Youth; Women, Gifted

Further Readings

Arnold, K. D., Noble, K. D., & Subotnik, R. F. (Eds.). (1996). *Remarkable women: Perspectives in female talent development*. Cresskill, NJ: Hampton Press.

Fennema, E., & Leder, G. C. (Eds.). (1990). *Mathematics and gender*. New York: Teachers College Press.

Gallagher, A. M., & Kaufman, J. C. (Eds.). (2005). *Gender differences in mathematics: An integrative psychological approach*. Cambridge, UK: Cambridge University Press.

Reis, S. M., & Park, S. (2001). Gender differences in high-achieving students in math and science. *Journal for the Education of the Gifted, 25,* 52–73.

Spelke, E. (2005). Sex differences in intrinsic aptitude for mathematics and science? A critical review. *American Psychologist, 60,* 950–958.

Subotnik, R. F., & Arnold, K. D. (Eds.). (1995). *Beyond Terman: Contemporary longitudinal studies of giftedness and talent*. Norwood, NJ: Ablex.

Talented Readers

Identifying the characteristics of and defining talented readers is challenging because no consensus exists. Research indicates that not all academically gifted students are talented readers, and not all talented readers are identified as academically gifted perhaps because of the wide variation of abilities in this population. This widely known research has had the result of precocious reading not being taken seriously by educators, who often believe that early reading is just decoding without comprehension. Many of these early readers are likely gifted but are overlooked for gifted education programs. Most current research suggests that gifted students' general learning characteristics differ from average learners in several ways: They usually learn faster than others; have the capacity to find, solve, and act on problems more readily; have a developed use of thinking skills; and understand and make connections about abstract concepts ideas more easily. Less is known about the characteristics of talented readers. This entry describes issues relating to talented readers.

Characteristics of talented readers have been described anecdotally, but little research has focused on these populations. They have been described as having exceptional reading ability and the capacity

to understand textual information well above what would be expected of other students in their age group. Talented readers are often defined as reading approximately 2 or more years above grade level as measured by some reading assessment. Work in the last two decades has focused on identifying some of the characteristics of this group, although no common list of research-based characteristics exists. Sally Reis and a team of researchers at the University of Connecticut reviewed recent work that suggests that many talented readers read earlier than their peers, read at least two grade levels above their chronological grade placement, begin to read early and may be self-taught. It also suggests that some of these students are avid, enthusiastic, voracious readers who use reading differently for different purposes, spend more time reading than their peers, and read a greater variety of literature into adulthood. In addition, it has been suggested that they automatically integrate prior knowledge and experience into their reading; use higher-order thinking skills such as analysis, synthesis, and evaluation; and communicate these ideas. Several researchers indicate that talented readers display verbal ability in self-expression, use colorful and descriptive phrasing, demonstrate advanced understanding of language, have an expansive vocabulary, perceive relationships between and among characters, and grasp complex ideas.

Other anecdotal information suggests that talented readers possess an unusual capacity to process information as well as an ability to process thoughts at an accelerated pace, synthesize ideas in a comprehensive way, perceive unusual relationships and integrate ideas. Some may display an advanced ability to understand a variety of texts and have other language-related abilities, such as the ability to retain a large quantity of information, as well as advanced comprehension, varied interests and curiosity in texts, and high level language development and verbal ability. Talented readers understand that books can help them acquire information, clarify ideas, stimulate the imagination, and deepen understanding, and many highly able readers often have preferences for science, history, biography, travel, poetry, and informational texts such as atlases, encyclopedias, and how-to books. Advanced reading is a complex process made up of many subskills that vary within the advanced-reader population. Talented readers' skills are usually considered advanced only as relative to their peers and a common definition is challenging as peer groups vary. Judith Wynn Halsted identified a pattern for young talented readers that may change throughout their academic lives, finding that they initially teach themselves how to read before they start school, are independent readers by second grade, know their favorite authors by third grade, and have well-established reading patterns by fifth grade. Unfortunately, their reading level may drop off by the time they reach middle school as a result of increased participation in extracurricular activities or an absence of challenge in reading in school.

Little research has focused on identifying and teaching talented readers to ensure that they can make continuous progress in reading. Recently, Reis and others synthesized research that found that talented readers can be defined by four characteristics: reading early and at advanced levels, using advanced processing in reading, reading with enthusiasm and enjoyment, and demonstrating advanced language skills (oral, reading, and written).

Talented readers need appropriately challenging instruction and curricular content that helps them make continuous progress in reading. They have differentiated talents and instructional needs that require advanced learning opportunities to challenge and extend their abilities and enable them to read content above their current reading level, to engage and think about complex texts, and to extend conventional basal reading instruction, which is usually below their chronological grade level. Talented readers are placed at risk in many schools simply because they are not challenged and therefore their reading development can be delayed or even halted. If reading instructional and independent materials are not above the students' level of knowledge or understanding, learning is less efficient and reading development may be delayed or stopped. Some talented readers never learn to exert effort in reading and, consequently, acquire poor work habits.

A summary of information on the current classroom reading experiences of talented readers suggests that although they can benefit from appropriately challenging levels of reading, they seldom receive it. Methods for differentiating curriculum and instruction for talented readers exist, and teachers can learn to differentiate. Some research supports the effectiveness of specific

instructional and curricular strategies with talented readers, particularly curriculum compacting, grouping, acceleration, the use of advanced literature and challenging reading, and using the schoolwide enrichment model–reading approach developed by researchers at the University of Connecticut. Without these challenges, some talented readers grow accustomed by third or fourth grade to expending minimal effort and learn few self-regulation strategies and few advanced reading strategies. If talented readers are going to be challenged, it will require more professional development, new curricular and instructional options, and the use of materials that eliminate or extend basal reading programs and provide high levels of challenge. To challenge talented readers, educators must compact their regular reading instruction, provide challenging alternate materials, give opportunities for acceleration, and find other ways to stimulate their potential. Promising strategies do exist, but they must be more widely implemented.

Sally M. Reis

See also Gifted Readers; Precocious Reading; Verbal Ability

Further Readings

Halsted, J. W. (1994). *Some of my best friends are books: Guiding gifted readers from pre-school to high school.* Dayton: Ohio Psychology Press.

Jackson, N. E. (1988). Precocious reading ability: What does it mean? *Gifted Child Quarterly, 32,* 200–204.

Reis, S. M., Eckert, R. D., Jacobs, J., Coyne, M., Richards, S. Briggs, C. J., et al. (2005). *The schoolwide enrichment model—Reading framework.* Storrs, CT: National Research Center on the Gifted and Talented.

Reis, S. M., Gubbins, E. J., Briggs, C., Schreber, F. R., Richards, S., Jacobs, J., et al. (2004). Reading instruction for talented readers: Case studies documenting few opportunities for continuous progress. *Gifted Child Quarterly, 48,* 309–338.

Talent Identification Program

Duke University's Talent Identification Program (TIP), described in this entry, was founded in 1980 by a grant from the Duke Endowment. One of four university-based talent search programs in the United States (the others are Johns Hopkins University's Center for Talented Youth, Northwestern University's Center for Talent Development, and the University of Denver's Rocky Mountain Talent Search), the TIP has served more than 1.8 million gifted students, in a geographical area focused on 16 states in the South and Southeast. Duke TIP was first created to identify gifted students and help serve their educational needs through partnerships with local gifted and talented programs. Since its first talent search in 1981, which focused on seventh-grade students, Duke TIP has expanded its offerings to include a twice-yearly fourth- and fifth-grade talent search, summer programs, school-year programs, e-studies, and independent learning opportunities.

Talent Search Programs

Talent Searches

In a typical talent search program, students who score in the top 5 percent on a standardized achievement test are invited to take one of the two main college entrance examinations, either the SAT or the American College Testing program (ACT). Based on their test results, students are then offered access to various services provided by the particular talent search program. The reasoning behind using the above-level testing to identify gifted and talented students is that most grade-appropriate tests would have too low a ceiling, resulting in a lower, inaccurate picture of the student's true abilities.

Duke TIP Seventh-Grade Search

When TIP originated in 1980, it was in the form of a talent search program that served seventh-grade students. The first talent search, which was held in 1981, identified about 8,700 students. Currently, approximately 6,000 middle and junior high schools participate each year in the seventh-grade search. Once the students take their examination (ACT or SAT), they are provided with feedback about their abilities, and how they performed in comparison with other similar students. Students and their parents receive materials about further educational enrichment

opportunities, receive a certificate of merit, and are typically invited to participate in an awards ceremony.

Duke TIP Fourth- and Fifth-Grade Search

Originally called Motivation for Academic Performance, the fourth- and fifth-grade talent search was started by Duke University in 1994. By 2005, more than 41,000 students participated in the lower-level talent search. Students who qualify for admission receive educational materials, a certificate of achievement, and the opportunity to take an achievement test developed by the ACT for an eighth-grade population, the EXPLORE.

Beyond the Talent Search

Once students have been selected for admission through the talent search process, Duke TIP offers may different opportunities to enrich each student's education through multiple programs. Some programs are offered only during the summer, and others are offered throughout the year. Some programs require an overnight stay, but others can be experienced from the home.

Summer Studies Programs

Duke TIP started its Summer Studies program in 1981, serving 151 students on the Duke University campus. Currently, Duke TIP offers two varieties of summer study programs, with the difference based on the student's level of achievement on the talent search admission test. The Academy for Summer Studies programs, currently offered on four college campuses (Appalachian State University, University of Kansas, Duke University Marine Lab, and Texas A&M University), serves students who have lower qualifying scores on either the SAT or ACT. The Center for Summer Studies programs, currently offered on five college campuses (Davidson College, Duke University East Campus, Duke University West Campus, Duke University Marine Lab, and Wake Forest University), serves students who score higher qualifying scores on the SAT or ACT. Both programs accept students in the 7th through 10th grades.

These programs are 3-week-long residential programs, where each student takes one fast-paced college-level course that meets for approximately 40 hours per week, Monday through Saturday. Students typically live in the college dorms in residential groups based on gender and age. Classes tend to be mixed both in gender and grade level, so any class may contain 7th, 8th, 9th, and 10th graders. Classes tend to be offered based on the individual campus specialties, so universities with a strong veterinary program might offer Introduction to Veterinary Medicine, but another university with a strong aerospace program might offer Aerospace Engineering. While not in classes, students participate in evening review sessions, as well as social and recreational activities that range from sports to games to crafts to movie viewing. Two sessions are offered each summer on most campuses.

Field Studies

Field studies are offered both nationally and internationally to qualifying students in the 9th through 12th grades (international programs start in 10th grade). These residential programs last 2 weeks and cover a variety of interests, from Astronomy at an observatory in North Carolina to Architecture in Italy. Each program typically serves 20 to 25 students and is staffed by three adults, one of whom is the instructor while the other two are assistants. As with the Summer Studies programs, the instructors tend to be college professors, graduate students, or teachers, and the assistants tend to be undergraduate college students. Only one field study program of each type is offered per summer.

Institutes

Duke TIP offers three institutes for students in Grades 9 through 12, with two new institutes offered this year. Each program focuses on a different area of interest, from leadership to computational science to prelaw. Students live on Duke University's East campus, in residential groups. Twenty-five to 35 students are selected for each 15-day residential program. Only one of each institute program is offered each summer.

School-Year Programs

Duke TIP also offers Scholar Weekend programs during the school year for qualified 8th

through 11th graders, although some campuses accept 12th graders. These programs offer a short but intense course in topics usually not available in the students' home school. These courses, similar to the summer studies courses but shorter in length, offer students a chance to explore a topic of interest in depth for a fast-paced weekend, and provide a brief experience of college life. Scholar Weekends are offered on seven university campuses, and cover topics ranging from Anatomy to Fairy Tales to Criminal Trial Advocacy.

E-Studies and Independent Learning

For students who prefer to work from home, TIP offers e-studies and independent learning opportunities. E-studies courses offer a distance-learning environment, run by a TIP instructor over the Internet. These courses typically allow students to work at their own pace, in collaboration with other gifted students from around the world. Courses are 16 weeks long and are offered once per year. The courses are available for students in Grades 8 through 12.

The TIP Independent Learning Programs provide offerings for students in Grades 4 through 12. These programs are CD-ROM based, not requiring the use of the Internet. In the Learn On Your Own Courses, students in Grades 4 through 12 work through a workbook and CD-ROM with a local mentor. In the CD-ROM Enrichment Courses, students use a multimedia CD and workbook to learn. The Enrichment Courses are offered to students in Grades 7 through 12. The Learn On Your Own Courses tend to cover topics found in the normal school, and the CD-ROM Enrichment Courses offerings cover topics not usually found in middle and high schools.

Carol A. Carman

See also ACT College Admission Examination; Center for Talent Development; SAT; Study of Mathematically Precocious Youth; Summer Programs; Talent Searches

Further Readings

Talent Identification Program. (2009). *Educational opportunity guide*. Durham, NC: Duke University. Retrieved from http://www.tip.duke.edu/resources

VanTassel-Baska, J. (1984). The talent search as identification model. *Gifted Child Quarterly, 28*(1), 55–57. Retrieved from http://www.gt-cybersource.org/Record.aspx?NavID=2_0&rid=11227

Talent Searches

The talent search method was developed by Julian C. Stanley (Johns Hopkins University) to assess the ability of students with academic performance far above that of most others their age. In 1969, Stanley evaluated a 13-year-old boy by using tests designed for college students. Current talent searches around the world trace their history back to this assessment. This entry discusses at-level testing, above-level testing, talent searches, extracurricular opportunities, educational planning, and future directions of talent searches

At-Level Testing

Standardized achievement tests typically are used *at-level* (also called *in-grade*). They are given near the end of the school year and present material at a student's grade level to determine how well the student has mastered what was taught. For most students, this approach is effective. For someone achieving a high score, however, important questions remain unanswered. Does the student know higher-level material than that covered on the test—and, if so, at what level is the student functioning?

At-level testing cannot answer these questions because of a *ceiling effect*—the tests do not include items of sufficient difficulty. Including only grade-level material means that someone who knows grade-level material as well as more advanced material will obtain the same score as someone who knows grade-level material only. To accurately assess gifted students' abilities, an assessment method must raise the ceiling by providing higher-level material.

Above-Level Testing

In *above-level* testing, standardized tests are administered to students younger than those for whom the tests were designed, but for whom the ceilings on at-level tests are too low. Because this

method tests students on information they have not been taught, the results indicate reasoning ability, rather than retention. The use of existing, published tests ensures test security, appropriate standardization and content, good psychometric properties, and valid comparisons of the gifted student's performance with that of other students at a similar academic level. Above-level testing provides a more accurate assessment of a high-achieving student's ability than is possible with at-level testing, and scores predict performance in advanced classes, higher education, and careers.

Talent Searches

The results of Stanley's initial above-level testing were extremely useful in developing appropriate educational plans for highly able students. In 1972, the first talent search was conducted; the mathematics portion of the SAT was administered to 450 gifted seventh- and eighth-grade students from the Baltimore, Maryland, area. In 1973, the verbal portion of the SAT was added. Later, this original talent search expanded its coverage beyond Baltimore, and other regional talent searches were developed. Currently, several state-based programs also exist, and talent searches have been established outside the United States. Presently, the major regional talent searches in the United States are as shown in Table 1.

Over time, talent search programs have expanded beyond the SAT to include the American College Testing Program (ACT) for seventh- and eighth-graders and talent searches for elementary school students. To qualify, a student must obtain a score at or above the 95th percentile (97th percentile for the youngest students in some programs) on the national norms of an in-grade standardized achievement test. Once talent search results are in, programs provide information about interpreting the scores and using them for educational planning, as well as opportunities for students to take special classes outside of school.

Extracurricular Opportunities

Many talent searches offer classes for students who earn high scores in talent search testing. Some classes are accelerative and can replace classes students typically would take in school; others are enrichment-based and offer a chance to explore a topic in more depth or breadth than is possible in school. All classes provide important opportunities for students to interact with others who have similar abilities and interests. Students have reported significant benefits from the social interaction, as well as the academic challenge, provided by these classes. In many cases, however, extracurricular classes are not enough; highly gifted students also require academic interventions within their school settings.

Table 1 Regional Talent Search Programs in the United States

Program	*States Covered*	*Grade Levels Served*
Center for Talented Youth (CTY) Johns Hopkins University, Baltimore, MD www.cty.jhu.edu	AK, AZ, CA, CT, DE, DC, HI, ME, MD, MA, NH, NJ, NY, OR, PA, RI, VT, VA, WA, WV	2–8
Midwest Academic Talent Search (MATS) Center for Talent Development (CTD) Northwestern University, Evanston, IL www.ctd.northwestern.edu	IN, IL, MI, MN, ND, OH, SD, WI	3–9
Rocky Mountain Academic Talent Search (RMATS) Center for Innovative and Talented Youth (CITY) University of Denver, Denver, CO www.du.edu/city/programs/academic-year-programs/rocky-mountain-talent-search/index.html	CO, ID, MT, NV, NM, UT, WY	3–9
Talent Identification Program (TIP) Duke University, Durham, NC www.tip.duke.edu	AL, AR, FL, GA, IA, KS, KY, LA, MS, MO, NE, NC, OK, SC, TN, TX	4–7

Educational Planning

Because students who obtain high scores in talent searches function at an advanced level, acceleration often is appropriate. Acceleration involves academic work at an advanced grade level. One means of accomplishing this is to allow a student to skip material that already is known. The high ceilings of above-level tests allow accurate assessment of what is known, so talent search results can be used to identify students who may benefit from acceleration. Standardized tests may not be perfectly aligned with a school's curriculum, however, so talent search results often are used as a screening tool, after which above-level administration of a school's own assessment tools (e.g., end-of-year exams) can determine the most appropriate placement for a given student within the school's curriculum.

Future Directions

Hundreds of thousands of students have participated in talent searches since 1972, but there is a need to reach more eligible students. Currently, talent searches are conducted by independent programs and charge fees to participants. Although financial aid is provided, the cost and the need to become involved outside school may discourage some families from participating. For students who do participate, there is a need to ensure a match between ability and education. Too often, schools fail to follow up on talent search results with appropriate educational plans. Talent search programs are actively working to address these concerns.

Mary Ann Swiatek

See also Center for Talent Development; Midwest Academic Talent Search; Study of Mathematically Precocious Youth; Summer Programs; Talent Identification Program

Further Readings

Olszewski-Kubilius, P. (2003). Special summer and Saturday programs for gifted students. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 219–228). Boston: Allyn & Bacon.

Stanley, J. C. (1996). In the beginning: The study of mathematically precocious youth. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 225–235). Baltimore: Johns Hopkins University Press.

Swiatek, M. A. (2007). The talent search model: Past, present, and future. [Special issue: Best practices in gifted education.] *Gifted Child Quarterly, 51*(4), 320–329.

Teacher Attitudes

A considerable body of literature in gifted education espouses teacher qualities that promote talent development. A perusal of approximately 20 references, from the 1950s to date, reveals more than 140 different characteristics desirable for gifted education teachers. A closer examination finds lists consist predominantly of knowledge and skills. Knowledge includes anticipated areas such as the nature and needs of students and differentiated instruction, but also specifically test construction. Some lists speak to knowledge of creativity; some do not.

An abundance of skills are suggested, such as being able to understand giftedness, think complexly, and use questioning techniques. Developing a suitable environment is named in approximately half of the time; however, this might be described in terms of safety, warmth, caring, learner-centeredness or even permissiveness. Differences surface as authors include the ability to teach creativity and problem solving, but others do not mention this trait. The extensiveness expands to possessing skills in training others and being organized and well prepared. However, little in the literature described the desired attitudes of teachers concerning beliefs toward students, instruction, or teaching. This entry describes intelligence as a criterial quality, the lack of framework for teacher preparation, attitudes that make a difference, and application of teacher attitudes.

Intelligence as a Criterial Quality

The most frequently cited quality necessary to teaching bright students successfully is the teacher's superior intelligence or intelligence similar to the students they teach. This quality is proffered in more than half of the references reviewed spanning 1954 to 2004. In approximately a third of the references, others similarly assert gifted education teachers need to possess advanced subject matter knowledge; however, neither assertion is supported by empirical evidence.

Lack of Framework for Teacher Preparation

Although the gifted education field is replete with frameworks for conceptualizing giftedness, identifying students, and programming for these learners, there has not been a parallel development of conceptual frameworks for preparing their teachers. It is generally agreed that gifted education teachers need specialized training or licensure. Frameworks for this training have been lacking, yet talented teachers continued to be touted as the most important means of reaching gifted and talented students. Guidance from empirical research is needed for those who prepare teachers to work with gifted and talented students.

Attitudes That Make a Difference

Studies reviewed did not specifically delineate between knowledge, skills, and attitudes of teachers nor was there an accepted framework by which to analyze attitudes of gifted education teachers who taught with reputational expertise. Instead, lists of characteristics and competencies were vague, diverse, and occasionally contradictory. Many studies were considered only secondary sources, only citing other authors. Of the more than 20 studies uncovered in a comprehensive search of the extant literature, few employed actual interviews of gifted education teachers. Others used checklists and student or teacher surveys. Methodology employing direct observation of teachers in action in the classroom was rare. In two qualitative studies found, one examined a single teacher; the other a specialized setting with teachers as facilitators. Lack of research and only vague standards to describe the attitudes related to teachers who possess reputational expertise calls for rigorous research using direct observation and personal reflection.

A Phenomenological and Ethnographic Study

Critical to the field was a phenomenological and ethnographic study to examine the beliefs of teachers more closely. Intensive case studies, including observations of teaching, planning, and thinking aloud–style reflections about gifted education offered a new method to define behaviors and attitudes of teachers possessing reputational expertise. Observations encompassed elementary through high school teachers and documented occurrences seen as sufficiently evident behaviors from which deductions concerning attitudes could be made. Think-aloud reflections strengthened the deductions as these individuals expounded on their thinking and beliefs accompanying the incidents. Units of information from stories, explanations, and quotes were then categorized and sorted into the conceptual framework.

Reputational Expertise Qualities

Defining belief systems of teachers of the gifted who displayed reputational expertise were (a) displaying enthusiasm and insatiable curiosity, (b) learning continuously, and (c) showing firmness in their belief system. In addition, they held their commitment so strongly to these beliefs that the teachers felt compelled to promote and encourage students to value them as well. In practice, teachers used and modeled the techniques and engaged students in metacognitive discussions and reflections to encourage them to adopt the behavior.

Enthusiasm and Insatiable Curiosity

Instructional goals encompassed inherently and intrinsically motivating, stimulating, and inspiring activities and projects because teachers recognized if they were bored with assignments or curriculum, students must be as well. Sparking creativity and

developing passion was viewed as strengthening student investment in learning. Enthusiasm and insatiable curiosity fueled teaching and learning.

Continuous Learners

Teachers displaying reputational expertise exhibited lifelong learners traits and encouraged students to embrace this as well. Viewing themselves as facilitators of learning eliminated the need to be seen as an expert and enabled teachers to learn and become enlightened along with students. Students were encouraged to think, challenge, and find out. Understanding the perspectives of others, reflective thinking, and learning to question were practiced pathways. Values centered on learning autonomously and taking responsibility for one's own growth. Taking risks and experiencing failure were part of the process; personal, in-depth reflections were encouraged, and a desire to improve was promoted. Teachers personally embraced the same philosophies.

Firm in Their Belief System

Teachers who displayed reputational expertise exemplified strong commitment to their belief systems. Responses to questions were pensive and replete with signs of prior evaluation and reflection. Conviction and commitment flowed effortlessly as teachers explained rationales and values.

The Policy Attribute

As evidence of conviction, teachers with reputational expertise attempted to teach and pass on these behaviors to students. Accompanying commitment to their own personal lifelong learning led the teachers to consciously share this value with students. Holding strong beliefs about the benefits of thinking interdependently found students actively using the strategies but also learning how to apply them to their lives. Teachers developed these skills in their students rather than merely exposing students to these skills.

Application

Teacher training and professional development can use desired qualities espoused in the literature and offer practitioners time to discuss and examine implications for the classroom. Students and practicing teachers could articulate and define other behaviors that blended with qualities in the literature. Specialization in the field is validated. It provides opportunities to think interdependently about attitudes encompassing the desirable characteristics and promotes understanding, reflection, and application of the examined traits. Intense study and a desire for continuous improvement will better allow teachers to walk the talk.

Marcia Dvorak

See also Professional Development; Research, Qualitative; Teachers of Gifted; Teacher Training

Further Readings

Colangelo, N., & Davis, G. A. (Eds.). (2003). *Handbook of gifted education* (3rd ed.). Boston: Allyn & Bacon.

Coleman, L. (1992). The cognitive map of a master teacher conducting discussions with gifted students. *Exceptionality, 3*(1), 45–53.

Heath, W. J. (1997). *What are the most effective characteristics of teachers of the gifted?* ERIC Document Reproduction Service: ED 411 665. EC 305 858.

Robinson, A., & Kolloff, P. (2005). Preparing teachers to work with high ability youth at the secondary level: Issues and implications for licensure. In F. Dixon & S. M. Moon (Ed.), *The handbook of secondary gifted education* (pp. 581–610). Waco, TX: Prufrock Press.

Robinson, A., Shore, B. M., & Enersen, D. L. (2007). *Best practices in gifted education: An evidence-based guide.* Waco, TX; Prufrock Press.

Story, C. M. (1985). Facilitator of learning: A micro-ethnographic study of the teacher of the gifted. *Gifted Child Quarterly, 29,* 155–159.

Teacher Nominations

Teacher nomination has been found to be a valuable method to use to identify students for gifted and talented programs. The use of teacher nomination, described in this entry, has been compared with other independent variables such

as peer and parent ratings and evaluations of work samples and is considered a standard practice in the identification of academically gifted and talented students. However, only a small number of teacher nomination instruments have been developed for rating the characteristics of high-ability students, and only a few studies have investigated the technical aspects of most scales. Several researchers have investigated the effectiveness of teacher nominations of students for gifted programs during the last few decades and their findings suggest that when specific rating criteria exist, teachers are able to identify talented students in their classrooms.

Teacher nominations are often completed when teachers use either rating scales or checklists of known characteristics and behaviors of gifted and talented children, and teacher nominations can be an important procedure in identifying gifted and high potential students. Teacher nominations can help identify students who do not excel on standardized tests; teachers often are able to identify characteristics such as creativity, leadership, motivation, and other specific talent areas such as music, art, and drama.

When nominations are sought from multiple sources, students who are nominated by teachers or others can be considered for gifted program participation. The following tools are often used in the nomination of gifted students: standardized achievement test scores; aptitude or other tests; grades, state achievement tests, behavioral inventories, or checklists; the nomination of a previous or current teacher; classroom observations; portfolio or student work submissions; parent nomination; self-nomination; and peer nominations.

When classroom teachers nominate students for participation in gifted programs, their nominations are often considered along with other assessment information that has been gathered. For example, many teacher nominations are not considered unless students also achieve a certain cutoff score on aptitude or achievement tests. In the Joseph Renzulli and Sally Reis talent pool identification approach that is a part of the *schoolwide enrichment model,* teacher nominations are more important. In this approach, teacher nominations are the second phase of identification and are considered an automatic pathway as part of the procedure. In this approach, all teachers are informed about the students who have gained entrance through test score nominations so that they will not have to engage in needless paperwork for students who have already been admitted. In the second step of the schoolwide enrichment model, teachers nominate students who display characteristics that are not easily determined by tests (e.g., high levels of creativity, task commitment, unusual interest, talents, or special areas of superior performance of potential). With the exception of teachers who are overnominators or undernominators, nominations from teachers who have received training in this process are accepted into the talent pool in the schoolwide enrichment model on an equal value with test score nominations.

Teacher nominations in other identification systems may be informal, as some nomination procedures simply ask teachers to consider which students in the class might benefit from a gifted program. Others ask teachers to "think about a few students in your class that might qualify for the gifted program." Others are more formal and include objective checklists with specific forms that teachers are asked to complete.

Teacher nominations are part of many identification systems for gifted and talented programs, although this method does have some inherent problems, such as a potential for teacher bias. Some teachers may nominate only students who display academic giftedness in all content areas all of the time. Some teachers may not consider nominating students who speak English as a second language or those with high potential but who underachieve in school. One way to eliminate bias in teacher nomination is to use a series of scales or checklists to make the nomination process more formal and less subjective.

Research conducted on teacher nomination has found that professional development provided to teachers on characteristics of giftedness can help increase the reliability of teacher nominations. This research suggests that, with additional training in gifted and talented education, teachers can improve their nomination and the subsequent identification of gifted students that they have nominated. Teachers who nominate students for

placement in gifted programs usually consider the following characteristics:

- Achievement in content areas such as reading and mathematics at 1 or more years above current enrolled grade level
- Strong ratings on teacher checklists of gifted learner characteristics
- Scores on individual achievement or aptitude tests

Most school district personnel use some type of district or school screening instrument that can be completed by classroom teachers in the spring of the school year so that teachers can nominate students who have been in their classrooms for a year. This nomination form usually enables teachers to nominate students whose performance exceeds expected grade-level norms in one or more content areas. After teachers have completed a nomination form and a referral is made, additional information is usually collected. This information generally includes standardized achievement or aptitude tests, grade averages, learning characteristics checklists, information from parents, and work products or other creative product ratings. Then, in most school districts, a committee reviews the data and decides which students will be subsequently identified as gifted.

Joseph S. Renzulli

See also Giftedness, Definition; Identification; Schoolwide Enrichment Model; Teacher Rating Scales; Teacher Training

Further Readings

Johnsen, S. (Ed.). *Identifying gifted students: A practical guide*. Waco, TX: Prufrock Press.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A comprehensive plan for educational excellence*. Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Reis, S. M., & Smith, L. H. (1981). *Revolving door identification model guidebook*. Mansfield Center, CT: Creative Learning Press.

Siegle, D., & Powell, T. (2004). Exploring teacher biases when nominating students for gifted programs. *Gifted Child Quarterly, 48,* 21–29.

Teacher Rating Scales

Many researchers suggest the use of teacher rating scales as one way to help identify gifted and talented students. The use of reliable and valid teacher rating instruments and scales can aid teacher nomination and may result in the inclusion of more students in gifted and talented programs. Only a handful of teacher rating instruments have been developed for rating the characteristics of high-ability students, and only a few studies have investigated the technical aspects of most scales. Several researchers have investigated the effectiveness of teacher ratings of students for gifted programs and results collectively suggest that when specific rating criteria are used, teachers can and do identify gifted and talented students in their classrooms. Other studies have examined the construct validity or criterion-related validity of teacher judgment instruments for high-ability students and generally supported some instrument developers' assertions that the instruments do examine the hypothetical construct(s) being measured. This entry describes various types of teaching rating scales.

Teacher Rating Instruments and Scales

Researchers have developed different observation and nomination scales for teachers, parents, and others for many years. These rating scales can and do provide valuable information about specific strengths of students. The Scales for Rating the Behavioral Characteristics of Superior Students (SRBCSS) by Joseph Renzulli and his colleagues was the first published instrument with available reliability and validity information in 1976, with 10 scales to identify student strengths in the areas of learning, motivation, creativity, artistic, musical, dramatics, communication-precision, communication-expressive, and planning. It was subsequently revised, and scales were added in the areas of reading, mathematics, technology, and science. The scales were developed for teachers and other school personnel to rate students for specialized programs using a six-point rating: *never, very rarely, rarely, occasionally, frequently,* and *always*. The most widely used scales in the SRBCSS are those dealing with learning, motivation, leadership, and creativity and these three scales

were subsequently revised. An independent summary review of SRBCSS from the Buros Mental Measurements Yearbook explained that the SRBCSS represented a significant advancement in the expansion of the methodology for identifying intellectually gifted, creative, or talented youth.

The Gifted Education Scale, Second Edition, developed by Stephen McCarney and Paul Anderson is another scale used for the screening and identification of children and youth in kindergarten through Grade 12. This scale includes 48 items across five areas: intellectual ability, creativity, specific academic aptitude, leadership, and performing and visual arts, with an optional scale on motivation.

The Pfeiffer-Jarosewich Gifted Rating Scale (GRS) developed by Tania Jarosewich and Steven Pfeiffer is also used to identify students in preschool kindergarten and school-aged children and includes subscales focusing on intellectual, academic, creative, and artistic talent and motivation. The data support the intended use of the instrument as a screening measure or as part of a comprehensive battery to determine whether a student qualifies for gifted programming.

