Conceptions of Giftedness and Talent

Edited by
Robert J. Sternberg · Don Ambrose

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This book is dedicated to all the gifted children in the world, those who have been identified and those who have not been but, we hope, soon will be!

Preface

Many parents of schoolchildren (including one of the editors, who is a parent of five children) are frustrated with the relatively narrow criteria schools use to identify gifted children. Typically, the schools use scores on tests of academic skills and achievement as well as teacher recommendations. They then end up identifying as gifted those who excel at the mechanics of verbal and symbolic processing and willingly doing what they are told to do but who are not necessarily excellent in other ways. This is especially the case when we consider skills that may be more important, say, for the survival of the world as we know it. Scores on standardized tests will not tell us who will become the active, concerned citizens who try to make a positive, meaningful, and enduring difference to the world—the ones, in other words, who are truly gifted and talented in terms of what they have to offer the world. Can the world, given its current state, really afford to identify children simply on the basis of skills that lead to high school grades but not necessarily a whole lot more? This is not to say that traditional conceptions of giftedness and talent are necessarily "wrong" but rather that they are woefully incomplete.

Current conceptions of giftedness lean heavily on the conception put forward by Lewis M. Terman early in the twentieth century. Terman identified children in California largely on the basis of their scores on the Stanford-Binet Intelligence Scales. It certainly makes sense to look at IQ as one component of giftedness: People with higher IQs tend, on average, to be more successful than people with lower IQs in many avenues of life, such as in careers and in their personal lives (Deary & Whalley, 2009; Terman, 1925; Terman & Oden, 1959). But such "success" is not necessarily the kind that changes the world for the better. Indeed, there are many "successful" graduates of the most prestigious universities who go on to make a total mess of things, as witnessed by the global financial collapse in 2008 and current fiascoes in the US government (the shutdown of 2019), in the British government (the badly mishandled Brexit of 2018–2019), and in governments around the world (the panoply of ill-conceived responses to the coronavirus pandemic of 2020).

Many people—laymen and experts alike—have believed that there is a need for broader conceptions of giftedness. To address this belief, Robert J. Sternberg and Janet E. Davidson edited the volume *Conceptions of Giftedness,* first published in 1986 (Sternberg & Davidson, 1986) and then appearing in a second edition in 2005 (Sternberg & Davidson, 2005). The goal of the book was to present broader and more diverse conceptions of giftedness than had been prevalent in the field prior to the publication of the volumes.

The second edition of the book is now quite out of date. A great deal of new work has appeared since 2005. For example, Goleman's (2005) book on emotional intelligence appeared the same year as the revision of *Conceptions of Giftedness.* Sternberg and Jordan's (2005) *Handbook of Wisdom* appeared in the same year. Keith Stanovich's *What Intelligence Tests Miss: The Psychology of Rational Thinking* (Stanovich, 2009) did not appear until four years later. Ambrose, Sternberg, and Sriraman's (2012) book on confronting dogmatism in gifted education did not appear until seven years later. *As* a result, topics such as emotional intelligence, wisdom, and rational thinking received essentially no attention in the revised *Conceptions* volume. Given the state of the world today—which some would argue is much more precarious than in 2005—attributes such as emotional intelligence, wisdom, and rationality would appear to be more important than ever to conceptions of giftedness and talent. Moreover, the 1986 and 2005 editions were largely (although not exclusively) US-centric. They placed a very strong emphasis on North American views.

To address these issues, we have edited a new volume, *Conceptions of Giftedness and Talent: Worldwide Perspectives.* We have added the term "talent" because it refers to skills that are not necessarily highly general and also more implies modifiability than the term "giftedness" typically does. This book, therefore, could be viewed as a new start entirely.

As an additional note, Janet E. Davidson co-edited the first two editions of *Conceptions of Giftedness* with Robert J. Sternberg, but she was unable to participate as a co-editor in this new volume. We are grateful to Dr. Davidson for her invaluable contributions to the earlier two volumes. Sternberg asked Don Ambrose, one of the most prominent individuals in the field of giftedness and the editor of a premier journal on giftedness, *Roeper Review*, to join him in this venture. Ambrose and Sternberg have edited several volumes together and were delighted to team up for this new endeavor.

The main goal of the book is to present diverse conceptions of giftedness and talent viewed from a variety of worldwide perspectives. We seek to cover classical views, emphasizing IQ, but also to get away from the common exclusive emphasis on IQ-based skills.

We asked authors to write in a way that would be accessible to students of giftedness, scholars, educators, and parents as well. We believed that the book would accomplish our aim of changing the way gifted education is done only if the chapters were written in a way that educators and parents, not just scholars, could understand. At the same time, we asked authors to preserve scholarly integrity of the highest order because we are aware, as are many others, that giftedness as a field has attracted many "snake-oil salesmen" who know little about the theory and research in the field and merely look to peddle their commercial ideas in the hope of making money, whatever may happen with the children who are affected by their efforts.

Authors were given free rein to write about their conception as they best could communicate it. Nevertheless, to ensure coherence of the book, we asked authors to ensure that they deal with five basic questions:

1. What is your conception of giftedness and talent?
2. What is the empirical evidence that supports your conception?
3. How would one identify gifted and talented children, based on your conception?
4. How would one teach gifted and talented children, based on your conception?
5. What do you see as the advantage of your conception over traditional ones?

We believe that the book has special features that will make it especially attractive to readers and hence eminently salable:

1. Editors who are eminent in the field of giftedness and talent but also who represent the newer views on what giftedness and talent mean.
2. Authors who are among the most eminent scholars and, in many cases, also practitioners in the field of giftedness and talent. All of the authors have top scholarly credentials.
3. Worldwide points of view, not only North American ones.
4. Relatively short chapters that recognize our readers have limited time and need to receive presentations of material within relatively tight space constraints.
5. A concluding chapter by the editors integrating the different points of view and showing ways in which major ideas, even when given different

names, can be integrated to provide a holistic and integral viewpoint on giftedness and talent.

We hope you enjoy this book. We all have worked hard on it and hope that it provides you with a broad introduction to the field of giftedness that will help you to move forward in your own endeavors to understand and apply the latest ideas in the field of giftedness.

Ithaca, NY, USA Robert J. Sternberg
Lawrenceville, NJ, USA Don Ambrose

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Notes on Contributors

Don Ambrose is Professor of Graduate Studies at Rider University and editor of the *Roeper Review*. He leads numerous interdisciplinary scholarly projects involving eminent researchers studying creative intelligence. He serves on the editorial boards of numerous major journals and several book series. Ambrose's publications include many books and articles that clarify and expand the conceptual foundations for gifted education and neighboring fields. He has invented new creative and critical thinking strategies based on concepts borrowed from more than 30 academic disciplines and professional fields. Ambrose has won international, national, regional, and institutional awards including the National Association for Gifted Children (NAGC) distinguished scholar award. He has delivered invited keynote presentations throughout the world.

Amy Price Azano is an associate professor in the School of Education at Virginia Tech and focuses her scholarship on rural education, a critical pedagogy of place, and the educational needs of special populations in rural communities. She is the co-principal investigator of Promoting PLACE in Rural Schools, a federal grant designed to support gifted education programs in high-poverty rural communities. She is nationally and internationally known for her work in rural education and rural gifted education.

Maud Besançon is a psychologist and Professor of Differential Psychology at the University of Rennes 2. As a psychologist, during the past ten years, her practice concerned primarily children and adolescents with school-related difficulties and possible high intellectual or creative potential. Her research has focused on creativity with a work on factors influencing the development of creative competencies in children and adolescents, in particular cognitive factors such as logical-mathematical reasoning and inhibition, environmental factors taking into account pedagogical practices, and the distinction between high intellectual potential and high creative potential. In order to target better the development of children's creative competencies, Maud Besançon contributed to the creation of the EPoC battery (Evaluation of Potential for Creativity) with Todd Lubart and Baptiste Barbot. She is also the co-author with Todd Lubart of a French book entitled *Creativity in children : evaluation and development*. Currently, her research examines the development of twenty-first century skills such as creativity and critical thinking but high potential as well with a multidimensional approach including socio-emotional competencies (such as theory of mind, social creativity, humor, etc.)

Maxwell Birdnow is a research team member of the Counseling Laboratory for the Exploration of Optimal States who also serves as its outreach coordinator. He is a doctoral candidate in counseling psychology and has completed a graduate certificate in women, gender, and sexuality studies at The University of Kansas.

Sheyla Blumen is Professor of Psychology and Dean of the School of Graduate Studies at the Pontificia Universidad Catolica del Peru. She runs Future Minds, a center for gifted children, and promotes talent development toward excellence in ethnic-linguistic diverse and multicultural young scholars. She was instrumental in the launching of the Peruvian Law supporting high achievers, and in the development of the state-funded Academies of Arts and Sciences for high achievers coming from high-vulnerable contexts in the Andean and Amazon regions.

James H. Borland is Professor of Education at Teachers College, Columbia University, where he directs the programs in the education of gifted students and chairs the Faculty Executive Committee. He has lectured on the education of gifted students across the United States and abroad, and he has consulted with numerous school districts, primarily as an evaluator of programs for gifted students. Borland is the author of numerous books, journal articles, and book chapters. He is the editor of the Education and Psychology of the Gifted series and is past co-editor of the section on Teaching, Learning, and Human Development of the *American Educational Research Journal*. Borland's 1989 book, *Planning and Implementing Programs for the Gifted*, was named one of the "top ten" books in the field by the *Roeper Review* in 1996. His article, "Identifying Young, Potentially Gifted, Economically Disadvantaged Students," co-authored with Lisa Wright, is the most frequently cited article in the history of the *Gifted Child Quarterly*. Borland was awarded the *Gifted*

Child Quarterly Paper of the Year Award for 1994 and 2000 and the Award for Excellence in Research from the Mensa Education and Research Foundation in 1989–1990 and 1999–2000.

Carolyn M. Callahan is Commonwealth Professor of Education Emeritus at the University of Virginia and has been principal investigator on projects of the National Center for Research on Gifted Education (formerly NRC/GT) and principal investigator on five Javits grants including Project PLACE, focusing on the identification and provision of services to rural gifted students. Her work with the NRC/GT and with the Javits projects has focused on curriculum development and implementation. She has been recognized as Outstanding Professor of the Commonwealth of Virginia and Distinguished Scholar of the National Association for Gifted Children, and she has served as President of the National Association for Gifted Children and the Association for the Gifted and as Editor of *Gifted Child Quarterly.* Callahan has published over 250 articles and 50 book chapters. She is the co-editor of the recently published book, *Fundamentals of Gifted Education: Considering Multiple Perspectives* (2nd ed., 2013) and *Critical Issues in Gifted Education* (3rd ed., 2020).

Dowon Choi is a Combined Counseling and School Psychology doctoral student and fellow at Florida State University. She has authored ten academic publications and engaged in international media; these have included giving a TEDxUConn talk, interviewing giftedness experts on YouTube, being featured on Vietnamese podcasts/magazines, and writing weblogs for the Korean Ministry of Education.

Kristina Henry Collins is the core Talent Development faculty and LBJ Institute Research Fellow at Texas State University. Collins holds a PhD in Educational Psychology and an EdS in Gifted and Creative Education from the University of Georgia. She holds an MSEd in Mathematics (Jacksonville State University) with certifications in technology education and computer science; a BS in Engineering (University of Alabama); and a military science diploma (USN) in cryptology and electronic surveillance. Collins is the proud recipient of the 2011 Mary Frasier Equity and Excellence Award presented to her by the Georgia Association for Gifted Children (GAGC) for her work in advancing educational opportunities for underrepresented students in gifted education. She is serving as president of Supporting Emotional Needs of the Gifted (SENG) and member-at-large for the National Association for Gifted Children's board of directors. Her research foci include multicultural gifted education, STEM identity development, and mentoring across the lifespan.

Tracy L. Cross is the Jody and Layton Smith Professor of Psychology and Gifted Education and the executive director of the Center for Gifted Education and the Institute for Research on the Suicide of Gifted Students at William & Mary. He is the past editor of numerous journals, including *Gifted Child Quarterly*, *Roeper Review*, and *Journal for the Education of the Gifted*. He has been president of the National Association for Gifted Children and The Association for the Gifted. Cross has received many awards for his research and service in the field of gifted education, including the 2020 Palmarium Award.

Jennifer Riedl Cross is Director of Research at the William & Mary Center for Gifted Education. She is the co-editor, with Tracy L. Cross, of the *Handbook for Counselors Serving Students with Gifts and Talents* (2011) and co-author of the second edition of *Suicide Among Gifted Children and Adolescents* (2013). Cross is a member of the leadership team of the newly created William & Mary Institute for Research on the Suicide of Gifted Students. Her research in the field of gifted education emphasizes its social aspects, from individual coping with the stigma of giftedness to attitudes toward giftedness and gifted education.

David Yun Dai is Professor of Educational Psychology and Methodology at University at Albany, State University of New York. He holds a doctoral degree in Psychology from Purdue University and worked as a postdoctoral fellow at the National Research Center on the Gifted and Talented, University of Connecticut. Dai has published 9 authored or edited books and over 100 articles in general psychology, educational psychology, gifted and talented education, and creativity. Dai was the recipient of the Distinguished Scholar Award conferred by the National Association for Gifted Children in 2017. Dai is serving as a member of editorial boards of *Gifted Child Quarterly*, *Journal for the Education of the Gifted*, *Roeper Review*, and the *Academic Journal of Special Education* (Taiwan).

Jennifer E. Drake is Associate Professor of Psychology at Brooklyn College and the Graduate Center of The City University of New York (CUNY). Her research program focuses on the psychology of the arts. In one line of research, she examines the emotion regulation benefits of engaging in drawing for children and adults. In a second line of research, she studies the cognitive and perceptual processes underlying graphic representation skills in autistic, non-autistic, and gifted children. Her research has been funded by grants from the National Endowment of the Arts, the Imagination Institute supported by the John Templeton Foundation, and PSC-CUNY. Her research has been featured in *Scientific American Mind, The Atlantic, The Wall Street Journal, National Geographic,* and *The New York Times* and on National Public Radio. She was named a 2015 "Rising Star" by the Association for Psychological Science (APS) and an outstanding early career in 2018 by the American Psychological Association (APA) for her work on the emotion regulation benefits of everyday art-making.

Donna Y. Ford is a distinguished professor in the College of Education and Human Ecology. She is also a faculty affiliate with the Kirwan Institute. Ford is in the Department of Educational Studies, the Special Education Program. Ford has written over 300 articles and book chapters, has more than a dozen books, and has made over 2000 presentations. Ford conducts research primarily in gifted and talented education and culturally responsive/multicultural/urban education. Specifically, her work focuses on the following: (1) the achievement gap; (2) recruiting and retaining culturally different students in gifted education; (3) multicultural curriculum and instruction; (4) culturally competent teacher training and development; (5) Black identity; and (6) Black family involvement. She consults with school districts and educational and legal organizations on such topics as gifted and talented education underrepresentation and Advanced Placement, multicultural/urban education and counseling, and closing the achievement gap.

Tarek C. Grantham is a professor in the Department of Educational Psychology at the University of Georgia where he teaches in the Gifted and Creative Education Graduate Program. He co-directs the University-School Partnerships for Achievement, Rigor, and Creativity (Project U-SPARC) initiative. Grantham's research addresses equity for underrepresented ethnic minority students in advanced programs, gifted Black males, motivation, and creativity policy. Grantham serves on the Advisory Board of the University of Georgia African American Male Experience (GAAME) of the University System of Georgia and the Board of Directors for the National Association for Gifted Children. Grantham was honored as an E. Paul Torrance Creativity Award recipient by the Georgia Association for Gifted Children for recognizing creative strengths in economically disadvantaged students, mentoring, and developing creativity in students, especially those from underserved populations.

Elena L. Grigorenko holds a PhD in General Psychology from Moscow State University, Russia, and a PhD in Developmental Psychology and Genetics from Yale University, United States; and has re-specialization in clinical (forensic) psychology from Fielding University, United States. Grigorenko is affiliated with five universities: Baylor College of Medicine, University of Houston, and Yale University in the United States, and Moscow State University for Psychology and Education and St. Petersburg State University in Russia. Grigorenko has published more than 500 peer-reviewed articles, book chapters, and books. She has received multiple professional awards for her work, obtained funding for her research from numerous federal and private sponsoring organizations in the United States and other countries, supported multiple nonprofit organizations, including as a board member, and served as editor-in-chief for professional journals. Grigorenko has worked with children and their families in the United States as well as in Africa (Kenya, Tanzania and Zanzibar, Ghana, the Gambia, and Zambia), India, Saudi Arabia, and Russia.

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Barbara Kerr is the Williamson Distinguished Professor of Counseling Psychology and co-director of the Center for Creativity and Entrepreneurship in Education at The University of Kansas. She is a fellow of APA, an associate editor of *Gifted and Talented International*, and author of *Smart Girls in the Twenty-First Century* (2014), *Smart Boys* (2001), and over 100 articles and papers on creativity, talent development, gender, and privilege.

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Todd Lubart is Professor of Psychology at the University of Paris (France). He has directed a research lab, several large-scale projects on creativity, and is currently leading ISSCI, a non-profit organization to foster international research initiatives on creativity. Since 30 years, he has authored/coauthored 200+ articles, books, and book chapters on creativity, as well as internationally used psychometric tools to assess creative potential. His work focuses, in part, on high creative potential and its detection.

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James L. Moore III is the vice provost for Diversity and Inclusion and chief diversity officer at The Ohio State University, while serving as the first executive director of the Todd Anthony Bell National Resource Center on the African American Male. He is also the inaugural EHE Distinguished Professor of Urban Education in the College of Education and Human Ecology. Moore is internationally recognized for his work on African American males, and his research agenda focuses on school counseling, gifted education, urban education, higher education, multicultural education/counseling, and STEM education. In both 2018 and 2019, he was cited by *Education Week* as one of the 200 most influential scholars and researchers in the United States, who inform educational policy, practice, and reform. Further, Moore has also published over 130 publications; obtained over $25 million in grants, contracts, and gifts; and given over 200 scholarly presentations and lectures throughout the United States and other parts of the world.

Eugenia Mora-Flores is a professor in the Rossier School of Education at the University of Southern California (USC). She teaches courses on first and second language acquisition, Latino culture, and in literacy development for elementary and secondary students. Her research interests include studies on effective practices in developing the language and literacy skills of English learners in grades Pre-K-12. She has written nine books in the area of literacy and academic language development (ALD) for English learners. Mora-Flores further works as a consultant for a variety of elementary, middle, and high schools across the country in the areas of English language development (ELD), ALD, and writing instruction.

Paula Olszewski-Kubilius is the director of the Center for Talent Development at Northwestern University and a professor in the School of Education and Social Policy. Over the past 36 years, she has created programs for all kinds of gifted learners and written extensively about talent development. She has served as the editor of *Gifted Child Quarterly*, co-editor of the *Journal of Secondary Gifted Education,* and on the editorial boards of *Gifted and Talented International*, *Roeper Review*, and *Gifted Child Today*. She is the past president of the National Association for Gifted Children and received the NAGC Distinguished Scholar Award in 2009.

Caitriona Pennycook is a researcher-psychologist in the CNAHP (National Center for Children and Adolescents with High Potential in Difficulty), France. She obtained an undergraduate double degree in Education and Psychology from Mary Immaculate College, University of Limerick, Ireland (2010–2014). She then taught for several years in a variety of educational settings in Ireland and France, with both typically developing children and adolescents and children with special educational needs. Following this, she obtained a Master's Degree in Educational Psychology from the University of Rennes 2 (2017–2019), France, during which she completed a research project on the inclusion of children with autism in mainstream settings in Ireland and France. Caitriona's interests include understanding specific special educational needs in order to improve the identification, psychological care, and inclusion of these children in education and society. Among her current projects at the CNAHP, she is working on several research questions which explore dyslexia and body image of children with high potential.

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Jonathan A. Plucker is the Julian C. Stanley Professor of Talent Development at Johns Hopkins University, where he works in the Center for Talented Youth and School of Education. His work focuses on creativity and talent development in education, with an emphasis on equity issues and excellence gaps.

Miriam Reder is a fourth year doctoral candidate at The University of Kansas. She is pursuing a career in child, adolescent, and family therapy with specialties in pediatric health psychology and assessment. She is also interested in program development that focuses on the well-being of medical and psychology trainees in hospital and graduate school settings.

Sally Reis recently completed a term as vice provost for Academic Affairs and is a Board of Trustees Distinguished Professor, and the Letitia Neag Morgan Chair in Educational Psychology Department in the Neag School of Education at the University of Connecticut. Her research interests relate to talent development, special populations of talented students, including students with disabilities, talented women, and culturally diverse talented students. She has authored and co-authored over 300 articles, books, book chapters, monographs, and technical reports, as a part of a research team that has generated over 50 million dollars in grants during the last four decades.

Joseph S. Renzulli is Distinguished Professor of Educational Psychology at the University of Connecticut and an international leader in gifted education and talent development opportunities for all students. His Schoolwide Enrichment Model, which focuses on total school improvement, is widely used throughout the world. He has obtained more than 50 million dollars in research grants and the American Psychological Association named him among the 25 most influential psychologists in the world. In 2009 he received the Harold W. McGraw, Jr. Award for Innovation in Education and he was recently listed as one of the world's top 30 international education professionals by the Global Guru Annual Survey.

Robert Root-Bernstein is Professor of Physiology at Michigan State University. He holds degrees from Princeton University and he was a postdoctoral fellow with Jonas Salk. A MacArthur Fellowship encouraged his multidisciplinarity, including studies of creativity, art-science interactions, and polymathy (e.g., *Discovering*, 1989, and, with Michele Root-Bernstein, *Sparks of Genius*, 1999). He is an editor of *LEONARDO*, an art-science journal, exhibits his own artwork, and collaborates with the trans-media artist Adam W. Brown (http://adamwbrown.net). He is at work on a new book called *Modern Leonardos: Artists, Musicians and Performers as Scientists And Inventors*.

Michele Root-Bernstein is an independent scholar, writer, and poet, with an adjunct position in the Department of Theatre at Michigan State University. Her PhD in History from Princeton University sets the stage for a broad, multidisciplinary approach to the study of creative imagination across the arts and sciences, often in collaboration with Bob Root-Bernstein. Her most recent scholarly book, *Inventing Imaginary Worlds: From Childhood Play to Adult Creativity* (2014), argues for the importance of imaginative play throughout the lifespan. As a poet and scholar, she is working on the individual networks of vocation and avocation that inspire personal and professional creativity.

Ugur Sak is a professor and founding director of the Center for Research and Practice for High Ability Education at Anadolu University and the founding editor of the *Turkish Journal of Giftedness and Education*. His research has focused on the identification and education of gifted students and creativity.

He is the author of Selective Problem Solving Model, CREACT, and Anadolu-Sak Intelligence Scale, and co-author of Creative Scientific Ability Test.

Elena V. Shmeleva holds a PhD in Sociology from St. Petersburg State University. Since 2012, she has been focusing on issues related to education and support of gifted and talented youth in the Russian Federation: from 2012 to 2015 she led the nonprofit organization supporting the development of intellectual and creative potential of Russian youth at Moscow State University, and since 2015 she has been the Director of the Talent and Success Foundation (which created and continues to develop Sirius). Shmeleva is a member of the Presidential Advisory Council for Science and Education. Her research and practice are focused on giftedness, competitive models of education focused on the challenges faced by, and the needs of, the Russian Federation, socially valuable applications of scientific discoveries and innovation, and the development of a value-driven model of gifted education.

Dean Keith Simonton is Distinguished Professor Emeritus of Psychology at The University of California, Davis. His 500-plus single-authored publications focus on genius, creativity, and leadership. Honors include the William James Book Award, the George A. Miller Outstanding Article Award, the Theoretical Innovation Prize in Personality and Social Psychology, the Sir Francis Galton Award for Outstanding Contributions to the Study of Creativity, the Rudolf Arnheim Award for Outstanding Contributions to Psychology and the Arts, the E. Paul Torrance Award for Creativity, three Mensa Awards for Excellence in Research, and the Mensa Lifetime Achievement Award. His *Genius Checklist* was published in 2018.

Robert J. Sternberg is Professor of Human Development in the College of Human Ecology at Cornell University and Honorary Professor of Psychology at Heidelberg University, Germany. Previously, Sternberg served for eight and a half years in academic administration. Before that, he was IBM Professor of Psychology and Education and Professor of Management at Yale.

Sternberg is a past president of the American Psychological Association, the Federation of Associations in Behavioral and Brain Sciences, the Eastern Psychological Association, and the International Association for Cognitive Education and Psychology. Sternberg also has been president of four divisions of the American Psychological Association and treasurer of the Association of American Colleges and Universities.

Sternberg's BA is from Yale University summa cum laude, Phi Beta Kappa, his PhD is from Stanford University, and he holds 13 honorary doctorates. Sternberg has won more than two dozen awards for his work, including the

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He was cited in an APA *Monitor on Psychology* report as one of the top 100 psychologists of the twentieth century (#60) and in a report in *Archives of Scientific Psychology* by Diener and colleagues as one of the top 200 psychologists of the modern era (#60). He was cited by Griggs and Christopher in *Teaching of Psychology* as one of the top-cited scholars in introductory-psychology textbooks (#5). According to Google Scholar, he has been cited over 156,000 times; he has an h index of 190 and an i10 index of 989. He has authored textbooks in introductory psychology, cognitive psychology, and communication in psychology. Sternberg is a member of the National Academy of Education and the American Academy of Arts and Sciences. He is a fellow of the American Association for the Advancement of Science.

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Interdisciplinary Exploration Guiding Conceptions of Giftedness

Don Ambrose

Interdisciplinary Exploration Guiding Conceptions of Giftedness

Our highly complex twenty-first-century environment is plagued by gigantic problems and ethical dilemmas (Ambrose & Sternberg, 2016a, b), so it demands more expansive thinking about the nature of giftedness and talent development. Combining this need for expansion of our vision with the complexities of giftedness, talent development, and creativity makes our field enigmatic. Exploring the conceptual terrain of diverse academic disciplines and professional fields, and borrowing promising constructs emerging in that terrain, can help us achieve some of this expansive thinking while clarifying the nature of some complex phenomena.

Upon reflection, I've been mulling over enigmas about giftedness for quite a while, since well before I began to study them in academia. For example, while working on a pipeline construction crew in the western plains to finance my college education, I encountered an exceptionally gifted individual who *never* would have qualified for a typical gifted program. The members of the crew were roughnecks who dropped out of school well before grade 12 and spent their time working long, grueling, somewhat dangerous shifts and then drinking, swearing, and fighting in the small number of off hours they

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enjoyed. But one crew member stood out. He was quiet, unassuming, and operated his massive earth mover like Rembrandt operated a paintbrush. When asked, he would quietly and artfully mentor new workers so they could get up to speed with the intricacies of the construction equipment and processes. He commanded the respect of all who met him because they could observe his immense talent and the way he guided his construction work with an exquisite sense of aesthetics.

I've also met the exact opposite—individuals with sterling credentials, from the best backgrounds, in lofty positions, who came across as superficially articulate and arrogantly superior, and couldn't think their way out of a paper bag if they found themselves trapped inside one. Some of them went through gifted programs in their elite schools. This puzzling contrast between *non-gifted brilliance* and *gifted mediocrity* is one of the primary motivators in my interdisciplinary explorations, which have spanned three decades.

We Need Interdisciplinary Work to Navigate Through Various Levels of Analysis

The complexities of the mind cannot be sufficiently understood from within the borders of a single disciplinary silo. A prominent evolutionary biologist, Joseph Henrich (2016), described a compelling reason for establishing more interdisciplinary work in all fields contributing to knowledge about human thought and behavior:

> To move forward in our quest to better understand human life, we need to embrace a new kind of evolutionary science, one that focuses on the rich interaction and co-evolution of psychology, culture, biology, history, and genes. This scientific road is largely untraveled. (p. 331)

Along these lines, interdisciplinary investigation is needed in gifted education because the phenomena of interest in the field stretch throughout various levels of analysis, each of which is addressed by different academic disciplines (Ambrose, 2005b, 2009, 2015, 2017, 2019a). For example, Table 1.1 illustrates levels of analysis from micro to macro along with examples of phenomena that fit into each level and questions relevant to gifted education that derive from these phenomena and levels.

The vast majority of empirical research projects in the field fit into the individual and immediate contextual levels, which are dominated by psychological and educational investigative paradigms and methods addressing cognitive

Table 1.1 Levels of analysis relevant to conceptions of giftedness and talent development

Levels of analysis, relevant phenomena, and representative investigative questions for expansion of conceptual foundations		
Level of analysis	Examples of phenomena within the scope of each level (relevant disciplines in parentheses)	Questions that emerge from each level with potential relevance to gifted education
Broad contextual	Patterns of power, subordination, domination, and enterprise in a society (sociology, political science, economics) Beliefs and traditions of cultural and ethnic groups within societies (cultural anthropology) Worthiness and harmfulness of individual and group actions within societal contexts (ethical philosophy) Transitory nature of socioeconomic, political, and cultural patterns over long time periods in specific geographic locations (history, archaeology)	What aspects of a child's intelligence and talents are obscured or suppressed by deprivation, stigmatization, and segregation? What differences exist between nations as contexts for talent development? How does culture shape identity formation and how does cultural identity influence talent development? What ethical problems ensue from educational emphases on creativity and individual self-actualization? Certain abilities were valued over others in various historical eras and locations. What can we learn from changing historical patterns of talent development? Have we reified and overvalued twentieth-century conceptions of ability and talent (e.g., rapid symbolic information processing and binary logic)?
Immediate contextual	The nature of curriculum, instruction, human interaction, and organizational constraints in school systems, schools, and classrooms (educational research)	Much inquiry within and beyond the field of gifted education occurs at this level

(*continued*)

Table 1.1 (continued)

Levels of analysis, relevant phenomena, and representative investigative questions for expansion of conceptual foundations		
Level of analysis	Examples of phenomena within the scope of each level (relevant disciplines in parentheses)	Questions that emerge from each level with potential relevance to gifted education
Individual	Cognitive, motivational, affective, dispositional, and achievement dynamics of the individual (educational research, psychology)	Much inquiry within and beyond the field of gifted education occurs at this level
Organic systems	Structure and function of larger brain components and subsystems (neuroscience, cognitive science)	How much influence does/should brain-based learning exert on gifted education?
Cellular	Structure and function of neurons and neural networks in the brain (neuroscience, cognitive science)	How much influence does/should brain-based learning exert on gifted education? What are the implications of the paradigm wars between connectionists and symbolists in cognitive science?
Molecular-atomic	Genetic influences on behavior (molecular biology)	Are there new developments in the nature-nurture debate? Genetic engineering promises to accelerate creative entrepreneurship while posing enormous ethical problems. What are the implications for education of the gifted?
Subatomic	Strange paradoxes of quantum mechanics, which run counter to common-sense human experience (quantum mechanics)	Many theorists assume that quantum events are inapplicable at macroscopic levels. But can these events influence the operation of the brain? With what implications?

Reprinted with permission from Ambrose (2005b) processes and the workings of educational environments. Note that when we push our inquiries down into the micro levels inside the individual person to organic systems, cellular and molecular-atomic phenomena, and possibly even down into the subatomic, we need to borrow from fields such as neuroscience and cognitive science, molecular biology, and possibly theoretical physics. Conversely, when we stretch upward and outward beyond the individual and her/his immediate context in the education system we begin to borrow from disciplines such as political science, economics, sociology, cultural anthropology, ethical philosophy, history, and archaeology.

Both the micro and macro levels of analysis can produce rich insights that will help us understand the nature and nuances of giftedness and talent development. For example, a special issue of the *Roeper Review* addressed the organic systems and cellular levels through a project exploring the neuroscience of giftedness (Kalbfleisch, 2008). Another special issue went up into the broad contextual level, exploring socioeconomic contextual influences on gifted minds through a project on the impact of growing inequality on the gifted and talented (Cross & Borland, 2013).

Benefits also can arise when researchers synthesize insights from micro and macro levels. In one example, neuroscientist Robert Sapolsky (2018) synthesized research findings about neuroscientific phenomena and socioeconomic inequality to reveal the ways in which the operations of the human brain-mind system are stunted and warped by severe inequality. The discoveries included portrayals of the *biological grind* that arises from the chronic, long-term stress generated by severe inequality, and how this grind distorts brain function by causing chromosomal damage and inflammation. The effects on the workings of the mind include the heightening of fear and anxiety; weakening of learning, memory, planning, decision-making, and impulse control; and the worsening of depression and addiction. Fortunately, researchers in gifted education have been focusing more on some of these levels of analysis beyond the individual and immediate context. For example, along with the special issue on socioeconomic inequality (Cross & Borland, 2013) attention to the effects of inequality and related ideological issues has been expanding in the field (see Cross & Cross, 2005; Cross, Cross, & Finch, 2010; Plucker, Giancola, Healey, Arndt, & Wang, 2015; Reis & Renzulli, 2010; Siegle et al., 2016; VanTassel-Baska & Stambaugh, 2018). In order to make research initiatives like this more attractive and successful, scholars need to understand more of the benefits of interdisciplinary work.

Strengthening Cognitive Diversity by Making Domain-Specific and Interdisciplinary Work Noncontradictory

Given the ways in which cultures and economies have been integrating through the processes of globalization in the last several decades, interdisciplinary work is becoming more important (Ambrose, 2016). International, interdisciplinary collaboration and networking initiatives have been growing in power and productivity, especially in STEM (science, technology, engineering, and mathematics) fields, but not exclusively in those areas (Bozeman & Youtie, 2017; Frodeman, Klein, Mitcham, & Holbrook, 2010; Nielsen, 2011; Rice, 2013; Suresh, 2013; Wagner et al., 2011).

Meanwhile, domain specificity has become an important intellectual trend in gifted education (Olszewski-Kubilius, Subotnik, & Worrell, 2017; Subotnik, Olszewski-Kubilius, & Worrell, 2011) and in the neighboring field of creativity studies (Baer, 1998, 2012, 2015). Producing domain-specific expertise is a very important purpose in gifted education because knowledge within fields has been growing exponentially (see Ambrose, 2016; Arbesman, 2012; Glenn, Abdulhai, & Ponsky, 2017; Motta, 2013; Zander & Mosterman, 2014), and that knowledge must be mastered to the extent possible by leading thinkers for progress to be made. But we also need gifted young people to learn how to expand their minds beyond the borders of single domains. Both domain specificity and interdisciplinary expertise are needed in today's complex world so we shouldn't consider this an either-or situation. Burke (2020), a cultural historian, puts this in perspective to some extent by showing how the importance of polymaths grew when the invention of printing and the scientific revolution spurred on the accumulation of vast amounts of new knowledge; however, the continued growth of that knowledge produced a strong emphasis on specialization, which discouraged polymaths from extending their intellectual reach beyond one or a few fields.

In addition, cognitively diverse teams consistently outperform homogenous teams when grappling with complex problems in organizational environments, even when the homogenous teams are superior in intelligence (Page, 2007, 2010, 2017). A cognitively diverse team encompasses diverse theories, knowledge bases, problem-solving heuristics, and belief systems. If all of the experts collaboratively trying to solve a complex problem in an organization come from the same academic discipline or professional field, the team can benefit from extremely rich domain-specific expertise but will suffer from a lack of cognitive diversity. If that team can include some experts from diverse academic disciplines and professional fields its cognitive diversity will increase substantially, and the chances of a successful problem solution will rise considerably.

Combining Burke's (2020) insight about the forced narrowing of polymathic minds with the increasing importance of collaborative interdisciplinary work in the twenty-first century, gifted education must make room for the development of both strong, domain-specific expertise and interdisciplinary exploration. Fortunately, our awareness of domain-specific expertise has been strengthening due to the work of insightful scholars in our field (Olszewski-Kubilius et al., 2017; Subotnik et al., 2011), and our awareness of developing interdisciplinary thought has been strengthened through important work on curriculum integration (e.g., VanTassel-Baska & Stambaugh, 2006; VanTassel-Baska & Wood, 2010).

An example of an initiative designed to bring together domain-specific and interdisciplinary perspectives on giftedness and talent development is the "ask the expert" series of interviews in the *Roeper Review.* The interviews have been carried out with diverse high achievers including a nuclear engineer, federal judge, entrepreneurial lighting designer, neurologist, mathematician, orchestra conductor, ecotoxicologist, pediatric cardiologist, Hollywood videographer, and Pulitzer Prize winning *New York Times* journalist, among others. The interviews are designed to reveal the nature and nuances of expertise in a wide variety of professions and academic disciplines. Interviewees describe their professional aspirations, education and training, problems and opportunities that come forth in their work, and more. These interviews can help us understand the specialized nature of work in specific domains while also pushing our minds outside domain-specificity, expanding our thoughts about the many, diverse ways that giftedness can manifest in the world of adult work.

Targets for Interdisciplinary Inquiry: A Few Examples

Having explored some reasons for including more interdisciplinary work in the field of gifted education it will be helpful to see some possible outcomes of that work. The next subsections show some examples of concepts in a variety of disciplines and how their exploration could add to the knowledge base in gifted education.

Our Cancerous Economic System

Imagine the global economy as a human body. Since the ascendance of capitalism long ago in the days of Adam Smith (1776/1937), a famous philosopher-economist generally considered to be capitalism's early champion, this gigantic, metaphorical body has been growing. Of course, there have been severe illnesses here and there, such as the Great Depression of the 1930s and the more recent great recession that hit in 2008. But overall, the body has become stronger, more energetic, and vibrant. Nevertheless, leading scholars in economics and political science have been detecting life-threatening cancerous lesions. Here are just a few of the symptoms.

Selfish Gain for a Few at the Long-Term Expense of All Others A few very powerful billionaires seem to be succeeding in their efforts to destroy the planet for their own short-term, personal gain. Some of them inherited fortunes deriving from the environmentally toxic petroleum industry (see Mayer, 2016). Among their unethical actions is the founding and operation of devious, ideological think tanks designed to create anti-science deception with the purpose of convincing the general public that climate change is not harmful and, if it is damaging, it's not due to human actions (see Roper, Ganesh, & Zorn, 2016). Extremely powerful, affluent individuals like these generally are considered to be gifted even though many of them simply inherited their privilege. They often are cases of unearned merit, which means they can be rather ordinary or even below average in terms of intelligence and talent, but their lofty status makes them appear to be meritorious (for elaboration on unearned merit see Sen, 2000).

In another example of the selfish few, political scientist Clifford Bob (2019) showed how human rights often are paradoxically used as weapons to damage the lives of perceived enemies. For instance, John Locke, one of the world's most famous philosophers, strongly emphasized the right to "property" in "lives, liberties and estates" (cited in Bob, p. 3). A primary reason for this was his desire to maintain and increase the power of the extremely affluent landed gentry over the severely deprived people of the time who were demanding a small measure of human rights. Locke obviously was a highly gifted individual but, in this instance, he was using his talents to justify the imposition of serious harm on the vast majority while favoring a small, extremely privileged minority, most of whom were cases of unearned merit.

Luck and Success Frank (2016, also see Frank & Cook, 1995), an economist, pulled together research into the nature of economic markets and the extent to which luck plays a role in determining who can become successful in those markets. The conclusions are that most of us tend to underestimate the role of chance in the success that arises from work and innovation. Small initial advantages and unpredictable circumstances often turn into enormous advantages with even larger outcomes. Frank described the modern capitalist economy as a winner-take-all system that gives virtually all of the rewards to a very few who benefited from good fortune while leaving the scraps for many others who either had just a smidgen less talent, or a little worse luck. The implications for conceptions of giftedness could be the need to ensure that fortunate circumstances in terms of education and resources are available to all, and recognizing that those at the top of the economic pile might not be much more, or even any more, gifted than those who are not. This connects back to the prior mention of unearned merit.

Wildly Privatizing Everything In most developed nations, it is generally accepted that the private sector controls much of the economy and the government controls some essential aspects of the economy that are necessary for maintaining opportunities and human rights. That's much less the case in the USA, especially over the last several decades. There have been persistent, successful attempts by neoliberal ideologues, guided by neoclassical economic theory, to privatize many things in the name of freedom (see Michaels, 2017; Rooks, 2017; Quiggin, 2010, Stiglitz, 2003). Taking one sector of the economy as an example, the largely privatized American health care system is far more costly and less effective than government-run medical systems in other developed nations (Case & Deaton, 2020; Hacker, 2013; Reinhardt, 2019; Schneider, Sarnak, Squires, Shah, & Doty, 2017). The privatized system makes room for economic predators to gouge citizens who need healthcare by establishing high costs and driving them ever upward through exploitative practices. The politically powerful medical insurance and pharmaceutical companies that drive costs through the roof provide specific examples of these practices.

Sikkink (2019) adds an intriguing piece to this puzzle by highlighting a common overemphasis on rights over responsibilities. The latter tend to be ignored in debates over issues having to do with law and politics. Sikkink argued that human responsibilities must be a part of those debates, along with human rights.

When we apply these examples from a cancerous economic system to conceptions of giftedness, they magnify the importance of ethical awareness. Those with insufficient ethical awareness can be prone to demanding that their own rights are protected and sustained while ignoring their own responsibilities. A classic example of otherwise "gifted" people showcasing their own lack of ethical awareness comes from neoliberal ideologues who echo John Locke to some extent by demanding that the economic system be privatized to the hilt in order to protect their rights to engage in unrestrained, entrepreneurial actions in all areas of human experience.

Many of these ideologues would fit into Sternberg's (2003, 2004, 2005a, 2005b, 2012, 2015, 2017) WICS (wisdom, intelligence, and creativity synthesized) analyses. They are creative and intelligent because they creatively design their privatization plans and intelligently refine them in practical ways to make them work in the public arena. But they lack wisdom, the W in WICS, because they don't consider or care about the well-being of the vast majority of citizens who are at considerable risk in the midst of a predatory health care system. Consequently, these insights from political science and economics magnify the importance of emphasizing ethical wisdom in gifted education programs.

Other Gifted Innovators Doing Severe Damage

Years ago, I had a conversation with a scientist who claimed that those coming up with scientific innovations have no responsibility for how those innovations are put to use. I agreed that they shouldn't have to shoulder all responsibility for unanticipated consequences, but they should be at least somewhat responsible because they are in the best position to know what the possible implications might be. If gifted STEM innovators just create powerful inventions and then unleash them on the world, humanity could be in for a rough ride.

This could be especially true in the case of a particular dimension of STEM innovation: the operations of artificial intelligence and the Internet. For example, a small number of gifted, creative individuals produced social-media enterprises that have grown exceptionally powerful, to the point where they exert considerable control over hundreds of millions of minds and are undermining democracy (see Howard, 2020). The technological systems they created have enabled unethical leaders and conspiracy theorists, some of whom also are gifted and creative, to produce powerful "lie machines" that seriously weaken one of the primary bulwarks of democracy—an informed citizenry.

So far, the owners and initiators of these enterprises either cannot or will not take sufficient responsibility for the harmful actions their innovations are enabling. This, again, magnifies the importance of ethical wisdom in gifted education.

Trapping Minds Within Sterile Certainty

Another phenomenon that interdisciplinary inquiry tends to illuminate is the common problem of excessive infatuation with the precision of metrics within and beyond academia. Interdisciplinary exploration occasionally enables discovery of an intriguing situation—many eminent scholars from diverse fields discussing the same thing and calling it different names. So far in my explorations, I have come across more than 20 prominent scholars in different disciplines who are criticizing dogmatic assumptions about precision in their fields. Here are brief descriptions of just a few terms used by some of these scholars:

- The leading mathematician William Byers (2007, 2011) used the term *sterile certainty* to signify a common problem—many mathematicians and natural scientists assuming that discoveries in their fields are more precise, certain, and bound to logic than they really are. By confining their minds within sterile certainty, they miss opportunities to make important discoveries by embracing the imprecision and ambiguity at the core of complex mathematical phenomena.
- The prominent historian Jerry Muller (2018) showed how practical work in various areas of human endeavor (e.g., the education, healthcare, and financial sectors) becomes distorted and constrained by increasingly frenzied attempts to establish precise, accountability-measurement systems. He termed this tendency the *tyranny of metrics.*
- The renowned political scientist Ian Shapiro (2005) claimed that excessive reductionism in his field has been oversimplifying human behavior because the analysts are excessively focusing on the intricacies of their methodological tools, and on thought-constraining theories. He described these tendencies as *the flight from reality in the human sciences.*
- The eminent psychologist Robert J. Sternberg (2017) used the term *pseudo-quantitative precision* to show how excessive adherence to the supposed precision of standardized achievement and IQ testing in gifted education has drawn attention away from important abilities that aren't visible through

those measures. Insufficient attention to ethical awareness and wisdom is an especially problematic side effect of measurement mania.

Here are just a few of the other depictions of sterile certainty from prominent scholars in various fields: *weapons of math destruction* (mathematician, Cathy O'Neil, 2016); *the scientific illusion* (economist, Thomas Piketty, 2014); *silly reductionism* (neuroscientist, Gerald Edelman, 1995); and *reductive megalomania* (moral philosopher, Mary Midgley, 1995).

In view of these insights, the field of gifted education should be wary of falling prey to sterile certainty in theory development, interpretations of phenomena, application of research methodologies, and assessment of student progress. For example, while precision in mechanistic, quantitative research methodology is a worthy goal, it should not override the nuanced judgment that is needed for careful interpretation of complex, ambiguous phenomena. Fortunately, many of the authors in this volume suggest ways to make the curriculum and assessment in gifted programs more rooted in the complexities of the real world.

Learning from Indigenous Leaders

Indigenous leadership tends to differ from leadership carried out by those who gain their credentials in mainstream, Western cultures (Alfred, 1999). When an organization earns recognition for good work, indigenous leaders tend to push their colleagues forward to accept an accolade instead of jumping forward to accept it themselves. And when the organization faces criticism the leaders move forward to accept the blame. They tend to develop *skin seven spans thick* so they can take the blows of criticism and punishment. If gifted education borrows this insight from indigenous studies, it could make us recognize the need for more attention to ethical awareness and empathy in the development of leadership capacities.

Modern-Materialist or Postmodern-Postmaterialist Values?

Based on a large body of evidence from the World Values Surveys, Inglehart (1997, 2000, 2016, 2018), a leading political scientist, developed an intriguing theory about societal change over the long term. The values and behaviors of populations in nations are strongly influenced by the extent to which they feel secure. When the people of a nation feel secure and their survival doesn't seem to be in question, they become more open to change, new ideas, and diversity. For example, the peace and widespread prosperity of the postwar era in the mid-twentieth century led to the strengthening of environmental movements, progressive cultural changes, and the growth of democracy. But in the decades after that, rising inequality and disappearing employment prospects for the middle and lower classes threatened security to the extent that large numbers came to reject outsiders and became more inclined to mindlessly obey authoritarian leaders. These insights align with analyses of governance in developed nations, which indicate that democracy has been weakening in the early 21st century (Ambrose, 2005a, 2019b; Hacker & Pierson, 2010; Levitsky & Ziblatt, 2018; MacLean, 2018; Wolin, 2008).

These large-scale shifts in values pose significant challenges for gifted young people and gifted education. First, the development of ethical awareness is far more difficult when those young people come from communities and families that favor authoritarian populism and the rejection of those who don't fit their identity groups. Second, all gifted young people should be made aware of Inglehart's insights about societal change, and the erosion of democracy. This will give them a chance to do what they can in the future to preserve democratic governance while resisting the ascendance of totalitarianism.

Additional Implications for Theory, Research, and Practice in Gifted Education

From a macro-perspective, the field of gifted education fits an interesting pattern revealed during large-scale, interdisciplinary analyses of the structure and dynamics of academic disciplines, which included economics, analytic philosophy, political science, and English studies (Bender & Schorske, 1997). The investigators distinguished between unified, insular, firmly policed academic disciplines and fragmented, porous, contested disciplines. The tightly unified disciplines of analytic philosophy and neoclassical economics tended to unify around a single theoretical framework, strongly resisted the importation of concepts from outside fields, and very seldom published work that didn't conform to the intellectual orthodoxy. In contrast, the pluralized disciplines included battles over contested theories and could not or would not resist invasion by theories from outside fields.

Based on analyses of four different levels of operation (practice, research, theory, philosophy) Ambrose, VanTassel-Baska, Coleman, and Cross (2010) used the Bender and Schorske framework and determined that gifted education fits the fragmented, porous, contested pattern. This can be frustrating for those who want solid answers to questions about important theoretical concepts such as the nature of giftedness and intelligence. But a fragmented, porous, contested discipline has its advantages. One of these is the cognitive diversity it encourages. Recall that the prominent economist and complexity scientist Scott Page (2007, 2010, 2017) identified cognitive diversity as a strong advantage for problem-solving teams in organizations. If we conceive of gifted education as an organization on the large scale, the intermixing of diverse theories, philosophical perspectives, practical actions, and research methodologies can be considered an advantage in terms of problem solving in the field because it strengthens our cognitive diversity. In comparison with the unified, insular, firmly policed discipline of neoclassical economics, for example (see prior discussions about the dogmatism in that field), we are in a favorable position.

Without directly mentioning cognitive diversity, or the interdisciplinary research on unified, insular, firmly policed and fragmented, porous, contested disciplines, the prominent cultural anthropologist Clifford Geertz (2000) supported these notions that ill-defined concepts in ill-defined disciplines can be advantageous. He described the difficulty faced by leading cultural anthropologists who got together with the intent of clearly defining the central concept of their discipline—culture. The best they could do was to condense the multiple, somewhat nebulous definitions they were operating with into 171 somewhat better elucidations that fit into 13 categories. Essentially, they discovered that the concept of culture was simply too multidimensional to be concentrated into a single, clearly defined concept. Geertz also argued that, "one of the advantages of anthropology as a scholarly enterprise is that no one, including its practitioners, quite knows exactly what it is" (p. 89).

While giftedness and culture are very different concepts, the former is strongly influenced by the latter so giftedness could be at least somewhat saturated with the messiness of culture. And given the difficulty of finding agreement on a definition of giftedness throughout the history of gifted education it's likely that this important concept itself suffers from, and benefits from, a persistent lack of clarity. Consequently, more interdisciplinary inquiry in our field likely will make our messy field messier, to the chagrin of many, while also ensuring that it doesn't ignore a large number of crucially important, highly relevant phenomena.

So, in essence, to make progress in our highly complex, fragmented, porous, contested field we must combine two contradictory impulses—the intent to stay focused on important phenomena while broadening our vision well beyond our own patch of conceptual terrain in the landscape of knowledge. Staying focused on important phenomena will largely be addressed by the domain-specific research trajectory in the field (see Olszewski-Kubilius et al., 2017; Subotnik et al., 2011). But that focus will need to be augmented with discoveries of other relevant phenomena in a variety of other academic disciplines and professional fields. Consequently, we will have to be wary of mind capture by sterile certainty as discussed in a prior section of this chapter. If we are unsuccessful in that resistance, we could become a field populated by intelligent but dogmatic scholars who imprison researchers and practitioners within a rather barren domain-specific silo (for more on dogmatism see Ambrose & Sternberg, 2012; Ambrose, Sternberg, & Sriraman, 2012). That silo would produce knowledge and actions that are weak and counterproductive, something like the inaccuracies and distortions of neoclassical economics, which also are discussed in an earlier section of this chapter.

Hopefully, we will learn to embrace the valuable insights that arise from domain specificity while also carrying out adventurous, interdisciplinary investigations that will prevent us from falling prey to sterile certainty. This means we will need to ensure that researchers and practitioners learn about the value of interdisciplinary work. The emphases on curriculum integration in our field (VanTassel-Baska & Stambaugh, 2006; VanTassel-Baska & Wood, 2010) will help considerably in this regard because curriculum integration is a strong, practical manifestation of interdisciplinary thinking. Practitioners who explore curriculum integration in their classrooms learn to value it because they appreciate the light-bulb moments enjoyed by gifted students who are connecting concepts across subject areas at their levels.

Metaphorical thinking can help us resolve the tension between competing paradigms in a field. The metaphor of "creative intelligence city" illustrates the value in both domain-specific and interdisciplinary work in gifted education and creativity studies (Ambrose, 2019a). This metaphor portrays academic domains as complex office towers within the imaginary city of creative intelligence. Each tower has more than enough phenomena and knowledge to keep all of its researchers and practitioners busy throughout the length of a career; however, if all of the professionals in the building don't ever go outside, their domain will become somewhat dogmatic and stagnant. Interdisciplinary inquiry is portrayed as traveling throughout the city, exploring the diverse domain-specific buildings on the various blocks and then bringing back borrowed concepts to one's own building. Collaborative work among the domain-specific professionals and the interdisciplinary explorers will produce a very rich field-building over the long term. I am hopeful that the professionals in gifted education will be willing and able to achieve this collaboration.

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2

Talent Development, Cultural Diversity, and Equity: The Challenge of the Andean Countries

Sheyla Blumen

Is it possible to identify gifted children in the extreme highlands of the Andes or in the depth of the Amazon jungle? This is the core question of my academic life. It was first asked as a provocative question on July 1991, while I was attending the Educational Research Workshop *Education of the Gifted in Europe: Theoretical and Research Issues*, a milestone event for gifted education in Europe (Mönks & Pflüger, 2005). At that moment, my country was immersed in a bloody armed conflict, and gifted education wasn't a priority. However, enrichment programs became a key alternative to improve the quality of education in regular classes (Alencar, Blumen, & Castellanos, 2000).

Giftedness and talent development occur in different parts of the world, where opportunity and commitment (Cross & Coleman, 2005) support its growth. Both, intrinsic variables to the individual, so-called learning capital by the learning resources approach (Ziegler & Baker, 2013), and the opportunity for talent development toward excellence, so-called educational capital by Ziegler and Stoeger (2017), are necessary; the latter is highly dependent on the opportunities provided to the individual along the life-span and the culture where he/she develops.

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Current Status of Gifted Education and Talent Development in the Andean Countries

In the early 1970s, the Marland Report (1972) triggered a watershed moment for the study of the highly able around the world (Jolly & Robins, 2016), and became the catalyst for gifted education programs in South America. Countries such as Brazil, Peru, and Venezuela provided support for teacher training and a Chilean gifted program emerged from a private initiative. Yet, due to the polarized nature of South American societies, by the beginning of the new millennium, gifted education was perceived as an "elitist" concept. People perceived giftedness as a neoliberal tendency, meant to violate principles of democracy and equity. This situation disturbed many scholars of the region, and there was a need to re-shape the conceptualization of gifted children toward a more inclusive proposal, to advocate for gifted education as an educational right to be addressed (Donoso-Romo, 2014; Hornsey et al., 2018; Mönks, Ypenburg, & Blumen, 1997; Wechsler, Blumen, & Bendelman, 2018).

The first comprehensive resource available on gifted education in Central and South America (Alencar & Blumen, 1993) was published in Heller, Mönks, and Passow's (1993) *International handbook of research and development of giftedness and talent*. It provided a critical review of the scientific research on gifted education done until the 1990s, updated in its second edition (Heller, Mönks, Sternberg, & Subotnik, 2000). Later, Benavides, Castro, and Blanco (2004) published a descriptive review on the resources available on gifted education in Latin America and the Caribbean, aiming to compare the Hispanic American gifted education trajectory to that of the United States of America (Gallagher, 2009).

Studies on gifted children in the Andean and Amazon region have led us to consider giftedness as a social construct, highly dependent on cultural and developmental factors, as well as on educational opportunities. Hence, we need to restrain our need to frame a narrow one-size-fits-all conception of giftedness toward a dynamic one shaped by the values, concepts, attitudes, and the language of the culture (Blumen, 2020). In multicultural contexts, where poverty conditions are inherent to the native populations, students who perceived greater obstacles during acculturation are more sensitive to social exclusion. Challenging experiences in acculturation may lead to heightened reactivity to socially hurtful events (Hornsey et al., 2018; Mazzoli, 2013).

A Developmental, Cross-cultural, Inclusive Approach

In Peru, my home country, there is high ethnic-linguistic diversity, with 42 native languages spoken in the Andean highlands and the Amazon rainforest. Likewise, the three main socio-geographical regions contribute to the different worldviews that influence perceptions of giftedness (Blumen, 2020). Therefore, an integrated developmental, cultural, and inclusive school approach was critical to better understand the gifted and talented children of the Andes and the Amazon region.

The Developmental Approach

The developmental approach recognizes the dynamic nature of developing abilities and every process involved in the path toward gifted performance (Porath, 2006; Simonton, 2005). It understands giftedness as the guise of certain characteristics at different stages of development and includes the diversity among children and youth with performance, in both cognitive and social-emotional areas, as a characteristic to be addressed from a developmental perspective. Moreover, initiatives coming from scientific settings revealed that cognitive and conative factors with correlated variables such as access to opportunities and perseverance (Ambrose, 2016) need to be considered. The development of expertise (Sternberg & Davidson, 2005) involves training and interventions in domain-specific skills, as well as self-regulated thinking to achieve levels of expertise and outstanding performance in adulthood (Stoeger & Ziegler, 2016). Although traditional models of talent tended to focus on personality traits, an emphasis on the dynamic interaction of the person with the environment is needed, in order to have a better understanding of the processes related to high achievement under poverty conditions.

From a developmental perspective we need to consider cognitive and conative factors, together with access to learning, since talent development involves training in domain-specific skills, as well as self-regulated thinking to achieve an outstanding performance in adulthood (Ambrose, 2016; Dweck & Leggett, 1988; Sternberg & Davidson, 2005; Stoeger & Ziegler, 2016; Subotnik, Olszewski-Kubilius, & Worrell, 2011). Thus, the dynamic interaction of person/environment needs to be considered in order to have a better understanding of the processes related to excellence.

Oh and collaborators' cross-cultural study (Oh et al., 2016), with 1794 participants from five countries, revealed that a learning-goal orientation and a performance-based approach to motivation predicted positive perceptions of a high-achieving classmates' intellectual ability in all participating countries but Peru. Though Obando's (2019) study with 268 students (age range 14–18) from the Residential Academy for the High Achievers revealed that the mastery-approach goal—a subtype of achievement goal following Elliot and Muruyama's model (Elliot & McGregor, 2001; Elliot & Muruyama, 2008)—and the incremental theory of intelligence—a subtype of Dweck and Leggett's (1988) model of implicit theories of intelligence—were predictive variables of academic resilience, with the mastery-approach goal functioning as a mediator between the incremental theory of intelligence and academic resilience.

Obando's (2019) study showed that those students that perceive intelligence as a skill that can be developed learned to follow self-imposed standards to measure their ability, considering errors as part of the learning process; and their self-concept seemed not to be menaced if they didn't show high achievements in every moment. Also, sex differences were found in reflective and adaptive help-seeking and the incremental theory of intelligence, with women scoring higher than males. Therefore, high-achieving women considered that personal effort contributes toward their high performance, more than high-achieving men.

Additionally, Alcántara's (2019) study on academic engagement, academic stress, and well-being with young scholars coming from ethnic diverse backgrounds, who were studying at a culture-sensitive university, showed that despite their high levels of stress, young scholars felt engaged toward their learning, and managed to keep their academic performance. It seems that the peer mentoring support that the university provides is a facilitating factor for young scholars coming from ethnic-linguistic diverse backgrounds. Therefore, it seems that cognitive and motivational processes are significant as facilitators toward keeping high levels of learning performance.

The Cultural Approach

The cultural approach recognizes the influence of culture in the conceptualization of giftedness, respecting the cultural context in which the gifted child and youth are being raised, providing fair identification and intervention programs (Blumen, 2016a, 2016b; Freeman, 2015; Persson, 2012; Renzulli, 2019). This is a key condition, particularly for those children and youths coming from native towns, whose mother-tongue is different from the mainstream culture.