The Scales for Identifying Gifted Students (SIGS) include seven abilities: General Intellectual Ability, Language Arts, Mathematics, Science, Social Studies, Creativity, and Leadership. Both a school version and home version are available, and those completing the form are asked to provide examples for any subscale with six or more high responses. The Buros summary of the SIGS included some cautions, however, about the technical adequacy of the SIGS.

The Gifted and Talented Evaluation Scales (GATES) developed by James Gilliam, Betsy Carpenter, and James Christensen were also designed to identify gifted students from ages 5 to 18. The GATES are based on the current federal and state definitions of giftedness, including intellectual ability, academic skills, creativity, leadership, and artistic talent. Teachers, parents, and others who are knowledgeable about the child may complete the GATES for nomination for gifted and talented programs. The Buros commentary on the GATES suggests that its validity and the value-added role of the GATES remain unclear and suggests that more research would be needed to provide a stronger justification for using this product.

Any teacher rating scale or instrument should be cautiously used as a part of an identification plan for gifted students. Rating scales should be used as a part of a comprehensive battery of assessment techniques—the Buros reviews indicate that the psychometric properties of these scales are mixed. For example, there may be lower reliability when SRBCSS is compared with an intelligence test such as the Wechsler Intelligence Scale for Children—Revised (WISC–R) because it was designed to identify characteristics that are not often measured in intellectual assessments. Some instruments seem to load on one factor. For example, the Buros reviews of the Gifted Evaluation Scale (GES) suggest that the five behaviors the test purports to measure load primarily on one "general academic" factor, with leadership and arts as subfactors. A comparison of independent reviews of these rating scales as reported in the Buros Mental Measurement Yearbook would be an important step for any educator interested in using any of these scales. Teacher rating scales that are both valid and reliable can aid identification initiatives for high-ability students in and help their teachers to be more objective in nominating them for gifted and talented programs.

Joseph S. Renzulli

See also Giftedness, Definition; Identification; Teacher Nominations

Further Readings

Gilliam, J. E., Carpenter, B. O., & Christensen, J. R. (1996). *Gifted and talented evaluation scales*. Austin, TX: PRO-ED.

Jarosewich, T., Pfeiffer, S. I., & Morris, J. (2002). Identifying gifted students using teacher rating scales: A review of existing instruments. *Journal of Psychoeducational Assessment, 20,* 322–336.

McCarney, S. B., & Anderson, P. D. (1998). *The Gifted Evaluation Scale: Technical manual* (2nd ed.). Columbia, MO: Hawthorne Educational Services.

Renzulli, J. S., Smith, L. H., White, A. J., Callahan, C. M., Hartman, R. K., & Westberg, K. L. (2002). *Scales for rating the behavior characteristics of superior students* (Rev. ed.). Mansfield Center, CT: Creative Learning Press.

Ryser, G. R., & McConnell, K. (2004). *Scales for identifying gifted students: Ages 5 through 18*. Waco, TX: Prufrock Press.

Teachers of Gifted

In gifted education as in other disciplines the teacher has been found to be the most influential factor in student achievement and satisfaction. Effective teachers are well prepared to teach in their area, have common personality traits, use a wide range of pedagogical strategies in their teaching, and view parents as partners. There is no "one right way" to teach gifted children. Different teachers use different strategies at different times. Effective teachers respond to the individual child and the circumstances and choose strategies and activities based on their individual teaching strengths and styles, as well as their students' learning profiles, readiness levels, and interests. Whereas it was assumed by Lewis Terman and other early scholars of the gifted that teachers of gifted students should be gifted themselves, little research has been done in this area. Instead, research has focused on training and preparation, and this research shows that teachers trained in gifted education are more effective in teaching these students, as described in this entry.

Preparation

Teacher preparation in gifted pedagogy is essential to ensure that students are provided with appropriately challenging learning experiences. The National Association for Gifted Children (NAGC) and the Council for Exceptional Children (CEC) worked together to develop Teacher Preparation Standards in Gifted Education, which were adopted in 2006 by the National Council for Accreditation of Teacher Education (NCATE), the professional organization that accredits teacher education programs at colleges and universities. These research-based standards clarify the knowledge and skills needed to be an effective teacher of the gifted. The NAGC-CEC standards are intended as guidelines for training teachers of the gifted in teacher preparation and in district-based professional development programs. Such training is designed to extend that which is delivered in initial teacher licensure instruction. Training gives teachers an understanding of the cognitive needs of the gifted, as well as giving teachers insight into the social and emotional development of gifted students. Teachers with minimal or no training in gifted education are less likely to differentiate the curriculum and have lower expectations than do those who have received training, thereby limiting the learning opportunities for gifted youth. Students of teachers who had received training in gifted education pedagogy reported higher levels of thinking and discussion in their classrooms and, in addition, their teachers were less likely to lecture, and more likely to engage students in discussions and activities that challenge students to work at high levels of cognitive processing. Educated and experienced teachers are more likely to implement a wide variety of curricular models.

Gifted education coursework grounded in the NAGC-CEC standards encompasses a wide range of topics related to gifted education. The standards go beyond the development and delivery of appropriate curriculum to include knowledge and skills in the areas of the cognitive and affective development of gifted children, cultural diversity, and foundational knowledge. The foundational influences including key theories, philosophies, and models are the basis for Standard 1. In addition to historical influences, the importance of social, economic, and cultural factors are also stressed, as are research-based constructs. Standard 2 explains the importance of understanding the development and characteristics of gifted children, their idiosyncratic ways of thinking and learning, and the similarities and differences between gifted youth and their chronological peer group. The influence of culture and the environment on the development of individuals with gifts and talents in all domains—intellectual, academic, creative, leadership, and artistic—is underscored. Individual learning differences is the topic of Standard 3 with a special focus on diverse groups of learners. Standard 4 stresses the importance of using evidence-based curriculum and instructional strategies to differentiate for individuals with gifts and talents. Critical and creative thinking, problem solving, and performance skills are to be used in conjunction with differentiated instruction to provide properly paced activities. Learning environments and social interactions are the topics of Standard 5. Self-awareness and the development of self-advocacy skills are imbedded in instruction focused on a thorough understanding of cultural diversity. Standard 6 is centered on the role of

language and communication in talent development. The need to develop oral and written communication skills may necessitate the use of assistive technologies for English language learners or students who have concomitant learning disabilities. Instructional planning is discussed in Standard 7. The importance of planning differentiated curricula for gifted students consisting of in-depth activities that are conceptually challenging and include complex content is stressed. The value of incorporating academic and career guidance into gifted students' educational experience is also noted. Standard 8 emphasizes the need to integrate assessment into the decision-making process when determining the appropriate placement and instructional steps for gifted children. Professional and ethical practices are the subject of Standard 9. Teachers of the gifted need to strive for continuous improvement by participating in continuing professional development as a means to remain cognizant of current evidence-based practices. Standard 10 focuses on collaboration. Teachers of the gifted should collaborate with fellow educators, as well as work with families, professionals, and community workers as they advocate for their gifted students.

Personality

Effective teachers of the gifted share common personality characteristics including empathy, openness, patience, curiosity, a sense of humor, and a positive sense of self. Teachers who excel in working with gifted children understand the inner workings of the child, both the cognitive and emotional aspects. They empathize with the child and are able to imagine how the child thinks and feels about situations and topics. These teachers have an openness that results in their being sensitive to and accepting of all children. Curious about many topics themselves, teachers of the gifted are enthusiastic about students with diverse interests even when the areas of passion for the students are not aligned with the curriculum. Being socially responsive and culturally sensitive, teachers of the gifted are able to bridge the fields of gifted education and multicultural education. A strong sense of humor coupled with a positive sense of self allows these teachers to easily laugh at themselves and laugh with others. As a result of their comfort level with their own identity, effective teachers of the gifted are willing to make mistakes and have a sense of comfort with ambiguity and not knowing "all of the answers." Having a sincere interest in the whole child, not just academic prowess, these teachers focus on student strengths and interests and create a secure classroom environment.

Pedagogy

Teachers of the gifted choose strategies and activities based on their individual teaching strengths and styles, as well as their students' learning profiles, readiness levels, and interests. They rarely teach something the same way twice because their students' academic needs vary widely, and they have an extensive repertoire of strategies from which to draw. Essential pedagogical strategies to be used by the educator of the gifted include culturally responsive teaching, creativity, flexibility, student-centered approaches, and high expectations. Teachers of the gifted recognize the effects of culture and environment and acknowledge the importance of using culturally sensitive techniques to frame instruction. Educators of the gifted think creatively, and they bring an aspect of creativity to their teaching. Creative, flexible, and differentiated approaches to curriculum development and delivery allow students to learn content through relevant activities and at an appropriate pace. Student-based strategies including curriculum compacting, inquiry-based instruction, problem-based learning, open-ended activities, and independent and small-group investigations increase the level of expectations. Planned instruction revolves around open-ended activities that necessitate the use of critical and creative thinking. These activities move students away from the misconception that excellence in education is manifested by being able to recite one correct answer and on to the realization that new discoveries and true learning are multidimensional. Effective teachers model excellence through their own high achievement orientation and commitment to personal intellectual growth. Exemplary teachers of the gifted act as facilitators and allow students to become active seekers of knowledge and take charge of their own learning. These teachers pass on their own enthusiasm for lifelong learning and share their broad interests with their students.

Parents

Extending their reach beyond the students, effective teachers of the gifted work with the parents of their students to support them in their efforts to nurture their children. As the teacher works collaboratively with the parents, he or she is better able to understand the child's strengths, relative weaknesses, and interests. In return, the teacher is able to provide the parents with a support system through conversation, literature recommendations, and advocacy resources on topics such as overexcitabilities, perfectionism, and underachievement. Educators of the gifted can provide parents of gifted children with the knowledge and skills that will nurture the intellectual growth, as well as the social and emotional development of the child. Working together, parents and teachers can help students understand their cognitive, emotional, and social needs and assist them as they develop self-advocacy skills to be used in efforts to have their needs met.

Exemplary teachers of the gifted understand and empathize with their students. Such teachers have an appreciation of their students' strengths, relative weaknesses, and interests. These teachers have a keen awareness of the knowledge and skills they want their students to acquire and can easily adapt instructional techniques and the curriculum to meet their students' needs. Their repertoire of teaching strategies and instructional activities is extensive and allows them to develop high level learning experiences for their students. Teachers of the gifted share their students' enthusiasm for learning and curiosity about the unknown. While raising student expectations, these teachers are able to create nonthreatening learning environments through an acceptance of all students, an awareness of their students' needs and interests, and a confidence in their own abilities.

Rebecca L. Mann

See also Best Practices; Effective Programs; Teacher Attitudes

Further Readings

Bishop, W. E. (1980). Successful teachers of the gifted. In J. S. Renzulli & E. P. Stoddard (Eds.), *Under one cover: Gifted and talented education in perspective* (pp. 152–160). Reston, VA: Council for Exceptional Children.

Callahan, C., Cooper, C., & Glascock, R. (2003). *Preparing teachers to develop and enhance talent: The position of national education organizations.* (ERIC Document Services No. ED477882)

Davalos, R., & Griffin, G. (1999). The impact of teachers' individualized practices on gifted students in rural, heterogeneous classrooms. *Roeper Review, 21*(4), 308–314.

Eyre, D., Coates, D., Fitzpatrick, M., Higgins, C., McClure, L., & Wilson, H., et al. (2002). Effective teaching of able pupils in the primary school: The findings of the Oxfordshire effective teachers of able pupils project. *Gifted Education International, 16*(2), 158–169.

Ford, D. Y., & Trotman, M. F. (2001). Teachers of gifted students: Suggested multicultural characteristics and competencies. *Roeper Review, 23,* 235–239.

Hansen, J. B., & Feldhusen, J. F. (1994). Comparison of trained and untrained teachers of gifted students. *Gifted Child Quarterly, 38,* 115–121.

Lewis, J. F. (1982, May/June). Bulldozers or chairs? Gifted students describe their ideal teacher. *Gifted Child Today* (23), 16–19.

Rash, P. K., & Miller, A. D. (2000). A survey of practices of teachers of the gifted. *Roeper Review, 22,* 192–194.

Renzulli, J. S. (1968). Identifying key features in programs for the gifted. *Exceptional Children, 35,* 217–221.

Stephens, K. R. (1999). Parents of the gifted and talented: The forgotten partner. *Gifted Child Today, 22*(5), 38–43, 52.

Stronge, J. (2002). *Qualities of effective teachers.* Alexandria, VA: Association for Supervision and Curriculum Development.

Whitlock, M. S., & DuCette, J. P. (1989). Outstanding and average teachers of the gifted: A comparative study. *Gifted Child Quarterly, 33,* 15–21.

Teacher Training

Teacher training may be perceived as somewhat of an intangible construct because it presumes to cover a lot of ground, takes on many forms, and pertains to different kinds of participants. There are teachers from preschool through graduate studies; in homes, resource centers, schools, and

alternative educational settings; in various stages of professional careers; and in the throes of juggling many administrative, instructional, learning, and other kinds of responsibilities. As understandings evolve as to the magnitude of who teaches, and what teaching encompasses, so, too, do our understandings broaden regarding the training that is necessary to do the job (in all its multifaceted complexity) *well*.

Training implies learning and development in any number of capacities, personal and professional, but given the breadth of whom and what is at issue with respect to training processes within an educational framework, it is impossible to detail all the elements here. This entry will specify the two predominant types of teacher training thrusts (preservice and inservice), and many important aspects and considerations involved therein, and as they apply to gifted education.

Initial Teacher Training

Preservice training is designed for individuals who have chosen to enter the teaching profession. This training for certification generally includes work that addresses theoretical perspectives, pedagogical practice, and educational psychology (such as the study of cognitive development, identity formation, strategies for classroom management, and suitable means of fostering and sustaining motivation). There is a practicum component to preservice education whereby teacher candidates learn "on the job" and receive feedback from experienced associates. Prospective teachers are encouraged to share their various learning experiences with their colleagues-in-training through discussion, meaningful activities, and online venues. Preservice offerings may or may not have a special education thrust, an umbrella under which the "gifted exceptionality" would likely fall. The amount of attention directly paid to gifted learning needs varies greatly from one preservice program and geographical locale to the next, although much of the literature in the field of gifted education argues for more, better, and appropriately targeted training provision in gifted-related matters. Initial teacher training programs often focus on subject-specific domains grounded in curricular requirements at various grade levels, prescribed standards of practice, familiarity with current research findings and resource materials, assessment procedures, relevant legislative matters, and how to facilitate a good learner-learning match for all students. Professionalism, a solid grasp of principles underlying learning and teaching, and an appreciation of diversity in context and how best to address it, are the cornerstones of such programs. Some preservice programs are longer than others, and they can range from a minimum of 10 months of training through to several years depending on the selected program of study. When there is a particular focus, such as gifted education, then the course would be geared to pertinent material to better equip teachers to address the needs of the target population. Ideally, those who provide this training are current, knowledgeable, and master teachers in their own right—effectively trained to train effectively. There are postgraduate level certification and advanced degree programs in place for educators who want to take on this sort of leadership role—and some teacher trainers will have been exposed to a rather generalized orientation with respect to topics such as child development, and how to differentiate for exceptionalities, whereas others will have received more of a gifted focus.

Teacher Training for Experienced Educators

Inservice training is designed for practicing educators. Whereas preservice training provides the fuel and momentum required to become an effective teacher, inservice training replenishes and sustains practicing educators. Training often takes the form of professional development sessions, one or more specifically targeted presentations, or additional qualification or degree courses that are formally offered through colleges and universities. It may also involve consultation, reflection, hands-on group activities, case study work, visitations and careful observation, documentation and analysis of current practice, and action research. Sometimes grants are available for research and advanced training initiatives. Some teachers go on sabbatical, others take time off to extend their knowledge base in the field of education, and many continue to work in classrooms.

Like its preservice counterpart, inservice training is variable in design, extent, and the nature of core elements. For example, training might focus

on enhancing or honing educators' pedagogical, technological, or communication skills; on inquiry-based processes; or on the application of specialized procedures. Generally speaking, teachers learn how to better identify and address learning problems, develop curriculum and instruction, acquire a foundation of information on a range of strategies for appropriately responsive teaching, and engage in collaborative practices in and beyond schools. This, in turn, makes them stronger in an ever-changing educational environment, enabling them to contribute more meaningfully to the learning community while raising the bar for others. At the same time, teacher training reinforces the importance of continued, constructive, and collegial learning for students, and because it requires time, commitment, and effort, this, too, sends a positive message to youngsters. The nature of inservice training tends to be flexible and fluid, and commonly boils down to whatever a particular individual, group, administrative body, or school district deems important to its optimal functioning at any point in time. However, inservice training builds from two premises: that teachers have a basic understanding of educational theory and of what underlies best practice, and that their participation in the training process is predicated on a desire to improve, update, and evaluate what they do. Teacher training moves in different directions from there, sometimes formal and sometimes informal in nature, with learning opportunities more or less available depending on such factors as accessibility, funding, demand, need, and even whim.

Teaching Training in Gifted Education

Teacher training in gifted education may or may not be part of the short-term or overall professional development plan for any one person, department, school, or district. Far too often, things "gifted" do not rank high on a priority list, and many administrators do not consider it essential given numerous other competing issues and demands for limited time and educational funding allocations. However, it is important for teachers to recognize the importance of gifted issues, for administrators to do their part to promote increased understanding about high-level development, and for parents to advocate for their highly able children. This could have a strong and advantageous effect on the teacher training impetus, increasing the availability and caliber of professional development offerings on giftedness. As it is, the paucity of teachers actually receiving training in gifted education is problematic, especially when one considers that there are high-ability learners who are going unrecognized, and whose diverse learning needs are not being met. When teachers are offered and choose to avail themselves of opportunities to think constructively about giftedness and issues pertaining to high-level development, and to develop sound approaches for working with exceptional learners—and when they are administratively supported in this regard—the system and everyone in it stands to benefits.

New and seasoned educators can access teacher training, collaboratively or independently, in many ways. Several associations, college faculties, and university-affiliated organizations disseminate information about giftedness, thereby heightening awareness and promoting the appropriate address of exceptional learners' needs. Teachers can form study groups, partner with professional networks (industry, business committees, corporations), and enroll in distance education programs. Some professional consultants make it their business to criss-cross the world offering teacher training programs in gifted-related topics including social-emotional concerns, talent development, subject-specific curriculum, differentiated programming models, identification procedures, and so on. Countless resources are available online, at bookstores, and in conference exhibit halls, and one can also access gifted chat rooms, advocacy organizations, and lectures on gifted-related topics of interest. Although teacher training for certification purposes is generally structured by an overseeing body in accordance with set standards, teacher training for the sake of professional growth—designed to help one become a more competent and effective educator—is, as noted at the outset, an evolving and both a personal and professional endeavor.

The field of gifted education is now formally recognized as having its own training standards as approved by the National Council for Accreditation of Teacher Education (NCATE) in the United States. These standards outline many specific areas of knowledge and skill requirements, and focus on important matters such as diversity, assessment features, instructional strategies, and collaborative

endeavors. At the same time, there is an emphasis on the importance of coursework, clinical practice, and field experience among teacher candidates in gifted education at both the undergraduate and graduate levels, and among more experienced teachers as well. Targeted resource material that represents research-based and standards-based practices in gifted education is increasingly available for use by professors, course developers, accreditation coordinators, and professional development leaders, and use of these resources helps build coherence and ensure educational quality across programs, districts, and countries. Two guidebooks of particular note are *Gifted Education Standards for University Teacher Preparation Programs* and *Using the National Gifted Education Standards for PreK–12 Professional Development*.

Conclusion

The nature of any teacher training offered and the challenges of the learning process itself will vary from one trainer, teacher, context, and area of focus to the next. There is much more to teaching than the day-to-day goings-on in any given classroom, school, or other educational setting. Regular, appropriately designed, and effectively delivered training is essential for teachers so they can consolidate and build on their understandings, develop the tools and the competences they need to address diversity in today's student population, and support and champion lifelong learning.

Joanne F. Foster

See also Competencies for Teachers of Gifted; Effective Programs; Preservice Education; Professional Development

Further Readings

Dettmar, P., & Landrum, M. (Eds.). (1998). *Staff development: The key to effective gifted education programs*. Waco, TX: Prufrock Press.

Johnsen, S., VanTassel-Baska, J., & Robinson, A. (2008). *Gifted education standards for university teacher preparation programs*. Thousand Oaks, CA: Corwin Press.

Kitano, M., Montgomery, D., VanTassel-Baska, J., & Johnsen, S. (2008). *Using the national gifted education standards for PreK–12 professional development*. Thousand Oaks, CA: Corwin Press.

Landrum, M. S., Callahan, C. M., & Shaklee, B. D. (Eds.). (2001). *Aiming for excellence: Annotations to the NAGC PreK–Grade 12 gifted program standard*. Waco, TX: Prufrock Press.

Matthews, D. J., & Foster, J. F. (2005). Teacher development. In *Being smart about gifted children: A guidebook for parents and educators* (pp. 337–362). Scottsdale, AZ: Great Potential Press.

National Association for Gifted Children. *NAGC Standards: Professional development*. Retrieved September 15, 2008, from http://www.nagc.org

Technology

In this entry, *technology* refers to computer technologies and peripherals, which require technical skills to operate and evaluative skills to determine which computing functions are most appropriate to accomplish a goal. Technology has received greater emphasis in educational settings during the last 20 years, especially with the advent of the Internet, affordable pricing of computers for the general public, and widespread use of technology in business, industry, and academia. Computer technologies are recognized as both learning tools and as a content area in gifted education, each of which should be included in the curriculum for gifted to appropriately address gifted students' intellectual, creative, academic, psychosocial, and leadership needs. This entry presents accepted standards and educational goals for using technology in educating gifted learners, considers the implications of technology for educators, and discusses the literature dealing with the role of technology in gifted education.

Standards and Educational Goals

Technology is a tool that fits well with the precepts of gifted education, especially as a means of solving problems, but also because gifted learners should also explore the philosophical aspects of technology—including its effects on society and problems generated through society's use, dependence, and need for technology. Two guiding bodies have developed standards, which, in concert

with the PreK–12 Gifted Program Standards developed by the National Association for Gifted Children (NAGC) and national content-area standards, can assist educators in conceptualizing and developing appropriate learning challenges for the gifted in using technology or considering its role from a systems approach. The Technology Standards for Students developed by the International Society for Technology in Education (ISTE) and the Technology Content Standards developed by the International Technology Education Association (ITEA) are seminal works in education because each establishes benchmarks in the study and use of technology in all grade levels and disciplines with the goal of developing technologically literate students.

Today's K–12 gifted learners have known a world that uses technology for social and academic pursuits—unlike the world many veteran teachers knew, which had little to no exposure to computers during their schooling. Gifted learners often come to school with advanced technology skills and can quickly and efficiently use digital cameras, e-mail, word processors, and games. Teachers, on the other hand, may require professional development to understand the functions of computers and their connections to learning, especially because the K–12 classrooms of their childhood may not have offered the infusion of these tools or models of how to integrate them into the curriculum.

Although gaining the necessary technical expertise requires practice, educators must think beyond the mere inclusion of gadgets and gizmos to a more holistic understanding of information technology, including a systems perspective and a practical design perspective. This understanding, based on the sound philosophies generated by ITEA, is centered on providing students opportunities to think critically about (a) the influx of these technologies in our world; (b) how these tools enhance or diminish communication, relationships, business, and government; and (c) the historical, present-day, and future issues and concerns posed by the ever-changing world of technology. The approach to studying technology offered by ITEA is similar to the best practices and recommended instructional approaches for working with gifted learners. As the NAGC standards and other seminal resources in the field indicate, gifted learners should regularly engage in discussions and experiences focused on social issues and recognizing how innovations may affect the world. The emphasis of the ITEA standards is to build students' awareness of technology and its impact on life, which allows students to use many higher-level thinking skills, including analysis, synthesis, evaluation, and reflection.

The ITEA's standards outline educational goals and outcomes that are similar to gifted education, including problem-solving skills; preparing students to become independent, lifelong learners and informed, judicious consumers of information; maintaining technology equipment; and the interdisciplinary nature of technology as a tool to assist students in learning about other content areas, including math and science as well as the arts. The expectations for what teachers should know and be able to do with respect to technology are outlined in a set of standards provided by ISTE. Then, teachers must remain current with the evolution of computers and related peripherals and learn how to modify instruction so that students with advanced technology abilities are provided appropriately challenging learning opportunities in the classroom.

The sophisticated uses of computers are especially important for gifted students because their curricular experiences should include cognitive challenges that can be facilitated through information technology, including all phases of research and project development, such as concept mapping; data gathering; analysis of appropriate and credible electronic sources; communication with experts via e-mail, blogs, chats, or wikis; synthesis of ideas using word-processing tools; and digital presentations in the form of electronic portfolios, Web sites, or presentation media, to name a few.

Although the study of technology and the use of technology with gifted learners seem to be a natural fit, the relationship between these fields has received little attention thus far in the literature. This gap may be because research has only recently addressed the role of technology in student learning gains, and definitive answers to questions about whether technology can, in fact, increase achievement, remain. Extant literature in gifted education supports the design of learner-centered experiences, opportunities for creative problem solving, and maximizing these thinking processes through the sophisticated application of technology. Project-based learning—which promotes

higher-level thinking—is ideal for gifted learners because information technology can facilitate concept mapping through graphics such as Inspiration© and Kidspiration©; research through databases and the Internet; electronic processing of data through spreadsheets; word processing for written explanations; and graphics, digital videos and pictures, and electronic portfolios for developing products.

Implications for Educators

Just as educators should provide students with opportunities to think about the role of technology, teachers must learn how to adjust their teaching methods. Just as educators of the gifted are expected to differentiate learning so that instruction meets the needs of gifted students and the range of abilities presented, learning can be differentiated according to a student's technological proficiency so that individuals are provided opportunities to advance from novice to expert levels of use. Furthermore, teachers can sculpt learning experiences to address individual learning interests as well as flexible and accelerated pacing through the use of technology. Accelerated learning software, digital simulations, WebQuests, and electronic classrooms can open up a gifted student's world and be helpful tools for teachers in responding to the needs of students.

Information technology can also be a great tool for teacher planning through electronic resources for teachers. Thematic units that integrate multiple disciplines are available online, and lesson plans and units specific to technology infusion can be obtained free of charge for teachers at all grade levels and content levels—sometimes even with recommended modifications for the gifted. Ethical uses of technology are identified in the ISTE standards for students and delineate considerations teachers of the gifted should discuss with gifted students, including societal issues surrounding licensing, copyrights, hacking, gaming, virtual spaces, and related philosophical, legal, and moral issues.

As educators become more aware of the educational possibilities technology offers, virtual classrooms and distance learning will become more prominent features of gifted education. Gifted learners may spur the influx of these electronic classroom options, so schools will be increasingly expected to implement learning opportunities that address these expectations. For students without local access to Advanced Placement courses or dual enrollment opportunities, online course delivery will grow in its availability, cost effectiveness, and sophistication. Concurrently, the demand for K–12 educators skilled in developing and delivering online courses will likely increase, requiring educators to further develop their knowledge about effective distance-learning teaching practices for working with gifted children.

As schools have increased spending on hardware and software, teacher training has also become a related consideration because seasoned educators likely had little exposure to computer technologies during their preservice teacher training programs—a trend that is rapidly being replaced by teacher preparation programs that emphasize technology integration. Many of the recent teacher graduates have used such technologies as students themselves and, thus, may have more positive attitudes toward infusing computers into classroom learning experiences.

Current and Future Research

The research guiding gifted education in understanding the role of technology in learning is largely derived from the general education literature, especially given the recent influx of technology in education. Research indicates that teachers' views of the influx of computer resources are central to how these tools are incorporated into the curriculum. Prior investigations have documented the key role attitudes play in educators' acquisition, adoption, and sustained use of technology in the classroom, all of which can also affect students' use of technology.

To date, most of the literature about technology in gifted education has been theoretical, though there has been a dramatic increase in the number of published articles in gifted education that focus on various technologies to challenge the gifted, most of which are framed around growth in academic pursuits and technology skill acquisition. During the last few years, a variety of articles have provided teachers with guidance in using computers in classroom instruction; these works have addressed presentation software, Internet use, blogs and Webcasts, and global positioning systems. Innovative approaches to thinking about the

role of technology in gifted education have also been suggested.

Though the focus of most of the technology literature focuses on academic needs, the role of technology in addressing social-emotional needs has also been established. Tracey Cross examines the psychosocial connection gifted learners have with communication technologies, especially as e-mail, instant messaging, chat rooms, social networking and other communication devices are frequently used by students, often for the emotional support and assistance that may not be available to students in their schools or communities. Mentoring can also be facilitated through online supports, whereby a student communicates regularly with a designated adult who guides the learner, provides feedback to questions about careers, personal challenges, schooling, social skills, and identity development.

With the influx of technology in education, the field of gifted education has included information technology in the standards developed by the NAGC. The current K–12 Gifted Program Standards recommend that schools have state-of-the-art technology. With the proliferation of computers and related tools, additional emphasis on learning with technology and about technology may be warranted, as will recognition of the specialized learning needs of technologically gifted learners, according to Del Siegle. A sign of the times is the addition of a technology checklist in one of the most widely used instruments for screening gifted learners.

Though computers are now regular fixtures in classrooms, homes, and businesses, there is a paucity of research in gifted education about the value these technologies bring to the lives of gifted learners and the ways in which students and teachers use technology. One recent empirical work by Elizabeth Shaunessy provides a statewide picture of the attitudes about technology among teachers of the gifted; findings indicate teachers with more training and exposure to computers tend to have more positive feelings about these tools than do their colleagues with fewer opportunities to experiment with technology.

Robert Abelman's work sheds light on computer usage among achieving and underachieving gifted learners and indicates the latter use the Internet significantly more often than do achieving and average-ability learners. Likewise, parents of underachieving gifted learners monitored their child's electronic pursuits to a greater degree than did parents of achieving gifted and academically average learners. Future research should address the efficacy of instruction using technology, technology as a motivational tool for learning, the connection with individuals from around the world (including experts and other students), and the correlation between computer use and learning gains.

Elizabeth Shaunessy

See also National Association for Gifted Children; Online Gifted Education; Web-Based Learning

Further Readings

Abelman, R. (2007). Fighting the war on indecency: Mediating TV, Internet, and videogame usage among achieving and underachieving gifted children. *Roeper Review, 29,* 100–112.

Cross, T. L. (2004). Technology and the unseen world of gifted students. *Gifted Child Today, 27,* 14–16, 63.

Cross, T. L. (2007). The changing life metaphor of gifted youth. *Gifted Child Today, 30,* 14–16, 65.

International Society for Technology in Education (ISTE). (2000). *National educational technology standards for students: Connecting curriculum and technology.* Eugene, OR: Author.

Landrum, M. S., Callahan, C. M., & Shaklee, B. D. (2001). *Aiming for excellence: Gifted program standards.* Waco, TX: Prufrock Press.

Shaunessy, E. (2007). Attitudes toward information technology of teachers of the gifted: Implications for gifted education. *Gifted Child Quarterly, 51,* 119–135.

Siegle, D. (2004). Identifying students with gifts and talents in technology. *Gifted Child Today, 27,* 30–33, 64.

Technology for All Americans Project, & International Technology Education Association. (2000). *Standards for technological literacy: Content for the study of technology.* Reston, VA: International Technology Education Association.

Terman's Studies of Genius

Lewis Terman was fundamental in establishing the empirical study of precocious children and

contributed to the modern conception of the "gifted" child. He dispelled many of the popular misconceptions that gifted children were ultimately disadvantaged physically, socially, or professionally. Through his research on intelligence and testing, he provided the instruments that became the foundation of the study of gifted children and the educational policies that affected them for decades. Commonly referred to as "the father of gifted education," he is often credited as the first psychologist to empirically study gifted children and adults. This entry describes Terman's background and his studies of genius.

Background

Terman was born on the January 15, 1877, on a small farm in Johnson County, Indiana. Terman displayed an aptitude for school at an early age, quickly finishing the rural schools and entering a teacher's college at the age of 15. Terman taught for several years to earn enough money to permit graduate study and ultimately earned an M.A. from Indiana University at Bloomington in 1903 and a Ph.D. in psychology from Clark University in 1905. After graduation, Terman was employed as a school principal for San Bernardino, California, and as a professor at the Los Angeles Normal School in 1907. In 1910, Terman became a professor at Stanford University, where he remained until his death in 1956. During his career, he was elected as the president of the American Psychological Society and served as the editor of six professionally reviewed journals.