The Blumen and Cornejo Lanao (2006) study with gifted children in Peruvian rural areas reveal that: (a) Children from the Andean highlands show more similarities with Mäori components such as collective giftedness, sensitivity toward interpersonal domains, hospitality and humbleness, intuition, spirituality, and leadership through role-modeling, than with gifted Peruvians living in urban areas (Bevan-Brown, 2011); and (b) gifted children of the Amazon rainforest tend to exhibit a giftedness view very similar to those of the Australian Aboriginal reported by Gibson and Vialle (2007), in relation to linguistic intelligence, spatial intelligence as a survival ability strengthened by parental practices, interpersonal intelligence, and spiritual intelligence in term of the strong connection established with the motherland.

The lack of culturally fitted considerations in Peru refrained policies related to talent identification services in the community for more than a decade (Blumen, 2013). Among them was the term "gifted" which in Spanish involves a deterministic meaning, related to "the chosen one," which was totally rejected by the majority of the population. After it was changed to "highly able," a term which provides a more dynamic and pragmatic meaning to the concept, easier to be understood by teachers, parents, and policymakers, a change of the law was possible to support them.

However, disparities in academic achievement among the highly able students show that students coming from culturally/linguistic diverse contexts are often overlooked for programs for the high achievers, and inequities in the screening and identification procedures for students living in rural areas post new challenges on the fairness of the processes.

Peru, a country with 25 state-funded residential academies for the high performers, needs to face this situation to include students attending rural schools in the Andean highlands, and in the deep Amazon region, in its provision. An identification process which aims to exhibit the diverse ethnic-linguistic minority youths is presented, to promote equity in the identification of the highly able, beyond the limits of the cultural background.

The Inclusive School Approach

The inclusive school approach recognizes the influence of the school context for the development of giftedness (Coleman & Cross, 2001). High performance takes place whenever the opportunities for learning are available and the person takes advantage of them. However, impoverished environments mostly found in the Andean highlands as well as in the Amazon rainforest constitute interferents toward adequate learning.

In the Andean countries, where the majority of the population lives under poverty conditions with limited learning resources, school context is the best setting for learning opportunities. As Cross and Coleman (2005) stated, "when achievement measures are used with foundational domains, assessment issues in terms of identification and outcomes become the same, and performance is the key" (p. 57).

In Peru, the Residential Academies for High Achievers, so-called COARs, by their name in Spanish, were launched in 2010 to serve the talented youths coming from disadvantaged and poverty contexts (Blumen, 2013, 2016a, 2020). Their aim was to foster academic talent in students coming from highly vulnerable conditions, either due to low-income households or due to the intersection of poverty and ethnic-linguistic background. They work under the principles of equity, inclusion, interculturality, and quality of education. They also provide the opportunity to achieve the IB Diploma (International Baccalaureate Diploma). First launched in Lima City, positive results lead to the expansion of the model to every Peruvian region. Their student body is culturally diverse and provides a good example of intercultural partnership among their students, with respect toward their cultural identity.

Identification of the Ethnic-Linguistic Diverse Gifted Student

With the aim to rationalize the on-going conflicting demands to launch a national identification program for the COARs, key information was collected from headmasters, teachers, and counselors from most of the 25 residential COARs, as well as from the officers of the Ministry of Education. Data about their perception of the barriers to admitting minority ethnic groups to the residential Academies for the High Achievers were collected, often mentioning the low performance of applicants from native towns in face-to-face interviews.

Likewise, headmasters and academic coordinators also expressed their concerns about the possibility of rural children coping with the academic exigency of an IB school (International Baccalaureate School), which were similar to those found by Mazzoli (2013) in her study about giftedness and globalization.

Triangulation across multiple criteria was considered in order to secure the inclusion of an integrated developmental, cultural, inclusive approach, and the following criteria were considered:

- An independent team was organized to monitor the complete identification process.
- Assessment criteria were discussed with specialists in gifted education, intercultural education, and the headmasters of the COARs, and were transparent to them.
- The goal was to provide the opportunity for every student who demonstrated high performance in their public school to participate in the identification process. Therefore, requirements involved the best 10 ranked students of their class in both the seventh and eighth grades.
- A total of 84 application centers reaching remote areas both in the highlands and in the rainforests were disposed. As a result, an increase of 18% in applicants was shown, with 34,000 eighth graders, applying for a place in December 2019 (MINEDU, 2020).
- Special accommodations were considered for those exhibiting impairments or learning difficulties and involved (a) accommodations for the visually, auditory, and motor impaired, involving translation into Braille system for psychometric tests, a sign translator for the auditory impaired; (b) accommodations for special educational conditions such as ASD (Autistic Spectrum Disorder), ADHD (Attention Hyperactive Deficit Disorder) (ADHD), and learning differences.
- Culturally sensitive personal interviews involved a female presence for girls coming from aboriginal towns, where gender-related values might affect oral communication.
- The possibility of having the personal interview in their mother-tongue for students coming from native villages was considered.
- Cognitive, motivational, socio-emotional, and creativity aspects were considered.
- Robust psychometric measures were used, including a pilot study with a representative sample of 621 participants with alphas from 0.707 to 0.944, and an average of $\alpha = 0.965$ for the general battery.
- Qualitative measures were also considered through group dynamics and face-to-face interviews.
- Alignment between assessment and provision was fully considered. Feedback for the finalists was given by their counselor at the COAR to which they were accepted.

In order to identify 2683 high-achieving eighth-grade students from the 34,000 applicants for the COARs following a developmental, cultural, and inclusive approach, a mixed method process was considered. Phase 1 involved the application of a psychometric measure, and Phase 2 considered group dynamics and personal interviews.

The psychometric measure involved a group of tests measuring the ability to use and manipulate abstract and symbolic relations. This type of activity is of particular relevance if we want to identify highly able students from vulnerable backgrounds, due to low socioeconomic status, ethnic-linguistic diversity, and rurality, that prevents them to access educational institutes of high quality (Callahan & Hébert, 2014).

This measure included five different batteries. Each battery provided a profile showing the level and patterns of abilities of each student (Feldhusen, 2005). Information about strengths and weaknesses of the students provided valuable information to compensate in those areas requiring consolidation (Horowitz, Subotnik, & Matthews, 2009). In this measure, the subtests were arranged in a way that allowed maximum flexibility in the adaptation of the task difficulty to the abilities of those being tested. Every subtest started with relatively easy items for a student finishing eighth grade, and then sequentially, difficult level became more complex.

The distribution of the items sequenced by level of difficulty, from the low level to the high level, aimed that every student, attending any type of school perceived that he/she was able to reach successful experiences, leading the most able toward their limits. This measure aimed to provide a continuum set for those students coming from different type of schools, including a flexible vision in the data collection. Evaluation was computer-assisted, involving norms that provide the relative position of each student compared to the complete group. The psychometric measure involved five batteries: Reading Comprehension, Math Reasoning, Spatial Reasoning, Fluid Reasoning, and a Socio-Emotional battery, as seen in Fig. 2.1.

The so-called Reading Comprehension battery was related to verbal comprehension skills and involved three subtests related to verbal classification, verbal analogies, and sentence completion. Even though performance was related to evoking verbal concepts, items included in each subtest require mainly flexibility in the use of concepts (Callahan & Hébert, 2014). Subtests were designed to assess relational thinking when the relations are formulated in verbal terms (Makel, Snyder, Thomas, Malone, & Putallz, 2015). Taking into consideration that most of the formal learning process is presented through verbal symbols, the relevance of a verbal test for performance forecast was significant.

Area	Battery	Description	Subtest
Cognitive Skills	**Reading Comprehension**	*Ability to evoke and use of verbal concepts; flexibility in the use of verbal concepts; verbal relational thinking*	Verbal Conceptualization Verbal Analogies Incomplete Sentences
	Math Reasoning	*Ability to evoke and use of quantitative concepts; relations between quantitative concepts; flexibility in the use of quantitative concepts*	Equations Numbers Sequence
	Spatial Reasoning	*Evaluation of relations among objects, dscrimmination and spatial relations*	Non-verbal Analogies Non-verbal Puzzles
	Fluid Reasoning	*Analysis-Synthesis; inductive and deductive reasoning*	Non-verbal Similarities
Socio-Emotional Skills	**Socio-Emotional Battery**	*Evaluation of Adaptation sills, coping with stress, self-confidence, academic motivation*	Academic Resilience and self-confidence Adaptation skills and Coping with stress Goal-oriented academic motivation
	Cooperative learning	Collaborative learning; team work with ethics; respect towards ethnic-linguistic diversity	Transformational leadership Proactivity Team work
	Personal Interview	Motivation towards learning in a boarding school for high achievers; perceived human and material resources to cope with difficulties	Communication skills Family dynamic supportive elements Facilitating factors to cope with difficulties

Fig. 2.1 Display of the areas considered in the psychometric measure, by battery and subtests (Blumen, 2020)

The Math Reasoning battery involved two subtests related to building up equations and series of numbers. Problem solving for each test requires a basic ability of storage of quantitative concepts, perception of concept relations, and flexibility in the use of quantitative concepts. Items do not require an exposure to oral/verbal reading, so the influence of reading ability is kept to the minimum. The ability to reason with quantitative symbols is one of the most required in the educational context. Math, Science, Administration, Management, and Economy, among others, include demands on quantitative skills. Quantitative reasoning, together with verbal reasoning, forms what Makel, Putallaz, and Wai (2012) have called "academic ability."

The Spatial Reasoning battery involved two subtests: figural analysis and figural recognition. Items in this battery involved mainly object relations in a certain space. It measured spatial discrimination and spatial ability. Subtests emphasized discovery and flexibility in the manipulation of relations expressed through figural symbols or patterns.

The Fluid Reasoning battery involved figural classification. Items involve figural geometric elements. It measures fluid thinking, part of cognitive potential, an ability that surpasses formal school instruction.

The Socio-Emotional battery involved three subtests related to academic resilience, coping with stress, and goal-oriented academic motivation. Items in this battery aim to measure adaptation ability, coping with stress and anxiety resources, self-confidence, and academic motivation.

In the pilot study, a sample of 621 eighth graders (48% boys and 51% girls) were considered from three different type of schools: regular long-day schools, short-day schools, and multi-grade schools. Schools were located in five regions, representing the mild and upper highlands of the Andes, the mild and deep Amazon rainforest, and the shanty-towns surrounding urban areas. Psychometric analysis revealed alphas from 0.707 to 0.944 among the subtests, with an average of $\alpha = 0.965$ for the psychometric measure involving cognitive and part of the socio-emotional battery.

In the nationwide application, from the 34,000 applicants, only 29,700 showed up at the testing centers. From them, 47 applicants required special accommodations, and 5660 applicants entered the second phase.

Phase 2 involved qualitative measures that included group dynamics and face-to-face interviews. Group dynamics aimed to assess collaborative learning, transformational leadership, proactivity, teamwork with ethics, and respect toward ethnic-linguistic diversity, through an activity proposed to a team of eight students with two leaders, previously trained on the goal and evaluation rubric of the dynamic.

Face-to-face interviewing aimed to investigate the motivation toward learning in a residential school for high achievers, family dynamic supportive elements, and factors to cope with difficulties. Culturally sensitive considerations for applicants coming from original ethnic groups involved (a) starting the interview in their original language, for at least 5 minutes, then switch to

Spanish, the official language of the country; (b) formally telling girls that they were allowed to provide a direct answer to a question asked by a male or by an adult, since in some native villages this behavior is considered inappropriate; (c) a female staff member being sit next to the female student to provide support since in some native villages, a girl being by herself in a room with male-only adults was seen as incorrect. Special accommodations were also considered for students exhibiting visual, auditory, and mobility impairments, as well as for those with special learning needs.

From the 9084 students that belonged to native towns (a record number), only 2115 chose to be interviewed in their mother-tongue, 52 exhibited a need of educational accommodations, and 17 belonged to highly vulnerable reparation groups.

In order to avoid conflicting incentives, the two-step assessment process was applied by the government office. After the two-step assessment process involving psychometric pencil-paper tests, group dynamics, and personal interview, 2700 students were selected to start ninth grade in 1 of the 25 Academies for the High Achievers in Peru (MINEDU, 2020). Among them, for the first time, a visually impaired student, coming from the depth of the Amazon jungle was identified, among other students coming from indigenous backgrounds.

This class started school in the middle of the COVID-19 Pandemic, through the e-learning modality, with laptops provided by the COARs for each student. So, it is possible to establish an inclusive schooling approach in an IB academically demanding school.

Conclusions

To approach gifted education in the ethnic-linguistic diverse Andean countries we need a dynamic concept of giftedness as a social construct, shaped by developmental and cultural factors, as well as by educational opportunities. An integrated developmental, cultural, and inclusive-school approach is key to understand giftedness and talent development in this part of the world. We need to improve our understanding about talent development under ethnic linguistic diversity and poverty contexts. Formal norms of talent promotion are needed in the Andean countries, with the commitment of colleges, enterprises, and the officials of education, in order to support talent development with social responsibility.

There are still some recommendations to follow: (a) the inducement of comparative research about the beliefs and conceptions on the highly able between the different ethnic linguistic groups is desirable; and (b) acceleration and homeschooling programs need to be developed to provide enrichment to the gifted living on rural areas, where multi-graded schools still prevailed.

Commitment is key for giftedness and talent development in Andean countries. It is possible to identify gifted children in the extreme highlands of the Andes or in the depth of the Amazon jungle using a developmental, cultural, and inclusive-school approach if there is enough ambition to serve with equity and social justice.

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3

The Trouble with Conceptions of Giftedness

James H. Borland

Defining giftedness, one might think, is essential for the practice of gifted education. After all, how can one address the educational needs of a certain population of students unless one can delineate, with some degree of confidence, the characteristics that render that population distinct from other student populations and that serve as the predicate for whatever special educational measures might be appropriate? The logic undergirding the belief in the centrality, the necessity, of defining giftedness would seem to be unassailable. And, under the terms of the paradigm from which the field's axioms and practices emerged, it is.

The term *paradigm* entered the scholarly lexicon as the result of Thomas Kuhn's highly influential book, *The Structure of Scientific Revolutions* (1962/1996). A useful definition of *paradigm* comes from D.C. Phillips, who defined it as "a theoretical framework . . . that determines the problems that are regarded as crucial, the ways these problems are to be conceptualized, the appropriate methods of inquiry, the relevant standards of judgment, etc." (1987, p. 205). A paradigm is the complex of theories and practices that

I think that the fact that we can't agree on what those underlying skills and attitudes are strongly suggests that gifted is a social construct, not something we discovered. The fact that there is less of a consensus about what giftedness is after a century of work also suggests that there is nothing to study, independent of our various Foucault argued that we create the things we study.

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constitutes the prevailing world-view and the accepted *modus operandi* of scientists, and, as such, it is often what is distilled in textbooks as scientific truth.

The paradigm that has informed theory and practice in gifted education, largely unchallenged, for the entirety of the field's existence is what Dai and Chen (2013, 2014) refer to as "the gifted-child paradigm."

Essential to the gifted-child paradigm are the following beliefs:

- Gifted students exist. Within our school-age population there is a subpopulation of students who differ significantly from their age peers by virtue of much-greater-than-average levels of ability or potential. These students are existentially distinct from other students.
- Gifted students have always existed, but it was not until sometime early in the twentieth century that we discovered them.
- Defining giftedness accurately is essential to providing appropriate educational experiences for these students. Some definitions are better than others. That is, some are closer to the truth, are more faithful mirrors of nature (thus books such as this one).
- Identifying gifted students and placing them in gifted programs are essential to and indispensable in the practice of gifted education. Identification should be guided by the best definition of giftedness available.
- Truly gifted students belong in gifted programs. Other students do not.

I suspect that the great majority of scholars and practitioners in the field of gifted education would find nothing exceptionable in these beliefs, which have consistently shaped the field from its beginning. I suspect that, were we able to reanimate Lewis Terman (e.g., 1925) or Leta Hollingworth (e.g., 1926), the nonconnubial father and mother of gifted education, they would have no difficulty recognizing the practices that characterize the field today, so persistent and influential has this paradigm been. Nonetheless, there are reasons to re-examine and to problematize (Gallagher, 1999)[1] the gifted-child paradigm.

Most fundamentally, I question the validity of the second bullet point above, that gifted students have always existed, but it was not until sometime in the second decade of the twentieth century that we discovered them. Accepting or rejecting that axiom bears directly on the issue of defining giftedness.

[1] According to Suzanne Gallagher, "problematizing [is] the process of grasping an assumption, that is, a taken-for-granted way of thinking, and turning it into a question" (1999, p. 70).

Giftedness as a Social Construct

In my *Nature and Needs of Gifted Students* class at Teachers College, I begin our session on conceptions of giftedness by posing the following question:

How long have there been gifted children?

As one might imagine, typical answers include "Forever," "As long as there have been children," and "Ever since *Homo sapiens* evolved," along with some more nuanced responses.

I then give my uninspiring answer, which, in 2020, is "100 years."

Why 100 years? Well, in 1920, the National Society for the Study of Education (NSSE) published its annual yearbook, something it did, until recently, every year since 1902. The publication of the NSSE yearbooks was a significant annual event in the field of education. Each one focused on a single issue, was edited by a prominent scholar in the area under consideration, and contained numerous chapters contributed by other leading scholars in that area of study. The focus of each yearbook was highly topical and denoted that the issue under consideration was deemed to be quite important to the field of education.

The 1920 yearbook[2] was entitled *Classroom Problems in the Education of Gifted Children* and was edited by T. S. Henry, about whom I know nothing except that he was the editor of this yearbook. The fact that, in 1920, the NSSE deemed "the education of gifted children" to be sufficiently timely and important to warrant a yearbook signifies to me that gifted education, as it later came to be called, had been recognized by the educational establishment, had officially come into existence.

Now, asserting that the publication of the NSSE yearbook about gifted education in 1920 brought gifted children into existence is debatable with respect to its specificity. However, I offer my answer to my own question, not to establish a specific date, but to argue that gifted children, as a distinct subpopulation within our overall school population, have a rather short history, spanning roughly one century. That is to say, we have not always had gifted children. Moreover, we did not discover gifted children, we invented them.

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[2] Actually, as was often the case, there were two NSSE yearbooks published in 1920. The one under discussion here was part II.

Of course, there have always been precocious children, students whose school performance is outstanding, even the occasional child prodigy. But the idea that there exists within our school-age population a small group known as "gifted children" who differ, qualitatively and quantitatively, from "average children" in significant ways is a notion that can be traced to the second decade of the twentieth century. In a very real (to me, at least) sense, there were no gifted children in the nineteenth century and before, simply because the label and the construct that gave birth to the label did not yet exist.

What I am arguing here is that giftedness in children, marking them as a distinct subgroup of humanity, is a social construction, not a fact of nature. What do I mean by that? As I wrote in an earlier paper:

> To state that a construct is socially constructed is to state that it gains its meaning, even its existence, from people's interactions, especially their discourse. Concepts and constructs that are socially constructed thus acquire their properties, and their influence, through the give-and-take of social interaction, not through the slow accretion of empirical facts about a pre-existing entity. (Borland, 1996, p. 7)

The argument that something is socially constructed and not a fact of nature does not deny its importance or relegate it to an inferior position vis-à-vis "more scientific" entities. Many important things we talk and think and write about in education—such things as intelligence, creativity, disability, and so forth—are social constructions. They represent categories we impose on the world to make sense of phenomena and behaviors we need to understand. They can be of considerable significance and be quite powerful. But it is important to remember that they are our creations; we brought them into being.

Let me try to make my argument that giftedness, in the context of educational programming, is a social construction, something humans invented, and not a fact of nature, something humans discovered. I will do this by tracing the epistemological history of an indisputable fact of nature and contrasting that with the epistemological history of the construct of giftedness.

How Giftedness Is Not Like Uranus

William Herschel (1738–1822) was a remarkable man.[3] Christened Friedrich Wilhelm Herschel, he was born into a family of prominent musicians in the Electorate of Hanover, in what is now Germany. Wilhelm became an oboist, like his father Isaac, and he also developed into a composer, some of whose compositions, which include 24 symphonies, are performed to this day.

Wilhelm and his brother Jakob, also an oboist, joined the band of the Hanoverian Guards, a military unit that was defeated by the French in 1757 as they tried to defend Hanover at the Battle of Hastenbeck. Fearing for his sons' lives, Isaac Herschel sent them to England,[4] where Friedrich Herschel quickly learned English and adopted the Anglicized name, Frederick William Herschel. Herschel continued his musical career, which he never completely abandoned, but his reputation today rests on his work in a much different field: astronomy.

As a result of acquaintances with, among others, the English Astronomer Royal Nevil Maskeline, Herschel developed a passion for astronomy, and, working with his sister Caroline, he made many notable discoveries. His discoveries were made possible by his extraordinary skill when it came to making telescopes, of which he made more than 400.[5] The telescopes, over which Herschel labored obsessively, polishing their mirrors for hours at a time, represented an extraordinary technological advance beyond what had existed up to that time, and they allowed him and Caroline to see what no one else had been able to see.

One evening in 1781, Herschel detected a heavenly body that he had never seen before and whose exact nature (a comet? a stellar disk?[6]) was unclear to him. Correspondence with other scientists and further observations convinced Herschel that what he had discovered was actually a new planet, the first to be discovered since ancient times, since it could not be seen with the naked eye. This is the planet we now call Uranus.[7]

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[3] See Richard Holmes's fascinating book, *The Age of Wonder* (2008), for more on Herschel and other great scientists of the Romantic Age.

[4] The crowns of England and Hanover were united at that time under George II, who was born in Hanover.

[5] The most famous of these was the "40-foot telescope," so called because of its 40-foot focal length. This was a rather unwieldy instrument, and most of Herschel's discoveries were made by using a 20-foot instrument.

[6] A toral accumulation of matter revolving around a star.

[7] Herschel originally dubbed the planet "The Georgian Planet" in a bid to win the favor of George III, who had by then ascended to the throne. That appellation obviously did not stick.

Now, Uranus is not a social construction. It is indisputably a fact of nature. It had been in existence about four and one half billion years before Herschel discovered it. As with anything that has physical existence, the knowledge that built up around Uranus followed a typical trajectory. First there was complete ignorance, and then confusion. Initially, as I indicated above, there was no certainty as to what this thing even was. Once it was agreed that this thing was a planet, study of it commenced, and more and more knowledge was generated.

Moreover, that knowledge became widely agreed upon because Uranus exists as a physical object that can be studied empirically. Scientists now agree that Uranus is, for example, nearly 1.8 billion miles from the sun, that it has 27 moons, and that its mass is almost 15 times that of the Earth. There is no disagreement over these facts. That is to say, knowledge about Uranus has converged over time. Ignorance and confusion gave way to a significant accretion of empirical knowledge and, ultimately, consensus. That is the way with physical objects, with facts of nature. Through the generation of empirically grounded knowledge, competing ideas and theories are sorted out, and an agreed-upon body of knowledge emerges.

That is not what typically happens with social constructions. Let us return to the construct of giftedness and the gifted child. When this notion first burst upon the scene, largely as a result of widespread mental testing in the United States,[8] there was, for the most part, consensus as to how giftedness in school children was defined. A child was gifted if they[9] exceeded a certain high cut-off score on a test such as the Stanford-Binet Intelligence Scale. But over time, this conception of giftedness was joined by other conceptions, many of which departed significantly, even radically, from the initial IQ-based conception.

This is reflected in the table of contents of the predecessor to this volume, the second edition of *Conceptions of Giftedness* (Sternberg & Davidson, 2005). Of the 24 chapters in that book, 23 are given over to explications of conceptions of giftedness, and these 23 conceptions differ greatly from each other.

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[8] It is not a coincidence that the "Father of Mental Testing" in this country and the "Father of Gifted Education" are one and the same man, Lewis M. Terman.

[9] Following most contemporary style guides (e.g., the A.P. Stylebook), I have grudgingly, but, I think, appropriately, adopted the epicene plurals *they, their, them*, and *themselves* as the appropriate pronouns to follow singular antecedents. The lack of a gender-neutral singular third-person pronoun in English and increasingly persuasive arguments against regarding gender and sex as dichotomous binaries have created the need to define certain heretofore plural pronouns as neuter singular. This is not unprecedented. The pronoun *you* used to be a second-person plural only (*thee* and *thou* were the accepted second-person singular pronouns). We can be grateful that the attempt by the Merriam-Webster people in 1934 to adopt *thon* as a gender-neutral pronoun did not succeed.

So, unlike the epistemological history of Uranus, where ignorance and conjecture were replaced by consensus, in the field of gifted education, the opposite happened. Univocality gave way over the years to multivocality. And that happened because giftedness is a social construction, not a fact of nature. There is no such physical thing as giftedness that can be studied empirically. We create it, and different ones among us create it differently, in part as a function of our beliefs, prejudices, experiences, and positionality in society.[10]

Gifted Education as an Existential, Rather Than an Educational, Undertaking

If, as I believe, giftedness is a social construction, where does that leave us as a field? I think it requires us to re-examine and problematize the gifted-child paradigm and the educational practices that flow from it.

Kuhn (1962/1996) wrote about "paradigm shifts," those epistemological tectonic upheavals that occur when belief in the established worldview is challenged by findings that cannot be assimilated into the reigning paradigm and that the reigning paradigm cannot accommodate itself to by virtue of a tweak here and there. Think of the demise of the geocentric view of the solar system prompted by the discoveries of Copernicus and others, which led to the heliocentric model that is an undisputed element of astronomy today. I think our field is overdue for a paradigm shift because the gifted-child paradigm is logically untenable and is the basis for practice that is highly problematic.

The paradigm is logically untenable because it rests on the belief in giftedness as a thing that is out there awaiting the day when we finally arrive at its "true" definition. But after a century of study and the efforts of folks such as the highly capable scholars responsible for this book's chapters, should we not have come to some degree of consensus as to what it is?

Moreover, grounding our practice in the gifted-child paradigm has resulted in educational practice that, for the most part, lacks empirical support.[11] Ours has largely been an existential undertaking rather than an educational one. What do I mean by that? Let us look at how we react to a student who demonstrates a very high level of ability in one or more subject areas.

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[10] One practical consequence of the multiplicity of definitions of giftedness in existence, and in use, is that a student can be "gifted" in one school district but not in another simply because the two districts use different definitions of giftedness in their gifted programs, a phenomenon I semi-facetiously refer to as "geographical giftedness."

[11] Although there is considerable support for acceleration in the gifted-education literature and elsewhere (see Colangelo, Assouline, & Gross, 2004).

Imagine a student who is clearly head and shoulders above their age peers in, say, mathematics. Such a student would be ill-served without carefully thought-out curricular and instructional differentiation. So, does the gifted-child paradigm prompt us to try to make mathematics instruction more appropriate for the student? No, it has us ask the question, "Is this a gifted student?" Our focus turns away from what the student *needs* to what the student *is*, away from the educational and toward the existential.

What typically happens is that the student is labeled a "gifted student" and placed in a part-time enrichment program where, in the service of "differentiated curriculum," all students study the same thing at the same time. The student's needs with respect to mathematics, which is what brought them to our attention in the first place, are not addressed because implicit in this model is the assumption that "gifted students" are a monolithic group, academically strong across the board, whose educational needs are identical.

Gifted Education Without Gifted Students

What is the (or *an*) alternative to working in the gifted-child paradigm? I have argued (e.g., 2005, 2009) for rethinking our field in a manner that leads to considering the possibility of "gifted education without gifted students." This is very similar to what Peters, Matthews, McBee, and McCoach (2014) refer to as "Advanced Academics."[12] In both of these formulations of gifted education, the emphasis is placed on meeting students' specific, demonstrated academic needs rather than determining whether or not students are gifted.

I think it would behoove us as a field to take a step back and ask a very basic question: "Why do we exist as a field?" I suspect that most people in the gifted education field, both academics and practitioners, would state that the answer is obvious: gifted education exists in order to advocate for the creation, operation, and perpetuation of gifted programs so that certain students can be identified as gifted, can be placed into these programs, and can be exposed to a differentiated curriculum. This is consistent with the axioms of the gifted-child paradigm, and it is implicit in the way most gifted programs operate. However, it is my belief that this is a myopic view of our field's purpose and that it represents a confusion of means with ends.

[12] In their book, *Beyond Gifted Education: Designing and Implementing Advanced Academic Programs*, which I highly recommend, Peters et al. pay much more attention to and devote more thought to the important practical issues of implementation than I do.

I believe that we need to think radically about our field's *raison d'être*. I am using the term *radically* in its original sense, meaning going to the root or origin of something. And I believe that, if we take this radical stance and problematize our beliefs and practices, it would force us to reconsider what we are all about as a field.

I submit that it is the proper education of high-ability and high-potential students, not the creation or preservation of gifted programs, that is, or should be, our field's ultimate goal, our justification for existing. If we view our purpose as a field as advocating for and working toward appropriate education for capable students, which is consistent with the larger goal of providing every student with an appropriate education, it becomes clear that creating and operating gifted programs is a means, only one means, and conceivably not the best means, toward achieving that larger goal.

Rethinking our field's purpose in this way has led me to the belief that, not only is it possible, perhaps desirable, to conceive of gifted education without gifted programs (Borland, 1996), but that it is conceivable and, I believe, highly desirable to consider the benefits of gifted education without gifted students. What does this mean?

Let us return to the hypothetical example above of the student who is unusually capable in mathematics. Rather than applying the label "gifted student" and placing them in a pull-out enrichment program, we could instead address their clear and pressing need for opportunities to move beyond the regular mathematics curriculum and engage in educational activities that are appropriate for them and are therefore actually educational.

This requires no labeling, no gifted students, at all. It is flexible in that it involves responding to the educational needs of various students in various subjects and obviates the putative "need" to define giftedness, to identify certain students as gifted, and to remove them from the regular classroom, which is where their need for advanced academics originated. It involves recognizing that there are not only inter-individual differences among students with respect to educational needs but also intra-individual differences. It does not involve treating "the gifted" as a monolithic group, all of whom are academically strong across the board. And it neatly fits gifted education, no longer labeled as such, within the larger, more comprehensive, educational undertaking of meeting the educational needs of all students.

The Differentiation Paradigm

Dai and Chen (2013, 2014) identify two other paradigms in the field of gifted education. I will focus on one of these, "the differentiation paradigm." According to the terms of this paradigm, the educational needs of advanced students arise in specific curricular contexts and therefore, "curriculum and instruction should be adapted to the needs of gifted students on an individual-by-individual basis" (Dai & Chen, 2013, p. 157). This echoes the many contributions of Carol Ann Tomlinson (e.g., 2001, 2014) to our understanding of the need for and the practice of instructional differentiation.

I would also include under this paradigm the view of gifted education put forth by Peters et al. (2014), which, as I mention above, has as its central construct the notion of "advanced academics."[13] They write:

> Gifted education is about identifying and serving a distinct class of individuals—the gifted. Advanced academics is about providing students who are not challenged by the ordinary curriculum and instruction with faster, deeper, and more rigorous instruction than they would receive within their typical educational experience, regardless of whether or not they are formally identified as gifted. (p. 17)

Central to approaches to gifted education that fall under, or can be force-fit into, the differentiation paradigm is an indifference to, or even a rejection of, the business of sorting students into "gifted" and "not gifted" categories and treating the former as a monolithic group with uniform, unchanging needs. Practice under the terms of the differentiation paradigm would instead lead to the search for specific manifestations of educational need that result from mismatches between students' aptitudes, on the one hand, and curricular offerings, on the other.

Let us return once again to the hypothetical student who is very advanced in mathematics. Working within the gifted-child paradigm, the educational response to their expression of mathematical precocity (Stanley, 1981) would involve determining, though some form of assessment,[14] whether the student falls within the school district's definition of giftedness and, if they do, placing them in a gifted program of some sort. Should the student not meet the criteria for being labeled "gifted," chances are that they would remain in the regular classroom full time and receive no response to their curricular needs,

[13] Although Scott Peters has expressed to me some doubt as to whether gifted education as advanced academics fits into the gifted-child paradigm.

[14] Typically, locally developed identification procedures that generate a ton of error variance.

except through whatever provisional services (Tannenbaum, 1983) their teacher may have the initiative to provide.

Things are much simpler and, I believe, more educationally defensible under the terms of the differentiation paradigm. Here, assessment involves simply noticing the student's aptitude for and achievement in mathematics, which would be difficult to miss, and the response would entail an alteration of the student's mathematics curriculum and instruction. And no definition of giftedness would be required.

Of course, although responding to this student's needs working within the differentiation paradigm is, I think, conceptually simpler and logically defensible, there is an obstacle to overcome that, if not insuperable, is daunting. And that is the fact that in relatively few schools has instructional differentiation so permeated teachers' day-to-day practice that curricular and instructional differentiation is easily and routinely available. I have been in quite a few school districts where differentiation is the policy. I have been in very few where it is actually widespread practice.

Infusing differentiation into the day-to-day practice in an educational setting such as a school district is not easy. It requires sustained support from administrators over an appreciable period of time. It requires opportunities for teachers to work together to plan, implement, and evaluate differentiation practices. It requires teacher-education programs to focus on differentiation strategies with their preservice students to a greater degree than most of them do now. Nevertheless, I cannot see any other approach that would lead to gifted-education practice that is more effective and more defensible, educationally and morally.

Dai and Chen's differentiation paradigm does not require a conception of giftedness. And I see that as a plus, because if by now we have not reached consensus as to what giftedness is, and we clearly have not, I do not think we ever will. Giftedness has become, and probably always was, what Stuart Hall (e.g., 1997), writing about race, calls a "floating signifier," a semiotic term "variously defined as a signifier with a vague, highly variable, unspecifiable or non-existent signified. Such signifiers mean different things to different people: they may stand for many or even *any* signifieds; they may mean whatever their interpreters want them to mean" (Chandler, 2001, p. 33). It is difficult to imagine effective educational practice taking place in a field whose most fundamental, most foundational construct means different things to different people, especially working within a paradigm that requires an agreement as to how to define that construct.

Thus, it is my contention that we must leave the gifted-child paradigm behind us and, with it, our search for *the* conception of giftedness. Does this mean that the reader should put this book down without reading the remaining chapters? Of course not. A great deal of brain power has gone into the preparation of this volume. The reader will find in the book's various chapters a great deal that will stimulate their thinking and teach them something in the process. But I don't think they will find the "true" conception of giftedness that is needed to make gifted education, in its traditional form, effective or defensible.

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4

Overcoming Structural Challenges Related to Identification and Curricula for Gifted Students in High-Poverty Rural Schools

Carolyn M. Callahan and Amy Price Azano

Unlike programming that benefits from state or federal mandates (e.g., special education, reading performance, free/reduced lunch), budgets for gifted education are often at the mercy of school boards and/or administrators' beliefs of the importance of or value in programming for high-achieving learners. In school districts already struggling financially to meet the required mandates, gifted education is often perceived as an expendable or nonessential line item. The belief that "gifted students will be okay" without instruction or programming is a persistent myth (National Association for Gifted Children (NAGC), https://www.nagc.org/myths-about-gifted-students) and can serve as a rationale for budgetary decisions. In contrast, more affluent school districts might prioritize gifted education, thus creating a pervasive gap in opportunities among gifted children across schools based on economic hardship. Those financial challenges have been well documented in rural communities. Thus, we have situated our work in terms of equity by addressing this opportunity gap. In this chapter, we highlight our conception of giftedness and the role of rurality in that definition with the evidence of the ways in which this

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conception has succeeded in broadening the pool of identified gifted learners and in enhancing their learning opportunities. We address how reimagined conceptions of giftedness in rural places can expand thinking related to identification and curricula as opportunities to overcome structural barriers to gifted education.

A Domain-Oriented Definition of Giftedness Based on Rural Place

The development and adoption of new conceptions of giftedness, acceptance of broadened definitions, and the subsequent identification of rural students who exhibit giftedness or potential for giftedness present a set of unique challenges to rural educators. One reason for these challenges comes from the calcified definitions of giftedness in regions that are relatively removed from the discussions of how concepts of and beliefs about giftedness have changed over time. Another challenge stems from concern about the demands gifted education make on the limited resources in school systems that are often demographically characterized by high levels of poverty. And, finally, other challenges are embedded in the general angst about the potential for gifted programs to create an environment in which high-achieving students are encouraged to leave the rural communities where they live. These persistent challenges related to misconceptions, poverty in many rural communities, and structural barriers related to identification and services have resulted in under-representation of gifted students in rural school districts—particularly in high-poverty rural school districts.

In tackling these challenges for rural learners, we first developed a conception of giftedness that reflects a more focused concentration on one talent domain and situated the definition of the talent described relative to the students who live in rural areas. So, for example, we not only looked at the single domain but asked how achievement in that domain might manifest in particular ways for rural leaners. Further, we tied that place-conscious domain to curriculum development to enhance the talents of rural gifted students in that specific domain. Then, for the purposes of our research, we focused exclusively on the domain of language arts (including reading and writing) so we could direct educators' perceptions away from a "generalized genius" definition of giftedness to consideration of capacity in a focused area. Hence, our definition reflects potential or demonstrated capacity in the specific aptitude in processing language and producing products that reflect a high level of competence in expression using language. The second part of our definition tied recognition of capacity to the specific environment of the students. In other words, we asked educators to recognize the characteristics that reflected talent in the language arts domain as they manifest in students who live in rural communities.

This definition capitalizes on the "opportunity to learn" (OTL) construct by recognizing that local contexts and socioeconomic status, among other factors, can influence the "opportunities" students have to learn and demonstrate their talents. As explained in the literature, OTL can serve as a factor influencing test performance or "whether or not . . . students have had the opportunity to study a particular topic or learn how to solve a particular type of problem presented by the test" (Husen, 1967a, pp. 162–163, cited in Burstein, 1993). Husen asserts that if students "have not had such an opportunity, they might in some cases transfer learning from related topics to produce a solution, but certainly their chance of responding correctly to the test item would be reduced" (Husen, 1967a, pp. 162–163, cited in Burstein, 1993). These early descriptions of OTL looked at time for learning as a significant variable; however, broadened conceptions of OTL include experiences students have had that reflect the content of the curriculum, critical thinking, knowledge assessed by standardized assessments, as well as their experiences with quality instruction, quality and scope of materials and resources, and facilities (Elliott & Bartlett, 2016; Lohman, 2013). These experiences (or lack thereof) influence the ways in which students have the opportunity to acquire knowledge and skills and *express* ability. As Lohman (2013) noted, "Clearly, the intellectual abilities of students who live in poverty, who have irregular or poor schooling, and who have less experience with the language of instruction (or testing) are often underestimated when their behavior is compared with that of other children who are the same age or in the same grade" (p. 119).

The range of these opportunities to learn produces "gaps" for rural students. The lack of gifted education programming is one such gap in the United States and other countries in which education opportunities are not equal. Often attributed to geographic isolation, lack of resources, low rates of school funding, and limited access to out-of-school educational resources (Callahan & Azano, 2019; Mattingly & Schaefer, 2015; Richards & Stambaugh, 2015), these opportunity and achievement gaps are more pronounced for rural students than for their non-rural peers. For one, rural districts struggle to staff schools with qualified teachers, and for the rural teachers who are working, they have less access to professional resources, with only 27% having access to professional development in their schools compared to 40% in cities and suburbs (e.g., Jarzabkowski, 2003; Stambaugh & Wood, 2015). Stambaugh and

Wood (2015) also indicate that, in the United States, rural schools are more likely to be staffed by first-year teachers or teachers teaching outside their subject area. Difficulty in accessing resources due to geographic isolation and underfunding (Brown, 2006; O'Callahan, 2015), along with professional isolation (Fry & Anderson, 2011), further complicate teachers' capacity to provide high-level opportunities for students in rural schools.

Acknowledging that these structural barriers (i.e., staffing) present pervasive challenges, we look at how place and local contexts also inform rural students' opportunities to learn. Rural communities are often described in terms of deficits—what they are lacking, especially in terms of schooling. As we have described here, those challenges do exist and can present further impediments to providing resources for high-potential students. However, a shift toward place and the ways in which rural communities provide other types of learning can engender a broader and more contextually relevant way for thinking about the gifts rural students have and the gifts that might be missed by more traditional concepts of academic performance or school-based accolades.

The Advantages of a Domain-Specific Definition Incorporating Place

Many definitions of giftedness include references to specific academic talent domains either directly (e.g., the definition adopted by the federal government ((20 U.S.Code sec. 7801(22)); Renzulli's 3-ring definition of giftedness (Renzulli, 1978; Renzulli & Delcourt, 2018; Subotnik, Olszewski-Kubilius, & Worrell, 2011) or indirectly (NAGC, 2010). This was our starting place; however, we wanted to further explore how place further contextualizes a domain-specific definition. The importance of focusing our definition on just one area of academic talent for our project was born in a theoretical agreement that giftedness may be focused in some individuals in just one domain of performance. In the particular case we present, the targeted academic discipline was language arts; however, parallel definitions could focus on mathematics, the social sciences, science, or foreign languages. Second, we committed to a conceptual notion that modifications in the curriculum for gifted students should match the area of talent exhibited by the student. Finally, we wanted to acknowledge those aforementioned structural challenges in rural schools. As such and without strong models of gifted programming in rural schools and often with educators holding narrow conceptions of giftedness, we wanted to be proactive in terms of helping educators resist convictions that giftedness is a unitary trait that can only be reflected in high scores on measures of general intellectual ability. Finally, we utilized philosophical tenets of place-based learning by valuing students' local community as an important resource for learning. This led us to focus definitions, identification processes, and curricular modifications on addressing these entities as rooted in what is local—the unique history, environment, culture, economy, literature, and art of a particular place—in this case the rural community.

This theoretical framing allowed us to question if and how gifts differ from place to place. How might contexts shape not only the value of giftedness, but the ways in which students express those gifts? In the same ways the field might think of a curriculum as being culturally responsive to its students, we wondered how the conception of giftedness can and should be reflective of the place in which it is situated.

Identification of Gifted Students Using a Domain-Centered and Place-Oriented Definition

Our process for identification necessarily recognizes the limited financial and personnel resources in high-poverty rural schools. Due to inequitable funding structures (i.e., based on property values) and competing budgetary priorities, many rural school districts tend to allocate a smaller proportion of their budget (generally well below 1%) and corresponding services to gifted education (Kettler, Russell, & Puryear, 2015; Puryear, & Kettler, 2017). This often results in administrators overseeing gifted programs as only one of many duties across a wide range of educational programming. For example, in our work, we found that special-education administrators or elementary-school principals also doubled as the gifted-education coordinator for the school district. Additionally, due to a variety of challenges related to staffing shortages and teacher turnover, rural teachers are more likely to be novice teachers without much experience in recognizing giftedness. And, as previously noted, rural teaching staff lack professional-development opportunities (Stambaugh & Wood, 2015). Therefore, we had to be intentional about incorporating a means for increasing accurate and all-embracing strategies for teacher input into the identification process.

In keeping with defensible models for selecting students representing the construct of giftedness proposed, we had to ensure the identification process reflected instruments and decision-making with evidence of validity. In this case, the process was designed to reflect the specific domain of language arts as it could be identified in rural settings and could predict success in high-level curriculum. To accomplish that goal, we returned to Lohman (2013) and applied a modified version of opportunity to learn to aid in the process. First, we discovered that not all participating sites used a universal screening tool. Thus, our process began with universal screening (in our particular project, at the end of second grade) using the Cognitive Abilities Test-Verbal (CogAT-V). Concurrently, teachers were provided rural-focused staff development on recognizing characteristics of giftedness as they might manifest in rural gifted students on the Reading, Motivation, and Creativity subscales of the *Scales for Rating the Behavioral Characteristics of Superior Students* (SRBCSS; Renzulli, Siegle, Reis, Gavin, & Reed, 2009). The professional development with teachers was a critical component of the identification process, especially given the challenges noted above relating to the background knowledge of teachers in rural settings about giftedness and talent development. In addition to working with teachers who had little training and/or experience with gifted education, even rating scales with considerable reliability and validity evidence for the general population or across nations may include items that lead teachers to focus on only a limited interpretation of how the students may exhibit those behaviors, most often considering only behaviors as exhibited in classroom-based and/or teacher-directed activities. The professional development allowed us to engage teachers with conversations about place. For example, problem-solving abilities may manifest in ways a child deals with extraordinary home responsibilities, or advanced verbal ability may be reflected in elaborated versions of local folklore or the ability to code switch from dialect to standard language patterns.

After administering the CogAT-V and having teachers complete the SRBCSS, we calculated students' percentile ratings on the CogAT-V based on both national norms and *local school district norms*. We also calculated SRBCSS percentile rankings for both classroom and school district norms, recognizing that errors reflecting leniency, central tendency, and/or other personal biases might affect a given teacher's evaluations of the students in their classroom. Peters and Gentry (2010) recommend using group-specific local norms "for low income students as a strategy that will locate those students who have demonstrated high achievement (when compared with their peers), but who also often go unnoticed" (p. 140). While the CogAT-V is a general scale, by using local norms in the analysis we were respecting the degree to which students in a "place" would have been exposed to similar constructs. Creation of a separate measure of aptitude with the accompanying need to establish validity and reliability would be cost prohibitive for individual school districts.

Another important consideration was the presentation of data to rural administrators. All test scores and teacher ratings for all three SRCBCSS subscales modified for place by the specific training of the teachers in how the general characteristics would be manifest in the different "places" were entered into an Excel spreadsheet and color-coded to indicate student performance. Patterns of test scores and teacher ratings were highlighted to indicate relatively high performers on various combinations of test scores (e.g., those above 90th percentile on CogAT-V and more than 2 standard deviations above the mean on two or more rating scales on the SRBCSS), along with other combinations to capture what could be nuanced expressions of giftedness (e.g., above the 75th percentile on CogAT-V and more than 2 standard deviations above the mean on three of the rating scales; and additional combinations of scores representing high levels of performance on one or more measures). The focus of the process was on highlighting the profile of each student to identify students potentially qualified to receive gifted services who may be overlooked or "missed" by more traditional methods such as using a cut-off score on a global measure of intelligence or a score on a matrix that combined individual scores into a global score. For example, a student scoring in the 80th percentile on the CogAT but with exceptional SRBCSS scores in creativity, motivation, and reading might represent a gifted student who has had fewer opportunities to learn in ways that a traditional CogAT assessment might capture, but who expresses gifts in ways noticed by teachers. Therefore, this process does not use cut-off scores nor matrices as they are likely to mask the individual characteristics of students and are not psychometrically defensible (Moon, 2018). Rather, personnel in each district responsible for making selection decisions met to review student profiles to consider scores holistically. In the case of our project, school personnel also met with project staff who explained the profiles developed on the Excel spreadsheets. School personnel made final decisions about the students to receive services in their gifted education program based on review of the profiles and the district instructional model and staff resources. In addition to increasing the number of students eligible for gifted education, we found they also facilitated a paradigm shift in the conception of giftedness, allowing school personnel to be more inclusive and open-minded in their selection processes. Results after implementing this process across three cohorts of second-grade students in high-poverty rural schools indicate that the process can greatly expand the numbers of students recognized by school personnel as potentially gifted (see Table 4.1).

The current literature is replete with urgings to implement alternative means to identify gifted and talented students, particularly those from

Table 4.1 Demographic information for identified gifted

	Cohort 1 (N = 43)			Cohort 2 (N = 234			Cohort 3 (N = 259)		
	Place-based model	District		Pace-based model	District		Place-based model	District	
American Indian/Alaskan native	0	0		0	0		2	0	
Asian/Pacific islander	0	1		0	2		2	1	
Black	0	0		12	1		13	6	
Hispanic	0	0		0	1		0	0	
White	14	24		86	90		121	36	
Mixed	0	0		1	1		5	1	
Total	14	25	39	99	95	194	143	44	187

Not all students were identified by district according to race and/or gender

underrepresented populations. Recommendations include the implementation of universal screenings, using alternative assessment tools, calculating local norms, and implementing alternative means of interpreting data in the identification and placement process. We verified that the use of multiple, distinctly different types of instruments (teacher rating scales and standardized cognitive assessments), local norms, and judgments of students' profiles does yield a new pool of students in high-poverty schools, with data confirming that the added students would have, in fact, been missed by preexisting processes in the rural districts. Further, we were able to document teacher ratings and standardized cognitive assessments are moderately correlated, but they are sufficiently independent to warrant the time (teachers') and expense (tests and test scoring) of using multiple measures.

Teaching Gifted and Talented Children Based on Place-Based Specific Academic Aptitude

Lohman (2013) noted that any attempt to identify talent within groups identified by the OTL strategy described above must also be accompanied by a redesign of the services provided to those students. In our project, we did not ask school districts to modify their service-delivery systems, but rather, offered four units of a language arts curriculum differentiated for rural gifted students. The units, based on the evidence-based CLEAR (***C***ontinual Formative Assessment, Clear ***L***earning Goals, Data-Driven Learning ***E***xperiences, ***A***uthentic Products, and ***R***ich Curriculum) Curriculum Model (Callahan, Moon, Oh, Azano, & Hailey, 2015), also included elements of place and local community for each school district. The CLEAR model was developed as a framework for curricular and instructional modifications for gifted students based on the critical components from Tomlinson's Differentiated Instruction Model (2001), Renzulli and Reis' (1985, 2000) Schoolwide Enrichment Model, and Kaplan's Depth and Complexity Model (2005). Four units were offered to identified gifted students—those identified through traditional identification processes by the school district personnel and those identified using the place-based, specific-aptitude identification process. These units were offered during the students' third grade (poetry and folklore) and fourth grade (fiction and research) school years. For further detail on the model and its elements, see Azano, Missett, Tackett, and Callahan (2018).

To understand and appropriately incorporate the concepts of place in each of the participating treatment districts, data were collected by distributing a survey to all teachers in the treatment districts with questions pertaining to the community. Items on the survey focused on identifying major industries (i.e., agriculture, tourism, etc.), well-known local gathering places, folklore, and events with which most students would be familiar, and perceptions as to how connected to or isolated from other geographic areas. In addition, we solicited teacher impressions of community factors that might support and hinder student achievement. Teachers' open-ended responses were used to provide insight into ways in which *rurality* and *place* were conceptualized within the specific school communities where the curriculum was implemented. Survey responses allowed the research team to modify the curriculum with locally relevant examples, literature selections (e.g., poems, short stories), and product requirements that would encourage students to make personal connections to the curriculum through community-specific reflections.

While "place" was a general concept used throughout the language arts units, these place-specific modifications freed teachers from needing to identify such references in the units and also modeled how to develop place-based units for the future. For example, in the poetry unit, all students learned about imagery and concrete versus abstract nouns while studying William Carlos Williams' canonical poem, "The Red Wheelbarrow." Teachers were introduced to place concepts and students were encouraged to think about concrete objects they rely on in their rural community. One student wrote a poem called "The Barn," writing: "So much depends/upon a yellow barn/covered with metal roofing/beside the healthy crops." While this lesson was place-conscious and focused on rural learners, another lesson in the unit suggested one poem for districts near the coast (e.g., "The Sandpiper" by Celia Thaxton) and a different one for districts in a mountainous region (e.g., "The

Mountain House" by Konnie Kabboord). Later in the unit, students are encouraged to write about events, and modifications for that same coastal district included place-specific community events at the beach versus a popular festival and ATV riding trails in the mountains. These examples modeled how teachers can use specific community features to engage students.

These suggestions exemplify important takeaways for incorporating place into a high-level curriculum. The first is to appreciate the diversity of rural places. A "rural curriculum" might include generalizations about rurality or a sense of community or creating space for conversations about rural places. However, more nuanced understandings of place (or to drive at critical pedagogies of place) must be community-driven and not imposed by curriculum developers or investigators. The survey from our work represents a comprehensive effort to drive at these diverse and unique understandings of place in participating school districts. In other contexts, curricular choices would be different. For example, whereas we chose poems about "the hills" (Muckenfuss, 1985) to reflect the foothills of Appalachia and another poem about cows to be culturally responsive to an agricultural region, or poems about the sea (e.g., Mansfield, 1902) in other places would reflect that specific geographical region. While we surveyed all school teaching staff to generate these data for incorporating the concepts of place, we learned that teachers in the rural areas are not always place experts relative to the schools in which they teach. Many teachers may be new to the area or commuting from a remote location. Therefore, community asset mapping and talking to families and community members may provide additional insights into ways for connecting content with context.

Evidence Supporting the Viability of the Place-Based Specific-Aptitude Definition of Giftedness Evidence for the viability and effectiveness of adoption of the place-based, specific aptitude definition of giftedness, the concomitant identification procedures, and curricular interventions has been provided through examination of the outcomes of the intervention with traditionally identified students and students identified by the process detailed herein for the place-based, specific aptitude identification process. Decisions for the inclusion of the place-based, specific aptitude students in instructional groups of gifted students were based on the consideration of students' scores by project staff and school staff (administrators and teachers). These alternatively identified students and those students identified by the school district using more conventional/traditional means (e.g., identified by national norms on intelligence tests, teacher referrals, or scores on state-level assessments) were all participants in randomly assigned treatment and control conditions (assigned at the district level) across service delivery models that included cluster grouping in the general education classroom, heterogeneous classrooms, and pull-out programs. Some groups were taught by gifted-education resource teachers; others were instructed by general-education teachers.

The issues of validity and effectiveness of the identification process were examined by assessing the outcomes of implementing a high-level curriculum designed for advanced learners in the treatment groups with both groups of students in these diverse settings. We asked the fundamental question of whether students who are identified to participate in gifted services through alternative strategies or using alternative assessments benefit from those services at the same level as those identified in a traditional fashion. The gifted students from both groups were assessed on the subscales of the Iowa Tests (Reading, Written Expression, and Vocabulary) as pretests prior to exposure to the language arts units. Students participated in instruction with teachers using the four units over the course of two academic years and then the students were assessed again using the Iowa Assessments as post-tests and completed unit tests on each unit and a writing sample. Messick (1989), in his classic analysis of validity, noted that validity "is an integrated [on-going] evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of *inferences* and actions based on test scores" (p. 13). Across the three different types of assessment (standardized achievement measure, unit tests, and writing samples), we found that in nearly all cases, the performance of students identified through alternative means matched the performance of students identified through traditional means. So, while in the first two Cohorts the two groups varied on pretests (with alternatively identified students performing lower on the Iowa), there were no differences in the posttests across the two groups. This significant finding invalidates claims that alternative assessment leads to the inclusion of students less capable of high levels of achievement. Rather, it supports more inclusivity and less "gate keeping" when it comes to arbitrary cut-off scores or the long-held gold standard of national norms. Additionally, these findings provide evidence that the alternative definition and assessment identify a wider pool of students who benefit equally from exposure to high-level curricular interventions.

Conclusion

There are well-documented, structural deficits related to funding in rural schools, and these limitations may often result in gifted education initiatives falling by the wayside. When we first began our work, we found that some districts had completed the required state minimum requirements of filing an identification plan and program description with the state's educational department. Often, however, those plans detailed a referral process and a differentiated general education classroom only for the historically defined high-achieving learner and/or students defined as high scorers on global measures of intelligence. Working with administrators and teachers provided an opportunity for rural districts to reconsider gifted education and how it is both conceptualized and valued. This dialogue served as a starting point to dispel myths about gifted learners, to consider the various opportunities to learn, and to think critically about how rural places provide rich resources for learners.

Many rural communities face real economic challenges and in no way do we mean here to offer these strategies as quick fixes. However, we found that with encouragement, rural districts were willing and able to identify and provide for students with high potential. The universal screening tool used in this work would be a financial expense; however, we argue that any universal screening available is more equitable than a referral only process. Consider how *all* children might be equally assessed in ways that provide multiple and meaningful opportunities for them to demonstrate their talents in a place-specific domain. Finally, we hope these descriptions further explore how the use of context can bring even great meaning to content.

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5

Where Does Creativity Come from? What Is Creativity? Where Is Creativity Going in Giftedness?

Dowon Choi and James C. Kaufman

Where Does Creativity Come from in Giftedness?

A single word may have many different conceptions, depending on cultural, linguistic, and temporal backgrounds. For example, consider the word *gypsy.* For the last 500 years, it has been used as a term to refer to Romani people. It has acquired other informal meanings that include being a free spirit, a frequent traveler, and an unlicensed worker (O'Conner & Kellerman, 2009). In part, because of these additional meanings, the word has increasingly been considered to be a slur that is offensive to the Romani. Although once commonplace, the usage of *gypsy* is becoming taboo. More and more, people are realizing that saying this word is no longer appropriate. It is similar to how virtually no one would use the words *idiot*, *imbecile*, or *moron* to describe a person with intellectual disability due to the negative connotation of the words.

Giftedness also has a historical and linguistic foundation. In Western society, it has a long history notating individual differences (Ziegler, Balestrini, & Stoeger, 2017). Early scholars in the field of giftedness wanted to identify which children were lucky enough to be endowed with certain gifts or static superior traits (Dai, 2017; Terman, 1922). This type of identification process

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was designed to answer the question: "Who is gifted and who is not?" In the process, it has led to some educational problems with inequity and labels.

To address these issues, Borland (2009) suggested the "Anti-gifted model" by arguing that giftedness is a socially constructed concept, which should be distinguished from physical features, such as blue eyes and red hair. S. B. Kaufman (2013) wonders in his book *Ungifted* if his childhood obstacles could have been a result of educators and gatekeepers who had fixed beliefs that giftedness was only found in students with high IQs.

Conceptions of giftedness have also evolved to reflect more cultural awareness and more recent studies of giftedness. Our view of giftedness is future-oriented, so a list of how-to-dos and what-to-dos depends on ongoing research. Therefore, it seems meaningful to review contemporary frameworks of giftedness. We will do so using a 3-D approach, namely, the themes of developmental trajectory, domain specificity, and diverse perspectives.

Three Ds

Developmental Giftedness

As indicated by the common expression of "gifted and talented" education in the United States, most scholars of giftedness embrace the idea of a developmental trajectory throughout the life-span (e.g., Tannenbaum, 2009). This concept is consistent with traditional Eastern/Asian conceptions of giftedness (Phillipson, 2013) and ecological European perspectives (Ziegler, 2005; Ziegler et al., 2017).

Treffinger (1998) urged the field to move from *gifted education* to *talent development* with a Levels of Services (LoS) model, which is similar to the popular special-educational model of Response to Intervention (RTI). Their similarity lies in offering appropriate educational services based on a student's response (e.g., interest, motivation, and mastery) to those services. This developmental model avoids putting too much effort into identification processes that may not be accurate, efficient, or fair.

Gagné's (2004) Differentiated Model of Giftedness and Talents explicitly distinguishes the concepts of *gifts* as high levels of inborn abilities, and *talents* as acquired skills/mastery. This model integrated high potential (nature) and the developmental and contextual process (nurture) to result in high performance. In other words, an individual with high intelligence should also obtain appropriate training and educational opportunities to fulfill their gifts. This trajectory view is supported by the comprehensive mega model of talent development (Subotnik, Olszewski-Kubilius, & Worrell, 2011). The mega model integrates the internal and external factors that comprise giftedness on the developmental spectrum (i.e., from potential to achievement to eminence). This model was influenced by Tannenbaum's (2009) Star model, which includes a chance factor and discusses the developmental dynamics between one's ability and environmental support.

Domain-Specific Giftedness

The above developmental and performance/product-based views on giftedness can flow naturally into domain-specific giftedness since an individual rarely becomes an expert in multiple disciplines. It is quite rare for someone to achieve a high level of prowess in disparate domains (J. C. Kaufman, Beghetto, Baer, & Ivcevic, 2010). Even within the same discipline, expertise may not transfer. A person who is a world-renowned rock drummer is unlikely to also be equally accomplished as a concert pianist (Baer & Kaufman, 2017).

However, certain domains are often emphasized over others. One internationally famous domain-specific project is the longitudinal Study of Mathematically Precocious Youth (Stanley, 1996). This emphasis on mathematical and scientific giftedness is not only present in the United States (Gray, 2014) but also in many Asian countries (such as China and Japan), which see a link between such abilities and national economic gains (Chan, 2017). In South Korea, for example, 90% of gifted students are specifically chosen for their STEM abilities (Cho & Suh, 2016). Although such giftedness is absolutely important, we must also consider how additional areas may be equally emphasized. How many marginalized underachieving gifted learners are still undiscovered due to a systemic failure to recognize them?