Intelligence Testing

Terman's interest in intelligence developed early in his academic career, as evidenced by his doctoral thesis entitled, "Genius and Stupidity: A Study of the Intellectual Processes of Seven 'Bright' and Seven 'Stupid' Boys." Interestingly, his most famous contribution to the field of intelligence came from adapting a French intelligence test developed by Alfred Binet and Theodore Simon in 1906. Terman translated the measure to English, revised or removed some of the tasks, and added several additional tasks developed for his doctoral thesis. To develop statistical norms for U.S. populations, Terman undertook the arduous task of organizing the testing of more than 1,000 California schoolchildren. Although this sample was not representative in race and socioeconomic status, it is widely considered revolutionary in its attempt at rigorous empirical controls. In 1916, Terman published the Stanford Revision of the Binet-Simon scale, or the *Stanford-Binet*.

Though it is possibly now the most famous test from that era, the Stanford-Binet was not the only mental test available during the 1920s. Many other intelligence and achievement tests had been developed, and an English translation of the Binet-Simon scale had already been developed by Henry H. Goddard in 1908. However, Terman's empirical standardization, combined with effective marketing by its publisher World Books, led to his measures being some of the most popular instruments of academics and school administrators. A school district in San Jose, California, became the first to develop a tracked system to accelerate students or offer remedial work based on the Stanford-Binet in 1921 and was quickly emulated by school systems around the nation. The Stanford-Binet is still one of the most commonly used measures of intelligence. Though the current edition has been thoroughly updated, many test items from the 1916 revision are still employed. Similarly, scores on intelligence tests like the Stanford-Binet are still one of the main criteria for receiving special education services in many states.

Terman's instrument to measure intelligence was a tremendous contribution to the empirical study of gifted individuals. The development of the Stanford-Binet provided researchers with a seemingly scientific and objective way to identify and categorize intelligence. Although other methods, such as accomplishments, academic progress, or evaluations by teachers or family were viable options, their obvious vulnerability to subjective bias caused the apparent impartial precision of the Stanford-Binet to be one of the preferred instruments in the boom of research on precocious children during the 1920s and 1930s. Many of the most prominent contemporary figures in gifted education, including Lulu Stedman, Leta Hollingworth, and Guy Whipple, used the Stanford-Binet as a central component in identifying gifted children for their research.

However, the popularity of Terman's instruments within the study of gifted education also had

several negative impacts. Most notably, the selection of items and standardization procedures resulted in severe disadvantages for children who were racial minorities or came from low socioeconomic backgrounds on his tests. The consequential racial and class differences found using his instruments resulted in an underrepresentation of minorities within the research on gifted education and were used as evidence for the eugenics movement. Although some critics challenged his research in the 1920s—most notably Walter Lippmann, William C. Bagley, and John Dewey—not until the Civil Rights Movement of the 1960s were many of the biases in intelligence testing and, thus, the conceptualization of the gifted child, rectified.

Research on Gifted Individuals

Before the 1920s, precocious children were viewed by many educators as being physically frail and socially maladjusted. There was a strong belief in the common saying "early ripe, early rot," which was supported by many anecdotes of individual children who showed great success in childhood but did not exhibit any success as adults and of slow children who went on to great accomplishments. Possibly motivated by his own precocious background, Terman started a program of research to investigate, and ultimately dispel, many of these assumptions.

In 1921, Terman began his legendary longitudinal study of highly intelligent children. Terman organized the testing of more than 250,000 school children on the Stanford-Binet intelligence test, from which he identified a core group of 1,528 children who scored within the top 1 percent of the population (corresponding to an IQ of higher than 140) with the goal of tracking them as they developed into adults. Data was collected regarding their physical, academic, social, and familial characteristics. The results were initially published in 1922, and follow-up studies were conducted in 1929, 1950, 1955, 1960, and 1972. The volumes were called the *Genetic Studies of Genius*. Terman revealed that, on average, these highly intelligent children, nicknamed "Terman's Termites," lived slightly healthier, happier, and more successful lives then the average child. Although it is difficult to determine if these children were truly better off than their counterparts, the study did provide strong evidence that many precocious children do go on to lead perfectly normal lives. In addition, although constrained by the rigid sex roles of the time, Terman's women went on to college and professional work in much greater numbers than average women did. The men went on to higher status positions and many accomplishments, and their success led most subsequent researchers to conclude that high intelligence was associated with greater success in school, college, and graduate and professional work.

Ryan Hansen

See also Eugenics; Hollingworth's Studies of Highly Gifted Students; Intelligence; Intelligence Testing; Stanford-Binet

Further Readings

Brim, O. G., Glass, D. C., Neulinger, J., & Firestone, I. J. (1969). *American beliefs and attitudes about intelligence*. New York: Russell Sage.

Fancher, R E. (1985). *The intelligence men: makers of the IQ controversy*. New York: W. W. Norton.

Jolly, J. L. (2005). Pioneering definitions and theoretical positions in the field of gifted education. *Gifted Education, 28*(3), 38–44.

Kimble, G. A., & Wertheimer, M. (1991). *Portraits of pioneers in psychology* (Vol. 4). Washington, DC: American Psychological Association.

Minton, H. L. (1987). Lewis M. Terman and mental testing: In search of the democratic ideal. In M. Sokal (Ed.), *Psychological testing and American society: 1890–1930*. New Brunswick, NJ: Rutgers University Press.

Minton, H. L. (1988). *Lewis M. Terman: Pioneer in psychological testing*. New York: New York University Press.

Terman, L. M. (1919). *The intelligence of school children*. Boston: Houghton Mifflin.

Test Development

A *test* refers to the systematic procedure by which a sample of behavior is measured. Tests are used as part of the measurement process and constitute one way of making attributes observable. In this respect, *tests* can refer to a process or tool by

which data is collected with regard to a defined attribute of interest. The subset or sample of behavior measured should be representative of the entire domain of interest. With a subset of information tested, an inference can be made about an individual's true status with regard to the attribute of interest.

The process of test development can be complex and meticulous, as described in this entry. However, if it is well-documented and comprehensive, a test can become a valuable tool for measuring traits and skills of various kinds. Although educational tests have historically been used for assessing general traits of collectives, they are also applicable to the assessment of individuals and hard-to-define constructs such as in the case of giftedness, creativity, and talent.

Purpose and Content Defined

The first and most important step in the test-development process is to establish the purpose of the test. In other words, the construct of interest must be identified and well defined. For instance, tests may be developed for the purposes of identification and placement, to measure progress of a skill or ability, or to assess potential. The purpose of any test will be based on the inferences the test developer intends to make from the results of that test. The intended use of any test should guide all subsequent steps in the test-development process.

Content should be developed based on a theoretical knowledge and understanding of the construct of interest. The realm of content included may belong to a general subject area such as math, science, or art, it may comprise items from multiple disciplines, or it may be a set of attitudinal items. The content that is chosen will be based on the purpose and objectives of the test. For instance, when evaluating giftedness in mathematics, it is probably not necessary to include items that peers are able to answer correctly. The purpose of the test would be better served if the content was more challenging and allowed students to demonstrate their unique abilities and skills.

Test Specifications

Test specifications describe how the content will be converted into test format. These specifications are often referred to as the test "blueprint." It contains every detail and direction necessary for the development of that test. Test specifications should be sufficiently detailed to provide different developers enough information that they could create parallel forms based only on those specifications. Test specifications should include, at a minimum, content objectives and details, a description of the test type, item type used, and the reporting design.

Content Objectives and Details

The objectives of test content should express where subject change or differences are expected. The goal is to understand these variations through responses to the content. Thus, objectives need to be observable and measurable. Content objectives define the test blueprint and therefore need to be explicitly stated in the specifications.

Test specifications also need to outline details concerning the content that will be included on a test. For instance, the test developer must decide how items should be balanced in content and item difficulty. It may be of interest to place items of similar content together on a test, whereas in other situations, similar items may need to be balanced throughout. Typically, items are ordered in a test to increase the level of difficulty. Once again, the ordering of items is based on the intended use of the test. All things being equal, test content should not be ambiguous; it should be practical, realistic, and appropriate for intended examinees. Finally, test content should be appropriate in length and difficulty for the time that will be allocated to administer the test, unless the purpose states otherwise.

Type of Test

Tests can be divided into two main categories known as maximum performance assessments and typical behavior assessments. In general, tests belong to one of these two categories based on what the examinee is instructed to do on the test. If the directions on a test indicate that examinees should do their best at choosing the correct answer, then it is a maximum performance test. If the directions indicate that examinees should express their opinions, values, attitudes, and so on, and that there is not a correct or incorrect answer, then it is a typical behavior test.

Maximum Performance Tests

Several distinctions can be made among maximum performance assessments. One common distinction is made between achievement and ability (aptitude) tests. Achievement tests measure that which has already been learned within a domain of knowledge, and ability tests measure one's facility for learning new material. Even though a distinction is made between these two test types, tests often contain elements of both.

Tests of creativity can be thought of as ability tests in that they assess one's aptitude for producing novel ideas, works of art, or any other type of original creation. Creativity tests often require the use of divergent thinking in that multiple "correct" answers are usually sought. The ability to draw on one's imagination and creativity to develop solutions and answers in an innovative and unique manner is the main focus of creativity tests.

A distinction can also be made between power tests versus speed tests. Speed tests consist of items that most students would be able to answer correctly. However, because of the lack of time allowed to complete the test, most students would not be able to finish the entire test. In this case, testing speed becomes part of the construct of interest. Power tests typically comprise only a few relatively challenging items. A sufficient amount of time is allocated to take the test. However, because of the level of item difficulty, most students are not able to complete it.

Another common distinction that is often made among maximum performance assessments is between summative and formative tests. Summative tests are typically administered at the end of an instructional period and assess what students have learned throughout that period. Formative tests are used during the instructional process and are intended to provide feedback to be used for improving the teaching and learning process. The main difference between these types of assessment is the point in time at which they are administered.

The nature of any test will be defined by the intended uses of the test and the content objectives. Assessing giftedness, talent, and creativity requires techniques that are both innovative and diverse. Use of multiple methods or nontraditional assessment may optimize the identification and evaluation process of a small number of gifted individuals or the assessment of a large number of talented and creative individuals.

Typical Behavior Tests

Tests of typical behavior can be subdivided into tests that measure constructs such as personality, interests, and attitudes. Personality tests measure individuals' traits, dispositions, and behaviors that define constructs such as leadership, extraversion, and self-discipline. Interest inventories are typically used for occupational purposes and measure the degree to which individuals prefer certain activities over others. Tests can also be used to measure individuals' positive or negative tendency toward some thing such as an object, a person, an event, or a product. These attitudinal tests measure both agreement and disagreement with the attitude of interest.

Item Types and Cognitive Levels

Item format will determine the level(s) of cognitive ability that the test will be able to capture. Item types can measure several different levels of cognitive complexity (based on Bloom's Taxonomy). However, each item type may or may not efficiently lend itself to the various cognitive levels. Following is a description of the cognitive levels measured well or poorly by four different item types.

1. *Matching:* Matching items can be written to measure basic knowledge of a construct, some areas of comprehension (e.g., organization of information), and quantitative application abilities. Higher-order cognitive levels are difficult to measure using matching items.

2. *True/False:* Because of the 50 percent chance of guessing the correct answer, true-false questions are best suited for measuring basic knowledge of a construct.

3. *Multiple Choice:* Multiple-choice questions can readily measure basic knowledge, comprehension, and application abilities. With practice, these items can be skillfully written to measure all high-order cognitive levels.

4. *Open-Ended Performance:* Items that require a constructed response can readily test higher-order

thinking abilities, including the abilities to analyze, synthesize, and evaluate information that is difficult to measure with other item types.

Report Design

An essential component of deciding the purpose behind a test is determining how the scores of that test will be interpreted. There are two main types of test interpretation: norm-referenced tests and criterion-referenced tests. Norm referencing provides meaning by comparing examinees' scores relative to a well-defined, meaningful comparison group. Data on groups is gathered from a representative sample and is subsequently used to determine how new examinees compare with these norms. For example, norm-referenced tests can be used to evaluate students' achievement levels as they compare with students across the nation. These tests can also be used to compare results on typical behavior assessments to characteristics of reference groups. Alternatively, criterion-referenced tests provide meaning by describing what an examinee with a certain score can do. For instance, criterion-referenced tests can be used to determine a student's level of mastery of a specified content domain. They can also be used to assess an individual independently of others, such as in the evaluation of personality traits.

Standardization and Objectivity

Standardization refers to the extent to which test content, administration, and scoring procedures are the same for all students who receive scores that may be compared. Standardization is on a continuum where standardized and nonstandardized tests are on the two ends of the spectrum. A well-standardized test will have tight content specifications to ensure that multiple forms of the test cover the same content. There will be instructions for test administrators so that similar testing experiences will be provided for all examinees. It has been argued that standardization discriminates against anyone who is not considered part of the norm (e.g., those with different cognitive and perceptual, and learning methods and styles). For these reasons, it may be more appropriate, when attempting to identify and assess giftedness, creativity, and talent, to administer tests that are less standardized. In any case, the purpose behind any test will determine the degree to which it should be standardized.

The word *objective* refers to that which can be measured and observed without the influence of personal opinion or judgment. Conversely, the word *subjective* refers to an opinion or judgment that cannot be readily observed or measured. All other things being equal, tests should be as objective as possible and free from subjective opinion. However, there are many sources of subjectivity—every time a decision is made in the test development, scoring, and reporting of test scores there is some element of subjectivity—all subjectivity cannot be avoided in any testing context. In the area of giftedness, creativity and talent subjectivity may be more acceptable in the assessment process. That is, the judgment of well-qualified educators in the identification and assessment of either a small number of gifted students or the talent of a large number of average students might provide a more accurate depiction of these constructs than might an objective measure that does not allow for such personal opinion.

Reliability and Validity

The landmark of any well-developed test is the degree to which it is both reliable and valid. Reliability refers to the consistency of scores or results that a test produces across multiple administrations. Validity refers to how accurately a test measures the intended construct of interest. Although these two concepts are frequently discussed independently, they are directly related to each other. Reliability is a necessary but not sufficient condition of validity. That is, a valid measure must produce consistent results, but those results must also reflect the intended construct. The key to developing a reliable and valid test is to link all steps in the test-development process back to the original intent and purpose behind the test.

John Poggio and Brooke Nash

See also Aptitude Assessment; Artistic Assessment; Cognitive Abilities Test; Creativity Training; High-Stakes Testing; Identification; Intelligence Testing

Further Readings

Anastasi, A., & Urbina, S. (1997). *Psychological testing* (7th ed.). Upper Saddle River, NJ: Prentice Hall.

Bloom, B. S. (1954). *Taxonomy of educational objectives*. Boston: Allyn & Bacon.

Cronbach, L. J. (1990). *Essentials of psychological testing* (5th ed.). New York: Harper & Row.

Domino, G. (2000). *Psychological testing: An introduction*. Upper Saddle River, NJ: Prentice Hall.

Downing, S. M., & Haladyna, T. M. (2006). *Handbook of test development*. Mahwah, NJ: Lawrence Erlbaum.

Friedenberg, L. (1995). *Psychological testing: Design, analysis, and use*. Needham Heights, MA: Allyn & Bacon.

Gregory, R. J. (2007). *Psychological testing: History, principles, and applications* (5th ed.). Boston: Allyn & Bacon.

Test Preparation

In the 21st century, we are living in a world of tests; many important educational decisions are made based on results of tests—for example, whether or not one will receive a high school diploma, a scholarship, or an admission to a university. Test performances can be improved by appropriately using test preparation activities. Providing practice tests for the students, teaching students test-taking skills, or offering classes for students to learn particular subject matter more in depth for a test are all examples of test preparation.

Previous studies have found a statistically significant relationship between test preparation and performance on a high school graduation test. In particular, the strongest relationships are found for mathematics, where the relative effect size, phi (ϕ) was approximately 0.25 and somewhat less for other subject areas. The patterns of the relationships between test preparation and test performance were generally consistent across subgroups related to gender and ethnicity. What has been found to date by independent researchers are weak-to-modest positive relationships between preparation and performance. So the next questions are, what kinds of activities are appropriate for administrators and teachers to prepare examinees for a test? And, what should be considered when developing test preparation activities?

Before answering the questions, the meaning of test preparation needs to be discussed. Although there is no exact definition for *test preparation* in the literature, the general idea of test preparation is to assist students or test-takers to improve their test performance through a variety of activities, tools, or aids. Test preparation activities and materials can range from simple practice to in-depth instruction, but most of these activities use some form of subject-matter reviews, tests familiarization, practice with feedback, and test-taking skills.

To determine the appropriateness and suitability of particular test preparation activities, administrators and teachers should consider ethical issues related to test preparation. Test preparation should not violate ethical standards of the educational profession. For instance, leaking test questions, stealing a test, cheating, violating state-imposed security procedures regarding the content of high-stake tests, or artificially increasing students' test scores on a test without increasing students' mastery of the domain knowledge and skills are all violations of ethical standards.

Administrators, teachers, or test-givers are often in the position of developing test preparation activities. This entry describes five common activities that capture most of the important test preparation options available to the administrators, teachers, and test-givers.

Teaching the Content Domain

Teaching students the content domain of the test is the first step for test preparation. However, instruction should not be limited to the content areas that teachers know will be tested. Teachers should assess students on various aspects of the content domain and should expose students to all curriculum objectives to be mastered at their grade level. For instance, in preparing for a mathematics test, teachers should not only emphasize the content domains that are sampled on the test, but also ensure their students can use mathematical concepts and procedures, such as number and computation, algebra, geometry, and data analysis, in a variety of situations.

Providing Information for Test Format

Test format can affect students' test performance directly. Students may spend extra time on becoming

familiar with the test format before they actually start to answer the questions, or students may get nervous when they are taking a test with an unfamiliar test format. Teachers can provide students information about what the test looks like before testing, for example, a description of the item types (multiple-choice items or constructed-response items), the number of items, the number of parts in the test and the testing time. Not providing this information may affect test results negatively.

Teaching Test-Taking Skills

Although teachers should not focus mainly on teaching students how to take a test, students' test performance can be improved by teaching them appropriate test-taking skills. One critical test-taking skill is time management; teachers can teach students how to finish a test within time limits. For instance, teachers can teach students (a) to work on easy questions first and come back to hard questions later on, (b) to spend more time on hard questions, but less time on easy ones, and (c) to skip the questions that they don't know or are uncertain of the answer, and come back to them later on. Teachers can also teach students how to transfer answers to separate answer sheets, and how to eliminate obviously incorrect distracters to choose the best answer for the question.

Providing Test Practice

Preparing students for tests by conducting practice on items from parallel forms of the test can provide students with the opportunity to learn test content and vocabularies, can integrate teaching of test-taking skills, and can ensure students have had prior experience with the testing format being used. For instance, formative assessments (in class questioning, pretests, and classroom/local assessments) are provided to students to act as test practices in state assessment.

Raising Students' Morale

Teachers can let students know their belief about testing is that students' performance is mediated by students' engagement and effort and not subject to direct teacher or school control. The most important thing that teachers can do is to try to exhort students to do their best on the test. Also, teachers can encourage students to get a good night's sleep and eat a light breakfast before the test, leaving time for a last quick review of the major content areas.

Although test preparation can help students develop the skills they need to do well on tests, it is a learning tool, instead of a shortcut for students to simply receive high scores on tests. Teachers should not over-rely on the test preparation activities and put too much effort on teaching students how to take a test. Instead, teachers should focus on teaching students curriculum objectives and make sure students can master the domain of knowledge or skills that the test is supposed to reflect. Finally, we should note that test preparation activities need to be affordable and equally available to the students. There should be no limitation or restriction regarding students' socioeconomic status or ethnicity for receiving test preparation materials or resources. In some situations, lower-income students may not have the means to afford test preparation and thus are denied this opportunity. Whereas test performance is only partly correlated to test preparation, there is some advantage to having the experience. Therein may lay the greatest bias and inequity of test preparation.

John Poggio and Pui Chi Chiu

See also Curriculum Models; High-Stakes Testing; No Child Left Behind; Student Attitudes; Teacher Attitudes; Test Development

Further Readings

Gulek, C. (2003). Preparing for high-stakes testing. *Theory Into Practice, 42*(1), 42–50.

Norton, S. M., & Park, H. S. (1996, November). *Relationships between test preparation and academic performance on a statewide high school exit examination.* Paper presented at the annual meeting of the Mid-South Educational Research Association, Tuscaloosa, AL.

Popham, W. J. (1991). Appropriateness of teachers' test-preparation practices. *Educational Measurement: Issues and Practice, 10*(4), 12–15.

Smith, M. L. (1991). Meanings of test preparation. *American Educational Research Journal, 28*(3), 521–542.

Thinking Skills

Thinking is as natural a part of our lives as breathing, blinking, or swallowing. It would be logical to assume that everyone understands what is meant by the word *thinking* because we do it all the time. However, depending on the person and the context, thinking means different things to different people in different places. Change, progress, and innovation all depend on flexibility of thought. Thinking also underlies the basic elements of everyday communication: speaking, listening, reading, and writing. It is the engine of learning.

Thinking skills may refer to skills used and honed during daily goings-on, such as inquiring, problem solving, reflecting, being creative, critiquing, and so on. There are low-order thinking skills, such as remembering, comprehending, and actively listening and processing information. There are high-order thinking skills whereby people intricately question, interpret, construct, and then evaluate new knowledge. For gifted or high-ability learners, this is especially important. Educators and parents can focus on helping high-ability learners build diverse and more complete understandings of the world, giving them the skills so they can challenge their surroundings and their minds, while teaching them to formulate more complex thinking processes. This entry discusses learning and metacognition and gifted education strategies in relation to thinking skills.

Learning and Metacognition

There are various views of what constitutes learning, yet they all relate to thinking in some meaningful way. An individual acquires knowledge based on myriad experiences involving active construction within one's own mind, as it might apply to such activities as the reconstruction of prior knowledge, practical application, guided practice, technological endeavors, and collaborative effort. Each of these activities requires thinking, and this effort may take such forms as reflecting, researching, interacting with others, drawing conclusions, and building new ideas. When skills become well learned and fairly automatic, they are often transferred to new situations, thus enabling more thinking and learning to take place.

Adults can teach thinking by modeling good thinking processes, encouraging practice, and providing targeted lessons in such skills as drawing comparisons, synthesizing ideas, weighing alternatives, making decisions, and changing perspectives. Careful thinkers employ many skills: For example, they ask pertinent questions, examine beliefs and assumptions, define criteria for analysis and evaluation, assess arguments, seek proof, look for solutions, and show a willingness to adjust their viewpoints.

There are also established models of thinking instruction (for example, Benjamin Bloom's Taxonomy, Edward deBono's thinking skills program, Robert Sternberg's triarchic model). These can be employed in ways that align with learners' interests and mastery of a subject area, and at a pace that is commensurate with their abilities. The learning can be integrated into curriculum-based activities and resources, with support and guidance involving a flexible approach, collaborative endeavors, and ongoing communication.

Being able to capitalize on knowledge efficiently and insightfully demands thinking about issues, events, acquired information, and problems in intricate ways, by distinguishing relevant information, and also combining and applying it meaningfully. Goal-directed thinking (which focuses on a desired outcome while working to comprehend, assess, or resolve matters) may involve such skills as focusing on reason, being precise, distinguishing between fact and opinion, seeking knowledge, and being aware of one's own biases. Scientific thinking (which demands such specific skills as drawing hypotheses, analyzing data, finding patterns, and devising recommendations based on solid evidence) empowers one to make discoveries by vision and logic, or creating order from chaos. Metacognition, or thinking about thinking, can also be taught. By monitoring and self-regulating one's cognitive processes, and by sharing and valuing one's own thoughts and proficiencies (e.g., memory, comprehension, elaboration, and other processes), one can become a developer, a gatekeeper, a collaborator, and a dreamer—in short, someone better able to tap into curiosity and both explore and extend the sense of wonder, linking ideas to experiences, informational sources, perspectives, and other modes of thought. Perhaps this is thinking at its finest.

Gifted Education: Strategies for Parents and Teachers

Adults who live and work with gifted or high-ability learners should consider their own reasoning, and plan how they want to teach and promote thinking skills—in various settings, both in isolation and as part of more general educational approaches. They can reflect on specific elements of programming such as structure, scaffolding, task design, risk-taking, and assessment elements and figure out how best to integrate choice and authentic (real world) issues to stimulate thought. They can also foster reflective habits of mind by encouraging children to engage in inquiry. (How can I be sure? What are the consequences? What if I tried this instead? When/why is it necessary to? Where can I find out more?) Adults can teach children to be convergent thinkers (learning how to narrow possibilities), divergent thinkers (devising many possible solutions to problems), and lateral thinkers (moving away from one way of looking at things). Another strategy is to encourage subject-specific thinking (skills consciously applied to a specific area or topic) and more wide-range thinking (where the whole world awaits one's exploration and introspection). Adults can also help children learn about self-assessment, and guide them so they can make explicit connections to previous experiences and knowledge bases. In this way, children can learn to set and monitor performance goals for themselves, and they will be well on their way to being able to think more broadly, reflectively, and astutely. These are prerequisites for high-level expertise.

Joanne F. Foster

See also Cognitive Abilities; Creative Problem Solving; Creativity Training; Critical Thinking; Divergent Thinking; Triarchic Theory

Further Readings

Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York: Random House.

Matthews, D. J., & Foster, J. F. (2005). *Being smart about gifted children: A guidebook for parents and educators*. Scottsdale, AZ: Great Potential Press.

Woolfolk, A. E., Winne, P. H., & Perry, N. E. (2005). *Educational psychology* (3rd Canadian ed.). Boston: Pearson Custom Publishing.

Torrance Center for Creativity and Talent Development

In 1966, E. Paul Torrance returned to his home state of Georgia to take up the mantle of department head of the newly merged department of Educational Psychology, Research, Measurement, and Statistics at the University of Georgia. He brought with him his extensive work in creativity and the renamed Torrance Tests of Creative Thinking née Minnesota Tests of Creative Thinking. During his time at the University of Georgia, he continued and expanded his work in creativity, developing the following four areas of inquiry: the Future Problem Solving Program, the incubation model of creative teaching, the eponymous tests, and the international collaborations with others interested in creativity research.

In 1984, when Torrance retired, Mary Frasier, a colleague of Torrance's, founded the Torrance Center for Creative and Future Studies in the College of Education at the University of Georgia. The center was established to carry on Torrance's work of identifying and developing creativity, giftedness, and talent in individuals. The Center, which was renamed in 2001 as the Torrance Center for Creativity and Talent Development, has served many students, families, teachers, schools, and scholars in its trifold mission of education, service, and research, as described in this entry.

In 2003, when he passed away, Torrance left money to the center to enable it to continue its work. He established separate funds for the center's operation, the annual lecture, and an endowed professorship. Housed in the Department of Educational Psychology and Instructional Technology, the Torrance Center works through the department and college to serve a local, state, national, and international constituency.

The programs that are supported by the Torrance Center include direct service programs for children from kindergarten through high school. These programs, which are held on weekends and in the summer, comprise a variety of offerings for students of various ages, interests, and talent levels. Each program charges tuition, but there are full and partial scholarships available. From the

Challenge Program, which offers enrichment opportunities to elementary students, to the Talent Identification Program (TIP), which offers challenging classes on the university campus, students are given opportunities to study topics and in ways that they would not ordinarily do in the regular classroom. In spring 2009, the Torrance Center started offering Saturday programs, called Academic Adventures, for students who have participated in the Duke fourth- and fifth-grade Talent Search. The Torrance Center now has a coordinator of educational programs, Elizabeth Connell, and additional programs are in development.

In addition to serving children and their families, the educational programs serve as a training ground for potential teachers and researchers who aspire to work with such students. University students and faculty from throughout the university participate in teaching the children and adolescents and investigating better ways to identify and nurture their talents.

The center also conducts regular training to prepare and update educators on skills such as administering and scoring the Torrance Tests of Creative Thinking, or the various components of coaching students in the Future Problem Solving Program, both creations of Torrance. Longer-term training sessions, each lasting for several weeks, have educated teachers from Korea about identifying and teaching gifted and creative students.

The Torrance Center sponsors a yearly Torrance Lecture, which has brought outstanding national and international speakers to the University of Georgia campus to discuss current creativity research and practices. Recent lecturers have included Dean Keith Simonton, Joseph Renzulli, June Maker, Mark Runco, and Terry Kay.

In the interest of sharing existing knowledge and creating new knowledge, the center maintains a small library with tests, articles, and books related to creativity. It also supports a visiting scholar program for individuals from around the world to work with faculty and resources in the center as well as the much larger collection of resources established by Torrance and housed in the Hargrett Rare Books Library of the University of Georgia main library. Scholars have come from Russia, Korea, Portugal, Egypt, and Turkey in recent years.

In 2008, the center hosted its first international creativity conference at the University of Georgia's Costa Rica campus. For 5 days, individuals from around the world and the United States shared insights, research, and programs related to creativity at an ecological campus on the edge of the cloud forest. This conference is planned to be a biennial event held during universities' winter break in January.

Also in 2008, the Torrance Center was able to hire the first endowed E. Paul Torrance Professor of Creative Studies and Gifted Education, Mark Runco. Runco, who is also the Torrance Center Director, has bolstered the research power of the Torrance Center with his role, which is strongly dedicated to research and development. As founder and editor, he has moved the *Creativity Research Journal* to the Torrance Center.

Bonnie Cramond

See also Creativity, Definition; Torrance Tests of Creative Thinking

Further Readings

Cramond, B. (in press). The life and contributions of E. Paul Torrance. In T. Coste (Ed.), *Recreating creativity.* Austin, TX: American Creativity Association Press.

Hébert, T. P., Cramond, B., Millar, G., & Silvian, A. F. (2002). *E. Paul Torrance: His life, accomplishments, and legacy* (RM02152). Storrs: National Research Center on the Gifted and Talented, University of Connecticut.

Millar, G. (2007). *E. Paul Torrance, "The creativity man": An authorized biography.* Bensenville, IL: Scholastic Testing Service.

Torrance, E. P., & Safter, H. T. (1990). *The incubation model of teaching: Getting beyond the aha!* Buffalo, NY: Bearly.

Torrance Center for Creativity and Talent Development: http://www.coe.uga.edu/torrance/index.html

Torrance Tests of Creative Thinking

The Torrance Tests of Creative Thinking (TTCT), described in this entry, are a battery of tests that are designed to assess creative thinking abilities in individuals from kindergarten to adulthood.

Published since 1962 by Scholastic Testing Service (STS), the figural and verbal tests are more than tests of divergent thinking. They also assess creative strengths and dispositions that may be expressed through the activities. These strengths and dispositions include humor, resistance to premature closure, and emotional expressiveness, among others. The tests do not measure motivation, skill, temperament, or any number of other factors that play a part in creative productivity. However, the same could be said of other aptitude and achievement measures. IQ tests certainly do not measure motivation to use the intelligence.

What *is* important is how well the tests measure what they purport to measure and how useful they are to educators and researchers. Several studies affirm the TTCT's predictive validity, most recently the results of the 40-year follow-up of elementary children given the tests in 1958 who were contacted in 1998 to assess their creative achievements in adulthood. So, evidence indicates that they are useful as predictors of creativity. Also, the reliability of the tests indicates strong internal consistency. Interrater reliability studies that are routinely performed in the STS Scoring Center and by the Torrance Center illustrate that trained scorers routinely obtain reliability coefficients showing agreement of greater than 90 percent. Finally, in the 50 years since they were created, the TTCT have been translated into more than 35 languages and have been used around the world. Their lasting and widespread use is further evidence of their efficacy.