Diverse (Inclusive) Giftedness

The essence of underachievement in giftedness is the discrepancy between learners' potential and their performance (Siegle, 2013). These populations often do not fit into the general educational systems due to reasons such as their cultural, linguistic, or neurocognitive individuality (see Davis, Rimm, & Siegle, 2011).

Reis (1998) and Kerr and Gahm (2017) have studied how to guide gifted females to develop their potential. In a longitudinal study about the mathematically gifted, gender differences in preferred academic domains and career-choice indicators were found (Lubinski & Benbow, 2006), although it is unclear how much of this result came from biological, social influences, or both. However, considering that there are only 53 females out of the 919 total Nobel Laureates (Nobel Media AB, n.d.), underachievement in females still seems real. Reis (this volume) emphasizes that for gifted females to be successful and productive, they should be sure to incorporate their personal interests and pursue meaningful work. Gifted students with a disability, often called *twice-exceptional learners* (Reis, Baum, & Burke, 2014), have been embraced in the gifted field (S. B. Kaufman, 2018). Common challenges include neurodevelopmental issues, such as attention-deficit/hyperactivity disorder (e.g., Gomez, Stavropoulos, Vance, & Griffiths, 2019), specific learning disorders (e.g., Berninger & Abbott, 2013; Ottone-Cross et al., 2017), autism spectrum disorder (e.g., Assouline, Foley-Nicpon, & Dockery, 2012; Neihart, 2004), as well as social-emotional issues (e.g., Daniels & Piechowski, 2009; Vuyk, Krieshok, & Kerr, 2016).

Under the umbrella of diverse giftedness, *creative giftedness* emerged to highlight those who are not necessarily academically gifted but creatively productive and bright (Renzulli, 2005). Indeed, Holland (1967), a pioneer of career-personality codes, noted the low correlation between creative accomplishment and academic achievement during his work at the American College Testing Program.

We will next briefly highlight some models of giftedness that include creativity and then models of creativity that can be applied to giftedness.

What Is Creativity in Giftedness?

Creativity plays a role in many giftedness models. For example, Renzulli (1978) included creativity as a major component in his Three-ring Conception of Giftedness, alongside above-average ability and task commitment. His model opened up gifted resources to a wider range of students (Delisle, Reis, & Gubbins, 1981) and has been developed into a schoolwide system (Reis & Renzulli, 1997, 2014). The Student Product Assessment Form was developed to evaluate the creative products of gifted students (Reis & Renzulli, 1991).

Sternberg's (2005, 2009) WICS model posits that gifted individuals synthesize wisdom, intelligence, and creativity. This model builds on his concept of successful intelligence, which is the ability to achieve one's life goal by adapting to, manipulating, and choosing one's context, maximizing one's strengths and compensating for weaknesses (Sternberg, 1996). Even if a person displays high levels of intelligence and creativity, those alone are not sufficient to be gifted in the WICS model. The wisdom component, therefore, emphasizes ethical values over extreme individualism, which can be easily linked to leadership in society (Sternberg, 2008). Creativity, in this model, is a decision or attitude to implement original ideas in an uncertain environment. The Rainbow Assessment was developed to measure creativity and practical skills in addition to traditionally measured analytical skills. This combination better predicted freshman college grades than did the SAT; it also demonstrated reduced ethnic differences (Sternberg & The Rainbow Project Collaborators, 2006).

Unfortunately, there is a gap between creativity's importance in theory and its applied role. Although nearly all (99.8%) elementary school gifted program coordinators across the United States reported that their district's definition of giftedness included intellectual abilities, only 56% had creative/divergent thinking as a component (Callahan, Moon, & Oh, 2013). This gap is troubling, especially given the many ways that creativity models can be applied to giftedness. We will discuss a few below.

Creativity Theories Applied to Giftedness

Creativity is traditionally defined by two main elements: (1) originality/newness/novelty and (2) usefulness/appropriateness in the context (J. C. Kaufman & Glăveanu, 2019). Creativity has most commonly been categorized into the Four Ps: the *person, process, press* (i.e., environment), and *product* (Rhodes, 1961). The creative person engages in the creative process, ideally in a supportive press, which can result in a creative product. This individual-based approach was refined by Glăveanu (2013) into the Five As: the *actor, action, affordances, audience,* and *artifact.* The key difference is that the general term of "press" is broken down into two separate concepts: the audience, which constitutes both the people who will eventually appreciate the work and those who guide the creator; and the affordances, which are the material and social resources that can be utilized. The Five As interact together and emphasize the sociocultural aspects of creativity. A gifted creator needs to be given some level of support by affordances and an audience.

The Four C model (Beghetto & Kaufman, 2007; J. C. Kaufman & Beghetto, 2009) proposes a developmental trajectory across four stages. At the mini-c level, creativity is personally new and meaningful; it includes potential and creative insights that can come as part of the learning process. Little-c is everyday creativity, which is the type of work that can be enjoyed by others (such as someone making YouTube videos as a hobby). Pro-c is expert-level creativity (such as an accomplished pianist), and Big-C is the level of historically long-lasting creative geniuses (such as Marie Curie or Louis Armstrong). This model helps articulate the pathway that a gifted student can become a creatively accomplished adult. Further, the Four Cs stress that Big-C is not a good comparison point. Aspiring gifted writers should not be using John Steinbeck or Toni Morrison as a metric of what it takes to be creative; they should not particularly compare themselves to the Pro-c level of current, published authors. Teachers ideally should recognize and value mini-c and little-c contributions and see them as part of a pathway toward creative excellence (Beghetto, Kaufman, & Baer, 2014).

There are several theories that examine the confluence of variables that are needed for creativity. Sternberg and Lubart (1991) liken creativity to financial investing, in which a productive creator will buy low and sell high in the marketplace of ideas. Required components for the process include relevant cognitive abilities, knowledge, thinking styles, personality, motivation, and a supportive environment. Sternberg (2018) expanded the idea of defying the crowd to also encompass defying one's self and the Zeitgeist. Amabile (1983) highlights the importance of creativity-relevant skills (such as being able to tolerate ambiguity), domain-specific skills (such as an architect having high visual-spatial abilities and a knowledge of classical buildings), and intrinsic motivation. Csikszentmihalyi (1988) looked at how the creator interacts with the field (such as the gatekeepers who determine what is published, funded, or produced) and the domain (the standards of a particular area, such as what are considered creative and successful music compositions). Generally, these same ingredients for being creative are equally important for creative giftedness.

The recent CASE model (J. C. Kaufman & Glăveanu, 2020) explicitly highlights unrecognized but worthwhile creative expressions that may fall under the radar. It categorizes such hidden creativity based on what is still needed to be recognized by a general audience: *capital, awareness, spark,* and *exceptionality. Capital* includes having the relevant knowledge, power, and status to bring creative work to light. Many creative ideas may not be recognized as such because they are missing relevant jargon or are outside of the current domain. *Awareness* includes being aware that one is being creative (both at a specific time and as part of one's ongoing routine). Many people may be creative but simply not realize or recognize that. *Spark* is being the one who initiates a creative idea. It is easy not to recognize people who continue creative work or build on other's creations. Finally, *exceptionality* includes interactive outcomes between unusually elegant creative expressions and audiences' appreciation. Many creators may regularly produce solid but unspectacular work that may be underappreciated. Just as incorporating creativity into giftedness helps recognize students who might otherwise be overlooked, the CASE model aims to highlight creative people who might traditionally be missed.

We next build off of past theories and research to suggest some new directions for creativity's role in giftedness.

New Directions for Creativity and Giftedness

Creativity for All

The notion of "creativity for all" can be potentially troublesome. It is reminiscent of a scene in *The Incredibles*, when Elastigirl tells her son, Dash, that everyone is special. He responds by saying that if everyone is special, then no one is. It is a concept later revisited by the villain, Syndrome. If we are too inclusive about what "counts" as being creative, does that negate actual gifted creative contributions? It is here that the many approaches come in handy. Considering creativity across different domains, levels, and interactions on specific individual difference variables (such as personality) allow us to add an enriched meaning for the idea of "creativity for all." It may, for example, not involve shifting paradigms or introducing a new framework but rather, integrating them. Indeed, psychology has a long history of Euro-centered perspectives, regardless of many psychologists' efforts to understand humanity as a whole (Sue & Sue, 2016). Gifted education is also not free from Western bias; despite culturally different conceptions of giftedness, many Asian countries' efforts to modernize their gifted education is based on traditional Western perspectives (Ziegler et al., 2017). Additionally, a systematic examination of giftedness studies in PsycINFO indicated that 84% were conducted in America, Europe, or Australia, thus lacking cross-culturally diverse representation (Stoeger, Balestrini, & Ziegler, 2017). By recognizing creativity and going beyond the traditional IQ-based ways of defining giftedness, we can possibly increase diversity in gifted education (Luria, O'Brien, & Kaufman, 2016).

Multiculturalism: Tailored Instruction and Assessment with Advanced Technology

That said, respecting diversity or multiculturalism is not free of charge; it has costs. Imagine a classroom filled with students speaking Chinese, English, and Spanish. The teacher would want to differentiate curriculum and instruction for students with various backgrounds, which would also include such variables as academic readiness or interests (Tomlinson & Strickland, 2005). However, differentiated instruction is incredibly challenging to be implemented, in part due to a lack of resources to support classroom teachers (Carolan & Guinn, 2007; Delisle, 2015). Now visualize this same classroom with 20 elementary students in a reading class. Having each student exploring divergent and creative answers instead of landing by rote on the convergent answer in the answer key becomes a luxury that requires much additional time and energy. Similarly, IQ tests are easy to administer because their items have one correct answer, but creativity assessments rarely have one correct answer. One problem with convergent answer-based tests is a language/cultural bias (Flanagan, Ortiz, & Alfonso, 2013).

However, more advanced technology can help reduce the cost of identifying and fostering diverse creativity (J. C. Kaufman, 2015). For example, latent semantic analysis can automatically measure how original responses are compared to the other responses to a question (Forster, 2008). One study found that linguistic programs that use text analysis can predict human ratings of creative writing (Zedelius, Mills, & Schooler, 2019). Some video games have been designed to subtly measure creativity components (Shute, Wang, Greiff, Zhao, & Moore, 2016) and develop each gamer's problem-solving (Ke, Shute, Clark, & Erlebacher, 2019) during adaptive gameplay. However, such advances are largely at the research level; ideally, they can be used widely as efficient and diagnostic creativity assessments for the classroom. Implementing more assessments that can measure and nurture mini-c or little-c creativity can help expand notions of creativity beyond Big-C or genius.

Superman (Big-C) and Pokémon (mini-c)

In the world of comics, Superman is a singular hero who saves the world from villains with his superpowers (comparable to Big-C). The Pokémon universe, on the other hand, is filled with hundreds of unique characters who adventure in relatively repetitive episodes (comparable to mini-c). Their stories are not as grand as Superman's spectacular adventures, nor are their abilities as awe-inspiring, yet they nonetheless work together to defeat the various villains. Each Pokémon has unique strengths and weaknesses. Their success does not lie in one Pokémon's individual heroic power, but rather collaboration. As they use their unique skills, whether through real-world fights or training, they level up, evolve, and become more resilient. Both the Superman and Pokémon comics are incredibly popular; personal preferences may vary, but each has enormous audiences. Similarly, just as the creative contributions from a few Big-C creators are essential to sustain a healthy global community, so too are the work of the multitudes of little-c or mini-c creators.

Cesare Lombroso's (1895) argument that "the appearance of a single great genius is more than equivalent to the birth of a hundred mediocrities" (p. 120) continues to have proponents (Simonton, 1994). However, quantity also matters in world history (Carr, 1964), and great quality can emerge from the presence of high quantity. For example, Anne Frank (2003) was inspired to begin her diary for publication after listening to a radio broadcast that spoke of the need for everyday citizens to document their lives and experiences. Years later, it was her diary that spoke to so many people and gave a face to the victims of the Holocaust. Simon Wiesenthal tracked down the Nazi who arrested Frank in part to prove to a young Holocaust denier that the young diarist actually lived and, thus, the Holocaust actually happened (Wiesenthal & Wechsberg, 1967).

Frank's talents as a writer are undeniable, but the girl who started writing her diary was a mini-c beginner. She developed into little-c while in hiding; the tragedy of her early death at the hands of the Nazis robbed the world of her Pro-c and Big-C literary works. However, she has become Big-C for her insights and documented composure and optimism in terrible times. A mini-c diarist who did not necessarily have particular literary gifts was Samuel Pepys (2003); his compulsively detailed diaries of his everyday life has become one of the best resources for historians studying the English restoration. Multitudes of mini-c creativity have the potential to be very impactful if given the opportunity to reach an audience.

Creativity and Connection

It has become easier for mini-c creators to reach large audiences in today's world. People are able to connect with each other more now than ever before. Social media (such as YouTube, Reddit, and TikTok) allows the creative work of those "hundred mediocrities" to potentially reach millions. Lombroso's claims (1895) may be less relevant to the modern world.

As we write this chapter the coronavirus is an active pandemic with the eventual implications unknown. People around the world must cope with a tremendously ambiguous situation, worries about their health, and anxiety about how everything may change when it is resolved. Just as the ease of travel may have contributed to the virus's spread, so too can the ease of communication enable all types of creativity to help during this time of crisis. A creative scientist may make a Pro-c or Big-C breakthrough and help treat or cure the virus, and such a contribution is, of course, vitally important. Yet recognizing this high-level achievement does not need to diminish the millions of mini-c or little-c creators whose contributions are also vital. Across the world, groups, organizations and communities are creating systems and procedures to implement safety guidelines in their unique context (including available resources). Some are using their creativity to make humorous memes or videos of themselves singing that can cheer up people who are homebound. Others are being creative in gathering resources for those in need, or simply to entertain and educate children stuck at home. These efforts are not exclusive to one community; many specific examples of lower-level creativity happen across the world. At the beginning of the pandemic in China, internet users foiled censorship to share a doctor's honest warning in public (Li, 2020). In Italy, residents in an apartment complex played music together in their own balcony to boost morale (Thorpe, 2020). In South Korea, innovative drive-through clinics enabled 15,000 tests in a day, which was adopted by some US communities due to its efficiency (Kuhn, 2020).

The Hoover dam is an example of a Big-C achievement, yet one person cannot claim the creativity. It was a result of a multitude of designers, engineers, and workers collaborating with their mini-c, little-c, and Pro-c creativity (J. C. Kaufman, 2018). Nearly all of the people who demonstrated mini-c and little-c creativity during this project are long forgotten. However, the end product is evidence that their invisible or unmeasurable creative interactions existed and continue to live on.

Beyond Ideologies and Utilitarianism

Public education, including gifted programs, have been historically related to sustaining a nation's wealth and power (Choi, Schoonard, & Kaufman, 2016). Gifted education in the United States was spurred by the USSR's successful launching of the satellite, Sputnik, during the Cold War (Davis et al., 2011). In order to compete in the space race, the gatekeepers realized we needed to help the best and brightest young minds. Of course, concrete creative achievements and educational efficiency (such as maximizing profits with minimized costs) should be valued, but we should also see the importance of the bigger picture. Consider Kozol's (2005) questions:

> What if a child should grow ill and die before she's old enough to make her contribution to the national economy? Will all the money that our government has spent to educate that child have to be regarded as a bad investment? (p. 94)

Our chapter's title was modified from the French painter Paul Gauguin's masterpiece, *Where Do We Come From? What Are We? Where Are We Going?* This educated painter could see "uncivilized" energy as fascinating and aesthetically pleasing. Creativity in giftedness does not merely serve to highlight unrecognized talents, potential, and passions. It can also help level the playing field of success, moving us to find creatively gifted children who might otherwise remain unknown and unidentified. Each specific dot painted by Georges Seurat may not stand out, but together, they form such pointillist masterpieces as *A Sunday Afternoon on the Island of La Grande Jatte.*

Outro

Temporally, our conceptions of giftedness are future-oriented on the basis of expected technological advancement, application, and domestication. Such developments may let us recognize mini-but-with-the-potential-to-grow-to-Big creative giftedness in a community. So Seurat's pointillism can be translated into 4K or 8K ultra-high-definition resolution with so many more dynamic pixels. Geographically, we intentionally include more diverse examples that may help capture multicultural creativity and giftedness beyond Euro-centered perspectives. As we discussed the CASE model, too many Western examples (e.g., expressionism) themselves can be a jargon and limit representation in the gifted field, which can be similar to how most of the DC Comics superheroes live in the United States. What if a Vietnamese girl gives up on her dream of becoming Superman since she doesn't live in the United States?

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6

A School-Based Conception of Giftedness: Clarifying Roles and Responsibilities in the Development of Talent in Our Public Schools

Tracy L. Cross and Jennifer Riedl Cross

In the United States, 90% of the 56.6 million K-12-aged students attend public schools (50.6 million students; National Center for Education Statistics, 2019). According to the National Association for Gifted Children and The Council of State Directors of Programs for the Gifted (NAGC & CSDPG, 2015), each state has its own policies and practices regarding its students with gifts and talents. Among the 42 states responding to the 2014–2015 NAGC & CSDPG survey on gifted education, 76% had a mandate to identify these students or to serve them or both. States have the authority to define giftedness and this identification is done differently in the various states across the country.

> State definitions of gifted and talented encompassed multiple areas, with almost all including intellectually gifted (34) and most including academically gifted (24), performing/visual arts (21), creatively gifted (21), and/or specific academic areas (20). Far fewer state definitions included specific populations of gifted/talented students, such as low SES (9), ESL/ELL (8), culturally or ethnically diverse (8), gifted with a disability (6), or geographically isolated/rural (3). Some states address other factors such as Arkansas including task commitment and high potential. (NAGC & CSDPG, 2015, p. 27)

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The ability to serve an equivocally defined population is further complicated for schools by local control of education. Even within school districts, different definitions may be adopted. Every school district is impacted by state-level requirements for the testing of all students, which encourage them to emphasize some subject areas over others. There has never been a national curriculum that specifies what every student should learn. Efforts in this direction, most recently the Common Core State Standards Initiative, have not been wholeheartedly embraced (Goldstein, 2019). The Common Core Standards were developed in response to state-level requests, but implementation has been challenging, despite support from many educators (McArdle, 2014). Local control remains the order of the day. Informed by state testing requirements and the resources available from their tax bases, local school boards identify valued learning objectives and provide the support required to achieve them. When districts support it, gifted education must fit within these objectives.

Books such as this one, with its numerous varied conceptions, offer insights into the phenomenon of giftedness, but little help to schools that need to settle on a concrete, employable definition. Our purpose in describing a school-based conception of giftedness (SCG; Cross & Coleman, 2005; Cross & Cross, 2020) is to acknowledge the boundaries on the phenomenon that matter in our public schools, which are the seat of talent development for most children. Without clear boundaries, schools may be overwhelmed by the task of supporting the many forms a students' giftedness can take, from athletic to artistic, from quantitative to verbal, from kinesthetic to cognitive, and on and on. Schools cannot be all things to all people. Identifying a community's priorities and maximizing students' talents in those domains can lead to an equitable education wherein all children have the opportunity to maximize their potential.

The current approach of identifying a student's exceptional abilities and proceeding from there, under the assumption that it is the school's responsibility to nurture those "gifts and talents," leaves schools in an unnecessarily ambiguous position. Imagine a meeting of a state's superintendents on the topic of gifted education. How do they come to agreement on their responsibilities to serve students with gifts and talents when there is not even agreement on who those students are? Schools come under attack for their inability to identify all students who have the potential to achieve at exceptional levels, for developing inequitable educational opportunities for those they do identify, for inadequate services to match the students' talents, for advantaging students who are often already advantaged, and for missing the mark in improving educational outcomes in international comparisons. The call to eliminate gifted programs is heard across the country, swelling and receding as educators attempt to appease the critics. New York City is only the most recent and visible hotbed of condemnation of gifted education (Shapiro, 2019).

The freedom that comes with (relative) local control of education is an advantage to communities whose members wish their citizens to be educated within valued parameters, but there are pitfalls, as well. The SCG was originally developed by Cross and Coleman (Coleman, 1985; Coleman & Cross, 2001, 2005; Cross & Coleman, 2005) in an effort to help school administrators, who struggle with the numerous definitions of giftedness and lack of guidance for specific practices (Callahan, Moon, & Oh, 2017; NAGC & CSDPG, 2015). Misidentification of students as gifted or creative, Cross and Coleman (2005) proposed, creates problems in schools that are trying to do what is best for gifted students. The "false connection" (p. 56) between identification and outcomes (e.g., productivity, achievement) can be avoided with a reconceptualization of giftedness. Students identified by a high test score may not perform in advanced coursework, becoming labeled "underachievers." A high performance on a test of creativity may not be associated with creative production in school. These situations can be eliminated by focusing on what schools can do best, rather than on the expectations developed from an identification procedure. With a focus on maximizing all students' potential without the need to identify who is in and who is out, all students will be better served. What is needed, therefore, is a conception of giftedness that can positively affect all students, while at the same time providing a model of talent development that can assist even the most advanced students in developing their abilities.

A School-Based Conception of Giftedness

The definition of giftedness in a school-based conception is similar to other talent development conceptions (e.g., Subotnik, Olszewski-Kubilius, & Worrell, 2011). An important difference is the emphasis on the context of school. The following definition is taken from Coleman and Cross (2005), citing earlier versions that had appeared in previous textbooks from 1985 to 2001.

> Our school-based conception of giftedness (SCG) is intended to encourage clearer communication among educators, administrators, and school boards concerning the role and responsibilities of our schools in developing talent (Cross & Coleman, 2005). The SCG differs from other conceptions by

> proposing a change in the criteria that describes giftedness by accounting for changes in abilities with advancing age in school. The criteria become narrower with increased age, which means that, in the early grades, giftedness would appear more in the areas of general ability or specific skills; but, as the child moves through school, evidence of ability and achievement would manifest within specific areas of study (Coleman, 1985; Coleman & Cross, 2000; Cross & Coleman, 2005). This is a developmental model that has roots in the writings of Feldman (1997), Fliegler (1961), Newland (1976), Renzulli (1977), and Simonton (1997).
>
> In the SCG, preadolescent gifted children have potential or demonstrated high ability in two areas: general cognitive ability and creative ability. Adolescent gifted children have demonstrated ability in abstract thinking, have produced creative works in some worthwhile area, and have demonstrated consistent involvement in activities of either type. (p. 21)

Expanding on this definition, we can say that *giftedness* is the potential or ability to achieve substantially above the level of one's peers in a domain that falls within the purview of one's school. Giftedness in an SCG is developed from an interaction between the student and the school. Potential or ability must be nurtured in primary grades, with evidence of achievement in a school-based domain in later grades. Students who do not move beyond potential to actual performance after being given *sufficient opportunity* to develop in a domain are not considered gifted in the school-based conception. School districts, considering their community values, resources available, and higher-level requirements, such as state-level testing, identify their education priorities. These priorities determine the basic domains for which they will take on the responsibility to develop. Secondary schools also have the responsibility to prepare students for appropriate post-secondary transitions into college or other educational opportunities that yield skills and talents desired and valued by their local communities and the broader society, and in which that student has demonstrated passion for, and commitment to, their own talent development during their school age years. In a P-16 talent development model, particular attention and commitment has to be paid to transitions between traditional school levels (e.g., preschool to primary, elementary to middle school, middle to high school, high school to post-secondary).

If a local school board wishes to focus schools on technical or vocational training or to provide magnet schools in art, music, leadership, or foreign languages, for example, a gifted student would be one who excels in those domains. While locally determined, it is reasonable to expect the chosen domains to meet certain standards. A district that focuses solely on local values may not be adequately preparing its students for adult productivity beyond the district's boundaries. Conversely, it is quite important that the local schools or state departments of education respect the important cultural values of the communities they represent, balancing the cultural mores and values and not merely presuming a one-size-fits-all set of goals for students (Howley, 2009). When describing what defines rural education, Howley opines that "Rural people have connections to working the land, and to a set of concepts about place, kinship and community" (2009, pp. 449–450). Neglecting the value of these connections comes from a negative framing of rural life.

> In this light, when educators anywhere, but particularly in rural schools, insist so strongly that a baccalaureate degree and a middle-class professional destiny is "best" for everyone, they make two serious errors. First, they err about the superiority of "professional" work over other forms of work: Considerable integrity and intelligence necessarily characterizes excellent work of all sorts, including manual work of all sorts, whereas considerable evasion and slavishness remains an option in professional life .... Second, and perhaps more significantly, they act out of hubris in counseling a life course based on such an error. (Howley, 2009, p. 548)

This example of the challenges associated with providing an appropriate education for students in rural communities reflects the need for clarity in the roles and responsibilities all schools have in developing students' talents (Cross & Coleman, 2005).

Mastery of foundational domains, such as language arts or mathematics, is essential to the performance domains for which specialized training prepares its students (e.g., architecture, auto mechanics, engineering, drama, etc.). Students may be advanced of their peers in these foundational domains, as well; the gifted young student learns rapidly in a domain. Key to students' success are the sufficient opportunities that are provided by schools and their own commitment to learning (see Table 6.1). Schools should be preparing students for post-secondary opportunities, making it possible for them to excel when they are able, not only when the school allows it.

Why place such a priority on what schools need, rather than on what students are capable of achieving? The current strategy of identifying students, who then receive services designed to maximize their abilities, has left schools struggling with inconsistencies in philosophy, definition, identification, and services offered. Taking responsibility for maximizing students' potential, without specifying parameters, places the onus on schools to draw out a

Table 6.1 Required contributions from school and student for advanced development

School inputs influencing level of achievement		Student inputs influencing level of achievement	
Input	Examples	Input	Examples
Resources	Well-trained teachers; small class sizes; technology; counselors; laboratories; materials; interesting/relevant curriculum	Academic ability	Intelligence; developed skills (e.g., reading, fundamental mathematics); speed of processing; problem-solving; critical thinking skills
Academic supports	Individualized instruction; pre-K programs; curriculum planned for talent development (i.e., foundational➔performance); English language learners tutoring; remediation; basic academic skills training (e.g., critical thinking)	Interest	Valuing of learning; passion for learning in a domain; identity-based motivation; expectation of an excellent education
Psychosocial support	Psychosocial curriculum; implicit theory development (e.g., growth mindset); cooperative classrooms; mastery instructional goals	Psychosocial skills	Openness to learning; self-regulation; perseverance (but not for boring tasks); interpersonal skills; cooperation; prosocial behavior
Opportunities*	Advanced level courses; performances; acceleration; mentorships; group/individual learning experiences; ability grouping; heterogeneous ability grouping; low risk opportunities to fail	Commitment*	Motivation to learn in a domain; willingness to practice; risk-taking

* Key components

students' giftedness. With a school-based conception of giftedness, the school is required to offer an excellent education in specific domains. To avoid the possibility that schools are inadequate in their decisions about which domains they will emphasize, standards such as the Common Core ensure a high bar.

Students should not be limited in development within any domain that requires academic preparation by their school district's decision to emphasize instruction in locally highly valued domains to the detriment of nationally or globally valued domains. This admonition to encourage high standards is fraught, however, in the case of rural schools naïvely encouraging their best students to aspire to leave their hometowns, in order to prepare for a middle-class professional role, often working for large corporations or institutions (Howley, 2009). Curricular decisions should maintain a respect for local values. When an SCG is implemented correctly, students with exceptional ability will advance through an excellent education, maximizing their potential along the way. This conception centers on the responsibility of both the school and the student to provide inputs (Table 6.1).

Successful adult productivity is the ultimate goal of a school program designed to develop students' talents. The SCG clarifies how this can be achieved. Table 6.2 describes the tenets of the SCG.

All students can benefit when schools adopt an SCG. The tenets in Table 6.2 describe an education that provides opportunities to all its students, with scaffolding to support primary school-aged students' learning and planned acceleration as they mature (Tenets #6 and #7). Identification centers on achievement and interest, relying on ability testing (Tenet #5) only to find high-potential students who do not reflect the modal student in gifted programs (e.g., White or Asian, middle- to upper-socioeconomic status, suburban; Coleman & Cross, 2005; Kaushal & Nepomnyaschy, 2009; Peters, Gentry, Whiting, & McBee, 2019) or in a diagnostic manner, as in the case of twice-exceptional students. Middle- or high-school students with strong ability test scores who lack interest in the schools' chosen curricular emphases and are not motivated to achieve would not be considered *underachievers* (Tenet #4). They would simply not be considered gifted in those domains. The school does not bear the responsibility to extract their potential, when the student is not committed to pursuing that area of development, provided the school has fulfilled its obligation to provide opportunities (Tenet #7), free of impediments (Tenets #8 and #9) and with intentional support for the psychosocial skills students need to persist and be successful (Tenet #11). Students must be willing to apply themselves in the domains offered by the schools (Tenet #10), pursuing increasingly more difficult challenges as they move from the foundations to performance in one or more domains.