To further make the case for the usefulness of the tests, we can look at E. Paul Torrance's reasons for developing them. In 1943, Torrance was a counselor and high school teacher, he read *Square Pegs in Square Holes* by Margaret Broadley, and he was struck by her description of children who don't fit into the school environment as "wild colts" who must have their energy directed toward positive pursuits. She wrote that unless this energy is used and directed into the right channels, it is a problem, but well-directed and developed, the aptitude can lead individuals in outstanding creative work. Torrance's career was interrupted by military service in the U.S. Army. He was appointed to head a task force to study factors in fighter interceptor effectiveness in Korea with particular emphasis on the jet aces, and he found that the outstanding aces were also like wild colts but had learned discipline to adapt successfully in the Air Force and learn how to survive. Seven years of experience in Air Force survival research gave Torrance many insights about creativity and training to behave creatively in response to emergencies and extreme conditions.

Moreover, Torrance believed that everyone has creativity, and it can be nurtured. When U.S. education was making its first response to *Sputnik,* he was designing tests to measure this special ability, creativity. Torrance was concerned that creative individuals are being overlooked and even undermined psychologically for lack of widespread use of creativity detection instruments. Thus, he designed the tests to measure creative thinking abilities so that they could be enhanced in everyone. The TTCT, especially the figural, are culture-fair tests that can be administered to individuals of all ages, cultures, and socioeconomic statuses to highlight their abilities. The tests were seen as a means of assessing the effectiveness of creativity training, understanding the human mind, and assisting with curriculum design and psychotherapy.

The verbal tests consist of six activities that take approximately one hour to administer. The respondents are requested to ask questions, guess causes, predict consequences, improve a product, think of new uses for a common object, and reason in a hypothetical situation. The figural tests consist of three activities and take approximately 45 minutes to administer. The respondents are given 10 minutes each to add details to black-and-white shapes and abstract line drawings to make something out of them. The instructions for the activities are designed to motivate the respondents to give creative responses by instructing them to give many, unusual, detailed ideas. Torrance found that performance on the verbal and figural tests show almost no relationship, which indicates that the verbal and figural tests measure different areas. In addition, Torrance has developed other creativity tests to measure creativity in other areas such as *Thinking Creatively With Sounds and Words* (TCSW) and *Thinking Creatively in Action and Movement* (TCAM).

Among Torrance's creativity tests, the TTCT, the TCSW, and the TCAM are in widespread and worldwide use because they have good reliability, have proven validity, are easy to use, and are neutral regarding a wide variety of factors such as

gender, race, community status, language, and culture. The TTCT are most often used as part of a multiple criteria approach to identifying students for gifted programs. The recent and growing emphasis on identifying a broad array of talents in a diverse population of students has increased interest in assessments such as the TTCT. Also, because Torrance was originally interested in creative students, wild colts who were often in trouble in schools, the TTCT may be particularly useful for discovering and redirecting such children's energies and talents toward more positive pursuits.

Torrance's creativity tests are useful to assess creativity in a wide variety of situations and for a wide variety of age groups from as young as age 3 to adults. The TTCT, the TCSW, and the TCAM are good measures for identifying and educating the gifted and for discovering and encouraging creativity in everyday life in the general population.

Bonnie Cramond and Kyung Hee Kim

See also Creative Productivity; Creativity Assessment; Creativity Training; Torrance Center for Creativity and Talent Development

Further Readings

Cramond, B., Matthews-Morgan, J., Bandalos, D., & Zuo, L. (2005). A report on the 40-year follow-up of the Torrance Tests of Creative Thinking: Alive and well in the new millennium. *Gifted Child Quarterly, 49,* 283–291.

Millar, G. W. (2007). *E. Paul Torrance, "The creativity man": An authorized biography.* Bensenville, IL: Scholastic Testing Service.

Scholastic Testing Service: http://www.ststesting.com

Torrance, E. P. (1966). *Torrance tests of creative thinking: Norms-technical manual* (Research ed.). Princeton, NJ: Personnel Press.

Torrance, E. P. (1971). Are the Torrance Tests of Creative Thinking biased against or in favor of "disadvantaged" groups? *Gifted Child Quarterly, 15,* 75–80.

Torrance, E. P. (1977). *Discovery and nurturance of giftedness in the culturally different.* Reston, VA: ERIC Clearinghouse on Handicapped and Gifted Children. (ERIC document Reproduction Service No. ED145621)

Torrance, E. P. (1995). Rationale of creativity tests. In E. P. Torrance (Ed.), *Why fly? A philosophy of creativity* (pp. 83–99). Norwood, NJ: Ablex.

Torrance, E. P. (2008). *Torrance Tests of Creative Thinking: Norms-technical manual.* Figural (Streamlined) Forms A&B. Bensenville, IL: Scholastic Testing Service.

Torrance, E. P. (2008). *Torrance Tests of Creative Thinking: Norms-technical manual.* Verbal Forms A&B. Bensenville, IL: Scholastic Testing Service.

Transpersonal Psychology

Transpersonal is defined as extending or going beyond the personal and individual. As described in this entry, transpersonal psychology grew out of humanistic psychology, which emphasized positive psychological health and self-actualization, that is, the realization of human potential. Self-actualization is much more than self-fulfillment. Abraham H. Maslow introduced it as the ideal norm of robust mental health, contrasting it with the norms based on what is average, which he found deficient. He described the characteristics of self-actualizing individuals in rich detail. Among the most salient are the following: problem centering (focusing on problems outside oneself); autonomy and will (independence of culture and environment); the mystic experience and the peak experience; *Gemeinshchaftsgefühl* (a sense of fellowship with all human beings); democratic character structure (some basic respect for all human beings); discrimination between means and ends ("they do right and they do not do wrong"); resistance to enculturation and the transcendence of any particular culture. The transpersonal component is represented by mystical and peak experiences: uplifting experiences of expanded consciousness of "limitless horizons," connectedness, loss of self (transcendence), and unity of everything. In other words, these transpersonal experiences go beyond self-actualization, beyond the personal and individual.

Maslow suggested transpersonal psychology as a field that would explore these "far reaches of human nature." Transpersonal psychology was founded in 1969 with the launching of the *Journal of Transpersonal Psychology.* The field is devoted to bringing together Western and Eastern psychologies (especially through the work of Ken Wilber), exploring varieties of spiritual experiences, methods of healing, and meditation techniques.

William James can be said to be the forerunner of transpersonal psychology. From his study of spiritually gifted people, James concluded that the visible world is part of an invisible spiritual universe. Communion with that universe gives zest, infusion of energy and enthusiasm, and a loving attitude toward others. Consequently, although the spiritual universe remains unseen, it nevertheless produces real observable effects. Therefore, if the unseen can produce real effects, it must be real, too.

One of the founders of transpersonal psychology was Roberto Assagioli who developed psychosynthesis in contrast to psychoanalysis. Psychoanalysis is limited to investigating the subconscious and unconscious layers of the psyche, so Assagioli stressed that the psyche also had a higher, superconscious sphere and within it the individual's higher self as the source of energy and creativity. Assagioli developed techniques for personal and spiritual growth designed to bring about the integration of disparate parts of the psyche expressed as different facets of personality, or to use his word, "subpersonalities."

Assagioli designed numerous scenarios for guided imagery. His work has been extended by Piero Ferrucci. Psychosynthesis techniques have been also adapted for young children.

Psychosynthesis techniques may work well with gifted children and adolescents who have the capacity for concentration, vivid visualization, and absorption in the imaginal experience. Imaginal experience is visualization with a full spectrum of sensory experience. In other words, the act of imagining oneself riding a horse cantering on a beach creates all the sensations of feeling the horse, smelling its scent and the sea, feeling the water splashed on one, hearing the sound of the horse's hoofs on the sand, the sound of the ocean waves, feeling the warmth of the sun, the wind, and so on.

Gifted children may be capable of having transpersonal experiences when they become deeply absorbed in experiential exercises or when they participate in a visualization. On such occasions, spiritual experiences may take place involving an encounter with a wise person or a spiritual figure. Another kind of imaginal experience is shapeshifting—experiencing oneself as something else. Consciousness seems to transfer into an animal or natural object (e.g., water, air, a tree) and the individual experiences things as that animal or object. For example: "When I became the water I traveled fast through the canal and could feel myself partially scraping against the sides and the bottom of the wet soil. To come back I had to come back to myself from where it was I first became the water. My soul then transferred back to my body."

Psychosynthesis exercises and guided imagery for gifted children and adolescents may enable them to exercise their imagination in an atmosphere of acceptance.

Michael M. Piechowski

See also Self-Actualization; Spiritual Intelligence; Spirituality

Further Readings

Assagioli, R. (1965). *Psychosynthesis*. New York: Viking.
Ferrucci, P. (1982). *What we may be: Techniques for psychological and spiritual growth through psychosynthesis*. New York: Jeremy P. Tarcher.
Hart, T., Nelson, P. L., & Puhakka, K. (Eds.). (2000). *Transpersonal knowing: Exploring the horizon of consciousness*. Albany: State University of New York Press.
James, W. (1902). *The varieties of religious experience*. New York: Longmans.
Maslow, A. H. (1970). *Motivation and personality* (2nd ed.). New York: Harper & Row.
Piechowski, M. M. (2006). *"Mellow out," they say. If I only could. Intensities and sensitivities of the young and bright*. Madison, WI: Yunasa Books.
Wilber, K. (1986). *Up from Eden: A transpersonal view of human evolution*. Boulder, CO: Shambhala.

Triarchic Theory

The *triarchic theory of successful intelligence* represents a way of understanding intelligence in broader terms than is the case for traditional theories of intelligence. The theory is called "triarchic" because, as explained in this entry, it has three parts, or subtheories. The theory views intelligence as a synthesis of analytical, creative, and practical skills.

Defining Intelligence

Intelligence is the ability to achieve success in life as defined by one's personal standards, within one's life context. The field of intelligence has, for the most part, produced tests that stress the academic aspect of intelligence, as one might expect, given the origins of modern intelligence testing in Alfred Binet and Theodore Simon's work at the beginning of the 20th century in designing an instrument that would distinguish children who would succeed from those who would fail in school. But the construct of intelligence needs to serve a broader purpose, accounting for the bases of success in all of one's life. Joseph Renzulli has pointed out that many children are gifted in school, but not in life. It is therefore important to define intelligence and giftedness in intelligence in the broader context of potential life, rather than just school, accomplishments.

One's ability to achieve success depends on one's capitalizing on one's strengths and correcting or compensating for one's weaknesses. Theories of intelligence typically specify some relatively fixed set of abilities. Such a specification is useful in establishing a common set of skills to be tested. But people achieve success, even within a given occupation, in many different ways. For example, successful teachers achieve success through many different blendings of skills rather than through any single formula that works for all of them. One teacher might excel in lecturing, another in leading seminars, another in supervising independent projects, another in raising students' self-esteem, and so forth. There is no one fixed set of abilities that constitutes the basis for giftedness in teaching. Different teachers bring different gifts to their teaching and excel in different ways.

Balancing of abilities is achieved to adapt to, shape, and select environments. Definitions of intelligence traditionally have emphasized the role of adaptation to the environment. But intelligence involves not only modifying oneself to suit the environment (adaptation), but also modifying the environment to suit oneself (shaping), and sometimes, finding a new environment that is a better match to one's skills, values, or desires (selection). For example, when someone takes a new job, that person is selecting a new environment in which to work. One needs to adapt by figuring out the rules and customs in the new employment setting and how to make oneself fit with them. But a person likely also wants to shape the environment, and make it a better place for himself or herself and others. For example, the person might have suggestions about how the work environment could be made a more rewarding one for himself or herself and other employees.

Success is attained through a balance of analytical, creative, and practical abilities. Analytical abilities are the abilities primarily measured by traditional tests of abilities. But success in life requires one to analyze one's own ideas as well as the ideas of others and to generate creative ideas and persuade other people of their value. This practical necessity occurs in the world of work, as when a subordinate tries to convince a superior of the value of his or her plan; in the world of personal relationships, as when a child attempts to convince a parent to do what he or she wants or when a spouse tries to convince the other spouse to do things his or her preferred way; and in the world of the school, as when a student writes an essay arguing for a point of view. People who are extremely gifted in one way but lacking in other abilities may be at risk in their life courses. For example, no matter how creative one is, if one cannot persuade others of the value of one's ideas, one may find oneself being frustrated in attempts to achieve acceptance of one's ideas.

Information-Processing Components

According to the triarchic theory of successful intelligence, a common set of mental processes underlies all aspects of intelligence. These processes are viewed as universal. For example, although the solutions to problems that are considered intelligent in one culture may be different from the solutions considered to be intelligent in another culture, the need to figure out the nature of the problems facing one and to devise strategies to solve these problems exists in all cultures.

Metacomponents

Metacomponents, or executive processes, plan what to do, monitor things as they are being done, and evaluate things after they are done. Examples of metacomponents are recognizing the existence of a problem, defining the nature of the problem, deciding on a strategy for solving the problem,

monitoring the solution of the problem, and evaluating the solution after the problem is solved.

Consider an example. Suppose someone's car is not working well, despite having put a lot of money into repairing it. Recognizing the existence of the problem means that the person knows that he or she has a problem, namely, that the investments in the car are not paying off. Defining the problem means figuring out why: Is it a bad car-repair shop, or is the car just too old to be repaired properly, or are the weather conditions unusually harsh, or what? Deciding on a strategy means figuring out what to do: keep trying to repair the car, perhaps at a new car-repair shop; buy a new car; buy a used car; lease a car; and so forth. Monitoring the solution means that, as one tries to solve the car problem, one continually asks oneself whether one is on the right track. Evaluating the solution means looking at how whatever one has decided to do has worked. For example, if the decision is to keep the car, will that mean continuing to pay a lot for repairs? If the decision is to buy a new car, is the new car working better?

Performance Components

Performance components execute the instructions of the metacomponents. For example, inference is used to decide how two stimuli are related, and application is used to apply what one has inferred. Other examples of performance components are comparison of stimuli, justification of a given response as adequate although not ideal, and actually making the response. For example, in deciding between two cars a person is considering buying, she likely will compare them in some detail. She may also infer things about the cars, such as how likely she is to enjoy driving them. In the end, she might decide that neither car is ideal, but that given her budget, she cannot afford the ideal car. So she might attempt to justify to herself that the car she is buying is the best she can do, given her financial circumstances.

Knowledge-Acquisition Components

Knowledge-acquisition components are used to learn how to solve problems or simply to acquire knowledge in the first place. Selective encoding is used to decide what information is relevant in the context of one's learning. Selective comparison is used to bring old information to bear on new problems. And selective combination is used to put together the selectively encoded and compared information into a single and sometimes insightful solution to a problem.

For example, suppose someone is about to take a written driver's test. He realizes that he cannot memorize everything in the driver's information book. So he selectively encodes what information he believes is most important and that therefore he is most likely to be tested on. He might also selectively compare what he read to what he already knows, especially if he has moved from one state to another. Sometimes, there are differences in laws from one state to another, and keeping track of changes might help him to avoid committing infractions in the new state that would not have been infractions in the former state.

Although the same processes are used for all three aspects of intelligence universally, these processes are applied to different kinds of tasks and situations depending on whether a given problem requires analytical thinking, creative thinking, practical thinking, or a combination of these kinds of thinking. In particular, analytical thinking is invoked when components are applied to fairly familiar kinds of problems abstracted from everyday life. Creative thinking is invoked when the components are applied to relatively novel kinds of tasks or situations. Practical thinking is invoked when the components are applied to experience to adapt to, shape, and select environments.

For example, someone may be good at solving textbook mathematics problems, but have more difficulty applying the principles to real-life math problems, or vice versa. The person thus might be better at the analytical aspect or the practical aspect, with the difference reflected in which kind of problem the person finds easier to solve. Jean Lave has found that housewives who are able to compute which of two products in a supermarket is a better buy are not necessarily able to do the same computations when they are presented in a paper-and-pencil, academic format.

What Does the Theory Predict?

A reasonable question to ask would be whether the theory actually can predict anything useful.

Researchers have done many different kinds of investigations to address this question.

For example, in one set of studies, people around the world were queried about what their beliefs are regarding the nature of intelligence. It turns out that different cultures, and even different ethnic groups within a culture, often have quite different conceptions of what it means to be intelligent. In many countries, especially in the developing world, social and practical skills are considered much more important to intelligence than are academic skills. These views may reflect less emphasis on academic training. But they also may reflect an awareness that performance in real-world jobs is not fully predicted by academic success.

Robert Sternberg and his colleagues studied performance in diverse real-world jobs in the United States. They were particularly interested in the relationship of both academic and practical kinds of skills to job performance. Like Frank Schmidt and John Hunter, Sternberg and his colleagues found that the kinds of more academic skills measured by conventional ability tests matter for real-world job performance. But they also found that practical aspects of intelligence predicted job performance, independently of more academic skills. Understanding other people and how to relate to them, for example, are important for job success, but are not measured by conventional ability tests.

In another set of studies, Sternberg and his colleagues asked how adding creative and practical predictors might affect the college-admissions process. They tested more than a thousand high school seniors and college freshmen, assessing creative and practical in addition to analytical skills. For example, in assessments of creative skills, students might be asked to write a story with a title such as "Beyond the Edge" or "The Octopus's Sneakers," be asked to tell a story about a picture of athletes, or be asked to caption a cartoon. In assessments of practical skills, the students might be asked how to solve an everyday problem, such as what to do if one eats in a restaurant and then finds one does not have the money to pay for the meal, or how to get a bed up to a bedroom when the bed does not fit up a winding staircase. The results showed that using such assessments doubled prediction of freshman grade-point average, and substantially reduced differences in test scores between members of diverse ethnic groups, such as African Americans, Anglo Americans, Hispanic Americans, and Asian Americans.

In sum, the triarchic theory of successful intelligence provides a broader framework in which to understand human intelligence. It does so by considering the analytical abilities measured by traditional tests, as well as creative and practical abilities. A gifted individual can be gifted by virtue of excellence in any one or more of these three abilities, or by virtue of having found a way of particularly well capitalizing on strengths and/or compensating for or correcting weaknesses.

Robert J. Sternberg

See also Academic Talent; Aptitude Assessment; Creative Process; Critical Thinking; Intelligence; Intelligence Theories; Thinking Skills

Further Readings

Cianciolo, A. T., & Sternberg, R. J. (2004). *A brief history of intelligence.* Malden, MA: Blackwell.

Hunter, J. B., & Schmidt, F. L. (1984). Validity and utility of alternative predictors of job performance. *Psychological Bulletin, 96.*

Sternberg, R. J. (Ed.). (2000). *Handbook of intelligence.* New York: Cambridge University Press.

Sternberg, R. J. (2003). *Wisdom, intelligence, and creativity synthesized.* New York: Cambridge University Press.

Sternberg, R. J. (Ed.). (2004). *International handbook of intelligence.* New York: Cambridge University Press.

Sternberg, R. J., & Grigorenko, E. L. (2007). *Teaching for successful intelligence* (2nd ed.). Thousand Oaks, CA: Corwin Press.

Twice Exceptional

Although there is no formal, agreed-upon definition of *twice exceptional,* this term is commonly used to refer to children who have two seemingly contradictory sets of traits: those related to their high intellectual or artistic abilities, and those related to their limitations or deficits. Another term often applied to this group is *gifted/learning disabled,* although not all

twice-exceptional children are formally diagnosed with learning disabilities. Those who are may have one or more diagnoses such as dyslexia, central auditory-processing disorder, visual-processing disorder, attention deficit disorder (with or without hyperactivity), Asperger's syndrome, obsessive/compulsive disorder, sensory-processing disorder, and Tourette's syndrome.

The exact number of twice-exceptional children is unknown. Estimates vary greatly, from 2 to 5 percent of all gifted children to as high as 20 percent. This entry discusses twice-exceptional children.

Characteristics

Because the causes of twice exceptionality are so varied, there can be no single profile of a twice-exceptional child. Children identified as twice exceptional can exhibit a wide range of traits, many of them typical of gifted children. In general, those who are twice exceptional, like other gifted children, show greater asynchrony than average children (that is, a larger gap between mental age and physical age). They are often intense, with a highly developed sense of curiosity and an unusual sense of humor. Also like other gifted children, they tend to be highly sensitive to their emotional and physical environments, and to display keen observation skills, an ability to remember large amounts of information, and advanced vocabularies and use of language.

Along with these traits, twice-exceptional children have deficits that may interfere with their ability to perform the tasks that classroom learning requires. Among the deficits may be the following:

- Limited short-term memory
- A poor sense of time and difficulty following a schedule
- Language-based disorders that can interfere with some or all of the following: reading, writing, verbal expression, and mathematics
- Difficulty focusing attention on subjects or tasks not of their choosing
- Fine or gross motor skills that are not well developed
- Processing disorders that make it hard to interpret visual or auditory information
- An inability to correctly interpret social cues, such as facial expressions and tone of voice
- Sensory processing difficulties that make it hard to organize and interpret information received through the senses of touch, taste, smell, sight, and sound, as well as through the placement and movement of their bodies.

Combination of Strengths and Weaknesses

The combination of exceptional strengths and weaknesses in a single individual results in inconsistency and often leads to a child who is misunderstood. His grades can alternate between high and low, sometimes within the same subject. She might have plenty to say but is unable to organize and express those thoughts on paper. He might do careful artwork but turn in assignments that are sloppy or illegible. She might complete assignments but is unable to keep track of them and remember to turn them in.

A disadvantage that twice-exceptional children face is that their disabilities or deficits are often not apparent to those around them. The twice-exceptional student may appear to be uninterested, lazy, distracted, or disruptive. He or she might present any of the three profiles that researcher and educator Susan Baum has identified: bright but not trying hard enough, learning disabled but with no exceptional abilities, or just average. In each situation, the twice-exceptional student's strengths are helping compensate for deficits; the deficits, however, are making the child's strengths less apparent.

It can be easy to assume that these children could do better if they tried. The reality for many twice-exceptional children is that they may be working as hard or even harder than others, but with fewer results to show for their efforts.

This struggle to accomplish tasks that appear easy for other students can leave twice-exceptional children with little enthusiasm or energy for schoolwork, and it can lead them to become frustrated, anxious, and depressed. Furthermore, because these children rarely meet the expectations others have for them, and that they may have for themselves, their self-esteem often suffers.

Identification

When their children are young, parents are often unaware that they have a twice-exceptional child. At home, many of these children seem bright, with

varied interests and advanced vocabularies. School is usually where problems first appear.

Teachers may notice social difficulties first. The twice-exceptional child may find it hard to make friends and fit in. Academic problems, however, may not arise until later. Transitions are common times for children to be identified as twice exceptional, such as entering third grade—when reading, writing, and organization skills become more important—or entering middle school, high school, or even college. As work demands increase, teachers may see a drop in performance or an increase in problem behaviors. Assignments may be inadequate, late, or missing. Neatness, organization, and poor time management may become obstacles to good grades. Behavior issues may surface or increase. Teachers might see that the child is unable to sit still and work quietly, plays the class clown, or has trouble controlling anger or frustration; or teachers might see that the child has withdrawn, showing reluctance to speak out or take other risks in class.

These difficulties spread from classroom to home, as parents start to see disappointing report cards and requests for teacher/parent conferences. A common result is that parents take on new, and often stressful, roles: academic tutor, behavior coach, or homework supervisor.

If these difficulties persist, school personnel or parents may decide that testing and evaluation are necessary to determine the cause. This assessment may be done by school district personnel, or parents may choose to have it done by independent professionals. In either case, it is important that the professionals who take part in the process are knowledgeable about giftedness. Some characteristics of giftedness can look much like those of a learning disability or disorder and, as a result, gifted children are sometimes incorrectly diagnosed.

Assessment may include achievement tests to assess strengths and weaknesses in subject areas such as reading, math, and spelling; and IQ testing to identify strengths and weaknesses in cognitive areas. The process might also include neuropsychological evaluation to examine multiple areas of functioning such as memory; executive function; visual, perceptual, and motor functions; and language function. Social-emotional testing may also be included. In addition, functional behavioral assessment may be performed to look at causes of, and ways to address, problem behavior. Parents may also take their children for physical examinations that include hearing and vision screenings.

When assessments are complete, the results should indicate what the child's strengths and weaknesses are and identify whether any disorders or learning disabilities are present. In addition, the results often include a report that states what the child needs to build on the strengths and compensate for the weaknesses identified by the assessment.

Teaching the Twice-Exceptional Student

Finding effective strategies to use with twice-exceptional students can present a challenge because of the variation in both the ways in which children can be gifted and the types of learning problems they can have. Teachers may need to try various strategies before discovering those that work for a particular student. Research, program evaluation, and practice show, however, that effective strategies for teaching twice-exceptional children share characteristics such as these:

- They are creative and flexible.
- They involve teamwork between gifted and special education teachers.
- They give students opportunities to interact with twice-exceptional peers.
- They lead students to a better understanding of their abilities, their limitations, and how they learn best.
- They build on the students' strengths, talents, and interests.

Teachers find that twice-exceptional students tend to learn best when given work that engages multiple senses, challenges their intellectual abilities, and offers opportunities for hands-on learning. Success often comes from project-based assignments that build on the students' interests and offer an outlet for their creative abilities. One study by Robert Sternberg showed that twice-exceptional students outperformed their brightest peers in focusing for long periods on complex projects when teachers gave assignments matched to the twice-exceptional students' particular interests and abilities.

An important requirement for success for twice-exceptional students is support. Along with

encouragement, other essential forms of support are compensation strategies and accommodations in their areas of weakness. Examples of useful compensation strategies to teach twice-exceptional students are problem-solving approaches, time-management skills, organizational techniques, note-taking and study skills, and social skills training. Examples of accommodations these students might require are as follows: allowing keyboarding in place of handwriting; more time to complete schoolwork and tests; reduced homework; preferred seating; guided notes or a note-taker; and the use of assistive technology such as electronic spellers, scanning and reading software, and reading pens. In combination, these forms of support help minimize the effects of disabilities or deficits and move the students toward self-confidence and independence in learning. Such support may be given informally on an as-needed basis or may be formally put in place by means of an Individual Education Plan (IEP) or other type of plan.

Raising the Twice-Exceptional Child

Parents of twice-exceptional children face a number of challenges. Among them is the challenge to go beyond the easy explanation that a child is lazy or careless, or an underachiever or troublemaker, to discover what the underlying cause of the behaviors might be. Sometimes it takes considerable time and money to search for professionals who have the skills, experience, and insight needed to accurately assess a child's strengths and weaknesses and then provide the help the child needs.

Another challenge for parents is coming to terms with their child's twice-exceptionality. Few twice-exceptional children match the stereotypical image of a gifted child. Because their academic performance is often uneven, they tend not to be the award winners and high achievers. It may be hard for parents, as well as other relatives and twice-exceptional children themselves, to give up that traditional view of academic success.

A third challenge is finding the right learning environment for a twice-exceptional child. Public and private schools that offer programs combining the appropriate levels of challenge and support for these learners are in the minority. For this reason, a number of parents choose alternative options for educating their children, including homeschooling and virtual (Internet-based) schools.

Parents will be better able to meet these challenges by educating themselves about the following topics:

- How gifts and talents shape these children
- How learning deficits/disabilities affect them
- How these two sets of characteristics come together—the blending of the child's strengths and weaknesses.

They will also find it helpful to become knowledgeable about the following:

- Professionals who can provide the medical, therapeutic, educational, and other types of services a twice-exceptional child might need
- Laws that protect the rights of individuals with disabilities (e.g., Individuals with Disabilities Education Act and Americans with Disabilities Act)
- Educational alternatives available to their children, which might include enrichment opportunities outside of school as well as school alternatives.

Joining organizations or online groups that focus directly on the needs of twice-exceptional children provides information, resources, and much-needed support for parents. This interaction with other families facing similar challenges can open possibilities for their twice-exceptional children that parents had not considered before.

Helping Twice-Exceptional Children Find Success

Twice-exceptional children need guidance from the adults in their lives in learning to understand who they are and what they need. Essential for these children is to know that there are other people just like them, many of whom have grown up to lead happy and successful lives. Furthermore, twice-exceptional children need help in learning how to advocate for themselves, that is, how to ask for the support they need. This vital skill will help these children become independent and successful in school and later in life.

Linda C. Neumann

See also Attention Deficit Hyperactivity Disorder; Depression; Differentiation; Disabilities, Gifted; Dyslexia; Self-Efficacy/Self-Esteem; Underachievement

Further Readings

Baum, S., Cooper, C., & Neu, T. (2001). Dual differentiation: An approach for meeting the curricular needs of gifted students with learning disabilities. *Psychology in the Schools, 38*(5), 477–490.

Baum, S., & Owen, S. (2004). *To be gifted & learning disabled: Strategies for helping bright students with LD, ADHD, and more*. Mansfield Center, CT: Creative Learning Press.

Eide, B., & Fernette, E. (2006). *The mislabeled child: Looking beyond behavior to find the true sources—and solutions—for children's learning challenges*. New York: Hyperion.

Levine, M. (2002). *The myth of laziness*. New York: Simon & Schuster.

Lovecky, D. (2004). *Different minds: Gifted children with AD/HD, Asperger's syndrome, and other learning deficits*. London: Jessica Kingsley.

Nielsen, M. E. (2002). Gifted students with learning disabilities: Recommendations for identification and programming. *Exceptionality, 10*(2), 93–111.

Rivero, L. (2002). *Creative home schooling: A resource guide for smart families*. Scottsdale, AZ: Great Potential Press.

Sternberg, R. (1997). What does it mean to be smart? *Educational Leadership, 54*(6), 20–24.

Webb, J. T., Amend, E. R., Webb, N. E., Goerss, J., Beljan, P., & Olenchak, F. R. (2005). *The misdiagnosis and dual diagnoses of gifted children and adults: ADHD, bipolar, OCD, Asperger's, depression, and other disorders*. Scottsdale, AZ: Great Potential Press.

Weinfeld, R., Jeweler, S., Barnes-Robinson, L., & Shevitz, B. (2006). *Smart kids with learning difficulties: Overcoming obstacles and realizing potential*. Waco, TX: Prufrock Press.

U

Underachievement

Underachievement among intellectually gifted children would appear to be an oxymoron, yet it is reasonably common to find gifted students not working up to their abilities in school. A 1983 report prepared by the National Commission on Excellence in Education pronounced that fully half of gifted children were underachieving. Although the report did not specify how the percentage was calculated, educators agree that underachievement among highly capable children is a common phenomenon, which this entry discusses.

Definitions

Definitions of underachievement involve discrepancies between abilities and achievement, but there are multiple approaches to calculating these discrepancies. Some gifted students are not provided with opportunities to work to their abilities, but others choose not to work to their abilities even when they are given opportunities. When students choose not to work to their abilities, those choices may be conscious, unconscious, or a mixture of both. Some usual definitions of underachievement are described.

Discrepancy Between School Grades and Measures of Ability

The most common underachievement problem that frustrates parents and teachers most is caused by children who have high measured ability but do not complete assignments, homework, or put forth good effort. They rarely study or prepare for tests and seem not to be motivated to learn in school. They are characteristically disorganized and forgetful, or at least claim to be forgetful. They blame teachers, parents, or others for their problems, although some describe themselves as lazy or uninterested. Their grades may vary between A's and F's, sometimes depending on whether they prefer a teacher or subject and other times with little predictability. A nationwide study by Nicholas Colangelo and Barbara Kerr of adolescents who scored in the 95th percentile on the ACT college admission test but who were receiving below average grades in school found these young people to be predominantly boys from affluent, large schools who seemed not to blame schools or teachers for their underachievement, but were unclear about goals and seemed to lack a sense of purpose.

Discrepancies Between Test Measurements of Aptitude and Achievement

Despite students' good grades, student achievement test scores may be lower than predicted by IQ test scores. Gifted children may not be exposed to curriculum that provides them with opportunities to learn material in school that provides the challenge of which they are capable. Their test scores do not show mastery of materials that other highly intelligent students have accomplished. These students typically find their work easy, but assume the ease of curriculum is related to their

giftedness, and they have become accustomed to putting forth little effort. Grades are likely very good or even excellent so that parents and teachers rarely indicate concern. When gifted children underachieve but earn excellent grades, they may confront difficult circumstances if they move to more challenging school districts or higher levels of curriculum at middle school, high school, or college because they lack experiences with academic challenge. When confronted with academic challenge, they may rise to the occasion by compensatory effort or may give up their attempts at achieving, avoid challenges, and assume they are less capable than they actually are. They can believe that their giftedness should make learning effortless.