The present strategy of identifying giftedness through test scores or multiple criteria, usually including test scores, products, and/or recommendations, leaves out many students who could be successful in advanced work. The goal of gifted programs is to provide services to identified students. The exclusion

Table 6.2 Tenets of the school-based conception of giftedness

#1	Giftedness exists at the intersection of the child and his or her context
#2	Schools are a unique context, charged with the development of specific, societally valued knowledge and skills, and bounded by cultural, environmental, and temporal limitations
#3	In schools, giftedness is conceptualized as a context-limited, age-related phenomenon. In the early grades, children who are gifted show "high general cognitive ability, either through potential (ability), actions (performance), or rapid learning in school-related domains" (Cross & Coleman, 2005, p. 59)
#4	In later grades (i.e., secondary), giftedness is the expression of potential in the form of advanced development in a foundational domain or production of creative works in some societally valued area, with consistent engagement in activities associated with either type. Without such expression, the secondary student should not be considered gifted in school
#5	Assessments should reflect differences in age and context. Ability testing should be used for identifying potential among young and nonmodal students who may not have had opportunities to develop through achievement. Subsequent assessment should be based on achievement
#6	Education should be in the form of planned, progressive acceleration in a domain, as opposed to dispersed forms of enrichment
#7	Schools are responsible for providing opportunities for the development of exceptional talent, offering scaffolding in foundational domains at early ages and increasingly sophisticated challenges in performance domains at secondary school ages
#8	Schools are responsible for ensuring students can readily transition through grade levels as they are able, including to post-secondary education, uninhibited by policy or a lack of appropriate educational resources
#9	Schools are responsible for eliminating systemic impediments to the development of talent in school-related domains. For example, the domains should be presented in an appropriately paced and interesting manner. Students should not be inhibited in the development of their abilities by untrained teachers or gatekeepers who can subvert their pursuits, based on behavior or other non-domain-related assessments
#10	Students are responsible for pursuing domains of interest to them, exhibiting early potential and showing increasing commitment as they move through school. Gifted students are those who perform at a significantly higher level than peers in a school-related domain
#11	Psychosocial skills training should be part of the school's curriculum to foster students' abilities to pursue talent development opportunities

Adapted from Cross, T. L., & Cross, J. R. (2020). An enhanced school-based conception of giftedness. In P. Olszewski-Kubilius & T. L. Cross (Eds.), *Conceptual frameworks for giftedness and talent development*. Waco, TX: Prufrock Academic Press

of those not identified is problematic, even discriminatory, as we see in the systematic overrepresentation of White and Asian students and the underrepresentation of students from other racial backgrounds (Cross, 2013; Ford, 2014; Peters et al., 2019). With an SCG, all students have access to opportunities to develop their abilities. Critical to the success of this approach is an understanding of how students develop in a domain.

Foundational and Performance Domains

A primary purpose of schools is to provide preparation for adult productivity. In choosing or developing curricula for the domains they have identified as priorities, it is critical for schools to maintain an awareness of the connection of basic skills to the ability to thrive in the adult world. In elementary school, students learn the foundations of all academic domains: reading, writing, and counting—the use of symbols. Their grasp of the basics is required to engage in more complex activities within a domain (Cross & Coleman, 2005). Subotnik and colleagues (Olszewski-Kubilius, Subotnik, & Worrell, 2016; Subotnik et al., 2011; Subotnik, Olszewski-Kubilius, & Worrell, 2019) describe the different *trajectories* of development in a domain. Developing from potential to competence in a domain requires enjoyment, engagement, and reinforcement in the early years; the transmission of more specific, sometimes tacit, knowledge about the domain as the student becomes proficient; and a gradual move from external- to self-assessment of abilities with the development of expertise. Each domain has unique start and peak points, with necessary domain-specific knowledge and skills (Feldman, 2020). A carefully crafted curriculum developing a child's abilities and knowledge in a domain from elementary through high school is necessary for the success of an SCG.

Opportunities to develop beyond the curriculum must exist for students to make successful transitions to post-secondary experiences (e.g., college, vocational, etc.). Schools can provide for students to excel by committing to a role of facilitator, coordinator, or advocate when a student's needs fall beyond or outside its resources, working with families when necessary to provide the best opportunities for talent development. For example, a student with exceptional mathematics talent in a school with teachers whose abilities only extend to an intermediate level of Calculus could be offered dual enrollment with a local college, online learning opportunities, or a mentorship with a local engineering firm. Gifted education in such examples is facilitative to the development of each student's talent. Students' potential should not be limited by their schools' resources.

Students will be motivated to pursue development in a domain if they achieve an identity as an expert in that domain (e.g., a writer, an architect, a pilot; Oyserman, 2015). The importance of a wide range of psychosocial skills, including persistence, self-advocacy, and interpersonal acumen, for example, cannot be overestimated. A planned implementation of a school-based psychosocial curriculum (Cross & Cross, 2017) would be an effective complement to academic curricula. Schools will want to consider the resource of school counselors in providing for their students' psychosocial development.

For a school to effectively implement the SCG, its curriculum should be built on a deep understanding of the requirements of development in a domain. Having selected the domains it wishes to develop (e.g., Science, Technology, Engineering, Mathematics [STEM]; the arts; social science, etc.), the components of domain-specific knowledge and skills should become integral to the curriculum. Foundational domains (e.g., reading, comprehension, problem-solving) may be necessary for all performance domains and should, therefore, be part of the elementary curriculum. At the secondary level, students will engage in the performance domains, attaining adult-level expertise as they are able to do so. Schools must be prepared for highly advanced students with authentic options for competition, mentorship, and production. Preparation of students for the transition to post-secondary education or occupation will need to be prioritized. If schools are inadequate in their preparation of students at the foundational domain or in the opportunities to develop in performance domains, students' talent development will be impeded.

The popular Schoolwide Enrichment Model (SEM) promotes the first component of talent development: enjoyment, engagement, and enthusiasm (Renzulli, 2016). Wide appeal of the SEM comes from its emphasis on developing "the 3 Es" (p. 64) among all students. This is an important first step in implementing the SCG—offering foundational opportunities in a domain to all students—but, without a plan for moving beyond this initial stage of talent development, the SEM is of little use for advanced development. Although meta-analysis of the few studies available identified a significant impact of enrichment programs on academic achievement (Kim, 2016), the effect of diverse enjoyable experiences can "short circuit" progress of learning in a talent domain (Cross & Coleman, 2005). Accelerated, domain-targeting high school coursework was a significant contributor to later success in academics (Hertzog & Chung, 2015; Steenbergen-Hu, Makel, & Olszewski-Kubilius, 2016; Wai & Allen, 2019) and occupation (Wai, Lubinski, Benbow, & Steiger, 2010). Interest in a domain also played an important role in intellectually gifted students' later success (Wai, Lubinski, & Benbow, 2005). Coleman and Guo (2013) uncovered the dearth of knowledge that exists regarding students' passion for learning in different domains. The relationship between early passion for learning in a domain and educational opportunities to develop in it should be further explored.

Building interest through enjoyable experiences at the elementary level will allow students to develop foundational skills that underpin later success in more challenging tasks. A curriculum that considers a domain's trajectory fosters the development of expertise, not just interest. Research on the development of expertise in a domain will lead to fundamental knowledge about learning trajectories that can form the basis of learning progressions in curriculum (Gotwals, 2018; Shea & Duncan, 2013). The standards movement encouraged a greater coherence between curriculum and identified desired outcomes, but these have tended to be focused on testing objectives, rather than the longer-term goal of building expertise in a domain (e.g., National Mathematics Advisory Panel, 2008). The knowledge and skills required to build expertise in a domain at each stage—elementary, middle, high school levels—must be known and built into the curriculum for an SCG to be successful. Part of the school's readiness is a curriculum that assumes at its base that it is developing young people to be successful adults in certain talent domains.

How to Recognize a Gifted Student with the SCG

Contemporary conceptions of giftedness rely on the identification of ability through test scores or exceptional production/achievement. Students so identified are channeled into programs that, purportedly, serve to develop their giftedness, while students not identified receive no special educational opportunities. In the SCG, giftedness is identified in more broad, relative terms. All children should have access to opportunities to learn in a foundational domain (e.g., math). Young children who show substantially greater interest than peers in that domain may continue with that subject long enough to develop expertise, even if they do not immediately show greater ability. Those who learn rapidly in a domain should be encouraged to continue in a course of study, as they may need time to enter the "falling in love" period that Bloom (1985) found to be important in the development of eminent talent.

Standardized testing should not necessarily be scrapped. Ability tests may be useful in identifying low-income or racially or ethnically diverse or twice exceptional (2e)—nonmodal—students who do not stand out from their peers. Prior lack of access to resources, such as technology or tutors or easy communication, will likely mean the performance of these nonmodal students on standardized tests does not reflect their actual abilities. In these cases, however, tests of ability may be informative. When tests are used to help educators be more effective with students, rather than as a tool to exclude students from opportunities, they can be of great benefit. This requires a reframing of the purpose of testing. The millions of dollars currently being spent to identify who should *not* receive gifted services can be better spent elsewhere with the adoption of an SCG.

At the secondary level, student achievement at a level far beyond their peers is how one would recognize "giftedness." The acknowledgement of the opportunity/motivation nexus (Subotnik et al., 2011) helps us conceive of giftedness not as an innate ability, but as a confluence of events and student characteristics that provides the opening for exceptional achievement. Formative assessment can be used as a tool to identify those students who are capable of performing at a level far beyond that of their peers. The SCG cannot be effective if limits are placed on how far students can progress because of their age or the school's lack of resources for advanced options. By reconceptualizing gifted education to focus on the development of talent as opposed to the nurturance of identified gifts, schools can redirect the resources required for testing to the resources needed for talent development.

The Importance of Commitment by Students and Schools

Anecdotally, the strongest criticism of the SCG has been reserved for Tenet #4, which specifies that secondary students who do not perform at a gifted level should not be considered gifted in school. This challenge to traditional views of giftedness as something innate to which schools must respond strikes a chord. What if schools decide they need not provide for the student who tested with high ability, but who is not achieving? How can schools be freed of responsibility for getting the most from their underachievers? It is antithetical to a traditional view of schools' roles and students' roles in gifted education. Upon closer examination, however, it is evident the SCG does not give schools license to neglect students with gifted potential. Rather than freeing schools from responsibility for the secondary level underachiever, it puts greater responsibility on them to provide opportunities and resources throughout the student's academic career. Additionally, the SCG emphasizes the student's role in her or his talent development. For the SCG to be effective, the inputs from both schools and students must be present (Table 6.1).

Schools that expend great effort in identifying nonmodal students make a grave mistake when they assume these students will be able to perform at the level of their peers. Early studies of the impact of Head Start, a comprehensive federally funded program that provides medical, educational, and social services to low-income preschoolers, found that positive academic effects disappeared by third grade (Head Start Impact Study, 2014). Later research identified more positive long-term outcomes, such as higher graduation rates (Deming, 2009), but the call to eliminate the program was strong once the public learned that initial academic benefits were not lasting. While we can laud the long-term outcomes, what might have been the effect of a longer intervention? If the low-income students had continued to receive medical, social, and educational supports beyond preschool, their differences from peers would have been ameliorated. Assuming the preschool years intervention would have a continued effect, even as students were left without these supports after preschool, is misguided. In other words, those who assumed the preschool program lifted the students to the same level as their more advantaged peers upon entry to kindergarten ignored the fact that medical, educational, and social services were still a need. Similarly, when schools identify students with gifted potential by casting a wide net, but then leave those identified students to fend for themselves in a gifted program, the likelihood of these students' success is marginal.

Conclusion

The example of Head Start is instructive for schools considering implementing an SCG. A commitment to this conception means a commitment to providing resources, supports, and opportunities to students. The SCG is a long-term developmental approach, providing all children the opportunity to participate early on and requiring schools and students to commit to the development of talent. This commitment includes the development of curriculum for learning trajectories that mirror the trajectories of development of expertise in various domains, with the ultimate goal of producing a well-educated citizenry. The cost savings to schools when identification is not required through expensive testing can be reallocated to instruction. When the goal of schools is to maximize the potential of all students, an SCG is an appropriate conception.

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7

Evolving Complexity Theory (ECT) of Talent Development: A New Vision for Gifted and Talented Education

David Yun Dai

A major problem in the history of conceptualizing giftedness or talent is that of *reification*: we treated giftedness or talent as a thing residing in our brain, like a Japanese origami, only to be uncovered once and for all, be it high IQs or scores on other aptitude tests. Today we still need to wrestle with the question Renzulli (1986) raised decades ago: "Is giftedness an absolute or a relative concept? That is, is a person either gifted or not gifted (the absolute view) or can varying kinds and degrees of gifted behaviors be displayed in certain people, at certain times, and under certain circumstances (the relative view)?" (p. 62).

Consider two hypothetical cases: Jen is a 10-year-old who shows a distinct penchant for mathematics and whose IQ score puts her in the "gifted" range, and Joe is a 16-year-old who does not show academic excellence in school grades but seems "talented" in creative writing. Jen is apparently gifted, but who can say Joe is less "gifted" or is just "talented?" When we take a "relative view" of giftedness and talent, the contexts in which Jen and Joe live and work become important, so do the developmental timing and duration of relevant exposure, and experience relative to their specific talent domains (Dai & Renzulli, 2008). I dubbed this more contextual, dynamic, emergent perspective, "giftedness in the making" (Dai, 2010, p. 196). In essence, giftedness or

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talent, however defined, is treated as an emergent property of a relational developmental system (Overton, 2014).

More formally, I present this system in terms of a three-dimensional framework shown in Fig. 7.1. The vertical axis represents the person-environment interface, the horizontal axis represents a life-span temporal progression, and the diagonal axis represents structural and functional changes of the developing person over time. In essence, talent development in terms of the increasingly differentiated and integrated competence and increasingly purposive personhood (i.e., individuality), represented by the diagonal line, are *contextually and temporally emergent* from the person-environment transactions (vertical line) over time (horizontal line). The intersection of the three dimensions forms a basic *unit of analysis*: person-in-place/time. The person is investigated and understood as a *developing agent* interacting with a specific social-cultural environment at a specific developmental juncture, with a particular timescale of transactions specific to the developmental changes in question (Bronfenbrenner, 1989; Cairns, Elder, & Costello, 1996). When applied to the example discussed above, the unit of analysis should be such that Jen's flair for math or Joe's interest in creative writing should be situated in context and dynamically understood.

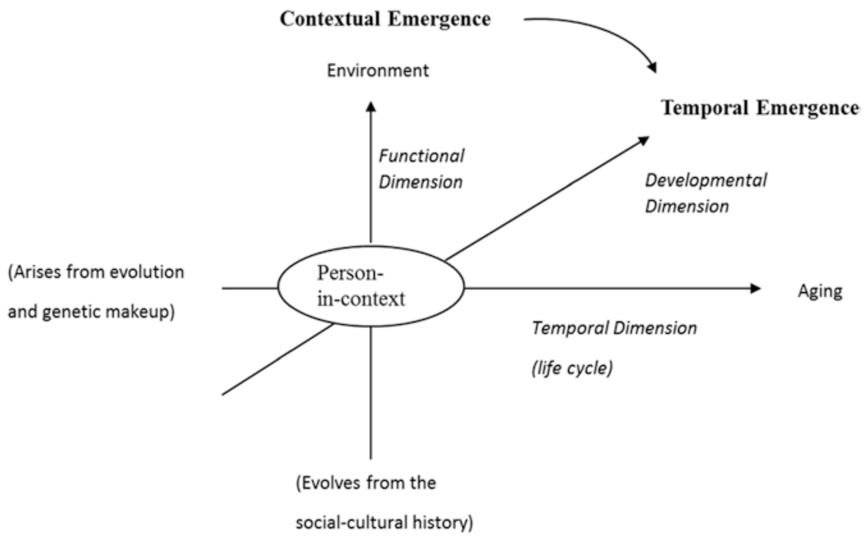

Fig. 7.1 A schematic representation of a dynamic, relational developmental system with three main dimensions: *functional* (the vertical dimension: person-environment transactions), *temporal* (the horizontal dimension: a person's life trajectory toward maturity and aging), and *developmental* (the diagonal dimension: a joint function of the functional and temporal emergence of new properties)

Evolving Complexity Theory (ECT): A Long Argument

Now that the stage is set, how do we characterize this relational developmental system of which giftedness or talent are emergent properties or manifestations? Kenneth Libbrecht (2004), a Caltech physics professor, described how snowflakes take shape: "Growth is the key ingredient for the generation of snow-crystal patterns. . . Even the tiniest protruding points will grow faster than their surroundings and thus protrude even more. Small corners grow into branches; random bumps on the branches grow into sidebranches. *Complexity is born* [italics added]" (p. 25).

The emergence of giftedness or talent is similar to snow-crystal formation, except that it involves *a developing person (a Jen or Joe), who is undergoing changes in oneself in multiple ways at multiple levels while interacting with the environment and exercising its agency* (Dai & Renzulli, 2008; Gottlieb, 1998, 2007). Lewis (2000) viewed the developing person as an open, dynamic, and adaptive living system that shows the following tenets: (a) producing novelty, (b) becoming ever more complex, (c) undergoing phase transitions, and (d) intrinsically robust to maintain its own continuity and extrinsically sensitive and adaptive to the environment. Dynamic system theory provides a foundation for conceptualizing giftedness and talent development as following the same developmental principle of evolving complexity, hence Evolving Complexity Theory (ECT, Dai, 2017).

The Contextual and Developmental Nature of Human Potential

The main assumption of ECT is that a truly developmental theory of talent is by nature organismic and non-reductionist. That is, the self-organization of the person as a whole has novel organizational properties, for example, increasingly differentiated and integrated functions, and increasingly purposive, self-directed behavior, which cannot be reduced to lower-level components (e.g., capacity and genetics). Also, individual developing follows self-organization principles (e.g., maximizing niche potential and seeking cultural distinction) that are not reducible to lower-level operational rules (e.g., self-preservation). The notion of *evolving complexity* reflects this fundamental principle of human development in general, and talent development in particular.

Through this lens, one can define talent development as *a prolonged process of human adaptation resulting in outstanding human accomplishments*. These accomplishments may stretch human limits in terms of extraordinary skilled performance (e.g., in sports, performing arts, and vocational professions), or take the form of creative contributions that significantly improve human conditions (e.g., philosophy, science, technology, literature, and art; cf. Sternberg, 2019). Hence,

Proposition 1 *Talent is a structural and functional property of the person relative to context and time. Talent emerges contextually and temporarily through maturation and adaptive transactions with relevant social-cultural environments. Talent development thus shows ever evolving complexity that cannot be "explained away" by lower-level simpler components that are part of the developmental system in question.*

Talent Potential as Dynamic and Variable

In contrast to the reductionistic bifurcation of nature and nurture as two separate forces contributing additively to human development, ECT views human potential as coming neither from nature nor from nurture alone. In this sense, human potential is not a *genetic constant* determined at birth or even conception, only to be "unleashed" to some degree depending on environmental opportunities and resources (i.e., a *reaction range* model; see Bouchard, 1997). Rather, human potential is a developmentally changing variable that depends on the nature of person-environment transactions, as well as the timing and duration of these transactions. Hence,

Proposition 2 *A person's talent potential is not a fixed capacity but depends on the person's environmental opportunities, resources, and transactional experiences* (i.e., *proximal processes;* Bronfenbrenner & Ceci, 1994). *Therefore, talent potential is dynamically evolving through probabilistic epigenesis* (Gottlieb, 1998) *and contingent on extended learning (formal or informal) and productive experiences that reciprocate with one's biological system (*e.g., *aptitudes and dispositions) at specific developmental junctures.*

The above proposition sets ECT apart from the pro-nature or "being" argument (Gagné, 2009) that an individual must be "gifted" in order to subsequently be talented. It also distinguishes ECT from the pro-nurture or "doing" argument (Ericsson, Krampe, & Tesch-Romer, 1993; Ericsson, Nandagopal, & Roring, 2007) that natural endowment (except for the predisposition to work hard) is negligible, as the nature-nurture bidirectional influence includes the role of genetics and biologically constitutional properties (Gottlieb, 1998; Horowitz, 2000). According to Propositions 7.1 and 7.2, a theory of talent development needs to address three empirical questions:

A) *What* develops (emergent structural and functional properties, increasing differentiation and integration of these functions, increasing self-directedness), which is addressed in Propositions 7.3 and 7.4.
B) *How* these changes occur at every step of the way (regulatory processes, endogenous or exogenous, that sustain actions, leading to structural and functional changes undergirding the manifest talent), which is addressed by Propositions 7.5 and 7.6.
C) *When* developmental transactions take place, and for how long the transactions must occur to effect a developmental change (see the curved arrow from contextual to temporal emergence in Fig. 7.1), which is addressed by Propositions 7.7 and 7.8.

Theoretical postulations in response to these three empirical questions (What, How, and When/How Long) will be delineated in the following sections, based on the preponderance of research evidence.

Structural and Functional Changes from Bio-ecological Effectivity to Talent

The contextual and temporal emergence of effectivity and talent is the central focus of ECT. ECT postulates five basic forms of bio-ecological effectivity: (1) *psychomotor* (executing and coordinating body movements to accomplish complex goals), (2) *social* (achieving practical goals in social situations through effective communication, negotiation, collaboration, and leadership), (3) *expressive* (expressing feelings and desires through imaginative play and artistic means, such as writing, drawing, acting, singing, dancing), (4) *technical* (making tools, gadgets, and codes to enhance effectiveness and efficiency), and (5) *intellectual* (observing, reasoning, experimenting, modeling, explaining, and theorizing using mathematics and logic, visual-spatial imaging, or literary means). Imagine that, in the hunter-gathering age, these five forms of bio-ecological effectivity were already at play for survival and reproduction (see Ziegler, 2005). In modern times, these basic forms of effectivity are just camouflaged in a variety of cultural and educational activities (e.g., sports, debates, science projects). In this sense, an *effectivity* (e.g., artistic expressiveness) is *biologically primary* (Geary, 1995) and can be demonstrated in informal,

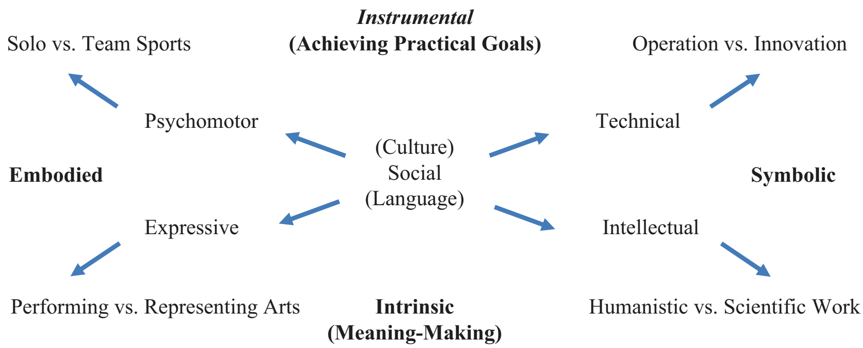

Fig. 7.2 A representation of structural and functional changes in *human effectivity* in five foundational domains, further differentiated (refined) and integrated with learning experiences in various cultural domains

"naturalistic" settings. In contrast, *talent* in the ECT nomenclature refers to high proficiency in culturally created domains or institutionalized social practice, typically involving culturally and semantically rich symbol systems (Csikszentmihalyi & Robinson, 1986). Therefore, talent involves more specialized skills and proficiencies (piano playing) that are *biologically secondary* and culture-dependent.

Figure 7.2 shows how increasing differentiation plays out developmentally. ECT postulates that five forms of effectivity are developed and manifested in early formative years through direct experience (e.g., at home or with peers) as well as significant social-cultural mediation (e.g., schooling). At the center is development of social effectivity, largely facilitated by social interaction and language skills. Thus, the developing person can be seen as socially situated, with a proverbial radarscope (specific sensitivity or proclivity) constantly scanning various environmental opportunities for self-development. In the meantime, specific effectivity also likely draws attentions from adults and enjoys differential cultural distinction, and is harnessed for talent development.

Figure 7.2 shows how bio-ecological effectivity can be culturally selected or harnessed for specialization and domain-specific use. While the development of effectivity is relatively spontaneous, talent development is fundamentally a cultural phenomenon (Csikszentmihalyi & Robinson, 1986) and typically takes place in more formal (sometimes regimented) settings such as school or higher education institutions (see the branching out of personal effectivity to talent domains in Fig. 7.2). Hence,

Proposition 3 *Talent development follows the developmental process of increasing differentiation and integration, from developing bio-ecologically based* *effectivities to a wide range of talent in culturally created domains and institutionalized practices. The differential distribution of aptitudes and dispositions vis-à-vis environmental opportunities and challenges lead to different patterns of effectivity and a variety of talent developmental corridors and trajectories, and consequently a distinct social distribution of talent across a wide range of social-cultural activities.*

Supporting evidence for increasingly differentiated talent trajectories is abundant (e.g., Csikszentmihalyi, Rathunde, & Whalen, 1993; Feist, 1998, 2006; Lubinski & Benbow, 2006). *Increasing differentiation* (Werner, 1967; Feldman, 1994) means that children in formative years should already manifest differential profiles of the five effectivities in an enriched modern social environment (usually the profile is "jagged" or uneven; Rose, 2016). The five broad domains of effectivity are meant to capture a person's strengths and readiness to take on challenges of systematically developing talent in hundreds and thousands of domains that are culturally valued or perceived as beneficial to achieving one's long-term goals. Figure 7.2 shows how different effectivities are further differentiated in the form of specialized talent or domain practice, be it music, mathematics, or engineering. However, as talent in a cultural domain involves more than one effectivity to develop (e.g., being expressive and technical at once in music, or being social, technical, intellectual, and expressive at the same time as a lawyer or political leader), one will witness *increasing integration* of effectivities through self-organization in talent development. An implication of this integration is that two musicians or two lawyers may have their own dominant effectivity in talent composition: A musician may have a strong expressive or technical inclination, and a lawyer may have a distinct intellectual or expressive style, so on and so forth.

The Growth of Individuality from Spontaneity to Purposive Acts

The picture of what effectivity or talent develops is incomplete without a provision of growing importance in self-direction. A skill-based account of effectivity, talent, and expert development is insufficient because talent development is always closely related to personal development, especially one's evolving individuality or selfhood (Edelman, 1995). If bio-ecological effectivities are extrinsically sensitive and adaptive, personal development is intrinsically robust (Lewis, 2000). Hence,

Proposition 4 *Talent development follows the tenet of evolving individuality or personhood as a result of maturation and developmental interaction with the environment, and consequently a changing pattern of forming spontaneous self-organized adaptive responses (*i.e.*, characteristic adaptation), gradually shifting to increasingly purposive, future-oriented endeavor to perfect one's trade and make an impact (*i.e.*, maximal adaptation).*

Self-directedness is a unique feature of human development. The person is not merely the product of natural development, but the producer of one's development in terms of *self-engendered* developmental interaction and experience (Dai & Renzulli, 2008; Feldman, 2003; Lerner, 2004). Thus, ECT postulates three critical developmental transitions from childhood to adolescence, (a) from other-direction to self-direction and self-regulation, (b) from playfulness to purposiveness (Csikszentmihalyi, 1996), and (c) from mastering foundational tools and instruments (effectivities) to making productive use of knowledge and skills (developing talents). These transitions significantly impact the sustainability of talent development.

The evolving individuality of a person has profound implications on how spontaneous self-organized responses (effectivities) lead to systematically developed competence (talents). In addition, talents are culturally created and valued (e.g., art and science), in that they carry a cultural function of enriching the meaningfulness of life, as well as making instrumental changes to improve human conditions. Thus, ECT postulates another bi-polar continuum in human functionality: instrumental (having practical impact) on the one hand and intrinsic (meaning-making) on the other hand (see Fig. 7.2). To be sure, it is conceivable that some talents are not socially condoned (e.g., burglary and computer hacking), but nevertheless systematically developed because they carry the "survive-and-thrive" value for the person involved. As Fig. 7.2 shows, increasing differentiation of competence (effectivities) further branches out talent domains to increase the person's sphere of a reaching power for making a difference (instrumental) or making the world (meaning-making). In other words, talent development becomes increasingly purposive for long-term gains and achievements.

Cognitive, Affective-Conative, and Social Processes Driving Talent Development

While the question of *what develops* (the diagonal axis in Fig. 7.1) helps reveal structural and functional changes over time, the delineation of *how it develops* (the vertical axis) reveals the driving forces, endogenous and exogenous, behind the developmental changes. In the preceding section, I alluded to the self-directed nature of human development. ECT postulates two main self-regulated forces of adaptation as driving talent development: *characteristic* and *maximal* adaptation. Adaptation here is used in the general sense of behavioral and developmental function as achieving a better fit given the present opportunities, challenges, and resources (Fig. 7.3).

As shown in Fig. 7.3, sources of individual differences for the five forms of effectivity may come from biology in terms of aptitudes and dispositions vis-à-vis a respective stimulation or challenge (Lohman, 2005), as well as social-cultural variations in one's upbringings and exposure (Bronfenbrenner & Ceci, 1994). For conceptual clarity, *aptitude* is indicative of capacity or ability to deal with a particular challenge, and *disposition* is indicative of an affective-conative tendency to engage in a relevant task. In comparison, *characteristic adaptation* (CA), originally used in personality psychology (McAdams & Pals, 2006), here refers to characteristic ways in which a person seeks certain developmental opportunities to carve out a distinct niche via dynamical self-organization of effectivities into a talent trajectory. Simply put, CA reflects a niche-picking tendency of the developing person (see the arrow in Fig. 7.3). In contrast, *maximal adaptation* (MA[1]) refers to intensive efforts to perfect one's trade and surpass oneself when one becomes more purposeful and dedicated, which is typically mediated by social-cultural expectations and pedagogical and institutional support (Bereiter & Scardamalia, 1993; Ericsson, 2006; see the backward arrow). At a macro-level, Fig. 7.3 shows different levels of human agency at work in a relational developmental system, which is

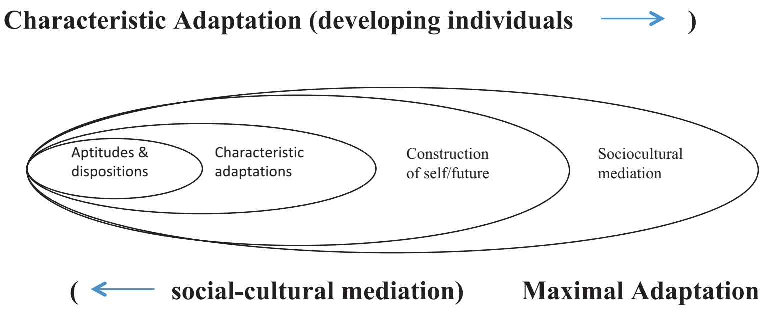

Fig. 7.3 A schematic representation of a nested multi-layered developmental system with two main regulatory forces

[1] Note that the acronyms CA and MA here should be distinguished from the same designations for chronological age (CA) and mental age (MA), as used in the psychometric intelligence literature.

nested, bidirectional, and reciprocating. However, a more micro-level process account is needed to explicate the psychosocial underpinnings of CA and MA. Hence,

Proposition 5 *There are interactive cognitive, affective-conative, and social processes underlying characteristic adaptation (CA) and maximal adaptation (MA), respectively, with CA and MA driving talent development from within (endogenously), and environmental forces that push and sustain talent development from without (exogenously), hence the push-sustain social mechanism.*

For CA, ECT postulates three interactive processes and conditions: (a) the ease of learning or differential learning curves given a task environment, (b) interest and selective affinity, and (c) favorable social conditions (including actual or perceived social comparative advantage, and available opportunities and resources). Although in some situations where children are too young to make a choice (e.g., training in violin or gymnastics at a very young age), CA still reveals itself in these three fit indexes. In comparison, psychosocial conditions that engender and sustain MA reflect a more challenging condition or environmental press (Murray, 1938); they include (a) increasingly challenging task demands (cognitive, sometimes social), (b) stress and affective costs, and (c) institutional expectations. Either way, each has its own push-sustain mechanism (Fig. 7.4).