Culturally Disadvantaged Populations

In schools where there are large populations of disadvantaged children, intellectually gifted children may go totally unrecognized. These children may do poorly on typical standardized tests of mental abilities because of differences in language and learning experiences. They may also perform poorly in school because parents and peers may not value school learning, and teachers may assume that giftedness rarely exists in such populations. Excellent logical and creative thinking, hands-on skills, unusual common sense, and rapid learning may only be exhibited outside the classroom but may be difficult to identify in school. For these students, classroom learning may seem irrelevant.

Extent

There is great variety in the extent that students underachieve. Some underachievers earn D's and F's on their report cards and underachieve so severely that unless they reverse their pattern dramatically, they are unlikely to be able to attend higher education and pursue careers commensurate with their abilities. Others only get somewhat lower grades than would be expected, but may or may not be at such high risk. With maturity and development of serious interests, it's possible for them to increase their efforts and be successful. However, depending on their career direction, their somewhat lower grades could prevent their entrance into the highly selective careers they may have preferred had they prepared well. For those who underachieved because curriculum was not appropriate but had high grades, their later accomplishments are likely to depend on their abilities to make adjustments to challenge. For those selective achievers who have achieved in some areas and underachieved in others, their later life achievement is likely to depend on the expectations of the specific career they choose. Some pay no penalty at all, but for others, career choices may be narrowed by their earlier inconsistency. For gifted underachievers who come from culturally deprived environments, many will not have the opportunities their capabilities could provide them. Others will find themselves in careers where, for the first time, their giftedness will be identified and they will be moved rapidly toward leadership positions. Their inadequate educations will, however, have served as a disadvantage for them.

School Causes

Uninteresting and undifferentiated curriculum often leads to underachievement. Curriculum that is too easy, too difficult, or unengaging can turn students away from learning. Too easy curriculum prevents students from experiencing self-efficacy and understanding how to make strong efforts. Too difficult curriculum may cause children to lose confidence in their abilities to achieve. Students who are perfectionistic or are not resilient in competition may not achieve well in highly competitive environments, but others may thrive in similar environments. Peers within the classroom also make a difference. Gifted children benefit by learning with other children who have similarly high abilities and interests and who value learning. Peer pressures that alienate good students can distract students from learning because of fears that their good grades and intellectual interests prevent their social acceptance. Thus, peer pressures can initiate students' underachievement.

Home Causes

When parents value education and respect teachers, children are much more likely to achieve in school. Parents who come from cultural or

economic disadvantage may or may not have had good school experiences. The interpretation of their own learning experiences makes a difference in the educational expectations they have for their children. A more subtle problem arises when parents differ from each other with regard to their children's education. One parent may expect more effort and higher grades than the other. When parents oppose each other and give their children differing expectations regarding school effort, children who are faced with challenges and lack self-efficacy may view the parent that expects less as providing "an easy way out." Oppositional relations between parents often encourage oppositional behavior and underachievement in children.

Parent opposition with teachers can also result in underachievement. If parents lack respect for teachers and assume teachers are not teaching well, students sometimes use their parents' assumptions as reason for their lack of effort in school. Respect between parents and between parents and teachers encourages student achievement in the classroom.

Here is a dilemma. Parents of gifted children frequently must advocate for their children to be sure curriculum is sufficiently challenging. When advocacy is conducted respectfully, it is likely to be helpful for children. If advocacy is conducted disrespectfully, it can backfire and provide a message to children to only work in school when they deem curriculum to be appropriate. Students may not always be the best judge of appropriateness. For example, correct grammar and spelling may not be high on the priority list for gifted students, and it may be difficult to convince them of the relevance of routine and repetitive study for some areas of education that could be crucial in their later lives. Students are not always able to predict their educational needs for the future.

Strategies for Reversing Underachievement

In her book *Giftedness, Conflict and Underachievement,* Joanne Whitmore recommended curricular changes for successfully reversing underachievement. In 1986, Sylvia Rimm provided a model for reversing underachievement in her book then entitled *Underachievement Syndrome: Causes and Cures* and revised in 1995 as *Why Bright Kids Get Poor Grades and What You Can Do About It.* Her *trifocal model* is directed at parents, teachers, and the underachieving child. This six-step model was found to be effective at Rimm's Family Achievement Clinic, as well as in many schools, and includes (1) Assessment, (2) Communication, (3) Changing Expectations, (4) Role-Model Identification, (5) Correction of Deficiencies, and (6) Modifications at Home and School. The model provides a framework from which teachers and parents can select appropriate techniques to use for specific children who are underachieving.

Curricular changes, including subject acceleration, grade skipping, and more opportunity for choice, are helpful for both preventing and reversing underachievement. Opportunities for creativity invite students with creative minds to find curriculum more interesting. Del Siegle found that convincing students of the relevance of curriculum made a significant difference in their motivation to achieve. Carol Dweck, in her book *Mindset: The New Psychology of Success,* established that when students were told that their mind was a muscle and that using it would increase their abilities and learning, students performed better than if they were taught only study skills.

Siegle and Rimm also found that students who are active in extracurricular activities were more likely to be achievers in school. In her study of the childhood of successful women, Rimm found that these women often found their direction toward careers through their extracurricular interests and involvement. Engagement in extracurricular activities provides experiences of self-efficacy and often generalizes to school achievement.

Role models and mentors can be powerful motivators toward achievement. These role models can be parents, teachers, scout leaders, special-interest teachers, neighbors, doctors, dentists, or people they meet in chance acquaintances. Rimm also found in her survey of more than 5,000 middle schoolers that they frequently select models from the media, sports, or literature they read. Unfortunately, role models from popular culture may not always be good for student achievement. When reversing students' underachievement, pairing them with adults who are achieving role models can be helpful in motivating them. A great many successful adults have credited their teachers as having inspired their motivation.

Projections for the Future

There have always been gifted students who do not achieve to their abilities in school. Schools, families, disadvantages, as well as a media culture that negates school achievement, all contribute to increasing underachievement. Gifted educational programming can contribute to preventing and reversing underachievement. When families are involved in programming for gifted children, parents are more likely to be supportive of schools and educators can guide parents in understanding the special needs of their gifted children. Research has already provided many techniques for enhancing motivation and reversing underachievement. Dissemination of information on reversing underachievement and engaging students in learning will surely assist many students in working to their abilities in school. Because there are many types and degrees of underachievement, it will be difficult to measure progress in overcoming the underachievement of gifted students.

Sylvia Rimm

See also Diversity in Gifted Education; Family Achievement; Parenting; Resilience; Self-Efficacy/Self-Esteem

Further Readings

Colangelo, N., & Kerr, B. A. (1993). A comparison of gifted underachievers and gifted high achievers. *Gifted Child Quarterly,* 37, 155–160.

Dweck, C. (2006). *Mindset: The new psychology of success*. New York: Random House.

Reis, S., & McCoach, B. (2000). The underachievement of gifted students: What do we know and where do we go? *Gifted Child Quarterly, 44*(3), 152–170.

Rimm, S. (2005). *Growing up too fast: The Rimm report on the secret world of America's middle schoolers*. New York: Rodale.

Rimm, S. (2007). *Keys to parenting the gifted child* (3rd ed.). Scottsdale, AZ: Great Potential Press.

Rimm, S. (2008). *Why bright kids get poor grades and what you can do about it*. Scottsdale, AZ: Great Potential Press. (Formerly *Underachievement Syndrome: Causes and Cures*. Watertown, WI: Apple Publishing, 1986.)

Rimm, S., Rimm-Kaufman, S., & Rimm, I. (1999). *See Jane win: The Rimm report on how 1,000 girls became successful women*. New York: Crown.

Siegle, D., & McCoach, B. (2006). Motivating gifted students. In F. A. Karnes & K. R. Stephens (Eds.), *The practical strategies series in gifted education*. Waco, TX: Prufrock Press.

Whitmore, J. R. (1980). *Giftedness, conflict, and underachievement*. Needham Heights, MA: Allyn & Bacon.

Underrepresentation

Two significant events occurred in 1954 that profoundly affected the education of gifted minorities. The first was *Brown vs. Board of Education, Topeka,* which required that African Americans receive an equal education in desegregated settings. The second was the creation of the National Association for Gifted Children, the prominent advocacy organization for students identified as gifted. Both developments—one focused on diversity and equity and the other focused on giftedness and equity—represented unprecedented opportunities to meet the needs of gifted African American students, Hispanic students, and Native American students, all of whom are underrepresented in gifted education programs. This entry discusses contributing factors, recruitment and retention, and the outlook of underrepresentation of gifted.

Attention to African Americans in gifted education is riddled with controversy. Gifted education has received much criticism from both advocates and opponents. The primary criticism is that African Americans are consistently underrepresented in gifted education and advanced placement (AP) classes. At no time in the history of gifted education has their school representation matched their representation in gifted education. Gifted education has always been segregated by race. For instance, as of 2002, Black students represented approximately 17.2 percent of school districts nationally, but 8.4 percent of gifted programs—a discrepancy of more than 50 percent. Compared with Black girls, Black boys are even more underrepresented in gifted education.

Hispanics are one of the fastest growing populations, but gifted education programs do not show a parallel increase in participation. Particularly those with limited English proficiency (LEP) are neglected in programs for gifted and talented.

Andrea Bermudez and Steven Rakow surveyed highly Hispanic-populated school districts and found that very few were identifying or serving gifted LEP students, and of those districts that have developed identification procedures for this group of students, only 33 percent experienced success with the developed measures.

Finally, even in schools where Native American students are the majority, such as those serving reservation students, little attention is given to proportionate representation of Native Americans in gifted programs. Few AP classes are available to Native American students, and where available, Native American students are underrepresented.

Contributing Factors

Several factors contribute to underrepresentation. Nationally, the first step to being screened for gifted education services in most schools is teacher referral. Teachers frequently under refer minority students for gifted education services and AP classes. Lack of training in cultural diversity, low expectations and stereotypes, and lack of training in gifted education play a role in teachers not recognizing giftedness among African Americans, Hispanics, and Native Americans. Thus, teachers are the initial gatekeepers to these students accessing gifted education. Second, students are administered an intelligence or achievement test. Many times, minorities do not attain predetermined cutoff scores; this is particularly true on traditional intelligence tests, where African American students tend to score one standard deviation below White students, and Hispanic students and Native Americans score between one-half and one standard deviation below White and Asian American students. Thus, traditional tests are the second barrier. Despite concerns about using tests with culturally and linguistically diverse students, this practice continues, and so does underrepresentation.

Recruitment and Retention

How can educators increase the percentage of minority students identified as gifted and ensure that they stay in gifted programs after being recruited? Efforts must focus on both recruitment and retention.

- Instruments, policies, and procedures that have a disparate impact on African American, Hispanic, and Native American students must be changed or eliminated. Instruments (tests, checklists, nomination forms) must be selected carefully, criteria (cutoff scores, etc.) must be examined carefully, and policies and procedures (e.g., teacher referral) must be evaluated to see if they are educationally useful or harmful.
- A philosophy of inclusion rather than exclusion is necessary; it is necessary for educators to search for students to include, rather than exclude on the basis of numerical scores.
- Definitions and theories need to be developed with cultural groups in mind. Are they sensitive and responsive to the characteristics of and values of African Americans, Hispanics, and Native Americans? Educators and decision makers must understand that the notion of gifted is socially constructed, such that what is viewed as and valued as gifted in one culture may not be considered gifted in another. One cultural group may value verbal skills, another may prize social skills, and another may value creativity.
- Evaluation must be ongoing and systemic. School personnel must consistently examine patterns and trends (male vs. female representation, under-referral, ineffective tests and instruments) and eliminate barriers.
- Education, including professional development, is necessary for educators and families, as well as other decision makers and stakeholders. All parties must be given formal preparation in understanding definitions and theories of giftedness, recognizing characteristics of gifted and talented students, and understanding tests, including their purpose and limitations.
- Educators must receive formal preparation in understanding culture, including how culture affects learning and test performance. They will need to know more about culturally diverse students in terms of characteristics, learning styles, communication styles, and values, traditions, customs and norms. All school personnel require assistance in creating culturally responsive classrooms, developing multicultural curricula, and modifying their instructional styles and strategies to accommodate diverse learning and cultural styles. With such formal preparation,

educators may be less likely to view cultural differences as deficits.

Future Outlook

No group has a monopoly on being gifted. Nonetheless, the field of gifted education remains racially and culturally segregated. For change to occur, a philosophy of inclusion is essential. Instruments, definitions, theories, criteria, policies, and procedures must be selected with care and modified so that they are culturally sensitive, fair, and equitable. School personnel and families must be educated about gifted education and about cultural diversity. And educators must be diligent, assertive, and proactive about evaluating and changing gifted education and advanced placement with the focus of recruiting *and* retaining minority students.

Donna Y. Ford and Gilman W. Whiting

See also African American, Gifted; Bilingualism and Creativity; Cultural Conceptions of Giftedness; Native American, Gifted

Further Readings

Barkan, J. H., & Bernal, E.M. (1991). Gifted education for bilingual and limited English proficient students. *Gifted Child Quarterly, 35*(3), 144–147.

Bermudez, A. B., & Rakow, S.J. (1990). Analyzing teachers' perceptions of identification procedures for gifted and talented Hispanic limited English proficient (LEP) students at-risk. *Journal of Educational Issues of Language Minority Students, 7,* 21–33.

Ford, D. Y. (2006). Closing the achievement gap: How gifted education can help. *Gifted Child Today, 29*(4), 14–18.

Ford, D. Y., & Grantham, T. C. (2003). Providing access for gifted culturally diverse students: From deficit thinking to dynamic thinking. *Theory Into Practice, 42*(3), 217–225.

Ford, D. Y., & Milner, H. R. (2005). *Teaching culturally diverse gifted students*. Waco, TX: Prufrock Press.

Ford, D. Y., & Whiting, G. W. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (part 1). *Gifted Education Press Quarterly, 20*(2), 2–6.

Montgomery, D. (2001). Increasing Native American Indian involvement in gifted education in rural schools. *Psychology in the Schools, 38*(5), 467–475.

Ortiz, V., & Volloff, W. (1987). Identification of gifted and accelerated Hispanic students. *Journal for the Education of the Gifted, 11*(1), 45–53.

Tomlinson, C. A., Ford, D. Y., Reis, S. M., Briggs, C. J., & Strickland, C. A. (Eds.). (2004). *In search of the dream: Designing schools and classrooms that work for high potential students from diverse cultural backgrounds*. Washington, DC: National Association for Gifted Children.

Whiting, G. W., & Ford, D. Y. (2006). Underrepresentation of diverse students in gifted education: Recommendations for nondiscriminatory assessment (part 2). *Gifted Education Press Quarterly, 20*(3), 6–10.

V

VALEDICTORIANS

Most U.S. and Canadian high schools recognize the graduating student who holds the highest academic standing with the title of valedictorian. Although the naming of a valedictorian is one of the most common markers of achievement in the United States, top academic standing is largely absent from the gifted literature. There is relatively little research about valedictorians and increasing controversy about whether to continue the designation. This entry describes some of the issues relating to valedictorians and gifted.

Literally "farewell sayer," the valedictorian traditionally gives a speech at high school commencement. The first record of naming a valedictorian appeared in Harvard College presidential papers in 1759. The practice was widespread among U.S. high schools by the 1840s, serving both as public recognition of individual achievement and showcasing of bright graduates. Today, most schools award the title of valedictorian to the graduating student with the highest cumulative grade-point average. Less frequently, the student body votes for the valedictorian or holds a speaking contest to determine the recipient. In other cases, school administrators name a high-achieving student who also exemplifies some measure of outstanding character. Students with identical grade-point averages sometimes share the honor as covaledictorians. Nationally, girls outnumber boys among high school valedictorians.

Earning high academic marks across subject areas requires a particular set of abilities and motivations. In an empirical study of high school valedictorians, the Illinois Valedictorian Project, Karen Arnold and Terry Denny followed 81 high school valedictorians and salutatorians longitudinally for 15 years through a combination of periodic interviews and surveys. Arnold and Denny found that high school academic talent was a constellation of intellectual ability, enjoyment of learning, hard work, and willingness to conform to family and school expectations. Outstanding academic performance also relied on what Joseph Renzulli has labeled "schoolhouse giftedness," including sophisticated understanding of teacher requirements and superior ability in tasks such as note taking, memorization, and testing. In keeping with their well-rounded profiles, Illinois Valedictorian Project members were highly involved in extracurricular activities and friendships.

Post–high school achievements of Illinois Valedictorian Project participants reflected their generalist interests, comfort in institutional settings, and strong work ethic. Valedictorians in the study earned postsecondary degrees in much higher numbers than did their high-ability peers nationally and continued to earn high grades in college. Most entered professions, including business, law, medicine, and academia. However, occupational attainments varied far more than academic performance, and valedictorians' well-rounded, pragmatic approach to work and family life did not lend itself to career eminence or creative productivity.

Gender, race, and social class strongly influence valedictorians' professional outcomes, as shown in both the Illinois Valedictorian Project and a study of North Carolina valedictorians by Anne York. Arnold found that valedictorians of color from the class of 1981 were less likely than their White peers were to finish college and take professional jobs and that women achieved less than men when they planned their careers around family roles. Two decades later, York found that 2003–2005 female high school valedictorians in North Carolina were less likely than were male valedictorians to attend the most selective colleges and to choose highly prestigious, top-paying professions. She also found that female valedictorians were more likely to attend a prestigious college if they graduated from a high school with high-average SAT scores; male valedictorians chose colleges based mainly on their own grade-point averages.

Since the 1990s, the practice of naming a high school valedictorian has become increasingly controversial. Grade inflation has made it more difficult to distinguish among high-grade earners. Strategic students can outscore more intellectually motivated classmates by avoiding subjects that are difficult for them. Most controversial are the many grade-point-average weighting systems that make course difficulty a factor in student class rankings. Many high schools weight honors and advanced placement course grades more highly than other course grades, making it possible to earn straight A's without having the highest grade-point average in the school. Under such a grading system, the valedictorian can be decided by a thousandth of a point. Along with grade-point calculations that reward number of credits, weighted course grades lead to accusations that the valedictorian is the most strategic course taker rather than the most meritorious academic achiever. Increasingly, law suits result from these hair-splitting designations. Eligibility to become valedictorian is also controversial: Some students have sued their high schools after having been outranked by transfer or homeschooled students, or because they were eliminated by virtue of their own transfer or homeschooling status.

Some high schools and school districts around the United States have abolished class rankings for another reason: achievement pressure on students. In the context of intensely competitive admission to the most selective colleges and universities, secondary schools claim that class rankings cause unacceptably high levels of stress and competition among students. No empirical research has been conducted to test the widely held belief that class rankings (including the naming of a valedictorian) are associated with student distress. An important study of national College Board data by Paul Attewell indirectly bolstered the argument that class rankings cause high pressure. Attewell found that talented students who ranked just below the top in "star" high schools took less challenging high school classes and entered less selective colleges than did equivalent students in less elite high schools.

The National Association of Secondary School Principals conducted a 1993 survey that found 7 percent of high schools had abolished class rankings. Although no recent national data exist, a stream of popular press articles indicates a continuing trend among high schools to discontinue class rankings and cease naming a valedictorian. Despite the national controversy about rankings, the title of valedictorian remains sought after and widely recognized as a legitimate indication of academic merit.

Karen D. Arnold

See also Adolescent, Gifted; Career Counseling; College Gifted; Secondary Schools

Further Readings

Arnold, K. (1995). *Lives of promise: What happens to high school valedictorians.* San Francisco: Jossey-Bass.

Attewell, P. (2001, Oct.). The winner-take-all high school: Organizational adaptations to educational stratification. *Sociology of Education, 74*(4), 267–295.

Talbot, M. (2005, June 6). Best in class: Students are suing their way to the top. *New Yorker.*

York, E. A. (in press). Gender differences in the college and career aspirations of high school valedictorians. *Journal of Advanced Academics.*

Verbal Ability

The role of verbal ability in any discussion of giftedness is a central topic. Early intelligence tests

were seen as heavily loaded in verbal components, suggesting that intelligence was often equated with high verbal ability. In more recent decades, the emphasis has begun to shift to a more balanced view of verbal ability and nonverbal ability. Nevertheless, high verbal ability persists as a basic component of giftedness because of its being a prerequisite for high-level performance in most professions for which gifted learners will prepare themselves and a basic requirement for entry to selective higher-education institutions. This entry describes aspects of verbal ability that relate to giftedness.

Characteristics of Verbal Ability

Students who are verbally advanced usually show signs of advanced verbal behaviors early. They typically learn letters and words by age 2, read at age 4 or 5, and exhibit early facility with writing and drawing. They also are strong in spoken language, fond of memorizing books or poems, for casual recitation. Choice of puzzles and games takes on a decidedly verbal cast. Preferences for Scrabble and other word games develops early. Playing with words is also a favorite pastime. Once they have unlocked the key to reading, they are voracious readers, gobbling up material in the home, whole library shelves, and other printed material available. They also are often nonstop talkers and question askers of parents and peers, seeking answers to deep questions and wanting to talk about philosophical issues such as god and the universe.

Identifying Verbal Ability

In gifted programs, verbal ability has been identified in various ways. Most prominently, it has been found through the use of group and individual intelligence tests through subsections that relate to vocabulary, analogies, and critical reading behaviors. In addition, the SAT traditionally has included sections on critical reading, analogies, sentence completion, and vocabulary. A Test of Standard Written English (TSWE) that probed usage and syntax was also included. More recent versions of the test have deleted analogies and the TSWE. The Graduate Record Exam (GRE) also contains a verbal aptitude section. The Miller Analogy Test (MAT) assesses the ability to solve 100 analogy problems in 50 minutes as a proxy for verbal intelligence. From kindergarten to graduate school, verbal tests have been widely used in selection decisions for gifted programs and advanced work.

In addition to ability measures, achievement tests, both individual and group, probe verbal capacity. Typically, two sections of such tests are devoted to vocabulary, reading comprehension, and often language arts that focus on usage. For younger students, word recognition is also featured. A student who scores at the 95th percentile and higher on one or more of these subsections is likely to be considered a candidate for gifted programs in concert with other selection criteria.

Many school districts also employ teacher recommendations, based on a checklist, to include students in programs. Verbal ability is often prominently featured on these checklists, suggesting that students who read early, show talent for writing and communication, and exhibit highly verbal skills in oral class work are strong candidates.

Verbal ability can readily be identified in specific areas of performance although it rarely is. Writing talent searches have identified writing talent as early as fourth grade. Dramatic talent can be discerned through tryouts for plays and interpretive reading competitions. Spelling ability may be found through participation in the National Spelling Bee. Grammar tests, often given in second language learning, can discern students strong in the structure of language. Only reading ability is routinely tested, with advanced reading behaviors a helpful indicator of giftedness but not a sufficient one.

Serving Students With Verbal Ability

Perhaps no group of gifted learners is easier to serve than those with verbal ability. Fascinated by words from an early age, they gravitate to books, movies, and other verbal media throughout their lives. Many of them learn to read on their own, unlocking the code in their own idiosyncratic way, often holistically rather than phonetically. They enjoy being read to as well as reading on their own. They also enjoy reading aloud for others.

Because they enjoy words so much, games and puzzles that require coming up with words or

patterns of words is highly enjoyable. Scrabble, crossword puzzles, searching for synonyms, homonyms, and antonyms as well as work with analogies and metaphors is highly stimulating.

Students with verbal ability often need time to develop their writing ability although their products are usually superior to their age-mates without much effort. Using great writers as models for writing; learning the writing models of narrative, expository, and persuasive writing; and practicing form and idea with regularity all improve their written work. Learning to take criticism from peers and adults also speeds improvement as does the willingness to revise based on feedback received. Often gifted students do not receive sufficient criticism for their writing, which hinders their growth in this area of verbal aptitude.

Verbal ability also prepares students to be strong in oral skills, especially argument through formal debate competitions and clubs in addition to classroom opportunities. Specific creative outlets for oral skills include oral interpretation and drama. Young gifted learners often begin their manifestation of this ability in recitations given for real world audiences, exhibiting oral ability coupled with memory skills.

Because of their strong sensitivity to language, students with verbal ability also can benefit from second language instruction as early as they are reasonably proficient in their own language. Second language learners enjoy an advantage here as they are often bilingual from early ages and retain their capacity to speak and write in both languages across their lives. Second language instruction choices for the gifted have ranged from encouraging difficult language acquisition such as German, Latin, Chinese, and Russian to languages that are more commonly spoken in the United States and Europe such as Spanish and French. Because 60 percent of English vocabulary is derived from Latin, often one year of that language is recommended to the verbally precocious.

Often the best reading program for the gifted is one that is highly individualized, based on reading capacity, interest, and complexity of the material to challenge the intellectually gifted. Minimally, gifted learners should be provided reading material above their tested reading level to be sufficiently challenged. Exposure to great multicultural literature is also an essential ingredient of such a program to broaden student capacity for cultural understanding and empathy. Use of books as bibliotherapy has also been found to be an effective intervention for the verbally gifted child at all ages, where a protagonist shares the child's concerns and problems, and the gifted child can see the issues explored on the page, one step removed. Reference materials and books in such subject matter areas as science can also be stimulating for gifted children. Reading encyclopedias, dictionaries, and atlases can be a favorite pastime. Biography and autobiography are other genres of reading that bring great satisfaction to the verbally gifted and enhance the possibility for acquiring a role model or someone to emulate.

Yet, verbally gifted learners are likely to be most challenged and most in need of development in the area of critical reasoning. Several critical thinking ability tests can pinpoint relative strengths and weaknesses in this area as well as document growth. Consistent practice with the elements of reasoning in oral and written form can sharpen a gifted student's capacity to deal with complexity and deepen his or her knowledge of relevant issues. Formal models for teaching critical thinking have been employed to help gifted students improve in this area. The most used is the Bloom's Taxonomy of Educational Objectives, now constituting seven levels: knowledge, comprehension, application, analysis, synthesis, evaluation, and creation. Another popular model is the Paul model of reasoning, developed by Richard Paul, an educational philosopher, which posits that eight elements of reasoning are used in the real world: identifying issues or problems, purpose, point of view, assumptions, concepts, data or evidence, inferences, and consequences and implications. These models among others are explicitly taught to gifted learners and applied through questions and activities as they explore readings and current issues in various media.

Exemplary Curriculum for the Verbally Gifted

Curriculum packages have been developed to address the needs of advanced readers and verbally gifted learners. These include the Junior Great Books Program, a reading program of short stories calibrated to be intellectually challenging and highly interpretive to enable strong readers to move beyond facts and evaluative commentary into literary analysis and interpretation. Another

packaged program used in both social studies and language arts is Philosophy for Children, developed to engage children in facilitated discussion of values and ethics in the context of teaching philosophical thinking. A third program in this area is the William and Mary Language Arts units of study, developed across K–12 to enable gifted learners to read more advanced selections and analyze and interpret them, to write persuasively, to develop oral communication skills, to gain linguistic competency, and to think more critically. This multifaceted program addresses multiple goals and outcomes for these learners. All these programs have evidence of effectiveness with gifted populations, with moderate to large effect sizes, suggesting that the interventions are successful if implemented faithfully in various settings.

Competitions

Just as research-based curricula can assist in developing verbal talent, so too can verbally oriented competitions. Writing contests, held in each state, are a good way for students to try out their writing skills and develop them further. Essay contests of various sorts at local, state, and national levels also provide the challenge of writing to a prompt. The *Concord Review* publication of student writing is the best high-level challenge for high school students who want to challenge themselves with a literary or social science research paper that will be considered for publication. Many other publication outlets exist for poetry, short stories, and other genres that students may want to master and experiment in.

Career Paths for the Verbally Gifted

Recent findings from a longitudinal study of advanced learners suggests that career paths for the verbally precocious can be determined as early as middle school if data are available on values and interests as well as aptitudes. Careers found in the study to be a strong match for these abilities include journalism, writing, theater, law, college professor in the humanities and social sciences, translators, and editing and publishing. Working with verbally gifted learners in schools should include a component of career counseling so their aspiration levels can be well-matched to appropriate undergraduate institutions, the programs they offer, and career clusters.

Facilitation of Verbal Talent for Creative Production

If creative production is seen as the highest level of accomplishment for gifted individuals in any field, then writing something that endures and contributes to the advancement of societal understanding is the goal of those who are verbally gifted. Studies of verbally talented writers suggest that they are autodidactic in their orientation to learning, teaching themselves what they need to know, as was the case with famous writers like Charlotte Bronte and Virginia Woolf. Yet, they also needed an audience for their work growing up, often family and close friends and tutors. Thus the education of writers is often more informal, done at home rather than at school. Their rich interior lives often require space and time for ideas to germinate and then take shape on the page. For women, this space and time issue has been acute, often leading to underproduction and lack of notable mention in the annals of famous writers. The need for a coterie of those who can appreciate the work remains a vital aspect of verbal production.

Written productivity may often come later in life for the verbally gifted. The gift for writing may be a latent talent not even tried before retirement. The law cases and their opinions may only be published close to the end of a stellar career. Novel writing may become a second career. The philosophical treatise that expounds on a particular aspect of existentialism may come even close to the end of life.

Joyce VanTassel-Baska

See also Multilingualism; Precocious Reading; Study of Mathematically Precocious Youth; Talented Readers; Talent Searches; Writers

Further Readings

Benbow, C., & Lubinski, D. (2006). The study of mathematically precocious youth after 35 years. *Perspectives on Psychological Science, 1*(4), 316–345.

Center for Gifted Education (2006). *The William and Mary Language Arts Series*. Dubuque, IA: Kendall/Hunt.

Junior Great Books. Chicago: Junior Great Books Foundation. Retrieved from http://www.greatbooks.org/programs-for-all-ages/junior.html

Reed, R., & Sharp, A. M. (Eds.). (1992). *Studies in philosophy for children: Harry Stottlemeier's discovery*. Philadelphia: Temple University Press.

VanTassel-Baska, J., & Stambaugh, T. (2006). *Comprehensive curriculum for gifted learners*. Boston: Pearson.

Very Young Creative

Paul Torrance, who extensively studied the creativity of very young children (under the age of 7), described creative behavior as, "the process of becoming sensitive to or aware of problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; bringing together in new relationships available information; defining the difficulty of identifying the missing elements; searching for solutions, making guesses, or formulating hypotheses about the problems or deficiencies; testing and resting them; perfecting them; and finally communicating the results" (1969, p. viii). In addition, personality traits, which may begin as inborn temperaments, can contribute greatly to the creativity of the young child, including openness to experience, independence, and nonconformity. Some creative behavior is available to everyone because it can be elicited through a variety of means, and most people are capable of everyday creativity. Unlike intelligence, research has shown that a large majority of variation seen in adult creative productivity is the result of family, school, and community environment. Further, children of high intelligence are not necessarily creative, but it is possible to be both highly intelligent and creative. This entry describes the major issues concerning creative children.

The extent to which a child is creative depends on the degree in which he or she shows novelty, displays unconventionality, diverges from what was previously accepted, and persists in exceeding previous performance. By the age of 2 or 3, children have obtained a great deal of experience in creative thinking through questioning, experimenting, and playing. Certain characteristics facilitate learning creatively: a long attention span, the capacity to organize, the ability to see things from a different perspective, and the ability to observe and listen. In addition, telling stories, creating songs, using the imagination to solve problems, observing things carefully, and exploring before formal instruction can aid in creative learning. Families that provide opportunities and resources for creative play and learning, that are open to children's risk taking, and that provide models of creative behavior can nourish creativity in young children.

Particular indicators of precocity in gifted children can be used to informally assess creativity in preschool children. Children with an unusually advanced vocabulary for their age possess a large amount of information about a variety of subjects and have an intense curiosity in something or in many things are likely to be creative. In addition, children who have a clear understanding of cause and effect relationships, strive toward perfection or excellence, are keen observers, and are interested in adult-like issues (i.e., religion, sex, race) are also likely to be creative. They are also capable of improvising with common items, engage in storytelling and highly imaginative play, have a good sense of humor, and respond to the kinesthetic or concrete. Further, they may possess exceptional abilities in creative movement and dance, visual arts, or music.

Several methods are used to identify very young creative children. Objective intelligence tests or achievement tests for specific areas are the most traditional means, but parent, peer, or professional nominations are other methods. In addition, biographical data, checklists, rating scales, observations, and performance and objective testing can be helpful. The validity and reliability of these methods vary.

Although it can be difficult to distinguish the creative among very young children, several guidelines have been created to assist in this difficult task. When very young children are tested for creativity, preschool children should be able to respond to a task that is characteristic of their development. Usually, the kinesthetic modality is most appropriate to elicit creative behavior because preschool children commonly practice skills in this area. A warm-up activity is recommended, the tests should be comprehendible to young children, and scoring and administration should be simple.

The most widely used formal assessment of creativity in very young children is the Torrance Tests

of Creative Thinking. It consists of two batteries: Thinking Creatively with Words and Thinking Creatively with Pictures. The verbal tests can be administered to children as young as 3 years old, and the picture tests can be administered to children starting at age 5. The verbal tests take about 45 minutes to administer, and they provide scores for fluency, flexibility, and originality. The picture tests take about 30 minutes to administer, and they provide scores for fluency, flexibility, originality, elaboration, resistance to premature closure, and abstract thinking. In addition, picture tests also supply criterion-referenced indicators of imagery, synthesis, humor, and putting things in context.

Another method of formal assessment for creativity in very young children developed by Torrance is the Thinking Creatively in Action and Movement measure. This measure allows children to respond by movement, in words, or a combination. Words are not required because young children may not be able to best express themselves verbally. It is designed for children ages 3 to 8. The test is divided into four activities that sample the most common ways young children use their creative abilities. The first activity asks children to create multiple methods of moving. The second activity samples children's ability to imagine, empathize, fantasize, and assume different roles. In the third activity, the children are asked to describe tasks or objects in a different way. In the fourth activity, children describe other uses for objects (i.e., a different use for a paper cup or chair).

The degree of creativity varies in all children, but it is not unusual for creative skills to be unused and even ignored once children reach school age. The level of curiosity, experimentation, and creative learning in children are much greater in younger children compared with older children. Moreover, the biggest drop of creativity has been observed once children reach kindergarten. Very young children can be encouraged by preschool environments that are rich in resources, provide adequate free time for imaginative play, and tolerate unconventional questions and answers. Children's creative abilities are important for growth in a variety of areas; therefore, creating conditions that will facilitate creative development among young children is critical.

Rhea L. Owens

See also Creative Personality; Creativity, Definition; Creativity Assessment; Creativity Training; Preschool; Torrance Tests of Creative Thinking; Very Young Gifted

Further Readings

Torrance, E. P. (1969). *Dimensions of early learning series: Creativity.* Sioux Falls, SD: Adapt Press.

Torrance, E. P. (2000). Preschool creativity. In B. A. Bracken (Ed.), *The psychoeducational assessment of preschool children*. Boston: Allyn & Bacon.

Very Young Gifted

Martha Morelock and John Feldman described gifted children as, "those showing sustained evidence of advanced capability relative to their peers in general academic skills and/or in more specific domains (music, art, science, etc.) to the extent that they need differentiated educational programming" (p. 302). To address the specific needs of gifted children and foster their development, identification and intervention for very young children (under the age of seven) is critical, as discussed in this entry.

Very young gifted children often have highly advanced verbal skills, emotional sensitivity, a cooperative play style, leadership skills, and a mature sense of humor. They are commonly curious, have a wide range of interests or demonstrate advanced skill in a single area, and are sensitive to problems with their peers. They also can be described as highly focused in their interests, persistent, divergent thinkers, and perceptive. It is not uncommon for gifted children to be precocious readers as well. Their intellectual, emotional, and motor development is often asynchronous in that although they may be advanced in one developmental area, other areas may be at the same level or below children of the same age.

Although early identification is critical with young, gifted children, it is difficult for several reasons. First, only potential giftedness is being assessed because the children are so young, and it is difficult to quantify potential. Second, young children have not had ample time to develop their talents and abilities; therefore, there is a risk for

over- or underestimating giftedness. Finally, young children may have difficulty in a testing situation because it differs from the surroundings they are used to, which can lead to lower scores that do not demonstrate their true potential.

Often intelligence, ability, or achievement tests are used to measure giftedness. A score of 130 (two standard deviations above the mean) is reasonable to infer giftedness. Intelligence tests that have been used to assess for giftedness include Stanford-Binet Intelligence Scale, Form L-M; the Wechsler Preschool and Primary Scale of Intelligence; the Slosson Intelligence Test for Children and Adults; the Columbia Mental Maturity Scale; and the Pictorial Test of Intelligence. Standardized achievement/readiness tests that have been used to assess preschool children for giftedness include the Metropolitan Readiness Test, Level I; Stanford Early School Achievement Test, Level I; and Test of Basic Experiences, Level K.

Intelligence and academic achievement are not the only forms of giftedness, so other tests are used to measure children suspected of being gifted in other domains. Several standardized tests of perceptual-motor development exist that have been used to identify young children, including the following: Basic Motor Ability Test, Developmental Test of Visual-Motor Integration, Purdue Perceptual-Motor Survey, and Wechsler Preschool and Primary Scale of Intelligence. The California Preschool Competency Scale and the Vineland Social Maturity Scale are standardized tests that have been used to measure social development. The Torrance Tests of Creative Thinking and the Thinking Creativity in Action in Movement are the two tests that measure creativity.

Many other methods are helpful in identifying very young, gifted children as well. Ratings and observational checklists can be helpful in identifying behaviors and performances that may not be accessed through tests. Observations can take place in a child's natural setting, which is more comfortable for a young child. In addition, qualitative measures are especially useful in conjunction with quantitative measures. Parents and teachers are key resources when using qualitative measures because they are likely around the child most frequently and have witnessed the child in familiar and unfamiliar situations. They are also aware of what the child is interested in and how the child responds to difficulties. Actually, parents and teachers are often capable of identifying a gifted child before the child is tested.

The beginning of preschool and kindergarten can be critical times for gifted children. If gifted children are overlooked, there is a risk that they might not actualize their potential, might become underachievers, or might develop negative attitudes toward learning or school. Often, gifted children are aware of their difference from other children and can have difficulty relating to others. Gifted children may develop fear or anxiety about school and hide their gifts. In addition, finding peers with similar interests, especially at their level can be difficult; therefore, frustration or boredom may result. Other problems common in gifted children include conformity, perfectionism, extreme sensitivity, intolerance, feelings of inadequacy, or the demand for large amounts of adult attention. For these reasons, it is important to correctly identify and provide guidance and appropriate challenges in the child's areas of interest so their needs are met.

Differentiating gifted children's curriculum and early entrance into school can be beneficial in addressing their needs. Gifted children will likely benefit from a more accelerated or advanced curriculum, which incorporates the child's interests and applies abstract and complex concepts. Entering school early for gifted children can aid in the child's intellectual needs because their mental ages will likely be matched if they are ready to begin grade school. The extent and area of giftedness vary in every child, so it is key to pay attention to children's particular needs and help them cultivate their talents.

Rhea L. Owens

See also Early Entrance, Kindergarten; Early Identification; Giftedness, Definition; Identification; Preschool; Very Young Creative

Further Readings

Karnes, M. B. (1983). *The underserved: Our young gifted children.* Reston, VA: ERIC.

Morelock, M. J., & Feldman, D. H. (1992). The assessment of giftedness in preschool children. In E. V. Nuttall, I. Romero, & J. Kalesnik (Eds.), *Assessing and screening preschoolers: Psychological*

and educational dimensions. Needham Heights, MA: Allyn & Bacon.
Sankar-DeLeeuw, N. (1999). Gifted preschoolers: Parent and teacher views on identification, early admission, and programming. *Roeper Review, 21*(3), 174–179.

VISUALIZATION

Whether or not they are aware of it, visualization practices of most individuals affect their behavior and emotional regulation every day. Visualization is the formation of mental images. It is a critical part of the creative process when considered in its "intentional" form because it allows the user to explore novel ways to organize and interact with facts and experiences. Creating mental images of chess pieces, for example, and probabilistic future placement, allows the player to take appropriate action offensively and defensively. This entry examines ways individuals employ visualization to creatively enhance performance, affect emotional state, and invoke visceral physical experiences.

Although the ability to visualize varies between people, the spectrums on which visualized images can be rated generally do not. Visualizations can be vivid or dull, loud or quiet, large or small. There is also a spectrum of skilled manipulating of mental images. For example, if one imagines a horse, how easily could the visualization be changed from say, a brown to blue horse? How quickly could the blue color be changed from dark to light?

An interesting by-product of intentional or unintentional visualization is affect. Emotions are often inextricably tied to images. It is challenging to separate affect from image because the biological structures used to store and retrieve memories are associated with emotional centers in the brain and an overwhelming corpus of literature supports the idea that emotions and accompanying physiological responses are also strongly associated. For example, if an individual is asked to vividly visualize the most scared she's ever been, the likelihood is that her sympathetic nervous system would be activated, increasing her heart rate, restricting blood flow from the skin and sending it to the lungs, and dilating lung bronchioles. Whereas visualizing a frightening thought can activate the sympathetic nervous system, visualizing peaceful thoughts can activate the parasympathetic nervous system, relaxing the individual and reversing sympathetic arousal, thereby also changing the individual's emotional state.

To demonstrate the immediacy and powerful effects of detailed visualization, in the following exercise, an individual is asked to imagine a perfect day. This kind of visualization is helpful for career exploration and, more importantly, to help uncover those things individuals value in their lives. Visualizers are asked to relax and close their eyes. The following is a small part of the waking up portion of the perfect day exercise.

> Imagine sometime in the future. You wake up and find yourself about to enjoy the most perfect day you can imagine. You live in a location where it is just perfect for you in a home perfectly built for you and later you will go to work that is both meaningful and fulfilling. What does your bedroom look like? Imagine it in as much detail as you can. Is there a window? What can you see through it? What time of day is it? How do you rise from bed to greet your perfect day?

The questions are asked to guide visualizers into creating a detailed, sensory-rich image of the components of their entire perfect day. The perfect day exercise exemplifies the power of visualization to reveal important personal constructs but that are sometimes ephemeral (values, emotions, etc.). It also helps create talking points for individuals intentionally working through issues to gain insight or toward reaching certain goals like career clarification, stress reduction, or performance enhancement. For example, a world champion golfer may use visualization when preparing for an important tournament: He mentally plays every hole in the course on the airline trip to the competition. He visualizes each stroke, anticipates errors, and rehearses different ways to overcome those errors. He considers what he will do if it is windy, if it rains, and if the grass is too long. He plays every hole until he has played the whole course in his mind and is confident walking off the last green holding the winner's cup.

The ability to generate and manipulate mental images seems to be associated with creativity. In one study of creativity and visualization in gifted schoolchildren, visualization and creative thinking

were found to be strongly correlated but IQ and visualization were not. Interestingly, individuals who were identified as creative were no better at identifying when they were visualizing and creatively generating ideas than were those not identified as creative. The degree to which an individual can intentionally manipulate visualizations is strongly associated with their creative problem-solving ability general comprehension levels, and although visualization permeates and affects both consciousness and behavior, it is largely subliminal. Therefore, it is possible to be creative, to use visualization, and to be unaware of the use of both. Actually, many individuals are not aware of ways they use visualization creatively.

Take the example of a young child who sees a cookie jar on the countertop and recalls the emotional sensation of delicious homemade chocolate cookies on the tongue. Wanting to again experience this affect, the child subliminally visualizes the experience and feels the accompanying warm, cozy affect. Once a more satisfying emotional state is visualized, the child may create a plan to make the visualized state a realized state via creative problem solving. As the child proceeds to assemble data about the real world from memory, a plan might be devised to push a chair to the counter to allow cookie jar access. All of the imagery, sensory flooding, and actualizing planning, though serial, typically occur within milliseconds.

The child's visualized creative synthesis is little different from an attorney arguing before a jury or a couple working through problems in therapy. In each case, the visualized image (successful argument for the attorney, a happier relationship for the couple) and the accompanying positive affects significantly motivate behaviors. Without clear visualization of the respective goals, it makes little sense to work toward them. Thus, intentional, vivid visualization can be used for intentional creative problem solving, emotional control, motivation toward and away from certain outcomes, goal planning, and achievement.

Gregory Decker

See also Athletic Giftedness; Cartooning; Chess; Imagery; Imagination; Originality; Writers

Further Readings

Gilbert, J. (2008). *Visualization: Theory and practice in science education*. New York: Springer.

Lapin, J. (2007). *The art of conscious creation: How you can transform the world*. Charleston, SC: Elevate.

Webster, R. (2006). *Creative visualization for beginners*. Woodbury, MN: Llewellyn Publications.

Visual Metaphor

Visual metaphor can serve as a powerful tool for learning large quantities of complex subject matter. Students can distill the most important insights from their independent study discoveries, or from a set of readings, and then translate these key insights into the form of a sketched, painted, or computer-designed visual metaphor. The image typically takes the form of a cartoon-like representation with many intricate elements or symbols, each of which illustrates one or more important ideas from the topic studied. The student usually creates a story or a bullet-point summary to explain the meaning of the symbolism in the image, showing what the various aspects of the image represent in terms of the subject matter studied.

The process of creating the visual metaphor engages the student in mode-switching, which forces the mind to transform ideas from one thought modality, usually verbal or text mode, to another mode, usually artistic representation. In terms of Howard Gardner's multiple intelligences, the process asks the student to carry many complex concepts across a thought barrier between verbal-linguistic thinking and visual-spatial thought. The difficult, creative work done during the translation process enables students to capture the essence of a large quantity of complex material, synthesizing and clarifying it while burning it into long-term memory. The process is little known and has not been extensively studied, but there are signs that it has strong potential to enhance learning, especially for gifted students with visual-spatial ability, as described in this entry.

Origin

The visual-metaphoric strategy evolved from the research of developmental psychologist Howard

Gruber who investigated the thought processes of highly creative people such as Charles Darwin and Jean Piaget. When grappling with difficult theoretic concepts and voluminous data, these eminent investigators would construct metaphorical images, or images of wide scope as Gruber designated them, to synthesize and clarify their own understandings. These images tended to congeal massive amounts of complex information into condensed form, thereby providing a basis for understanding the known and a platform for launching the search for the unknown in a field.

LeoNora Cohen adapted the cognitive processes Gruber discovered in the image of wide scope for use in the classroom. Although not as complex as the rare and lofty device used for cognitive synthesis by the geniuses Gruber studied, the visual metaphor used for instructional purposes is a highly original pedagogical tool because it relates new information to familiar ideas in metaphorical form through the mode-switching process. On rare occasions, visual metaphoric processes also have been used as conceptual research tools in scholarly publications to synthesize and illustrate complex bodies of knowledge pertinent to school reform, the implications of brain research for organizational leadership, and the intricacies of strategic planning.

Example of a Visual Metaphor Under Construction

Suppose a small group of gifted individuals decides to learn more about thoughts and actions that typify creative people. They could engage in the following process steps to create a visual metaphor that captures their findings.

Step 1. Outline or Summarize the Content

They use a linear outline, a mind map, or another favored method to capture important information pertaining to the characteristics and behaviors of creative people they read about in biographies. In this example, they might include the following attributes, among others: risk taker, purposeful, motivated, productive thinker, persistent, resilient, imaginative.

Step 2. Brainstorm Metaphorical Themes for the Drawing

They might brainstorm the following ideas as possible metaphors for the characteristics of the creative people they studied: explorer, builder, adventurer, vehicle, architect, and so on.

Step 3. Choose the Most Promising Metaphor

Here they choose the metaphor that seems most likely to incorporate the full range of concepts in the topic of study. They create some rough, preliminary sketches based on the metaphor and the set of items they listed in step 1 and then attempt to fit each of the concepts into the drawing. If they chose the vehicle as the most promising metaphor, they might sketch a futuristic all-terrain vehicle launching itself over a rocky chasm. The chasm represents risk taking, a compass on the dashboard represents purposeful direction, a sturdy frame represents resilience, a full fuel tank represents motivation, and so on.

Step 4. Sleep on It

Removing their attention from the difficult, creative task of creating a visual metaphor enables their minds to capitalize on intuitive processes, which can help them select a better metaphor, or confirm the appropriateness of the initial one. It can help them create additional, stronger connections between the symbolism in the drawing and the content. When they are satisfied with the metaphor and its symbolism, they can draw or paint a final, more elaborate and refined version of the visual metaphor.

Step 5. Write a Brief Summary Describing the Connections Between the Symbolism in the Drawing and the Content of Study

Their summary can take the form of bullet points or a short story. As a final check, they should go back through their content outline to ensure that their summary includes all of the important concepts.

Reasons to Employ Visual Metaphors in Instruction

The mode-switching process and the requirement that students build metaphorical connections

with important subject matter engage students in constructing knowledge actively. The process also encourages creative and critical thinking because producing the metaphor and its symbolism is a highly creative process and ensuring that the image represents all important subject-matter content requires critical thought. More specifically, the process engages thinking skills such as imagination, intuition, metaphorical analysis, analogy, synthesis, evaluation, and divergent (original, elaborative, flexible, fluent) thinking. Finally, visual metaphors in teaching and learning comes from the ways in which they encourage integration of the arts with other curriculum areas, a much needed way of enriching the curriculum for gifted students.

Don Ambrose

See also Artistic Ability; Cartooning; Imagery; Multiple Intelligences; Visual-Spatial Learners

Further Readings

Ambrose, D. (1996). Turtle soup: Establishing innovation-friendly conditions for school reform. *Journal of Creative Behavior, 39,* 25–38.

Ambrose, D. (1998). Creative organizational vision building through collaborative visual-metaphorical thought. *Journal of Creative Behavior, 32,* 229–243.

Cohen, L. M. (1994). Mode-switching strategies. In J. Edwards (Ed.), *Thinking: International, interdisciplinary perspectives* (pp. 230–240). Melbourne, Australia: Hawker Brownlow.

Gruber, H. E. (1974). *Darwin on man: A psychological study of scientific creativity* (2nd ed.). London: Wildwood House.

Visual-Spatial Learners

Visual-spatial learners refers to students who have preferences for instructional methods that emphasize imagery and that allow manipulation of spatial elements. The theory of visual-spatial learners is based on the concept that there are two predominant learning styles: visual-spatial and auditory-sequential. Spatial information is apprehended visually. Terms such as *visuospatial, spatial visualization,* and *visual-spatial* are used to describe the inextricable connection between *visual* and *spatial.* The relationship between *auditory* and *sequential* did not become clear until insights from the field of audiology fused with brain research. These two learning styles may be related to hemispheric preferences, according to Linda Silverman, as described in this entry.

Functions of Brain Hemispheres

Recognition of the functions of the two hemispheres began more than a century ago. In the late 19th century, John Hughlings Jackson hypothesized that the processing of visual information, perception, and visual imagery are all the province of the right cerebral hemisphere, whereas the processing of auditory information, verbal expression, and propositional thinking are the domain of the left hemisphere. Other researchers have characterized the left hemisphere as more logical, analytic, linguistic, and symbolic, and the right hemisphere as more visual, visuospatial, kinesthetic, imaginative, perceptual, synthetic, and nonverbal.

People use both hemispheres for most activities—especially complex thought; however, most people do not have equal facility with both hemispheres. Just as individuals favor either their right or left hands, they tend to rely on one hemisphere more than the other. Individuals who have more powerful right hemispheric preferences perceive and organize information in a different manner that do those who have greater left hemispheric style. As IQ increases, it seems that reliance on the right hemisphere also increases. Camilla Benbow and her colleagues found evidence that highly intellectually gifted students have enhanced right hemispheric functioning. A study of gifted 4- to 6-year-olds conducted with the Kaufman Assessment Battery for Children found intellectual giftedness to be more strongly correlated with simultaneous (spatial) than with sequential processing. In highly gifted children, both types of processing were evident.

Left hemispheric reasoning is auditory-sequential; right hemispheric awareness is visual-spatial. The left hemisphere produces speech; the right communicates in images and feelings. The left

hemisphere is temporal (time-oriented), whereas the right is oriented toward the manipulation of spatial patterns and relationships. It is guided by feelings, sensing, and intuition. The left hemisphere can deal well with nonmeaningful bits of information, such as phonemes, but the right hemisphere can only deal with meaningful material. As everyone has two hemispheres, everyone has access to the capacities of both hemispheres, although perhaps not equal access.

Characteristics of Visual-Spatial Learners

The theorized major scholastic differences between visual-spatial learners and auditory-sequential learners are shown here:

Visual-Spatial Learners	*Auditory-Sequential Learners*
Are whole-part learners	Learn in a step-by-step manner
Are keen observers	Are good listeners
See the "big picture"	Attend well to details
Learn concepts all at once ("Aha!")	Learn by trial and error
Think in images or feelings	Think in words or ideas
Solve problems in unusual ways	Are comfortable with one right answer
Often lose track of time	Are conscious of time
Arrive at correct solutions intuitively	Show steps of work easily
Struggle with spelling	Can sound out spelling words
Need to see relationships to learn	Excel at rote memorization
May appear disorganized	Are well organized
Learn whole words easier than phonics	Have excellent phonemic awareness
Read maps well	Follow directions well
Are good synthesizers	Are good analyzers
May have messy handwriting	Write quickly and neatly
Interweave thought and emotion	Compartmentalize thought and emotion
Learn complex concepts easily, but may struggle with easy skills	Progress sequentially from easy to difficult

Many students demonstrate both lists of attributes, but some clearly lean toward one set or the other. Tailored to auditory-sequential learners, school is often an unpleasant experience for visual-spatial learners. Gifted auditory-sequential learners are more likely to be high achievers in academic subjects, selected for gifted programs, recognized by their teachers as having high potential, and considered leaders. Gifted visual-spatial learners may more often be counted among underachievers, twice-exceptional children, dyslexics, children with attention deficit hyperactivity disorder, and creative children from minority groups. More talented children from low socioeconomic groups are identified by spatial tests than by verbal and mathematical measures.

Importance of Visual-Spatial Gifts

Success in the 21st century depends on different skills than are currently emphasized in school: grasping the big picture, multidimensional perception, problem-finding, visualization, thinking outside the box, ability to read people well, and creativity. According to Thomas West, the visual-spatial learning style may be uniquely suited for our technological world. Visual-spatial learners show promise as future surgeons, architects, engineers, pilots, mathematicians, scientists, computer programmers, designers, dentists, artists, musicians, dancers, military strategists, and so on. The importance of visual-spatial gifts cannot be overlooked. Rose Mary Webb, David Lubinski, and Camilla Benbow assert that they are vital in science, technology, engineering, and mathematics (STEM):

Carol Gohm, Lloyd Humphreys, and Grace Yao studied more than 1,000 spatially gifted high school seniors (578 boys and 511 girls) and found them to be "disenchanted with education" (p. 528). They reported that this group received less college guidance from school counselors, were less likely to go to college, and had lower career aspirations than equally intelligent students who excelled in mathematics.

Measurement of Visual-Spatial Abilities

Current intelligence tests place a greater emphasis on the assessment of visual-spatial abilities. Visual-spatial processing is one of five factors of intelligence measured in the fifth edition of the Stanford-Binet Intelligence Scale. The fourth edition of the Wechsler Intelligence Scale for Children (WISC-IV) also substantially improved its measurement of visual-spatial abilities. The Perceptual Reasoning Composite consists of Block Design and Matrix Reasoning, both excellent visual-spatial measures, and Picture Concepts, a visual similarities test. In prior versions, the Performance IQ was a mixture of spatial measures (e.g., Block Design and Object Assembly) and sequential measures (Coding and Picture Arrangement).

Several other tests of visual-spatial abilities are also in wide use. Raven's Progressive Matrices is the most popular test for identifying gifted children in various cultures worldwide; it has demonstrated a remarkable increase in spatial abilities across all cultures over the last few generations. The *Naglieri Nonverbal Abilities Test*—a series of matrices—is a group measure frequently used for identifying culturally diverse gifted children in the United States. The *Mental Rotations Test* has been employed in several studies to detect children with extraordinary visual-spatial talents.

The Gifted Development Center constructed the Visual-Spatial Identifier (VSI) during a 10-year period, with the involvement of an interdisciplinary team of psychologists, neuropsychiatrists, sociologists, reading specialists, gifted program coordinators, speech pathologists, artists, tutors, and parents. The VSI is a simple, 15-item checklist with two forms: a self-report for students and an observer report for teachers and parents. It has been validated with 750 fourth, fifth, and sixth graders in urban and rural settings. As more than 40 percent of the children at each site were Hispanic, the VSI has also been translated into Spanish.

One-third of the children in the validation studies emerged as strongly visual-spatial. An additional 30 percent showed a slight preference for the visual-spatial learning style. Added together, nearly two-thirds had a visual-spatial preference. Only 23 percent were strongly auditory-sequential. In another study conducted in Page, Arizona, under a Javits Program grant, 69 percent of predominantly Navajo children preferred the visual-spatial learning style. These findings suggest that culturally diverse students may learn better using visual-spatial methods.

Strategies for Success

To teach visual-spatial learners, it is necessary to increase emphasis on right hemisphere tasks. This can be done through humor, use of emotionally meaningful material, discovery learning, music, hands-on experiences, fantasy, and visual presentations. The following guidelines can assist teachers in adapting lessons to capitalize on visual-spatial strengths:

1. Use visual aids and visual imagery: "A picture is worth a thousand words."
2. Allow students to use a computer for written assignments. Computer instruction is also recommended because computers present information visually.

3. Avoid timed tests. Give untimed power tests.
4. Hands-on experience with manipulatives is essential.
5. Teach whole words that can be pictured before instruction in phonics.
6. Allow students to construct, draw, or otherwise create visual representations (e.g., PowerPoint slides) as a substitute for some written assignments.
7. Grade content separate from mechanics (spelling, punctuation, syntax, etc.)
8. Teach students to visualize spelling words, math problems, etc.
9. If students demonstrate consistent accuracy, allow credit for correct answers even if they cannot show their work.
10. Use inductive (discovery) techniques that encourage pattern-finding.
11. Teach students to translate what they hear into images, and record those images using webbing, mind-mapping techniques, or pictorial notes.
12. Avoid drill, repetition, and rote memorization; use more abstract conceptual approaches.
13. Teach to their strengths in visualization and imagination. Help them learn to use these powerful tools to compensate for their weaknesses.
14. Emphasize the fine arts. Art is the sanctuary of the visual-spatial learner.
15. Be emotionally supportive. Keenly sensitive to their teachers' attitudes, visual-spatial learners flourish when teachers believe in them.

With appropriate detection and classroom modifications, these children can be highly successful, particularly as they tackle more complex subject matter in high school and college. When they are placed in the right learning environment, where there is a good match between their learning styles and the way they are taught, visual-spatial learners can actualize their potential to become innovative leaders.

Linda Kreger Silverman

See also Brain Imaging; Learning Styles

Further Readings

Gohm, C. L., Humphreys, L. G., & Yao, G. (1998). Underachievement among spatially gifted students. *American Educational Research Journal, 35,* 515–531.

O'Boyle, M. W., & Benbow, C. P. (1990). Enhanced right hemisphere involvement during cognitive processing may relate to intellectual precocity. *Neuropsychologia, 28,* 211–216.

Schmidt, D. B., Lubinski, D., & Benbow, C. P. (1998). Validity of assessing educational-vocational preference dimensions among intellectually talented 13-year-olds. *Journal of Counseling Psychology, 45,* 436–453.

Silverman, L. K. (1990). *Characteristics of Giftedness Scale.* Denver, CO: Gifted Development Center. Retrieved from http://www.gifteddevelopment.com

Silverman, L. K. (1998). Personality and learning styles of gifted children. In. J. VanTassel-Baska (Ed.), *Excellence in educating gifted and talented learners* (3rd ed., pp. 29–65). Denver, CO: Love Publishing.

Silverman, L. K. (2002). *Upside-down brilliance: The visual-spatial learner.* Denver, CO: DeLeon.

Silverman, L. K. (2009). The measurement of giftedness. In L. Shavinina (Ed.), *The international handbook on giftedness.* Amsterdam: Springer Science.

Springer, S. P., & Deutsch, G. (1998). *Left brain/right brain: Perspectives from cognitive neuroscience* (5th ed.). New York: W. H. Freeman.

Webb, R. M., Lubinski, D., & Benbow, C. P. (2007). Spatial ability: A neglected dimension in talent searches for intellectually precocious youth. *Journal of Educational Psychology, 99,* 397–420.

West, T. G. (1991). *In the mind's eye: Visual thinkers, gifted people with learning difficulties, computer images, and the ironies of creativity.* Buffalo, NY: Prometheus Press.

W

Wallace Research Symposium

Henry B. (H. B.) Wallace (1915–2005) was an exceptionally gifted individual with amazing talents. These same talents led to extraordinary success in business, which he used to translate his concern for students and the future of U.S. education into action. These concerns, coupled with a respect for the importance of research as a means to answer questions and improve life, were the impetus for the Biennial Henry B. & Jocelyn Wallace National Research Symposium on Talent Development (Wallace Research Symposium). The Wallace Research Symposium, which was initiated with an endowment from the Wallace Research Foundation in the late 1980s, was held for the first time in 1991, at the University of Iowa.

The Wallace Research Symposium, described in this entry, has been internationally acclaimed as a preeminent research conference in gifted education. The structure of the symposium, including the meeting location, quality of speakers, and presentation format, lends itself to a personal experience that represents the height of professional development. Typically conducted over 2.5 days, nearly a dozen high-profile speakers are featured at each Wallace Research Symposium. A unique combination of experts in the field of gifted education as well as outside the field leads to an intellectually stimulating experience for all in attendance.

A sample of the range of keynote presentations includes the following:

Music, the Creative Process, and the Path of Enlightenment: Guiding the Gifted Through Their "Dark Night" to the "Music of the Spheres," which was presented and performed by pianist Lorin Hollander

From "Play Partner" to "Sure Shelter": How conceptions of Friendship Differ Between Average Ability, Moderately Gifted, and Highly Gifted Children, presented by Professor Miraca Gross, University of New South Wales, Sydney, Australia

Anti-Intellectuals in Universities, Schools, and Gifted Education, presented by Professor Nicholas Colangelo, The Belin-Blank Center, The University of Iowa

Why Are We Afraid to Unleash the Academic Talent in Most Kids? presented by Jay Mathews of *The Washington Post*

Creative Giftedness, presented by Professor Robert Sternberg (formerly of Yale University)

There are five categories for presentations at Wallace Research Symposia: the Julian C. Stanley Distinguished Lecture, Keynote Presentations, Invited Presentations, Concurrent Presentations, and Poster Presentations.

In 2002, the Julian C. Stanley Distinguished Lecture was initiated in recognition of the contributions to gifted education by the late Julian C. Stanley. Those selected to deliver the Stanley Distinguished Lecture are internationally recognized scholars.

Keynote presentations, which do not have any other activities scheduled opposite them, are broad

in scope and intended to encourage the participants to think innovatively about gifted education. Invited presentations are frequently scheduled two per time slot and tend to be more focused on research presentations that emphasize applications to the field. Keynote and Invited presenters are invited by the symposium's organizers.

In addition, concurrent presentations and poster presentations are selected from among the proposals submitted in response to a call for papers, which is made available several months in advance of the symposium. These presentations tend to be on specific lines of research and frequently represent cutting-edge results. The concurrent presentations are traditional (albeit shorter) in presentation format, with no more than nine sessions scheduled at the same time. Poster presentations are held in a single large room, which enables the symposium attendees to visit multiple presentations during that time.

Attendees at the Wallace Symposium come from throughout the United States as well as from a variety of countries. The 2008 Wallace Research Symposium was unique because it included 51 educators representing 46 countries (from six continents) who participated as part of a grant from the John Templeton Foundation.

Susan G. Assouline and Nicholas Colangelo

See also Belin-Blank Center; Institute for Research and Policy on Acceleration; National Association for Gifted Children

Further Readings

Belin-Blank Center: http://www.education.uiowa.edu/belinblank

Colangelo, N., & Assouline, S. G. (Eds.). (1999). *Talent development: Proceedings from the 1995 H. B. and Jocelyn Wallace National Research Symposium on Talent Development*. Scottsdale, AZ: Gifted Psychology Press.

Colangelo, N., & Assouline, S. G. (Eds.). (2001). *Talent development: Proceedings from the 1998 H. B. and Jocelyn Wallace National Research Symposium on Talent Development*. Scottsdale, AZ: Gifted Psychology Press.

Colangelo, N., Assouline, S., & Ambroson, D. (Eds.). (1992). *Talent development: Proceedings of the H. B. and Jocelyn Wallace National Research Symposium on Talent Development*. Monroe, NY: Trillium.