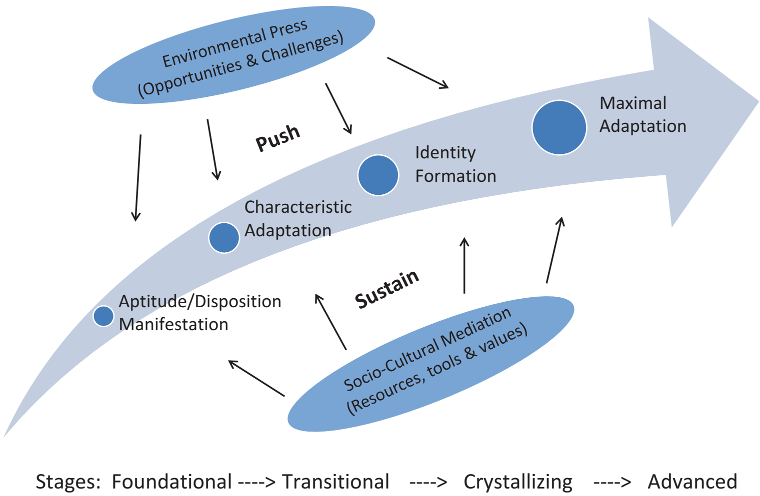

Fig. 7.4 An illustration of how endogenous momentum of talent development is "pushed" and "sustained" by exogenous forces

In terms of developmental consequences, what CA does is to enable the person to explore and expand a *personal action space* (PAS) and carve out a developmental niche, and what MA does is to enable the person to maximize one's contribution and impact.

Developmental Transition from Characteristic to Maximal Adaptation

As shown in Fig. 7.4, at the macro level (with a larger timescale) of individual development, ECT postulates four phases of talent development. To use music for illustration, demonstrating a music-related effectivity (Phase 1, Foundational) is one thing and pursuing a musical interest (Phase 2, Transitional) is another; becoming a musician (Phase 3, Crystallizing) or exploring a new form or personal style of musical expression (Phase 4, Advanced) even goes further beyond. These phases reflect the unfolding of different levels of developmental agency depicted in Fig. 7.3. The game changes, so to speak, as the person moves to later phases of talent development. What is noteworthy in Fig. 7.4 is how CA emerges and how developmental transition is made from CA and MA. The emergence of CA is indicated by a special patterning of strengths, interests, self-concepts, preferences, and actions (e.g., Ackerman, 2013; Lubinski & Benbow, 2006). The transition from CA to MA means not only that one is to become a more committed, self-directed, and serious learner, but also that one will be joining a community of professionals and thoroughly immersed in a domain of practice to fully explore one's individuality (Barron, 2006; Bloom, 1985). Hence,

Proposition 6 *An open, enriched environment conducive to CA and exploration and expansion of a personal action space will facilitate the transition from the Foundational to Transitional Phase, just as milestone events and crystallizing experiences* (Walters & Gardner, 1986) *will facilitate the transition from characteristic adaptation (CA) and maximal adaptation (MA) with purpose and commitment.*

Defined behaviorally, CA can include any niche-picking behaviors, such as taking certain electives, joining a math or history club, becoming a member of an *a cappella* group, or finding kindred spirits. It takes a relatively enriched, open environment (be it home, school, or community) for the child or adolescent to seek out certain experiences and explore a personal action space. In the same vein, without rich experiences of self-explorations and self-directed

Table 7.1 Four phases of talent development (TD) and the nature of tasks, affect-conative development, and social conditions and processes at each phase

Phases of TD	Developmental tasks that sustain TD	The nature of affective-conative development	Social conditions and processes
Advanced phase	Maximal adaptation (MA) Doing cutting-edge work Develop a personal niche	Vision/ perseverance	Institutionalized standards and norms; modus operandi
Crystallizing phase	Making commitment to a line of serious work	Identity/ commitment	Serious participation Mentorship
Transition phase	Characteristic adaptation (CA) Exploration/ expansion of a personal action space	Interest/ self-efficacy Selective affinity	Opportunity structure, Comparative advantage Autonomy support
Foundation phase	Manifestation of aptitudes and dispositions in foundational domains	Agency/will power	Typical/optimal condition Evocative interaction

activities (CA), it is difficult to develop a firm identity and deep commitment to a particular line of work, rendering unlikely the transition to MA (see Table 7.1 for task, affect, and social conditions that sustain talent development in each phase).

The Timing of the Onset and Duration of Talent Development Constrained by Domains and Life Cycle

The cultivation and fulfillment of human potential through talent development is fundamentally constrained by biology and life cycle; cognitive, emotional, and social maturity (or for that matter precocity) likely determines the proper timing of exposures and specific experiences and related payoff. However, based on bi-directional reciprocal interaction of biological maturity and environmental influences (Gottlieb, 1998), precocious development does not always mean rigidly following a biological clock, so to speak, but it can be culturally promoted so that certain aspects of human biology (at neural or genetic levels) are more cultivated than others based on cultural values and priorities. Likewise, long-term development in some domains is more vulnerable to cognitive ageing effects or competition with new comers (often from younger generations). There are distinct domain differences in terms of the timing of peak performance or productivity. Hence,

Proposition 7 *The typical timing of the onset and duration of talent development in cultural domains depend on the nature and complexity of a domain, especially with respect to the development and integration of the five foundational effectivities, which have their own developmental timetables.*

As revealed in Fig. 7.2, human functional complexity comes from two main sources. One source is the extent to which the realities are intuitively accessible through bodily experiences and direct observations; the other is the extent to which mastery entails complex symbolic maneuvering (i.e., *complexity of meaning-making* or understanding the world; Piaget, 1950), or the extent to which practical, instrumental changes one deems desirable involve high levels of technicality, broadly defined (i.e. *complexity of making instrumental changes*). On the embodied end, we should expect psychomotor and expressive effectivities to develop earlier, followed gradually by technical and intellectual effectivities on the symbolic end. However, all these aspects of individual development are mediated socially and, at least initially, for social purposes (Vygotsky, 1978). For example, a child might start to appreciate the rhythm and melody of music at the age of four (learning relying heavily on immediate bodily experiences, a biologically primary process), but sight reading may start at six (picking up symbolic skills, a biologically secondary process). These experiences are socially and culturally supported (i.e., the push-sustain social mechanism; Fig. 7.4). One important clue about the timing of development can be found in precocious talent development, especially the phenomenon of child prodigies (Feldman, 1986). The youngest talents tend to be in sport (psychomotor) and arts (expressive), and slightly older child prodigies also exist in mathematics and chess, suggesting that sheer intellectual power of reasoning and symbol manipulation (e.g., code cracking) can develop independent of social experiences and world knowledge.

It is instructive, therefore, to see many cultural domains in which talent does not emerge until much later. These domains may entail a prolonged accumulation of social experiences (social effectivity), insights, and deep knowledge to reach a high level of evolving complexity of meaning making (e.g., becoming a playwright or lawyer), just as prolonged specialized training and situated practice are essential to reach a high level of evolving complexity of making instrumental changes (e.g., becoming an engineer or master chef).

Complexity varies even within a domain. For instance, a poet only needs to master the expressiveness of language (e.g., various rhetoric devices), but a playwright must deal with characters, dramatic situations, and psychological subtleties way beyond language. This explains why young poets are more common and why playwrights usually take much longer to emerge (Lehman, 1953; see also Simonton, 2018). In the same vein, the spurt of creativity in a hypothetical-deductive manner seems more important in math and physics, wherein peak productivity tends to be achieved quite early, than in biology and sociology, wherein accumulation of facts and insights from bottom up (inductively) seems more important, and more seasoned scholars seem to have a distinct advantage. The complexity of meaning making also helps explain why natural scientists reach their peak creativity earlier than social scientists and scholars of humanities (Feist, 2006).

Timely Opportunities for Optimal Talent Development

While the typical timing and duration of talent development are domain specific, what is optimal for specific individuals may not be the same. What matters is timely *proximal processes* (Bronfenbrenner & Ceci, 1994) that are essential for initiating and sustaining a line of talent development. Hence,

Proposition 8 *The timely exposure to enriched environments that stimulate the development of the five foundational effectivities, the timely offer of deep experiences in talent domains, and the timely transition from CA and MA can escalate the pace of talent development and peak performance or productivity.*

Developmental timing of environmental experiences should follow the temporal order of foundational, transitional, crystallizing, and advanced phases, especially at two critical junctures: niche picking (CA) and exploration/expansion of a personal action space (PAS), and the transition from CA to MA. In this regard, ECT focuses on three time points: (a) timely exposure to enriched environments (Renzulli & Reis, 1997), typically in preschool and early school years for playful engagement of adult-structured activities; (b) timely offer of deep experience (Barron, 2006; Dai, Steenbergen-Hu, & Zhou, 2015), typically during adolescence; and (c) timely transition from CA and MA (Bloom, 1985), which can be accelerated for talented adolescents (Dai & Li, 2020; Dai et al., 2015).

What Distinguishes ECT from Other TD Theories and Models

In sum, ECT is predicated on the assumption of human evolving complexity as demonstrating personal agency at multiple levels, increasing differentiation and integration, and self-directedness and individuality through development (Dai, 2005, 2010, 2017, 2019; Dai & Renzulli, 2008). It postulates three essential features of talent development. First, with regard to what develops, it views human competencies (effectivity and talent) as emergent from person-environment transactional interaction; there is also increasing self-directedness in individual development. Second, in terms of how talent develops, ECT specifies individual niche-picking (characteristic adaptation) and a social-cultural force of stretching one's limits and surpassing oneself (maximal adaptation) as two main driving forces regulating talent development. Third, it stresses the developmental timing and duration as fundamentally constrained by life cycle and the nature of talent domains. The strengths of ECT can be seen when it is contrasted with other models of giftedness or talent development.

The Nature and Nurture of Giftedness and Talent

ECT does not hold a static capacity view of talent and giftedness (e.g., Galton, 1869) nor a purely environmentalist and experiential account of high human accomplishments (e.g., Ericsson et al., 1993, 2007). Rather, ECT views talent development as a process of successfully adapting to environmental opportunities and challenges and carving out a personal niche uniquely fit to realize one's potential to make contributions to certain aspects of human endeavor. This way, ECT transcends the dichotomous argument in favor of either nature or nurture, by specifying when *nature constrains nurture* (e.g., the role of aptitudes and dispositions and consequently characteristic adaptation; Ackerman, 2013), and when *nurture transcends or changes nature* (e.g., how maximal adaptation changes the neural, anatomical, physiological processes; Schlaug, 2001). Viewed dynamically, even the "gifted IQ" is an indicator of intellectual effectivity which, left unused, would decline (Ceci & Williams, 1997). Methodologically, the lifespan scope of ECT enables research to map out both distal factors emphasized by the nature camp (Gagné, 2009) and proximal factors emphasized by the nurture camp (Ericsson, 2006).

The Component Versus Systems Approach

Second, ECT is not a component model of talent in the sense of only identifying contributions of endogenous or exogenous factors without explicating how they work together to effect developmental processes and changes (e.g., Gagné, 2005; Lubinski & Benbow, 2006; Tannenbaum, 1983; see Ziegler & Phillipson, 2012 for a critique). Rather, ECT ascribes to a view of talent development as dynamic self-organization of the personhood at multiple levels (from neural to cognitive and behavioral; from basic approach-avoidance preferences to heightened intentions) through transactional interaction with a given task and social context. Such a view endorses relational causality or ontology (Plucker & Barab, 2005; Gottlieb, 2007; Overton, 2014), rather than isolating the role of many single components functioning independent of each other (see Hilpert & Marchand, 2018 on methodological ramifications).

ECT is not a merely process model of talent, either, if by "process" one refers to a step-by-step account of how a specific competence develops (e.g., Bloom, 1985; Ericsson & Williams, 2007). ECT attempts to map out how one's individuality evolves from early manifestation of effectivity vis-a-vis specific task and social environments all the way to highly developed individuality (a life purpose; Gruber, 1981), while interacting with developmental opportunities and challenges.

Domain-Centered Versus Person-Centered Approaches

Third, ECT was partly inspired by existing theories, such as Renzulli's (1986) three-ring theory, which is in effect a theory of *emergence* whereby task commitment and creative ideation are emergent properties of a person-environment functional relationship. It is also in keeping with Simonton's (1999) emergenic-epigenetic model in terms of stressing the contextual, dynamic, and emergent nature of talent. However, unlike Simonton's (1999) model, ECT provides a more elaborated time-sensitive and context-specific developmental account of talent, such as how a person's niche potential is cultivated by exploring and expanding one's personal action space (PAS), and what kind of push-sustain social mechanism is needed to support talent development. ECT also bears resemblance to Subotnik, Olszewski-Kubilius, and Worrell's (2011) mega-model of talent development, with a distinct focus on domain-specificity and developmental processes, the centrality of psychosocial skills (in ECT, the emphasis on self-directedness and personal development), and an integration of both "being" and "doing" accounts of talent (see also Subotnik, Olszewski-Kubilius, & Worrell, 2019). However, ECT is a more person-centered rather than domain-centered theory in that it conceptualizes talent and talent development in a larger context of interaction of biological and cultural forces in shaping one's individuality. ECT does not treat "domain" as firmly setting the boundary for talent manifestation and development. Rather, what one developmentally constructs out of social-cultural encounters is what ultimately matters as to how one's talent is used, defined, combined, or expanded for productive or performing purposes. Thus, there are many pathways to talent accomplishment, some significantly constrained by cultural conventions and institutional norms, and others breaking the conventions and institutional norms by creating new niches and new forms and types of talent expression in the realm of instrumental changes or meaning-making (Fig. 7.2).

Implications of ECT for Gifted Education

A distinct advantage of ECT (particularly over component models) is its explication of what develops and how and when it develops. These specifications can directly inform policy matters, identification strategies, and interventions, making education practice more theory-driven and proactive.

Policy Implications of ECT

The non-reductionist, contextual, and dynamic view of giftedness and talent means that giftedness or talent is not a unitary entity (a capacity of some sort), sitting there to be discovered; rather, it is only revealed and evolved dynamically through developmental interaction with certain task and social environments (Propositions 1 and 2). This contextual-developmental view stands in sharp contrast to an essentialist view that treats giftedness and talent as a permanent quality that holds its identity, unity, and continuity over the course of life. The contextual-developmental view ECT represents also fully reckons with developmental diversity and emergent individual differences in talent in every step of human development, and thus is inclusive in its scope of service, while providing a broader psychosocial basis for practical purposes.

Identification as Developmental Prognosis, Not a Status Determination

ECT articulates human development as following the path of increasing differentiation and integration, not only in terms of bio-ecological effectivities and culturally defined talents (Proposition 3), but also in terms of self-directedness and increasingly crystallized self-direction and purpose (Proposition 4). Rather than setting a uniform operational definition of what giftedness or talent is and how it should be determined by a fixed set of criteria (i.e., a status definition), the principles of increasing differentiation and integration call for a practice of identification as providing developmental prognosis of what is likely to happen and what are some options given a particular diagnosis of the child's strengths and challenges. For Jen, this developmental prognosis not only generates a profile of effectivities, but also makes proactive recommendations as to, for example, where Jen may need to build strengths (e.g., overcoming shyness) or what talent domains she might explore as they involve pervasive use of the mathematical tool. For Joe, such developmental prognosis may involve a careful analysis of his personal action space (PAS), and how he might take advantage of his writing skills and couple it with a specific genre (e.g., children's literature). In addition, because we know the typical timing of the onset and important milestone events of talent development in specific domains (Proposition 7), purposefully creating opportunities for self-exploration is a way of identifying specific talent strengths. The role of teachers and school counselors (rather than contrived testing) for shepherding this process becomes crucial. For example, creating a talent profile management system in school will help teachers and counselors keep track of a student's progress along a particular talent trajectory or pathway, or weigh options for optimal academic and career development.

Aligning Education with Talent Trajectories and Developmental Changes

A main assumption of ECT is that individuals' characteristic adaptation (CA) can be harnessed to maximize their developmental outcomes. ECT explicitly articulates specific cognitive, affective-conative, and social conditions for the emergence of CA, and for the transition from CA and MA (Propositions 5 and 6). Characteristic adaptation (CA) in terms of patterns of emergent talent, interests, and preferences can be the basis for designing educational provisions (e.g., programs and courses) conducive to particular lines of talent development. A distinct feature of ECT is its provision of education as integral part of human development (with its pedagogical tools and social-cultural support). In this regard, informal learning across home, community, and school can be highly valuable for the emergence of CA and self-sustained learning (Barron, 2006). Although it is difficult for educators to have total control over the timing and duration of relevant proximal processes necessary to advance particular lines of talent development, educators should be more alert to the role of three timely educational experiences (Proposition 8): (a) timely exposure to enriched activities in which children's aptitudes and dispositions vis-à-vis five foundational domains will be manifested, (b) timely exposure to various cultural domains so that children/adolescents will demonstrate their CA, and (c) timely deep experiences in a domain to facilitate transition from CA to MA. For example, ECT postulates that self-engendered talent development (CA), when left to one's own devices, can hit its plateau or bottleneck, unless a more rigorous regiment of learning and training is put in place (MA). This issue is more likely to occur during adolescence and beyond. Conceptualized this way, the challenge of gifted and talented education (e.g., research projects for high school students as practiced in specialized STEM schools) is a timely provision to help adolescents stretch their limits through maximal adaptation to challenges at hand (e.g., a robot competition, a project of urban planning). In this sense, ECT can be a guide for gifted programming every step of the way based on its four-phase framework.

Psychological Counseling and Guidance for Optimal Development

Gifted and talented children and adolescents may have special counseling needs because they arguably have more options, tougher challenges ahead, and more hurdles to overcome in individual development if they are to survive and thrive in their chosen lines of development. Evolving complexity for them implies that by living on the edge of competence (Bereiter & Scardamalia, 1993), developmental instability is more common for them (Dai & Renzulli, 2008). Throughout the four developmental phases, self-development is always crucial (even for young artists and athletes). Counseling can help talented teenagers to clarify their interests and aspirations, encourage them to explore talent domains that match their profiles. According to ECT, a main endogenous barrier for transition from CA to MA is affective in nature: how to find one's developmental niche is a life task that can be stressful. Counseling and guidance have a lot to offer in recognizing talented students' strengths and accomplishments, while helping them cope with stress and envision their life possibilities (Dai et al., 2015). Taken together, ECT can be a highly useful tool of guidance.

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8

What Is Distinctive About Artistically Gifted Children?

Jennifer E. Drake and Ellen Winner

People have often wondered about the nature of giftedness and talent. Is it inborn or the product of hours and hours of hard work? What similarities exist between children gifted in different kinds of domains? What underlying capacities predict giftedness in different areas? Do gifted children go on to become creative geniuses as adults? We begin this chapter by considering these distinctions.

In our view there is no difference between giftedness and talent. These are just two different names for the same thing. In this chapter we simply use the term "gifted" and we focus on giftedness in the visual arts. In thinking about giftedness in the visual art, we start out by ignoring distinctions. That is, we view giftedness in the visual arts as in certain respects no different from giftedness in any other domain, whether mathematics, music, or language. This is

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because gifted children, no matter what their area of gift, are distinguished by three characteristics: precocity, a rage to master, and a march to their own drummer.

By precocity, we mean high domain-specific ability emerging at a very young age, and the ability to make rapid progress in the domain. In the visual arts, precocity typically takes the form of realistic drawing, but not always, as we shall show. Some accounts of giftedness stop here, assuming precocity is all that sets gifted children apart. This kind of assumption is made when we define intellectual giftedness in terms of an IQ cut off. But focusing only on precocity ignores the very critical motivational component, which we refer to by the term "rage to master" (Winner, 1996). Gifted children show an obsessive interest in their area of high ability as they drive themselves to make sense of this area. They willingly (often compulsively) spend hours working on their own in their area of gift. We have studied preschool children who spend full afternoons making drawing after drawing, and parents report that they cannot tear their child away to come sit down for dinner, or to go out and play (Drake & Winner, 2012; Winner, 1996). This same kind of compulsion to draw has also been noted in autistic drawing savants (e.g., Selfe, 1983).

Still, precocity and rage to master do not constitute a full characterization. What must also be captured is that gifted children are not only quantitatively different—faster at reaching milestones—but also qualitatively different. These children don't just learn faster than others; they learn differently. And the most important way in which they seem different is their ability to teach themselves, requiring very little adult scaffolding. Thus they may figure out linear perspective and foreshortening on their own, needing no instruction or even guidance. We call this qualitative difference "marching to their own drummer."

These are all early signs of giftedness. Because of the very early ages at which we can spot children with these three characteristics, it is implausible to think of gifted children as just children who have worked harder than others. The full force of early giftedness makes it clear that there must be an inborn proclivity that sets these children apart.

This tripartite conception of giftedness has several advantages. First, this definition incorporates motivation in addition to cognition. Second, it alerts us to the importance of looking for qualitatively different ways of thinking and problem solving in gifted children rather than just measuring age and speed of acquisition. And finally, this conception appears to us to cut across domains of giftedness. We now move on to probe the kinds of signs that distinguish the artistically gifted child from those gifted in other areas.

Characteristics of Artistically Gifted Children and Their Drawings

Gifted children in the visual arts are easy to spot. Here we describe some of the artistically gifted children we and others have studied to show how the three characteristics we have just described manifest themselves so clearly.

Precocious Realism with No Adult Scaffolding

Typical children's drawings begin to be representational at age three, and these representations are abstractions: for example, an apple may be represented by a slash, a human by a circle with two lines for legs. In contrast, artistically gifted children's drawings are less abstract and more optically realistic. We refer to such children as "precocious realists." These are children who begin to draw representationally by age two—which is at least one year in advance of typical children. Figure 8.1 contrasts a precocious and an age-typical child's attempt at drawing apples, both drawn at age two years, two months.

The age-typical drawing shows a slash for each apple, with line standing for "thingness;" the precocious drawing uses line to capture the contour of the apple. Figure 8.2 contrasts two figure drawings by three-year-olds, one age-typica and one precocious. The typical drawing is called a "tadpole" representation of the human figure, with arms and legs protruding from the head; the precocious drawing differentiates the body into head, torso, and legs, and shows motion (note the attempt to show the woman's leg kicking up).

Precocious realists discover on their own how to create the illusion of three-dimensionality using pictorial depth cues—foreshortening (shortening the

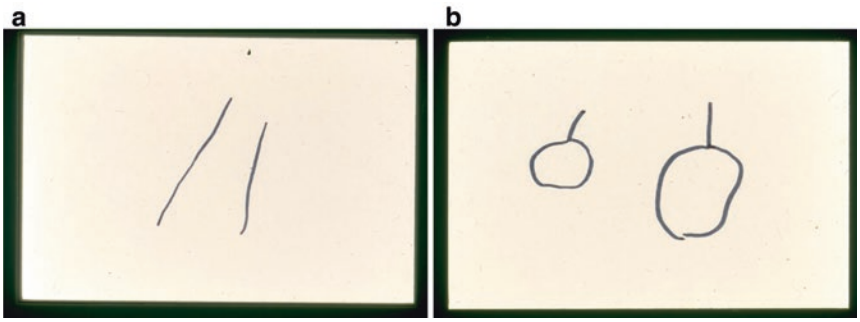

Fig. 8.1 Apples drawn by typical 2-year-old (a) and by a precocious 2-year-old (b). (From the collection of Ellen Winner, 1996)

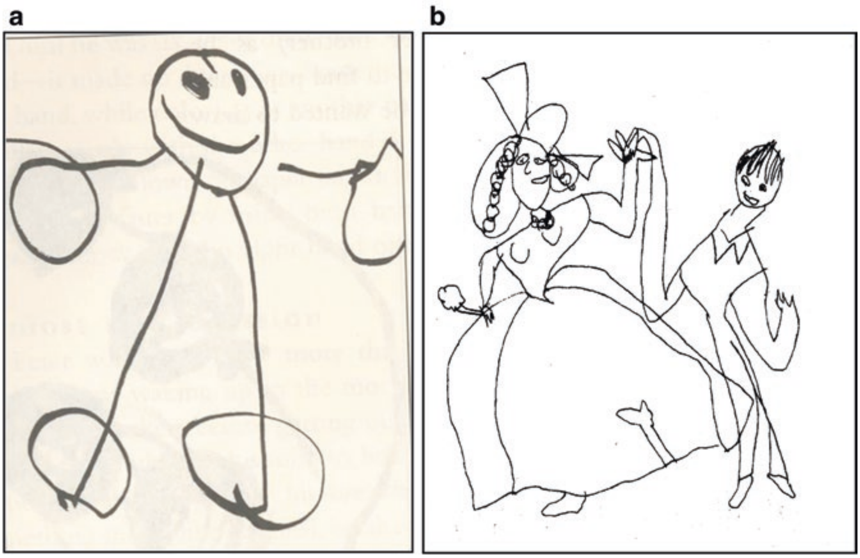

Fig. 8.2 (a) Typical tadpole human by 3-year-old (b) Drawing by a precocious realist at age 3. (Reprinted with permsision by Jennifer Pekrul)

size of an object not parallel to the picture plane—think of how short a finger looks when it is pointed directly at you), occlusion (partially covering one object by another object), size diminution (drawing objects in the background as smaller than objects in the foreground), modeling to show volume, and even the most difficult technique of all, linear perspective (drawing parallel lines as converging as they recede into depth)—and they do so years before typical children (Milbrath, 1995). These children seem to *see* the shapes of things, including the distortions of shapes as they recede into depth and diminish in size as they recede, or as they become foreshortened. For instance, foreshortening was used in 50 percent of the drawings by Milbrath's (1995) precocious sample by age 7 and 8; comparable levels in the typical sample were reached only by ages 13 and 14.

Typically, children in the West do not begin to draw in perspective until middle childhood, and only those who have explicit instruction ever attain true geometric perspective (Willats, 1977). But look at how Eitan, an Israeli child studied by Claire Golomb (1992, 1995), was able to use linear perspective at a very young age (Fig. 8.3a, b, c).

Arkin Rai, a child from Singapore, was able to use occlusion with exquisite realism. At age three, his dinosaurs were simple and schematic but already precocious (Fig. 8.4). A year and some months later, however, he created a complex drawing in which dinosaurs were layered one on top of the other, an

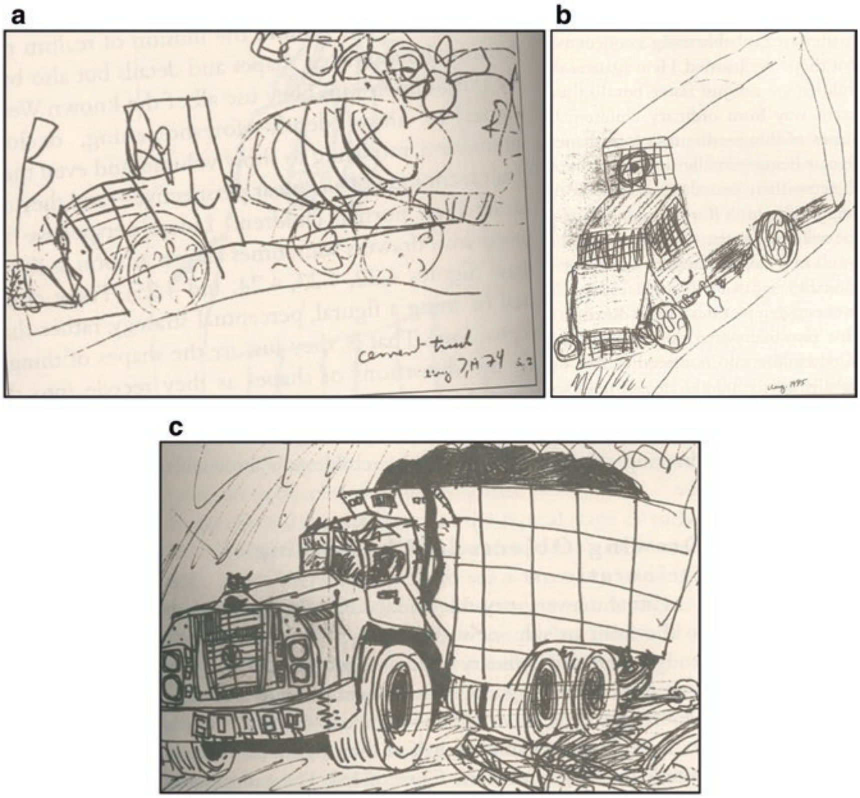

Fig. 8.3 Examples of perspective: All drawings by Eitan from Golomb (1992). (a) Cement truck by Eitan, age 2;7, showing the side view of the truck, the top view of the hood, and a frontal view of grill and bumper. (b) Truck by Eitan, age 3;7, showing isometric perspective, in which the third dimension is represented by parallel oblique lines. (c) Drawing entitled "Near Accident," by Eitan, age 6;6, showing the systematic use of isometric perspective. (Reprinted with permission by Claire Golomb)

image that bears an uncanny resemblance to a drawing of horses and a bull by the adult Pablo Picasso. In Arkin's fanciful scene (Fig. 8.5), the long, graceful neck of an Apatosaurus-like beast obscures the view of other dinosaurs. One of them is a *Tyrannosaurus rex*, drawn in profile with one leg mostly hidden behind another—a technique called occlusion, which most children discover at age eight or nine. In the ensuing months, his drawings became shockingly realistic. He started using fluid contour lines to give figures shape. At age six he was depicting dinosaurs fighting and running, using various advanced methods to convey the distance between objects. Most adults cannot draw anywhere nearly as realistically as Arkin can, and we are in awe of such technical virtuosity in a young child. Although we cannot know if Arkin will develop

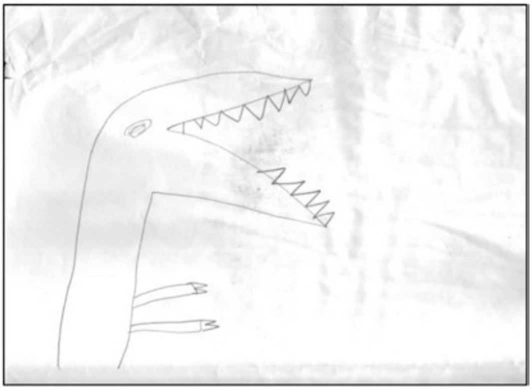

Fig. 8.4 Drawings of dinosaurs by Arkin Rai at age 3. (Reprinted with permission by Dinesh Rai)

Fig. 8.5 Drawings of dinosaurs by Arkin Rai at age 4;7 showing foreshortening, occlusion, and motion. (Reprinted with permission by Dinesh Rai)

into a professional artist, his drawings and those of children like him are helping us study the emergence of artistic ability.