Colangelo, N., Assouline, S., & Ambroson, D. (Eds.). (1994). *Talent development: Proceedings from the 1993 H. B. and Jocelyn Wallace National Research Symposium on Talent Development*. Dayton, OH: Ohio Psychology Press.

Web-Based Learning

Web-based learning, or open, flexible, and virtual learning, is known or referred to by many names including *e*-learning; *a*-learning; Web-based learning, instruction, or training; Internet-based education or training; blended learning; distance learning or education; and online learning. Web-based learning is one of many tools used to deliver education or training to students. In many traditional settings, Web-based learning is located organizationally in a distance education program together with other distance delivery models such as correspondence, satellite broadcast, two-way videoconferencing, videotape, and CD-ROM/DVD delivery modalities. All such modalities try to serve learners at remote locations away from their knowledge facilitator. Many of these modalities attempt to serve the learners by interacting with them at various chronological times. Distance education is frequently referred to as those delivery modalities that try to decrease the barriers of time and location to learning—thus, the commonly used phrase *anytime, anywhere learning*. One must be cautious, however, with that correlation as not all topics or educational goals lend themselves to "anytime" as a delivery method. This entry describes aspects of Web-based learning.

Anytime, Anywhere Learning

The following definitions are used to refer to anytime, anywhere learning:

Web-based learning refers to anytime, anywhere instruction delivered via the Internet to Web-connected learners. Two common models of Web-based instruction are synchronous and asynchronous. *Asynchronous* refers to communication in which interaction between parties does not take place simultaneously. *Synchronous* refers to communication in which interaction between participants is simultaneous.

E-learning is a form of teaching and learning using electronic means of delivery, usually Web-based. E-learning uses network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere.

Blended learning is the combination of multiple approaches to learning, for example, self-paced, collaborative, or inquiry-based study. Blended learning can be accomplished using blended virtual and physical resources. Examples include combinations of technology-mediated sessions, face-to-face sessions, and electronic or print materials.

Distance learning is a formal educational process in which most of the instruction occurs when a student and instructor are not in the same place. Instruction may be synchronous or asynchronous. Distance education may employ correspondence study, audio, video, and other electronic technologies.

Quality of Web-Based Learning

Web-based distance learning refers to a broad field of instruction where the faculty and student are separated geographically. The methods used for Web-based distance learning have been evolving for nearly two centuries, beginning with the use of the postal service for correspondence courses. As new technologies such as radio, television, cable, and satellite broadcasts were developed, they became transmission modes for Web-based or distance learning. Today, most distance learning takes place on the World Wide Web (WWW); making courses available anywhere and to anyone with access to an Internet-connected computer (*a*-learning). The practice of Web-based distance learning has been growing in recent years, to where the phrase is now consistently applied to a wide spectrum of activities. Web-based learning is increasingly being looked to by many institutions as a more efficient method of mobilizing their campus-based activities, expanding learning opportunities for students around the world, and making effective use of emerging new technologies.

Academic accreditation bodies recognizes that the continued development of Web-based distance learning and its worldwide acceptance depend on rigorous quality assurance, and that there are many areas in which the usual ways of doing things for on-campus provision are not necessarily appropriate in the context of Web-based learning.

Thus, the purpose for standards for *Web-based learning* means a way of providing education that involves delivering instruction using electronic and WWW technologies. There is considerable debate about appropriate terminology and a number of different terms are commonly used that refer to the same or similar sort of activity (e.g., *e-learning, distance education, distance learning*). There is also great diversity in the large number of actual arrangements—and even more in potential arrangements (how the program or courses are actually delivered)—which standards can be used to address. As the nature of institution-hosted and of collaborative, between and among institutions, provision develops and changes, and as the potential for Web-based learning is explored further, the boundaries between different forms of education are becoming less easy to recognize. Standards do not assume that Web-based learning is a separate and unique form of education around which there are clear, let alone fixed, boundaries. Nor is it assumed that all Web-based learning has uniform characteristics. However, programs and courses of Web-based learning have some basic features in common that broadly distinguish them from conventional modes of learning: physical proximity is not a requirement of study and programs made available through Web-based learning all involve some degree of geographical separation of the student from the institution responsible for providing instruction and awarding the degree. There are also a number of ways in which teaching and learning activities to support students on Web-based learning programs of study involve distinctive divisions of labor and allocations of responsibilities such as office hours, personal contact time, library resources, and so on.

Web-based standards can be arranged under the following headings, each dealing with an aspect where quality assurance is likely to require particular attention when Web-based learning is used:

1. Mission, planning, and institutional effectiveness
2. Organization, governance, and leadership
3. Public disclosure and integrity

4. Fiscal resources
5. Academic program and instruction
6. Faculty
7. Students
8. Library and other informational resources
9. Physical and technological resources

Benefits and Limitations of Web-Based Learning

Using Web-based learning, like all other delivery media, has benefits and limitations. Educators and course designers must carefully evaluate these against the use of other options on a case-by-case basis.

Benefits

Common benefits of Web-based learning when compared with conventional learning are as follows:

- Learning is typically self-paced and student directed.
- Access is available anytime, anywhere, around the globe.
- Student travel costs are reduced.
- Equipment costs for students are affordable.
- Student tracking is made easy.
- "Learning object" architecture supports on-demand, personalized learning.
- Content is easily updated.
- Students are more focused.

When compared with CD or DVD learning, the benefits of Web-based learning develop because access to the content is easy and requires no distribution of physical materials.

Limitations

Web-based learning has two genuine limitations, and both likely will be overcome in the next 5 or so years as increased high bandwidth network connections become widespread.

The first limitation is the lack of face-to-face interaction when compared with conventional classroom instruction. Web-based learning is better than CD or DVD learning in this regard. Students can use their Web connection to e-mail other students, post comments on message boards, or use chat rooms and videoconference links to communicate live. Although these methods of interaction are helpful, and an improvement over CD or DVD learning, they still do not have the impact of face-to-face interactions. With higher

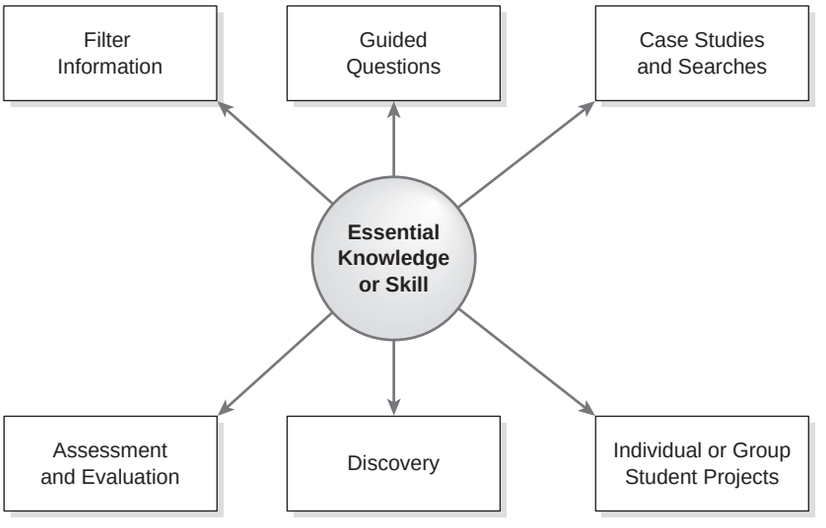


Figure 1 Web-Based Learning Design Model

bandwidth connections and improved conferencing software, students around the world will some day be able to communicate in real time with each other through full-screen video.

The second limitation is the lack of multimedia capabilities in many Web-based learning programs. Using audio and video are critical to creating persuasive descriptions, accommodating students with different learning styles, and creating realistic job simulations. Full multimedia is possible, particularly with the advent of YouTube and similar services, and many in education are using this resource. However, because large media files slow down the entire network, many information technology departments do not want such files used. The outcome is that many Web-based learning programs still comprise text and limited graphics. Once again, the bandwidth problem will likely be reduced in the future with advancements in network protocol standards and enhanced software compression.

Web-Based Learning Design Model

When starting a Web-based learning course, it is critical that the designer understand the direction the instructor wants to go and what essential knowledge and skills the instructor is trying to accomplish. The model in Figure 1 is to assist instructors in designing Web-based courses that are focused on students' understanding vital knowledge and skills and then applying them in real-world situations. The key concept is that these knowledges and skills are fluid and should be transferable to additional contexts and subjects.

Michael K. Swan

See also Online Gifted Education

Further Readings

Bruning, R. H., Horn, C. A., & PytlikZillig, L. M. (2003). *Web-based learning: What do we know? Where do we go?* Charlotte, NC: Information Age Publishing

O'Neil, H. F., & Perez, R. S. (2006). *Web-based learning: Theory, research, and practice.* Mahwah, NJ: Lawrence Erlbaum.

Wechsler Intelligence Scale for Children–Fourth Edition

Gifted children often require specialized instruction and intervention to optimize their academic performance. Before receiving individualized instruction, however, they must be identified as "gifted" through a process that typically involves the use of intelligence tests, such as the Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV), described in this entry. The first edition of the WISC was a modified version of the Wechsler-Bellevue Form II. Over the years, the WISC has been revised three additional times with the latest version being the most substantial revision of any Wechsler scale to date.

The WISC-IV represents a substantial improvement over its predecessor, the WISC-III. The many improvements made to this latest edition of the WISC have resulted in a psychometrically sound battery that is both adequate and appropriate for use in the identification of giftedness in children ages 6 to 16 years. Subtest ceilings have been raised, measures of fluid reasoning have been added, and there has been a de-emphasis on timed tasks. In addition, several excellent resources (e.g., technical reports, interpretive methods) will assist greatly in WISC-IV evaluation and interpretation, particularly for students who are gifted and who come from culturally and linguistically diverse backgrounds. A good rule of thumb when testing children for gifted and talented programming is to not rigidly adhere to a single cutoff score or criterion. Multiple data sources should always be used to make educational placement decisions.

Description

The WISC-IV is composed of 10 core-subtests that yield one global ability index, the Full-Scale Intelligence Quotient (FSIQ), and four lower-order composites: Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Working Memory Index (WMI), and Processing Speed Index (PSI). Five supplementary subtests are available and can serve as substitutes for core subtests

when appropriate. The clinical and psychometric features of the WISC-IV for identification of children with a variety of exceptionalities, including giftedness, have brought them to positions of dominance and popularity unrivaled in the history of intellectual assessment. Notwithstanding, the Wechsler Scales have been criticized with respect to their ability to accurately identify giftedness. These criticisms include the following: (a) difficulties in the interpretation of nontypical profiles and global ability scores, (b) lack of adequate measures of fluid reasoning, (c) overemphasis on speed of performance, (d) low test ceilings, and (e) lack of cultural fairness. The discussion that follows demonstrates, however, that these criticisms either no longer apply to the WISC-IV or have been circumvented by new interpretive procedures for the WISC-IV.

Nontypical Profiles and Global Ability Scores

Beginning with Lewis Terman, giftedness has been determined primarily by a global score from an intelligence test (i.e., IQ) that is greater than or equal to two standard deviations (SDs) above the mean. This criterion continues to be used today despite evidence that use of a global ability score may be invalid when an individual's performance on the tests comprising it is markedly variable. Because most individuals display significant variation in their cognitive ability profiles, use of a global score, such as IQ, as the sole determinant of giftedness is inappropriate. Indeed, more than 95 percent of the WISC-IV standardization sample demonstrates at least some scaled score variability. Therefore, before a global ability score, such as the FSIQ or General Ability Index (GAI), is used to make decisions regarding giftedness, the practitioner should first determine whether there is a significant difference among the scores that constitute them.

Sometimes neither the FSIQ nor the GAI is interpretable. In this situation, Betty Gridley's approach is a viable alternative. She and her colleagues proposed a method of determining giftedness that includes a "multidimensional definition of giftedness" (p. 290). Rather than relying on a global ability score, Gridley and her colleagues use the three strata of the Cattell-Horn-Carroll theory (CHC theory) as follows: superior potential or performance (top 10% of the population) in *general intellectual ability* (Stratum III); exceptional potential or performance (top 5% of the population) in *specific intellectual abilities* (Stratum II); and exceptional general or specific academic aptitudes (top 5% of the population; Strata I and II).

Fluid Reasoning Measures

Fluid Reasoning (*Gf*) refers to a type of thinking that an individual uses when faced with a relatively new task that cannot be performed automatically. This type of thinking involves, for example, forming and recognizing concepts, identifying and perceiving relationships, drawing inferences after reading a story, and reorganizing or transforming information. Overall, this ability can be thought of as a *problem-solving* type of intelligence.

In apparent response to the long-held criticism of the Wechsler Scales' lack of *Gf* measures, the fourth edition of the WISC now includes three new subtests that assess *Gf*—namely, Picture Concepts (PCn), Matrix Reasoning (MR), and Word Reasoning (WR). Dawn Flanagan and Alan Kaufman's interpretive system allows practitioners the option of generating three norm-based *Gf* clinical clusters. Given the importance of *Gf* in the identification of gifted and talented students, the WISC-IV is better suited for this purpose than were its predecessors.

Speed of Performance

The WISC-III was criticized for its inclusion of five timed tasks, all of which contributed to the FSIQ. Kaufman argued that response time would affect the performance of those gifted individuals who were either reflective, immature, or evidencing a coordination problem and suggested that the examiner pay careful attention to the examinee's behaviors during the testing session. The overemphasis on speed of performance on the WISC-III was addressed by the authors of the WISC-IV. In particular, two timed subtests were eliminated (i.e., Picture Arrangement and Object Assembly) and three were moved to supplementary status (i.e., Picture Completion, Cancellation, and Arithmetic), leaving only three timed subtests on the standard WISC-IV battery—Block Design, Coding, and Symbol Search—with the latter two contributing appropriately to the PSI.

Test Ceilings

When assessing individuals who may be intellectually gifted, practitioners should consider the age of the examinee, the age range of the test being used, and the test ceiling. Subtests with inadequate ceilings will underestimate the performance of gifted examinees because they do not include items of sufficient difficulty. As a result, the subtest will not adequately discriminate among those who score at the top of the test. For a test to have an adequate ceiling, the maximum raw score value must be equal to a standard score that is greater than two SDs above the mean of the test. However, when distinguishing among children who score in the gifted range, the maximum raw score value should be equivalent to a scaled score that is at least three SDs above the mean of the test.

All standard subtests on the WISC-IV are capable of measuring performance as many as three SDs above the mean for all ages. The *WISC-IV Technical Report Number 7* provides examiners with additional, extended norms that were developed as a result of a request from the National Association for Gifted Children to better differentiate among various degrees of intellectual giftedness. For example, whereas the WISC-IV norms show that the highest scaled score possible is 19, the norms reported in *Technical Report Number 7* extend the subtest scaled score ceilings as high as 28 in some cases to highlight the substantive and meaningful differences between scores. For older children (i.e., age 16), practitioners have the option of using the Wechsler Adult Intelligence Scale–Fourth Edition or any other intelligence battery that includes high ceilings.

Cultural Fairness

When using norm-referenced tests, practitioners should be aware of the potential concerns with fairness for different cultural groups. For example, as is the case with all current intelligence tests, the WISC-IV authors worked diligently to ensure that subtest items were not biased against any of the members of the standardization sample. The WISC-IV standardization sample was stratified across five typical demographic variables that included age, gender, geographic region, race/ethnicity, and socioeconomic status. Such sampling leads practitioners to assume that because culturally and linguistically diverse (CLD) individuals were included in the standardization sample, their performance can be compared fairly to that sample. Unfortunately, according to Samuel Ortiz, the absence of the systematic inclusion of two crucial variables, level of acculturation and degree of English language proficiency, tends to undermine the comparison of the performance of CLD individuals with the standardization sample. Creation of a truly representative sampling of *bilingual* individuals is a daunting task that faces many of the same difficulties encountered by publishers who seek to create special norm groups (e.g., deaf, learning disabilities, attention deficit disorder). As a result, the lack of a truly representative sample requires that practitioners consider the unique cultural and linguistic background histories when assessing a CLD examinee.

Dawn Flanagan and her colleagues recommend the CHC cross-battery approach, along with cultural and linguistic extensions, to provide a systematic and defensible method for greatly reducing the discriminatory aspects inherent in the use of cognitive ability tests with diverse individuals. Specifically, the use of the Culture-Language Interpretive Matrix (C-LIM), which is based on the Culture-Language Test Classifications (C-LTC), allows for the systematic interpretation of relevant cultural and linguistic characteristics that influence test performance.

Researchers have specified that an individual's familiarity with the content of the test (acculturation) and the degree to which they comprehend the language in which the test is based (proficiency) are directly related to test performance. Accordingly, tests such as the WISC-IV have been classified based on their degree of cultural loading and linguistic demand (e.g., low, medium, high). When these classifications are used in conjunction with the software program that assists in interpreting the test performances of CLD examinees (i.e., the C-LIM), this approach allows practitioners to determine whether test scores can be interpreted as valid indicators of what the test authors purport the tests to be measuring, or whether they reflect the examinee's levels of acculturation and English language proficiency.

Dawn P. Flanagan and Marlene Sotelo-Dynega

See also Intelligence; Intelligence Testing; Intelligence Theories

Further Readings

Flanagan, D. P., & Alfonso, V. C. (1995). A critical review of the technical characteristics of new and recently revised intelligence test for preschool children. *Journal of Psychoeducational Assessment, 13,* 66–90.

Flanagan D. P., & Kaufman, A. S. (2009). *Essentials of WISC-IV assessment* (2nd ed.). Hoboken, NJ: Wiley.

Flanagan, D. P., McGrew, K. S., & Ortiz, S. O. (2000). *The Wechsler intelligence scales and Gf-Gc theory: A contemporary approach to interpretation.* Boston: Allyn & Bacon.

Flanagan, D. P., Ortiz, S., & Alfonso, V. C. (2007). *Essentials of cross-battery assessment* (2nd ed.). New York: Wiley.

Gridley, B. E., Norman, K. A., Rizza, M. G., & Decker, S. L. (2003). Assessment of gifted children with the Woodcock-Johnson III. In F. A. Shrank & D. P. Flanagan (Eds.), *WJ III clinical use and interpretation: Scientist-practitioner perspectives* (pp. 285–317). Boston: Academic Press.

Kaufman, A. S. (1994). *Intelligent testing with the WISC-III.* New York: Wiley.

Ortiz, S. O. (2009). Bilingual-multicultural assessment with the WISC-IV. In D. P. Flanagan & A. S. Kaufman (Eds.), *Essentials of WISC-IV assessment* (2nd ed.). Hoboken, NJ: Wiley.

Volker, M. A., & Smerbeck, A. M. (2009). Identification of gifted students with the WISC-IV. In D. P. Flanagan & A. S. Kaufman (Eds.), *Essentials of WISC-IV assessment* (2nd ed.). Hoboken, NJ: Wiley.

Wechsler, D. (2003). *Wechsler intelligence scale for children* (4th ed.). San Antonio, TX: Psychological Corporation.

Zhu, J., Cayton, T., Weiss, L., & Gabel, A. (2008). WISC-IV extended norms (WISC-IV Technical Report No. 7). Retrieved September 16, 2008, from http://pearsonassess.com/NR/rdonlyres/C1C19227-BC79-46D9-B43C-8E4A114F7E1F/0/WISCIV_TechReport_7.pdf

Wechsler Preschool and Primary Scale of Intelligence–Third Edition

The Wechsler Preschool and Primary Scale of Intelligence–Third Edition (WPPSI-III), described in this entry, is designed to measure the general cognitive ability of young children from 2 years 6 months (2-6) to 7 years 3 months (7-3). The WPPSI-III measures verbal skills, including knowledge of words and general information, reasoning using pictorial cues, and solving problems with blocks and puzzles. The WPPSI-III also measures general language ability including receptive and expressive vocabulary.

The original Wechsler Preschool and Primary Scale of Intelligence (WPPSI) was published in 1967 in response to the development of educational programs for young children such as Head Start. These programs raised awareness of the need for accurate assessment of young children and evaluation of the effectiveness of early childhood education. The WPPSI was essentially a downward extension of the Wechsler Intelligence Scale for Children (WISC), first published in 1949. The WPPSI was revised in 1989, and the current edition was published in 2002, representing improvement of the scale to reflect input from examiners as well as research into the nature of intelligence in young children.

The WPPSI-III has been updated to measure aspects of intelligence based on Cattell-Horn-Carroll theory. Three new subtests measure fluid reasoning, which is the ability to solve problems using unfamiliar tasks or stimulus materials. Two new subtests measure processing speed, which requires timed responses on tasks requiring eye-hand coordination, and two new subtests measure expressive and receptive vocabulary.

The WPPSI-III covers two broad age groups, 2-6 to 3-11 and 4-0 to 7-3. The WPPSI-III overlaps with the Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV) at ages 6-0 to 7-3. The choice of which test to use depends on the child's estimated cognitive functioning and whether the child has previously been exposed to either test.

WPPSI-III subtests are designated as either core, supplemental, or optional. Core subtests are those that combine to form the Verbal, Performance, and Full Scale IQ scores. Supplemental subtests may be used to replace core subtests or to provide additional information. Optional subtests provide additional information but may not be used as replacements for core subtests.

At the younger age range, from 2-6 to 3-11, four core subtests are available. Receptive Vocabulary and Information form the Verbal scale. Block

Design and Object Assembly form the Performance scale. The Verbal and Performance scores are combined to determine the Full Scale IQ score. A supplemental subtest, Picture Naming, can be used as a substitute for Receptive Vocabulary or can be combined with Receptive Vocabulary to form the General Language Composite.

At the older age range, from 4-0 to 7-3, Information, Vocabulary, and Word Reasoning form the Verbal scale. Block Design, Matrix Reasoning, and Picture Concepts constitute the Performance scale. The Verbal and Performance IQ scores are used to determine the Full Scale IQ score. There are two supplemental subtests for the Verbal scale, Comprehension and Similarities, and two supplemental subtests for the Performance scale, Picture Completion and Object Assembly. The supplemental subtests may be used as replacements for other subtests in the same scale. A third scale for this age group, Processing Speed, consists of one core subtest, Coding, and one supplemental subtest, Symbol Search. The General Language Quotient consists of two tests that are optional at this age range, Receptive Vocabulary and Picture Naming.

Many WPPSI-III subtests are similar to subtests of the same name on the WISC-IV. Performance subtests include Block Design, which requires the child to reproduce designs using blocks with either one or two colors. Object Assembly asks the child to assemble puzzles of common objects. In Picture Concepts, the child must choose pictures that go together from two or three rows of pictures. Picture Completion requires the child to locate the missing element in an incomplete picture. Matrix Reasoning asks the child to solve visual puzzles by selecting the missing piece from several alternatives.

Verbal subtests include Information, which requires the child to answer questions about everyday subjects. The Vocabulary subtest asks the child to define words. For Word Reasoning, the child identifies an object or concept based on verbal clues. On Similarities, the child must describe how two objects are alike. Comprehension asks the child to provide solutions to problems involving common social situations.

Coding is a Processing Speed subtest that asks the child to copy symbols that are paired with other symbols. In Symbol Search, the child scans a row of symbols to determine if a target symbol is present or not.

Unique WPPSI-III subtests are those that form the General Language Composite. For Receptive Vocabulary the child points to one picture out of four that shows the meaning of a word. Picture Naming asks the child to name the item shown in a picture.

The WPPSI-III was standardized on 1,700 children representing the population of the United States in age, sex, race and ethnicity, geographic region, and parental education level. The test has good psychometric properties, including reliability, stability, and validity. The manuals and testing materials are interesting for children and provide excellent directions and scoring instructions for examiners.

The WPPSI-III can be used to identify intellectual giftedness and cognitive delay, and as a guide for placement in special programs. Because of the composite scores that are available, it provides some diagnostic information about cognitive strengths and weaknesses as well as the opportunity for the examiner to observe the child's responses to various materials and tasks. The General Language Quotient offers information about overall language skills, and this composite as well as the Verbal scale can be administered to children with motor impairments.

Weaknesses include the fact that only four core subtests are available at the younger age range, making the WPPSI-III more suitable as a screening instrument than as a comprehensive test of general intellectual ability. There is little continuity between the younger and older age ranges because of the different combinations of subtests used to obtain the IQ scores. There are a limited number of test items for children who are extremely low or high functioning, so it is difficult or impossible to distinguish performance at the extremes. Furthermore, because of the option to substitute supplemental subtests for core subtests, many different combinations of subtests may be used to determine the Full Scale IQ, especially at the older age range. This feature of the WPPSI-III is raises the potential for misuse as well as misunderstanding what the Full Scale IQ means for a particular child.

Julia Shaftel

See also IQ; Wechsler Intelligence Scale for Children–Fourth Edition

Further Readings

Lichtenberger, E. O., & Kaufman, A. S. (2004). *Essentials of WPPSI-III assessment*. Hoboken, NJ: Wiley.

Sattler, J. M., & Dumont, R. (2004). *Assessment of children: WISC-IV and WPPSI-III supplement*. San Diego, CA: Jerome M Sattler.

Wechsler, D. (2002). *WPPSI-III administration and scoring manual*. San Antonio, TX: Psychological Corporation.

Williams Syndrome

Williams syndrome, described in this entry, is a rare, genetically based neurodevelopmental disorder characterized by a complex profile of impairments and abilities, and a host of serious cardiac, digestive, metabolic, and other medical problems. Especially common are a supravalvular aortic stenosis (narrowing of the aorta), accompanied by mild-to-moderate mental retardation as measured by standard IQ tests, as well as characteristic craniofacial features and heightened musical and narrative abilities. The prevalence of Williams syndrome is estimated at 1 in 20,000 births.

The disorder was named after a New Zealand cardiologist, J. C. P. Williams, who first described in 1961 four cases of young children who shared similar health problems and unusual facial features. This condition was also independently recognized as a syndrome in 1962 by German cardiologist Alois J. Beuren and is sometimes called Williams-Beuren syndrome.

Overview

People affected by Williams syndrome have distinctive facial features that make them look much more like others with this condition than like members of their own families. These facial features include a broad forehead, full cheeks, a wide mouth, an upturned nose, and prominent eyes, which results in their faces being described as "elfin" or "pixie-like." Because they are often perceived as attractive and lovable, children with Williams syndrome usually evoke positive responses from family members, teachers, and therapists.

In 1993, Williams syndrome was determined to be caused by a microdeletion of DNA in a single copy region of chromosome 7, 7q11.23. The first deleted gene identified as responsible for Williams syndrome was the elastin gene (ELN), which causes supravalvular aortic stenosis in those both with and without Williams syndrome. In the adjacent area of the chromosome 7q11.23 between 16 and 20 other genes have been linked to behavioral and physical phenotype of Williams syndrome: characteristic behavioral and cognitive profile, heightened sociability, visuospatial and visuomotor integrative deficits, and physical appearance.

Children with Williams syndrome are often born with serious, even life-threatening cardiac, digestive, and other medical problems that require surgical interventions. Small stature and slight built in combination with skeletal problems such as progressive joint limitations and subsequent contractures, depression of the chest, and angulation of the big toe are also symptoms of Williams syndrome.

Most children with Williams syndrome show delays in most areas of development. They are late to speak, walk, run, read, and write. By late childhood, they often make up for the initial language delay but the visuospatial and visuomotor integrative challenges endure throughout their lifetime. They show a marked unevenness across subtests of most IQ tests achieving relatively high scores on verbal tests and low scores on performance tests. In general, such tests are considered a challenge because of distractibility, impulsiveness, and rigidity of these children. Because of these behavioral characteristics, a secondary diagnosis of attention deficit disorder with (ADHD) or without (ADD) hyperactivity is sometimes given.

Giftedness and Talent

Five areas of unusual aptitude have been identified in Williams syndrome: language, sociability, curiosity, memory, and musicality. These areas of considerable skills stand in contrast with the relatively low levels of overall functioning including cognitive limitations and behavioral challenges.

Children with Williams syndrome possess auditory hypersensitivity to certain sounds, along with giftedness in music and heightened phonological memory. The powerful relationship with the auditory world is central to the Williams syndrome profile. Most children with Williams syndrome are fascinated by auditory stimuli and are able to

detect nearly imperceptible sounds in noisy environments. Some of the usual sounds, such as vacuum cleaner, lawn mower, and thunder are perceived as unbearable and aversive, and the children often attempt to protect themselves by putting their hands over their ears. However, children with Williams syndrome have an exaggerated ability to attend to, identify, interpret, and remember auditory information. This ability is linked to their highly developed vocabulary, an excellent phonological memory, and an unusual aptitude for music, storytelling, and foreign languages.

Perfect pitch is a rare ability possessed by one in 10,000 people in the general population, yet it has been attributed to persons with Williams syndrome by clinicians, researchers, and musicians alike. Both absolute pitch, the ability to identify natural and accidental (sharps and flats) notes from several octaves, and relative pitch, the relation between pitches, have been identified as areas of talent in Williams syndrome. Brain imaging studies suggest that language and musical ability in Williams syndrome are related neuroanatomically. Musically gifted individuals with Williams syndrome are similar to professional musicians with absolute pitch in that they show leftward asymmetry of the planum temporal area in the auditory cortex, an area also associated with language processing.

Parents of individuals with Williams syndrome must be credited for recognizing and developing their children's musical talent and flair for musical performance, as well as for using these talents to support development in other areas. In addition, because of parental efforts, musicality in Williams syndrome has become a major area of research. Musicality is a well-documented area of giftedness in Williams syndrome, and researchers have now confirmed what parents have known all along: Individuals with Williams syndrome are more engaged in musical activities than any other people with a disability. Like musical talent of unaffected individuals, the extraordinary musical talent of those with Williams syndrome requires family and professionals' commitment to support and cultivate their musical skills.

Talent development approaches usually implemented in programs for the gifted and talented also show promise for children and youth with Williams syndrome. "Music and Minds," a residential summer camp program at the University of Connecticut in Storrs, offers young adults with Williams syndrome enrichment programs based on each participant's learning style, patterns of talent development, and past experiences. Belvoir Terrace in Lenox, Massachusetts, is another successful program where musically talented individuals with Williams syndrome develop and demonstrate their remarkable musicality in singing, performing, and composing. Throughout the past decade, musical talent in Williams syndrome was repeatedly recognized on radio and television programs such as *All Things Considered, 60 Minutes, Inside Edition, Nightline,* and the Nova documentary *The Mind Traveler.*

Williams syndrome is a disorder that transcends existing theories of intelligence, cognitive impairment, giftedness, and talent. It offers a unique opportunity to move beyond categorizing a group of people as "disabled" and to develop educational programs that support and nurture their unique interests and talents. It also provides an opportunity to re-think traditional approaches to special needs programs for children and youth with other neurodevelopmental conditions and to develop educational environments that support their interests and talents to the fullest.

Olga Solomon

See also Twice Exceptional; Verbal Ability

Further Readings

Bellugi, U., & St. George, M. I. (Eds.). (2001). *Journey from cognition to brain to gene: Perspectives from Williams syndrome.* Cambridge: MIT Press.

Morelock, M. J., & Feldman, D. H. (2003). Prodigies, savants and Williams syndrome: Windows into talent and cognition. In K. A. Heller, F. J. Monks, R. J. Sternberg, & R. Subotnik (Eds.), *International handbook for research on giftedness and talent* (2nd ed., pp. 227–242). Oxford, UK: Elsevier.

Morris, C., Lenhoff, H. M., & Wang, P. P. (Eds.). (2006). *Williams-Beuren syndrome: Research, evaluation, and treatment.* Baltimore: John Hopkins University Press.

Semel, E., & Rosner, S. R (2003). *Understanding Williams syndrome: Behavioral patterns and interventions.* Mahwah, NJ: Lawrence Erlbaum.

Sforza, T., Lenhoff, H. M., & Lenhoff, S. (2006). *The (strangest) song: One father's quest to help his daughter find her voice.* Amherst, NY: Prometheus Books.

Women, Gifted

Research on gifted women in various domains illustrates the complex and diverse paths they choose. Some have partners and some do not. Some have children and some do not. Some live fast-paced lives characterized by restless energy and a constant need to work. Others work more peacefully and carefully, living quieter lives while achieving similar or even higher levels of productivity. The processes of developing their talents also vary. Many gifted women evolved their talents over decades, drawing from a backdrop of earlier varied life experiences that helped them to prepare for their future life accomplishments. This entry describes theories of talent development in gifted women and the challenges facing gifted women.

Theories About Talent Development in Gifted Women

Although many articles have been published on gifted women, few researchers have proposed theories about the process of women's talent development that span various domains, and that can be widely applied under a variety of circumstances. Three such theories have been offered by researchers, including Sally Reis' theory of talent development, Karen Arnold, Kate Noble, and Rena Subotnik's theory of "remarkable women," and Barbara Kerr's work and themes about "smart girls and women."

Reis's Theory of Women's Talent Development

In research with gifted women who achieved eminence, Reis drew on research about this topic spanning two decades of work, proposing a new theory of women's talent development that suggested that the cumulative and contextual experiences of women of accomplishment differ from those of men in intellectual, moral, personal, and work perceptions. In studying the life experiences of an award-winning children's writer, for example, Reis found the writer wove memories of her Hispanic heritage and parenting into her literary work, incorporating the insights and creative experiences she had gained as a mother and through reflections on her own childhood. Other gifted women in Reis's study of eminent women made careful choices about the development of their talents, achieving at high levels through working steadily and slowly, though acknowledging and sometimes even celebrating the detours that occurred in their lives, such as raising family, helping others, and working in service for the betterment of others at home or in the community. All felt a certain intensity in their lives, characterized by a need and sense of obligation to pursue their talents in an active way. Many compared their own lives with the lives of their contemporaries—other equally talented women who did not attain the same level of eminence, but who appeared to live much calmer, and in some cases, happier lives.

Based on this research with gifted women, Reis proposed the following definition about the process of talent development in women:

Feminine talent development occurs when women with high intellectual, creative, artistic or leadership ability or potential achieve at high levels in an area they choose and when they make contributions that they consider meaningful to society; these contributions are enhanced when the women develop personally satisfying relationships and pursue what they believe to be significant and consequential work. (2005, p. 222).

Remarkable Women by Arnold, Noble, and Subotnik

Arnold, Noble, and Subotnik suggest that talent development in women may differ from that of men because of differences in psychological needs and drives, in issues faced at home and at work, and in access to resources that encourage the development of gifts. Arnold, Noble, and Subotnik's model of talent development defines gifted behavior differently than traditional models do. Most striking is their inclusion of the personal sphere as an outlet for gifted behavior. They note, for example, that there is talent in nurturing children well, building strong primary relationships, and making a home—particularly for the many women worldwide whose pasts are marked by dysfunction, lack of health services and other obstacles. In addition to the personal sphere, Arnold, Noble, and Subotnik recognize giftedness more traditionally, stating, "The widest sphere of influence lies in the creation of ideas or products that change the course of a

domain or a social arena" (p. 435). Success in the public sphere is characterized as "leadership" or "eminence." The model also heavily stresses context, however, suggesting that what qualifies as gifted behavior depends on a woman's individual background. Women with many opportunities and fewer obstacles may be seen as gifted if they become eminent for outstanding contributions to a field, whereas an Indian woman of low caste may be seen as demonstrating gifted behavior if she overcomes obstacles to receive a degree or obtain a career.

An emphasis on context in women's lives is seen throughout the talent development model offered by Arnold, Noble, and Subotnik. Central to the model is the idea that women's relative position in relation to "the mainstream of their societies' achievement centers" has a powerful effect on whether and to what degree they will develop their talents. Thus, demographic variables such as race, wealth, and geographic location are key facilitators/inhibitors of talent development. In this model, adversity may either help or hinder development of women's gifts—depending on the woman and the circumstances. Other factors include desire to achieve and the support and validation of at least one other person.

As described by Arnold, Noble, and Subotnik, the characteristics of achieving women are those that allow them to overcome cultural and gender discrimination in whatever form they take. Thus, "cognitive and emotional flexibility," willingness to take risks and aim high, tolerance for making mistakes, persistence in the face of adversity, and the ability to resist the tendency to internalize limiting messages from the outside world may all play a role in women's talent development. Talent is important, according to this model, but it certainly is not the only factor that influences women's achievement, for as the authors state, a high level of innate ability is insufficient to withstand cultural pressures that have caused untold numbers of women to discount or deny their gifts.

Kerr's Smart Girls and Women

Kerr's writings on eminent women differ from other work discussed in this entry in that Kerr conducted biographical research. Kerr studied the lives of 33 eminent women in various domains, including Margaret Meade, Eleanor Roosevelt, Marie Curie, Maya Angelou, Katherine Hepburn, and Rigoberta Menchú, in an attempt to draw some conclusions about how women's talent develops. In this review of the lives of successful actors, scientists, activists, writers, and more, she found several themes, detailed in the following sections.

One of the unique factors identified in Kerr's analysis of women's talent development is time alone during girlhood. For some of these girls who later became eminent women, time alone was a choice; for others, a state forced on them by circumstance. Kerr suggests that, regardless of the cause of isolation, periods of aloneness provided these girls with time for reflection and an appreciation for individual work. Individualized instruction likewise was common across this group. Kerr notes that, for these girls, being able to move through material at their own paces probably prevented boredom and allowed advancement of skills in areas of particular talent. This individualized instruction was often provided within the larger environment of same-sex education, allowing for attention beyond that which might have been found within mixed-gender classrooms. Finally, most of the women Kerr studied had mentors—and they had mentors who had access at the highest level of their professions. Kerr cautions that one should not draw the conclusion that these eminent women owed their success to their relationships with influential people but, rather, that their talent was significant enough to impress those at the peak of their individual fields.

In addition to the variety of external factors, Kerr found a number of internal characteristics common to eminent women. First, almost all the women she studied were talented and insatiable readers as girls, which may have facilitated their learning and provided fodder for new ideas. Many also felt that they were "different" or "special" from a young age, either because of their gifts, or for other reasons, including the feeling that they were physically unattractive. All but one found adolescence painful and troublesome, increasing the time they spent alone and providing direct experience of the costs and benefits of standing apart. As they grew toward adulthood, each of the women Kerr studied formed identities relating to their ideas and work, rather than defining themselves primarily by relationships with others.

Likewise, most of the women were able to avoid seeing themselves primarily in terms of their membership in a couple or group. Instead, Kerr's eminent women were able to connect with others such as mentors or partners without losing their own identities or goals. Finally, in keeping with the idea that work was a huge part of the lives and relationships of these women, Kerr found that many joined work and love by marrying or partnering others who shared their passions. Georgia O'Keeffe and Alfred Steiglitz, Marie and Pierre Curie, and Gertrude Stein and Alice B. Toklas are provided as examples of just a few such couples.

The Challenges Facing Gifted Women

Different research studies on gifted women who have not achieved at high levels in their adult lives tell a similar story. The gifted women who did not achieve were extremely bright in school, but as they grew up, they began to feel ambivalent about their future and their responsibilities to loved ones. Their dreams for future high-profile careers and important work wavered and diminished, and they began to doubt what they previously believed they could accomplish. Their beliefs about their abilities as well as their self-confidence may have been undermined during childhood or adolescence. Some acquired various levels of "feminine modesty," leading to changes in self-perceptions of ability and talent, which subsequently affected others' perceptions of their potential. Some fell in love in college and suddenly and unexpectedly, the dreams of the person they loved became more important to them than their own dreams and they lowered their aspirations to pursue the relationship. Some decided to become nurses instead of doctors, and some completed a bachelor's degree instead of a Ph.D. Some accepted less challenging work that was different from what they had dreamed about doing a decade earlier, but that enabled them sufficient time to raise their families and support their partner's work. Some talented women born after the women's movement were surprised to find that they had to make choices that benefited those they loved, after being consistently told that they could "have and do it all." They learned, often to their surprise, that they could not.

The reasons for the successful accomplishments of some highly talented girls and women and the failure of others to realize their high potential in meaningful work is complex and depends on many factors, including values, personal choices, and social-cultural forces. Some gifted women have a sense of destiny about their own potential to produce meaningful work that makes a difference. Reis's research suggests that gifted women made active choices to pursue their talents because they had a sense of destiny about the importance of their work. Many personal choices and barriers faced this diverse group, and some of their motivation and determination emerged in overcoming and successfully negotiating these obstacles. The development of a creatively productive life and the attainment of eminence is complex and decidedly personal. What one participant regarded as an obstacle, another perceived as an intriguing challenge. Although some were negatively influenced by their parents' lack of support and withdrew from relationships, others used this anger and rebelled, and eventually became eminent in their selected area of endeavor. The ways in which the same barriers differentially affect talented women provides the fascination about conducting research on the individual paths they follow to achieve high levels of accomplishment. Not all gifted women experience the same barriers, but research that has been conducted suggests a combination of the following that occur across the life span and differentially affect productivity at different ages and stages: personality characteristics such as modesty, dilemmas about abilities and talents, personal decisions about family, decisions about duty and caring (putting the needs of others first) as opposed to nurturing personal needs, religious beliefs, and social issues. Some of these dilemmas cannot be resolved to the satisfaction of everyone involved. Rather, they shift or are eliminated when changes occur in a woman's life, such as when her children grow up, her marriage ends, a new relationship starts, or she changes a home or work environment. If our society is to more actively help talented girls and adult women to realize their abilities and potential, expectations about women's personal choices and work process and environments must be altered, and our society must support diversity of life choices.

Sally M. Reis

See also Creative Productivity; Eminence; Gifted Education Centers; Girls, Gifted; Talent Development

Further Readings

Arnold, K. D., Noble, K. D., & Subotnik, R. F. (1996). *Remarkable women: Perspectives on female talent development*. Cresskill, NJ: Hampton Press.

Kerr, B. A. (1985). *Smart girls, gifted women*. Columbus, OH: Ohio Psychology Publishing.

Kerr, B. A. (1997). *Smart girls: A new psychology of girls, women, and giftedness* (Rev. ed.). Scottsdale, AZ: Great Potential Press.

Reis, S. M. (1998). *Work left undone*. Mansfield Center, CT: Creative Learning Press.

Reis, S. M. (2005). Feminist perspectives on talent development: A research based conception of giftedness in women. In R. J. Sternberg & J. Davidson (Eds.), *Conceptions of giftedness* (2nd ed.). New York: Cambridge University Press.

World Conferences

Conferences on Gifted and Talented Children, described in this entry, are held every 2 years in a different country. These are presented by the World Council for Gifted and Talented Children. This council was organized in the mid-1970s by a group of educators from the United States and England who were dedicated to the challenge of providing the best for the world's brightest children. The council has members from more than 50 countries, so the conferences are truly international events. They are one of the most multicultural conference events held in the world today. To date, they have been held in London, San Francisco, Jerusalem, Montreal, Manila, Hamburg, Salt Lake City, Sydney, La Hague, Toronto, Hong Kong, Seattle, Istanbul, Barcelona, Adelaide, New Orleans, and Warwick.

The themes for the conferences have evolved from "New Thinking for the Future" in 1985, "The Challenge of Excellence" in 1989, "Talent for the Future—Social and Personality Development" in 1991, "A Gifted Globe" in 1993, "Maximizing Potential—Lengthening and Strengthening our Stride" in 1995, "Connecting the Gifted Community Worldwide" in 1997, "Challenge for the New Millennium" in 1999, "Celebrating the Gifted Children of the World" in 2005, to "Promoting the Dream" in Canada's 2009 conference. The progression of themes is an indication of the changes in the world, the development of new roles and dimensions in education and the ever-changing political scene worldwide.

Educational groups in interested countries submit a bid to host a conference, in a similar manner to the Olympic bids. These are evaluated by the executive of the World Council and a decision is made. This is done at least 4 years in advance. The decisions are made according to a published criteria available from the council's headquarters. A critical element in the decision is to move the conferences around to different parts of the world and to be cognizant of the world political situations at the time.

The purpose of the World Council is to focus world attention on gifted and talented children in many ways. It facilitates worldwide communication of information, creates an atmosphere of acceptance of all types of giftedness from any background and any country, supports and disseminates research, provides opportunities for sharing and exchange of ideas, supports national groups and international programs, and importantly, supports and enhances parent and family groups. To this end, the conference is appealing and valuable for all types and levels of educators, psychologists, social workers, researchers, and parents.

Informal events including families also are planned. These include events such as sports games, shows, dinner cruises, special feasts, and cultural experiences unique to the host country.

The program schedule varies from one conference to another but they all include a variety of keynote speakers, specific topic speakers, panels, workshops, and poster and round-table sessions.

Anyone is welcome to submit a proposal to hold any type of session, other than main speaker. The keynote speakers are carefully chosen from the gifted and talented people around the world—Peter Ustinov being an example, as in Toronto he discussed his work with children of the world through the United Nations. The hope is to have speakers who will inspire, excite, and challenge the conference audience.

Throughout the conference, local student groups usually present musical interludes, band numbers, and various other entertaining bits. In 1993, in Toronto the idea of a Youth Summit was developed and created by Norah Maier, Edna McMillan, and Julien Kitchen. Young gifted students from

around the world came together in Toronto for a program running parallel to the conference that had its own goals and activities as well as being integrated with the adult conference for a variety of events. With 80 students from 15 countries, this initial event was so successful that it has been a component of most of the world conferences since. The interaction with students from such a variety of countries and backgrounds is often a memorable and life-changing event for these young people as they forge new and lasting friendships.

Edna Marie McMillan

See also World Council for Gifted and Talented Children

Further Readings

World Council for Gifted and Talented Children: http://www.world-gifted.org

World Council for Gifted and Talented Children

The World Council for Gifted and Talented Children (WCGTC), described in this entry was founded in London, England in 1975 at an international conference for gifted and talented children, chaired by Henry Collis, a prominent educator of the gifted and director of the National Association for Gifted Children in England. His vision evolved into a nonprofit organization of educators in the field of gifted education that spans the globe today.

The First Conference

The first conference was attended by more 500 people from 53 countries. Here, Harold C. Lyon, director of the Office of Gifted and Talented, from the United States, proposed that the participants join in a worldwide initiative to form a permanent organization to advocate for the gifted children of the world. In response, 150 educators in the field became members of the founding organization. This first conference was, subsequently, included in the numerical designation of the biennial world conferences of the WCGTC.

The First Executive

At the London conference, the first executive was elected. The first president was Dan Bitan, director of Gifted Education in Israel, and the first vice-president was Henry Collis. The remaining elected officers were from the United States: Alexis DuPont DeBie as executive vice-president, Dorothy Sisk as secretary, and Elizabeth Neuman and Marjorie Craig as co-treasurers.

The Incorporation

The World Council was officially incorporated and registered in the state of Delaware as a nonprofit organization on March 30, 1976. The officers at the time were representatives from three nations: from Israel, President Dan Bitan; from the United Kingdom, Vice-President Henry Collis; and from the United States, Executive Vice-President Alexis DuPont DeBie, joint Secretaries Dorothy Sisk and Elizabeth Neuman, and Treasurer Bob Swain.

The Second and Third Conferences

Bob Swain's proposal brought the second World Conference to San Francisco in 1977. Representation in the new seven-member executive expanded to seven nations: President Iraj Broomand of Iran, Vice-President Dorothy Sisk of the United States, Marie Schmidt of Venezuela, Levcho Zdravchev of Bulgaria, Warren Lett of Australia, Henry Collis of the United Kingdom, and Dan Bitan of Israel.

In 1978, with the Iranian conflict disrupting the ability of President Iraj Broomand to continue to serve as president of the World Council, Vice President Dorothy Sisk assumed the presidency until Henry Collis was elected as president at the third conference held in Jerusalem in 1979. He held the post until 1981.

A Developing Organization

As a requirement of incorporation, a constitution for the World Council was drafted by a subcommittee consisting of Sisk, representing the board, and two other founding members, DuPont DeBie and Neuman.

A major undertaking discussed at the San Francisco meeting was the creation of a journal. Levcho Zdravchev agreed to edit and publish the journal for the WCGTC, which was named *GATE: Gifted and Talented Education*. He published three issues of *GATE,* absorbing the cost of the journal at his Bulgarian office.

At the Jerusalem conference, Dorothy Sisk became the editor of the journal, now to be named *Gifted International,* and she held the post until 1993. During this time, Tom Kemnitz, owner of Trillium Press, published and distributed the journal at his expense. In the 1990s, under the editorship of John Feldhusen, the name was changed to *Gifted and Talented International.* Subsequent editors have been Joyce VanTassel-Baska and Maria McCann. The current editor is Taisir Subhi Yamin.

A third development, in 1979, was the creation of a permanent secretariat, today known as the headquarters, established at Teachers College, Columbia University, New York, with Milton Gold as executive administrator and A. Harry Passow as honorary director.

A further undertaking was the development of a newsletter. In 1980, *World Gifted* was produced by Dorothy Sisk and published by Milton Gold, assisted by Beverly Goodloe Kaplan. The newsletter has customarily been published by the hosting institution.

Successive Conferences and Presidents

Successive conferences took place upon the initiative and successful bidding of various leaders in the field. Bitan proposed Jerusalem as the site for the 1979 conference. Bruce Shore bid for the 1981 Montreal, Canada, conference, attended by 1,200 participants, with 350 presenting. In Montreal, James Gallagher assumed the presidency for a 4-year term.

Aurora Roldan's bid for Manila brought the next conference to the Philippines in 1983 and spawned the South East Asian organization.

The sixth biennial conference in Hamburg, Germany, in 1985, was proposed by Klaus Urban, which moved the event to Europe. The conference drew 1,200 participants from 47 different countries and 500 presentations. In Hamburg, A. Harry Passow became the president.

Calvin Taylor's proposal brought the next conference to Salt Lake City, Utah, in 1987. The organization had grown, as evidenced by its 1,756 participants and 400 presentations involving 775 presenters.

The next conference, proposed by Ken Imison, was held in Sydney, Australia, in 1989. Norah Maier was elected president. Vice-President Franz Mönks brought the next conference in 1991 to The Hague, Netherlands. Norah Maier, who had successfully proposed Toronto for the 1993 site, retired as president that year and was succeeded by Wu Tien-Wu from Taiwan, who had been responsible for the bringing the first strong delegation from Taiwan to the world conference in Montreal.

Between the 9th and 10th conferences, the Vienna Summit was held to examine new ways of reaching the goals of the World Council in the domains of teacher education, research, organization and planning, and policy issues.

Biennial conference sites after Toronto were Hong Kong in 1995, Seattle in 1997, Istanbul in 1999, Barcelona in 2001, Adelaide in 2003, New Orleans in 2005, Warwick in 2007, and Vancouver, Canada, in 2009.

The 4-year terms of the presidency during these years were held by Barbara Clark, from 1997 to 2001, by Klaus Urban, from 2001 to 2005, and by Den-Mo Tsai of Taiwan, from 2005 to 2009.

Affiliated Organizations and Federations

The World Council, whose membership consists of educators, graduate students, parents, educational institutions, and interested members in the international community, serves as a unifying organization globally. National associations and federations have joined as affiliated members to take advantage of the additional visibility and support they achieve, helping to further the mission of working for the welfare of gifted and talented children everywhere.

Headquarters

In 1983, for various reasons, the secretariat was transferred from New York to Tampa, at the University of South Florida, with Dorothy Sisk as executive secretary. Five years later, it was moved to Lamar University in Beaumont, Texas, with Sisk now as executive administrator. At both of these sites, all World Council expenses were covered by

the hosting institutions. In 1993, the secretariat was moved to Purdue University in West Lafayette, Indiana, and administered by the graduate students of John Feldhusen. Partly because of a financial incentive from David Belin, the office was moved to the Belin-Blank Center for Gifted and Talented Development at the University of Iowa in Iowa City in 1995, with Nicholas Colangelo serving as the executive director for 2 years. Subsequently, the headquarters was moved to Northridge, California, to the consulting company of Sheila Madsen and Dennis Stevens. In May 2005, the headquarters located at the University of Winnipeg. It is supported by the Faculty of Education, with Cathrine Froese Klassen as executive administrator. At present, the main thrusts of the WCGTC are communicated to its members and the general public through the its Web site.

Continuing Mission

The World Council continues to focus world attention on gifted and talented children to ensure the realization of their valuable potential to the benefit of humankind. This original and overriding purpose continues to guide the World Council in the 21st century. The organization has benefited from the vision and energy of its founders and their successors in office, from its dedicated and hardworking executive committees, from its support from elected delegates worldwide, from its generous donors and hosting institutions, and from its members across the globe, now numbering more than 700 and continuing to grow.

Cathrine Froese Klassen

See also National Association for Gifted Children

Further Readings

World Council for Gifted and Talented Children: http://www.world-gifted.org

World Views

Profound disagreements abound within most academic fields, including gifted education. Practitioners and scholars in the field of gifted education can become trapped within competing sets of implicit assumptions about the nature of intelligence, giftedness, creativity, and talent. Many arguments in this field, or in any academic field for that matter, arise from the incompatibility of philosophical assumptions held by differing groups of professionals. These assumptions are framed by several competing philosophical world views, which are based on a set of world hypotheses articulated by philosopher Stephen Pepper and elaborated by others since. World views are deep-rooted metaphors that guide our assumptions about the nature of reality. For example, some theorists denigrate the notion that a gifted person's intelligence can be captured by an IQ score, but others embrace IQ as an important measure of intellect. This dispute is rooted in the ways in which opposing world views frame our assumptions about the human mind. The world views include mechanism, contextualism, organicism, and formism.

These four competing world views implicitly shape scholars' beliefs about the nature of appropriate theories and investigative methodologies while guiding and confining practitioners' beliefs about the nature of appropriate instructional strategies and curriculum design. Strong adherence to a particular world view often gives rise to dogmatic insularity, which is the tendency to despise and dismiss viewpoints that differ from one's own. The problem of dogmatic insularity slows progress in a field or profession because the disciples of competing belief systems, or paradigms, have great difficulty finding common ground for progress. This entry provides descriptions of the world views and examples of world-view influence.

Descriptions of the World Views

Each world view is based on a root metaphor, which frames a professional's basic assumptions about important phenomena. The *mechanistic world view* is based on the metaphor of a machine and encourages the belief that reality is machine-like at its essence. Mechanism prompts us to reduce phenomena, breaking them into their component parts to predict and control events through discovery of cause-effect relationships. For example, researchers who employ experimental-quantitative

research methods to search for predictable mechanisms of thought are guided by mechanistic beliefs.

The *contextualist world view* is based on the metaphor of an ongoing event within its context, such as a canoe trip down a set of rapids, and emphasizes social interaction, shared meanings, and the unpredictably evolving, contextually shaped, nature of events. For example, researchers are guided by contextualism when they employ qualitative-ethnographic methods, embedding themselves in a classroom context to investigate the contextually influenced, unpredictably unfolding dynamics of students' experiences.

The *organicist world view* is based on the metaphor of a growing, well-integrated organism developing through predictable stages toward a particular end, such as a tree growing in a forest. Organicism emphasizes the whole system, not just the parts. It also highlights the ways in which the systems ties together by revealing integrative connections among its elements as well as the integration of subsystems into larger systems with different properties emerging at higher levels. Piaget's stage theory of development is an example of organicist thinking.

The *formist world view* is based on the root metaphor of similarity and emphasizes the intriguing recurrence of patterns in diverse phenomena. For example, interdisciplinary groups of complexity theorists at the Santa Fe Institute are discovering patterns of similarity in the behavior of chemical reactions, human thought patterns, animal populations in specific ecological niches, the dynamics of national economies, and other complex, adaptive systems.

According to prominent philosophers, adherence to a single world view can provide effective guidance for investigation up to a point; however, no single world view provides a complete or even an adequate portrayal of complex phenomena. Consequently, investigators and practitioners who become trapped dogmatically within the tenets of a single world view limit their effectiveness and cannot claim comprehensive understanding of the more complex phenomena in their field. Gifted education entails the study of exceptionally complex phenomena because the human mind is one of the most complex systems in the universe. In view of this complexity, investigations and theoretic interpretations from multiple world views are needed if more comprehensive understanding of high ability is to be grasped. Taken together, investigations from several different world-view vantage points can provide broader and deeper understandings. The more complex the phenomena of interest, the more necessary it is to consider contributions from multiple world views.

However, communication among adherents to opposing world views is difficult because the world-view frameworks tend to be incommensurable, and this promotes dogmatic insularity. That is, they lack common standards for comparison, and agreement on terminology. Very bright people adhering to differing world views and discussing the same phenomenon often talk past each other because their fundamental conceptual frameworks are so different. During the infrequent periods when they do understand each other, they tend to launch into vehement intellectual conflict, again because of their fundamentally opposing assumptions.

Examples of World-View Influence

World-view conflicts abound in fields related to high ability. For instance, some mechanistic cognitive scientists such as Steven Pinker believe that the human brain is a machine made of meat and consciousness arises solely from the electrochemical mechanisms within the cranium. Organicist-contextualist cognitive scientists vehemently disagree, arguing that consciousness is constructed largely from social interaction and the influences of sociopolitical and ideological contexts. From within each of the warring camps, the preferred position appears logical and comprehensive, but the opposing position appears to be ill conceived at best. Nevertheless, from the macro-perspective of philosophical world-view analysis, both camps are partially on target and contributions from both are needed to glean a more comprehensive view of the mind.

The following is another example of how world view directly and powerfully influences gifted education. The federal No Child Left Behind legislation's emphasis on testing for accountability to predict and control learning outcomes marks it as dogmatically mechanistic. In assuming that all children and all schools can achieve its standards, it tends to ignore the contextual influences on learning such as child poverty and inequality of opportunity.

In essence, no single world view has a monopoly on the truth, and one world view is not necessarily better or worse than another. All four world views are extremely broad in scope but each has its strengths and weaknesses. Mechanism offers us the advantage of precision but it tends to ignore the important influences of context, the integrative, holistic nature of many phenomena, and difficult to discern, far-flung similarities. Contextualism reveals the unpredictable influences of context, organicism sheds light on integrative interconnections, and formism reveals similarities, but these three world views lack the precision of mechanism. The inability of a single world view to encompass the entirety of a complex phenomenon, and the tendency of professionals to trap themselves within a particular world view indicate that open-minded dialogue is crucial for understanding high ability.

Don Ambrose

See also Cognition; Controversies in Gifted Education; High-Stakes Testing; IQ; No Child Left Behind; Research, Qualitative; Research, Quantitative

Further Readings

Ambrose, D. (1996). Unifying theories of creativity: Metaphorical thought and the unification process. *New Ideas in Psychology, 14,* 257–267.

Ambrose, D. (1998). Comprehensiveness of conceptual foundations for gifted education: A world-view analysis. *Journal for the Education of the Gifted, 21,* 452–470.

Ambrose, D. (2000). World-view entrapment: Moral-ethical implications for gifted education. *Journal for the Education of the Gifted, 23,* 159–186.

Overton, W. F. (1984). World views and their influence on psychological thoughts and research: Khun-Lakatos-Laudan. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 18, pp. 91–226). New York: Academic Press.

Pepper, S. C. (1942). *World hypotheses.* Berkeley: University of California Press.

Writers

The playwright, the poet, the novelist, the memoirist, the screenwriter, and the journalist are the varieties of writers discussed in this entry. What is creativity in writing, and how is it judged? How does creativity in writing relate to creativity in general? A small number of researchers, mostly educators and psychologists, have been asking these questions. Conventionally, the "creative" writer is defined as the writer who writes poetry, fiction, plays, song lyrics, screenplays, or essays that usually don't have footnotes (except for the novels of such postmodern fiction writers as David Foster Wallace). If the writer uses footnotes and other sources, he or she is a scholarly writer but not a creative writer.

A surge in research on creativity began in the late 1940s, after World War II, when the Institute for Personality Assessment and Research (IPAR) at the University of California at Berkeley, and the Army Aptitudes Project in the Structure of Intellect (SOI) at the University of California at Los Angeles began to develop tests, checklists, and other devices and instruments to help the country find and describe people who are most effective. Those who wrote on the psychology of creative writers included psychologist Frank Barron, who studied eminent, popular, and student writers. Social psychologist Dean Keith Simonton also studied writers according to genre, geographical location of residence, and eminence. Howard Gardner did a case study of T. S. Eliot using Gardner's concept of linguistic intelligence. Psychotherapists Nancy Andreason, Kay Jamison, and Albert Rothenberg studied writers with regard to their psychopathology. Scott Kaufman and James Kaufman edited a book on the psychology of creative writing. Jane Piirto did a study of 180 contemporary U.S. creative writers.

Such research has shown that creative writers were often early readers. They used early reading and writing to escape. They have high conceptual intelligence and high verbal intelligence. They are independent, nonconforming, and not interested in joining groups. They value self-expression and are productive. They are often driven, able to take rejection, and like to work alone for long periods.

In addition, writers often have difficulty with alcohol or substances. They prefer writing as their mode of expression of emotions and feelings. Creative writers are not immune to great ambition and envy, probably because they are

often rejected by publishers, editors, and agents, and when one of their number succeeds, they wonder, "Why not me? What is the difference between my writing and his?" Their conceptual intelligence allows them to focus on philosophical matters, but they are able to convey the concepts concretely, so that the average reader can apprehend them. The concern with philosophical matters may take an almost religious, and certainly a spiritual tone. Writers are often politically active, most often left-leaning. They experience a higher rate of psychopathology and suicide than does the general population. Depression is more common than in the normal population, and writers are 10 times more likely to experience bipolar spectrum disorders than is the general population. Writers have often experienced childhood trauma. Poets have the highest rate of suicide among writers; journalists have the lowest. Writers seem to empathize with the underdog and with the oppressed. Of people imprisoned worldwide for their convictions, journalists rank highest. Writers' verbal talent is often shown in their odd senses of humor. Studies with psychological instruments such as the Myers Briggs Type Indicator (MBTI) show that writers prefer intuition as a learning style.

In their creative process, writers have said that (a) they seem to have rituals; for example, they like to walk; (b) they crave silence; (c) they go to retreats and colonies; (d) they are inspired by travel; (e) they use imagination; (f) they trust their dreams; (g) they seek solitude so they may go into a state of reverie (or flow); (h) they meditate; (i) they get inspiration from the muse (desire or love); (j) they are inspired by others' works of art and music; (k) they use substances to help their inspiration, or to "come down" after working, because they have explored deep places of their psyches; (l) they improvise (automatic writing, free writing).

Piirto found 16 themes in the lives of 180 contemporary U.S. creative writers, and arranged them according to the Environmental Suns in the Piirto Pyramid of Talent Development:

The Sun of Home

Theme 1: Unconventional families and family traumas

Theme 2: Extensive early reading

Theme 3: Early publication and interest in writing

Theme 4: Incidence of depression or acts such as use of alcohol, drugs, or the like

Theme 5: Being in an occupation different from their parents

The Sun of Community and Culture

Theme 6: Feeling of marginalization or being an outsider, and a resulting need to have their group's story told (e.g., minorities, lesbians, regional writers, writers from lower socioeconomic class, writers of different immigration groups)

Theme 7: Late career recognition

The Sun of School

Theme 8: High academic achievement and many writing awards

Theme 9: Nurturing of talents by both men and women teachers and mentors

Theme 10: Attendance at prestigious colleges, majoring in English literature but without attaining the Ph.D.

The Sun of Chance

Theme 11: Residence in New York City at some point, especially among the most prominent

Theme 12: The accident of place of birth and of ethnicity forms their subject matter

The Sun of Gender

Theme 13: Conflict with combining motherhood and careers in writing

Theme 14: Societal expectations of "femininity" incongruent with their essential personalities

Theme 15: History of divorce more prevalent in women

Theme 16: Military service more prevalent in men

Jane Piirto

See also Creative Personality; Literary Creativity; Playwrights; Verbal Ability

Further Readings

Andreason, N. (1987). Creativity and mental illness: Prevalence rates in writers and their first-degree

relatives. *American Journal of Psychiatry, 144,* 1288–1292.

Barron, F. (1969). The psychology of the creative writer. *Explorations in Creativity, 43*(12), 69–74.

Gardner, H. (1994). *Creating minds.* New York: Basic Books.

Jamison, K. R. (1993). *Touched with fire: Manic-depressive illness and the artistic temperament.* New York: Free Press.

Kaufman, S., & Kaufman. J. (2009). *The psychology of creative writing.* Cambridge, UK: Cambridge University Press.

Piirto, J. (2002). *"My teeming brain": Understanding creative writers.* Cresskill, NJ: Hampton Press.

Rothenberg, A. (1990). *Creativity and madness.* Baltimore: Johns Hopkins University Press.

Simonton, D. K. (1994). *Greatness: Who makes history and why?* New York: Guilford Press.

Index

Entry titles and their page numbers are in **bold.**