We have created a data base of precocious realists and their drawings to which we add regularly. We discover these children because parents often contact us when they note that their children seem to have exceptional drawing abilities. We plan to track these children into adulthood and then look back at the early drawings of those who go on to become artists. We hope thus to be able to detect the early signs that foreshadow becoming an artist.

Precocity Without Realism

As mentioned, the most common and most striking sign of giftedness in the visual arts is an early ability to draw realistically—something that has been observed both prospectively and retrospectively. Prospectively, we have found that children who have been identified as gifted in drawing at a young age continue to draw hyper-realistically into adolescence and adulthood (though this does not mean that they choose to become artists). Retrospectively, the ability to draw realistically at a young age marks the childhood of adult artists. We do not have the childhood drawings of most artists, but this generalization holds true for those for whom we do have this information, including Paul Klee and Pablo Picasso as well as a number of Israeli artists documented by Gordon (1987). These examples show us that even artists who go on to create non-realistic or non-representational works as adults began at first by striving for (and achieving) realism.

However, we have recently identified an artistically gifted child, Arrian, who created entirely non-representational works. His process and his works were completely different from that of his peers. Just before his second birthday, Arrian began creating large colorful abstract drawings using Crayola markers (Fig. 8.6). Note the contrast between Arrian's drawing and those of a

Fig. 8.6 Non-representational painting by Arrian, age 2;3. (Reprinted by permission of Rebecca Smith)

typical child and precocious realists in Fig. 8.2. These three children are similar in age, and yet their drawings are remarkably different—the typical child drew a tadpole, the precocious realist drew a detailed drawing of a couple dancing, and Arrian created an equally detailed abstract work.

We consider Arrian's work unusual because of the intensity of his rage to master. Arrian's mother described his process as meticulous, with Arrian spending about one to two days on each drawing and filling an entire page 18 × 24 inches in size. As his mother describes it: "One session for Arrian is typically a cycle through whatever set of markers he is using at the time. So, if he has a set of 24 he will systematically go through each marker one by one…. He often begins with some circles all over the page and long flowing lines…. Once he has his basic drawing he colors it in systematically—almost in quadrants." A few months later his mother noted:

> Ari is obsessed with making circles—he tries for hours to make the smallest, tightest, thinnest circles he can do. He tries all kinds of ways of holding the marker … experiments with putting his face really close to the page. He likes to dangle the marker to get a thin feather line but then tries with his fist to get a tighter circle—to hold it properly to gain control, and ultimately [he] seems to want to achieve some combination of all three to get the look he wants. He's been doing this all day for a week—sometimes with just one or two colors.

At age 3, Arrian began drawing people, right on track with typical development. While Arrian's representational skills were age typical, the intensity with which he drew was far from age typical. After drawing one face that consisted of a circle with eyes, Arrian went on to draw 400 faces in one sitting. He approached his faces with the same intensity, focus, and meticulous manner as his abstract drawings. We have not observed these behaviors in our precocious realists nor have any of them showed an interest in making non-representational art. Thus we can speculate that there may be two routes that gifted child artists follow—one the early representational and realism route, and the other the early abstraction route.

Probing Below the Surface

We have thus far described the surface features, visible to all who look. But what lies below the surface? What perceptual, cognitive, and behavioral traits underlie the ability to draw realistically? We have gone beyond case studies, probing more deeply to look for capacities that predict this kind of giftedness.

We administered a series of measures to 12 precocious realists in the data base mentioned above. The children ranged in age from 6 to 16 and came from many different countries. We compared our precocious realists' performance on our measures to the performance of a control group matched in age and gender and not selected for giftedness in drawing (Drake & Winner, 2018).

Exceptional Observational Drawing Skills Before administering our tasks, we confirmed that all of the gifted children were in fact drawing at least two years ahead of their chronological peers. As discussed and illustrated above, they drew recognizable shapes by the age of 2, and showed foreshortening, or occlusion, by the age of 4–5. These children differed widely in the subject matter they chose to draw—one child drew dinosaurs, another bugs and plants, still another buildings. While the subject matter of the drawings varied from child to child, each individual child tended to draw similar kinds of objects and scenes over and over again, but with variation—with a bird-obsessed child drawing a wide variety of kinds of birds, and a building-obsessed child drawing many kinds of buildings, and so on. Since there was such variation in what the precocious realists drew, we wanted to confirm their exceptional drawing abilities with a drawing task in which children were asked to draw a complex three-dimensional scene (a still life) from observation. We scored the drawings for four features found in realistic depiction: use of line to indicate edge rather than "thingness," foreshortening, occlusion, and detail (Drake, Redash, Coleman, Haimson, & Winner, 2010).

Unsurprisingly, all of our precocious realists received high scores on this test, and overall performed significantly higher than the control children, as well as an adult sample of non-artists ($n = 40$) given the same task (Drake & Winner, 2011). Thus, the precocious realists' drawings were several years above the level of their same-age peers and also above the level of typical adults. To determine whether there were abilities underlying the skill of translating the three-dimensional world so accurately onto a flat sheet of paper, we probed for verbal and non-verbal IQ as well as for a variety of visual-spatial abilities.

Average IQ The findings on the relationship between IQ and drawing abilities are mixed. Some work has demonstrated that there is no relationship as evident by the exceptional drawing abilities reported by autistic savants (Hermelin & O'Connor, 1990). Our previous work has shown that drawing ability is associated with non-verbal but not verbal IQ (Drake et al., 2010), but in this research we did not include prodigies in drawing but rather children who were only somewhat more advanced than their peers. Here we assessed IQ with the verbal and nonverbal sections of the Kaufman Brief Intelligence Test–II (Kaufman & Kaufman, 2004). Three findings emerged. First, we found no difference between the precocious realists and control children in verbal *or* non-verbal IQ, demonstrating that, contrary to prior findings, the precocious realists did not have superior non-verbal IQ. Second, the IQ scores of the precocious realists were within the normal range: verbal IQs ranged from 89 to 126; nonverbal IQs ranged from 86 to 134. Finally, we found that neither verbal nor nonverbal IQ was related to drawing ability as measured by our still life drawing test, consistent with what we know about drawing savants. We conclude that drawing ability at a high level can operate independently of IQ.

Some Superior Perceptual Skills If IQ does not predict precocious realism, might superior perceptual skills do so? We know that several studies have shown that artists (when compared to non-artists) show superior performance on tasks of visual memory (Winner, & Casey 1992), vividness of visual imagery, mental rotation, identification of out-of-focus, pictures, completing gestalt figures (Kozbelt, 2001), detecting embedded figures (Drake & Winner, 2011; Kozbelt, 2001), and mentally segmenting complex forms on the Block Design Task (Drake & Winner, 2011). Would our precocious realists also show these same heightened perceptual skills? To answer this question, we administered five visual-spatial measures.

Results were mixed and not entirely consistent with what we know about adult artists. On three of these measures, our precocious realists failed to outperform the control group. There were no differences between the two groups on visual memory, as tested by the Shape Memory Test (Ekstrom, French, Harman, & Dermen, 1976). On this test, children studied an abstract design filled with various shapes and were then presented with pictures containing either part of the original design or an altered version and were asked to indicate if the shapes were the same and in the same position as they were on the study page. There were no differences on the Vandenberg Mental Rotation Task (Peters et al. 1995), where children were shown a target form along with four others and were asked to identify the two forms that matched the target shape after rotation. And there were no differences in accuracy of visual imagery generation as tested by the Vividness of Visual Imagery Test (Campos, 1998), where children were asked to visualize something (e.g., a capital N rotated 90 degrees to the right) and then were asked to select between K and Z.

There were two tasks on which our precocious realists outperformed the control group—the Block Design Task and the Group Embedded Figures Test. Both of these tasks require the ability to focus on the details of visual display—often referred to as local processing. In the Block Design task, children were presented with a design that consisted of either 4, or 9, or 16 red and white blocks, and were asked to copy the design as quickly and accurately as possible using another set of blocks. Two versions of the task were given to each child, the easier segmented version and the more difficult unsegmented version (Shah & Frith, 1993). In the segmented version, the boundary between red and white co-occurred with the edge separating two blocks, making it easy to see each block as a unit. No analysis is required as the design is already "analyzed" into its parts by the block edges. In unsegmented version, the boundary between red and white did not co-occur with the edge separating two blocks. In the unsegmented version, children must analyze the whole into its parts (since the edges do not provide natural segmentation information) to determine where the boundaries between the blocks must be. In the Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971), children were presented with an outline of a small geometric and were asked to identify the small shape that was embedded within the complex larger figure. Children were instructed to trace the shape as quickly and as accurately as possible.

On both local processing tasks—Block Design Task and Group Embedded Figure Test—the precocious realists were superior. Compared to the control group, precocious realists were more accurate (though this difference only approached significance at $p = 0.071$) at copying the unsegmented designs on the Block Design Task and were significantly faster at finding the hidden figure in Group Embedded Figure Test.

Both Block Design and Embedded Figures require the focusing on the details of a visual display and ignoring the overall context. This is similar to what the task of realistic drawing requires. To draw realistically we must notice what the eye sees, as if it were a camera. We must keep expectations and beliefs from interfering with the retinal image. Thus, a plate seen somewhat sideways as it sits on a table forms an oval shape, and we must see that oval rather than fall back on the knowledge that a plate is actually circular. In short, to capture what a camera would record, we must override our schema for the plate shape. Drawing from observation thus requires attentive observation to analyze what is actually seen rather than expected. Similarly, both Block Design and Embedded Figures call for attentive observation and avoidance of interference by the visual context.

Conclusion What can we conclude? Is extreme drawing realism in children a splinter skill, unrelated to other high abilities? Or is extreme drawing realism part of a larger complex of high abilities? It appears that the answer is somewhere in between these two extremes. In terms of visual-spatial and other cognitive skills, our precocious realists' astonishingly strong abilities to render the three-dimensional world on paper were not consistently revealed to be part and parcel of a broader range visual spatial abilities and were unrelated to verbal and nonverbal IQ scores. Clearly, more research on these extreme children, with larger samples (though this will be difficult) and with more tasks, is called for before we can conclude whether the glass is half empty or half full.

It is interesting that the precocious children's visual-spatial abilities were not as consistently superior as those of adult visual artists. Two possible explanations seem plausible. First, superior visual-spatial skills may require time to develop, and they develop as a function of drawing. Or it may be that it is not visual-spatial skills that predict becoming an artist but instead a powerful motivational and personality component that goes beyond having a rage to master. Perhaps those (likely few) who go on to become artists have a questioning, restless, personality, a desire to make a mark on the art world, and a sense that they have something to "say." At the conclusion of this chapter we discuss why it is so difficult to predict which gifted children will go on to become adult creators.

How Should Artistically Gifted Children Be Taught?

Art-education practices have always reflected the culture's view of the purpose of education and the nature of art making. In the West today we have a particular conception of art as an activity that involves visual thinking, creativity, and self-expression. But traditionally, in all cultures, including in the United States until the beginning of the twentieth century, drawing was seen as a technical skill to be mastered (Winner, in preparation). No visual thinking was required. Copying was the order of the day. No self-expression was called for (indeed it was spurned), as all children aimed toward making identical drawings. Lessons were progressive. In nineteenth-century Europe and the United States, children were taught to copy straight lines, then curved lines, then geometric designs that combined both kinds of lines, and so forth, starting with simple forms and moving on to more complex ones. Children were told exactly how to hold their pencil or brush, how to sit, how to hold their arm, and how to make each kind of line. This method was in effect "teacher proof" in that no knowledge of drawing was required on the part of the teacher. This kind of art education was no different from how all subjects were taught—teacher at the center of the classroom dispensing knowledge, expecting children to learn by rote, with no value placed on independent discovery. In traditional Chinese art education, children are still taught in this way, mastering step-by-step formulae for drawing traditional subjects such as goldfish, shrimp, or bamboo (Winner, 1989). With such instruction, expressive and inventive aspects of drawing could only get in the way.

This kind of mindless art education created, in the United States, a welcome soil for the planting of progressivist seeds in the beginning of the twentieth century, influenced of course by the progressive educational philosophy of John Dewey. And progressive art education came with a wholly new view of art—with a focus on creative self-expression and the solving of visual problems with invented (rather than dispensed) solutions. While in traditional art classrooms children were all expected to do exactly the same thing, in progressive art classrooms each child's artwork was expected to be different from the others—since whenever a class of children produces very similar works, they must have been told just what to do. Art making was now seen as the expression of the child's feelings and personality, and the outcome of each child's individual discoveries. Art education was to enable each child to reach his or her potential and to celebrate individual differences. The teacher was not to be the authority or the dictator, but rather the gardener, nurturing each child's creative abilities.

The role of the progressive art teacher was to set up challenging situations that lead to children making discoveries and thinking (visually) on their own. The psychologist of art, Rudolf Arnheim, wrote that "In the arts as well as elsewhere in education, the best teacher is not the one who deals out all he knows or who withholds all he could give, but the one who, with the wisdom of a good gardener, watches, judges, and helps out when help is needed" (Arnheim, 1990, p. 58).

The good progressive teacher was not to be "laissez faire," simply presenting children with materials and giving them no suggestions for what to do with them. Instead the teacher was urged to provide challenging projects with no one right way or right "answer." Many such ideas for children of different ages are to be found in Victor Lowenfeld's widely used textbook, *Creative and Mental Growth* (originally published in 1947)—children were asked to draw themselves brushing their teeth, having a stomach ache, having their ears checked, or feeling pain in one of their knees. Another major progressive art educator, Victor D'Amico, the first head of the Education Department at the Museum of Modern Art, had his students go outside and draw or paint what they noticed (1942). He had them draw the unseen world they imagined as they listened to a story. He had them draw what they saw on the way to school—to train their powers of visual memory.

This kind of classroom, with no strict rules to follow, allows children to operate at any level of ability. It does not hold the gifted artists back, and just as it does not push the more typical children to do what they cannot do. When this kind of art education is done well, children at all levels of artistic ability flourish. All too often, though, progressive art education has deteriorated into a do nothing kind of approach where children are given easels and paint, or clay, but teachers do not suggest what they should do with these materials. Teachers are careful not to interject themselves to ask their students to look more carefully, or to reflect on what they are trying to do—in reaction to the traditional, top-down nineteenth-century method of arts education. In such laissez-faire progressive classrooms, children are not stretched in any way. This is suboptimal for children of all levels of ability: even self-motivated gifted artists thrive when stretched.

What the Reggio Emilia Schools Teach Us About Educating Artistically Gifted Children

Progressive art education at its best is beautifully exemplified today by the Reggio Emilia schools for children up to age six in Northern Italy, often praised as the best preschools in the world because of what they show young children to be capable of (Winner, in preparation). The Reggio schools do not call what they do arts education. They consider what they do to simply be early-childhood education that develops children's imagination, their ability to explore and understand the world, and their ability to express themselves in multiple modalities. Nevertheless, the children in these schools spend a great deal of their time making visual art, whether drawing, painting, sculpting in clay, or building structures with blocks. The works they produce are strikingly complex and skilled. The quality of the works created profoundly shakes up widespread assumptions of what preschool children are capable of. In fact, looking at the drawings and paintings on the walls, one might easily think that all of these children are gifted artists.

Two aspects of the Reggio approach we believe are particularly good for gifted child artists as well as for typical child artists and thus work well for an entire classroom with children of diverse artistic abilities: the presentation by the teacher of artistically challenging projects, and the insistence that children work on each project collaboratively, in discussion with one another.

Artistically Challenging Projects

Each Reggio classroom teacher works closely with a teacher trained in the visual arts (called the atelierista). The teachers and atelieristas play an active role, questioning and guiding the children individually or in small groups as they work. (There is no laissez faire teaching going on here!) Children are given very challenging art projects, as described in the next paragraph. As mentioned, challenging projects allow each child to attain his or her artistic potential.

Collaboration

Children in the Reggio schools never make art in a solitary fashion. All projects are collaborative. For example, for months children worked together on the challenging task of drawing their entire class seated in a circle for class assembly. Each child took on a part of this project, drawing one or two of their classmates. They photographed each other, made many drafts of their drawings, and interacted quite intensively with one another as they worked. They talked to one other about what they were trying to do, they watched how their classmates solved visual problems (like how to draw a person in profile or from behind), and they critiqued each other's work. The children were clearly learning from one another. After ultimately creating a finished group drawing of the class assembly with all of the children seated in a circle, the teacher and atelierista asked the children to recreate the entire scene, this time in clay. Clay, of course, presented its own specific challenges, like how to make a chair stand up, and how to make a head light enough to not fall off of the neck—and these challenges were discussed among the children as they worked. This kind of approach allows gifted children to flourish just as it allows those less able in drawing to be inspired by those with higher ability. Talking about what one is trying to do and practicing the art of critique is something that artists do. Such stepping back and reflecting spurs children of all levels to keep going and not be satisfied with their first, or even their fifth attempt.

Conclusion

How we educate gifted children should reflect best practices of education for children of all abilities. All education should be individualized, allowing all to reach their highest potential. All children can be given the same projects if these are challenging, but how children meet the challenge will differentiate the artistically gifted from typical child.

Should the aim of education of the gifted be to make gifted children into groundbreaking creators who transform a domain, such as Picasso, Einstein, Darwin, or Freud? This goal is unlikely to succeed. All too often even the most gifted children do not become major creators in their area as adults, making discoveries that change their domain (Gardner, 1993; Winner, 1996). The reason is simple. Giftedness involves mastering a domain that has already been invented. In contrast, big-C creativity involves changing a domain—as Renaissance architect Filippo Brunelleschi worked out the rules of linear perspective for the first time, as the early impressionists like Claude Monet developed a wholly new way of painting, or as Pablo Picasso and Georges Braque invented cubism. Mastering a domain and revolutionizing a domain are simply two very different kinds of achievements. We should not expect gifted child artists to become the major artists of the future. Some will; most will not. What matters is that gifted child artists be stimulated to use their artistic giftedness in a way that helps them develop the habits of mind that artists use—the habit of looking closely, generating mental imagery, reflecting and evaluating, expressing, and the like (Hetland, Winner, Veenema, & Sheridan, 2013). Indeed, what matters in art education, and even education more generally, is that all children develop these habits of mind. Such mental habits may prove useful to gifted as well as typical in other areas outside of the art room but this kind of transfer remains to be determined. But we do suggest that these kinds of habits of mind are most likely to be developed in the best kinds of progressive art rooms of today.

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9

Equity-Based Gifted and Talented Education to Increase the Recruitment and Retention of Black and Other Underrepresented Students

Donna Y. Ford, Kristina Henry Collins, Tarek C. Grantham, and James L. Moore III

During our collective personal and professional experiences in gifted and talented education (GATE), we have witnessed a staggering rate of underrepresentation among Black and Hispanic students. Never has there been equitable

This chapter updates and expands upon Ford, Moore, and Trotman Scott (2011).

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representation nationally in courses and programs for advanced learners. As we put the finishing touches on this chapter, we are in the midst of the COVID-19 pandemic and must assert that GATE—as we know it—is in a crisis in the United States and a pandemic worldwide. At the heart of underrepresentation in GATE is racial discrimination—intentional and unintentional, and explicit and implicit.

Racial bias and discrimination come in many forms in school and warrant scrutiny and debate because of the persistent and extensive underrepresentation of Black and Hispanic students in GATE. A few efforts have been proposed and implemented to reduce racial inequities and to improve their recruitment and retention, but to little or no avail. Progress has been slow or non-existent in many cases. When one reaches a certain age or level of maturity and professional accomplishment, it seems timely and instructive to reflect on his or her life and the impact it has (if any) on the profession and the lives of children overall but especially those who are marginalized–hampered by inequities.

The first author has spent almost two decades bewailing professionally (and longer, personally) the poor representation of Black students in GATE. The other authors have also devoted a great deal of their time grappling with this very issue. Individually and together, we have devoted decades of scholarship, teaching and advising, service, and leadership to finding equitable and defensible ways to increase the representation of Black and Hispanic students in GATE. This focus has been on the two-sided and inseparable goal of recruitment and retention. Recruitment addresses increasing numbers/percentages; retention addresses integration—keeping underrepresented students in GATE.

This chapter has several goals to encourage effective recruitment and retention in GATE in desegregating this field. The main goal is to present an overview of what is believed to be among the most promising works for guiding educators—teachers, counselors, psychologists, administrators, and decision makers—in their efforts to effect meaningful change, to correct inequities, and to be advocates for gifted and talented Black students. An additional goal is to screen, identify, and place more Black and Hispanic students in GATE programs in an equitable and culturally responsive manner, and to retain them once placed. We propose that several theories and conceptual frameworks can guide educators and decision makers in gaining a better understanding of underrepresentation via an equity-based and culturally responsive lens.

The Seminal Work of Equity-Based Scholars

Clearly, many scholars have developed theories and conceptual paradigms or frameworks that inform one or more vital aspects of Black and Hispanic underrepresentation in GATE. We direct special attention and applaud to two eminent scholars, Dr. Alexinia Y. Baldwin and Dr. Mary M. Frasier, for their decades of scholarship in GATE and for laying much of the groundwork—work that remains unfinished.

Baldwin's Principles for Leading Equitable GATE Programming

Dr. Baldwin contributed to the foundation for equity by serving the field of GATE in every state in the union, except Alaska, sharing her pioneering *Baldwin Identification Matrix* (1984) and training educators to better meet the needs of underserved students. To synthesize her views on effective leadership and engagement in GATE, she offered three guiding principles: (1) lead where you are, engage and persuade the people in charge; (2) value exemplary practitioners and learn from them; and (3) institutionalize for sustainability. These principles have served, then and now, as an exemplary standard of responsibility for all equity-focused stakeholders to collaborate and create culturally responsive GATE programs that are equitable and adequately serve *all* students.

Baldwin posited, "you have to incorporate people that have like minds or you have to convince adversaries or unengaged persons that it is important for them to look at children with gifts and talents from all groups. And the same thing goes for our Black and minority children" (p. 20). Many unsung heroes in PreK-12 schools who are important to changing GATE include equity-oriented practitioners who should not be dismissed because their day-to-day work and audience represent students and families versus professors, for instance. Scholars must build partnerships with practitioners and examine and share their pedagogical strategies for scalability.

Frasier's Four As

Dr. Frasier (1997) synthesized research on the identification of culturally and linguistically diverse (CLD) students for GATE and concluded that there are persistent issues. The Frasier Four As are attitude, access, assessment, and accommodation. *Attitude* refers to a mental position, feeling, or emotion toward CLD students, where negative attitudes, such as deficit thinking, hinder efforts to recognize and develop gifts and talents among them. *Access* refers to ways in which CLD students become referred for GATE placement. Too often, educators hold low academic expectations for, and negative views of CLD students, which means that such teachers will fail to adequately create opportunities in classrooms for these students to demonstrate their abilities and skills. *Assessment* refers to the entire process of evaluating the presence and degree of giftedness and talent. Often, too little data are gathered in the assessment process; multiple measures are critical in the assessment of underrepresented students to offset narrow policies and practices that favor White, Asian, middle- and upper-class students, or native English speaking students. *Adaptations* refer to program design and curricular experiences to support the needs and interests of CLD students. To meet students' needs, educators must adapt to differences where cultural and linguistic differences are not ignored; instead, teachers must view students' differences in a positive way, and change their teaching styles and curricula accordingly.

Frasier's (1997) research encouraged educators and parents to be reflective about their attitudes and beliefs, and how thinking influences behaviors and actions: What negative concerns about ability in CLD student groups create barriers? What beliefs about CLD families hinder educators from working collaboratively with them? Essentially, Dr. Frasier encouraged educators to be advocates and talent scouts—to actively and proactively search for potential and gifts and talents in students. Frasier's *Panning for Goal* Instrument, which evolved into her TABs (traits, aptitudes, and behaviors) Referral Tool, and *Frasier's Talent Assessment Profile* (F-TAP) promote a variety of ways that children from culturally and linguistically different backgrounds might express gifts and talents (Frasier et al., 1995; Frasier & Passow, 1994; Passow & Frasier, 1996).

Noteworthy Advances Since Baldwin and Frasier

In the discussion of advances in GATE, we must first look at official definitions of gifted and talented. In 1993, the most culturally responsive and equity-based federal definition was issued. For the first time, the dire need to make comparisons based on students' similar lived experiences—race, ethnicity, and income—was emphasized:

> 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 capacity in intellectual, creative, and/or artistic areas, and 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 & Office of Educational Research and Improvement, 1994, p. 11)

Equally important is the focus on potential, which emphasizes how access to GATE (Frasier, 1997) is not just a function of privilege that operates in GATE to advantage some and disadvantage others. For example, children from wealthy families often experience rigorous preschool education, which enhances their likelihood of being referred for GATE. Preschool advantage is an inappropriate and biased screener—inequitable criteria for GATE access because many children are missed.

Universal Screening

Universal screening is an inclusive approach to identifying gifted potential in students, where all students, regardless of background, are assessed on a measure to help educators identify strengths. Use of universal screening by GATE program teachers and administrators (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5137751/) has resulted in an increase in CLD students as well as those from lower socio-economic status. We caution, however, against the use of arbitrarily high and rigid cutoff scores, and instead recommend the use of school district norms, building level norms, and group norms to generate the talent pool and/or to identify students as gifted and talented. Also important to include are non-verbal measures, which we deem more culturally neutral and fair than traditional IQ tests. In conjunction with broadened notions of gifts and talents, universal screening and equitable representation are more responsive in narrowing but preferably closing identification gaps.

Equity Allowance Formula

In 2013, GATE witnessed the first court case in which equity was front and center. District U-26 in Elgin, IL, was found to be guilty of both intentional and unintentional discrimination against Hispanic students who had exited their English Language Learner (ELL) program in third grade (https://news.vanderbilt.edu/2013/08/27/vanderbilt-expert-discrimination-illegal/). Ford (2014) served as the expert witness for the plaintiffs in *McFadden v. Board of Education for Illinois* and applied a 20% equity allowance to calculate *minimal* GATE representation goals for each student group. The formula has been adopted in other court cases, districts, and states. Different from a cutoff score and not a quota, the equitable formula offers guidance to set quantifiable and measurable goals to hold decision makers accountable regarding racial and ethnic disparities in GATE. The quickest way to calculate any disparities in representation and the equity goal is to begin with the students' representation in a specified setting (e.g., nation, state, district, building) and in GATE in that same setting.

Table 9.1 depicts GATE representation goals based on 2015–2016 Office for Civil Rights Data, Civil Rights Data Collection. For example, Black students represent 19% of all students in US schools, but only 10% in GATE programs. Using the Racial Composition Index formula (Ford, 2013a) results in an underrepresentation, or discrepancy index, of 48% for Black students. However, the equitable goal for the GATE representation for Black students should be, at minimum, 15.2%. This would be within the 20% allowance, accounting for chance factors, different experiences, and injustices in society and schools. We assert that anything more is beyond chance and, thus, inequitable. See Ford (2013a, 2015) for more details on the court case and how to calculate the equity allowance.

Biased Teacher Referrals

Longstanding inequities in GATE can be attributed to under-referrals by educators, the majority of whom are White females. Grissom and Redding's (2016) research found that even when Black students were matched with White students on test scores, grades, family characteristics, and more, White teachers continued to under-refer them for GATE. Racism discrimination cannot be denied or negated. Ford, Grantham, and Whiting (2008a) summarized numerous reports pointing to educators as the key gatekeeper, especially for Black students; but Grissom and Redding were the first to match students. GATE has indeed failed many groups of color in almost every state (e.g., Ford, Wright, Sewell, Whiting, & Moore, 2018; and https://www.education.purdue.edu/geri/new-publications/gifted-education-in-the-united-states/?fbclid=IwAR0vwTDCPR1jHNBNidiXhmQLdSQzED9to_z-VFaQ-Pjd0E9OCevPS_vWGWM).

Table 9.1 Equity goals using 20% allowance to address underrepresentation in GATE

Student group	Representation in US schools (%)	Representation in GATE (%)	GATE under-representation (%)	Equitable GATE representation goal based on 20% allowance (%)
Black	19	10	48	15.2 (GATE representation must increase from 10% to at least 15.2%)
Hispanic	26	16	38	20.8 (GATE representation must increase from 16% to at least 20.8%)

Given too little progress, some states and districts have elected to address inequities by dismantling GATE programs altogether, including New York and Seattle (see https://www.usatoday.com/story/news/education/2020/01/13/nyc-doe-racist-segregation-brooklyn-specialized-high-school-exam-gifted/2763549001/ and https://reason.com/2020/03/26/seattles-school-system-has-begun-dismantling-its-gifted-programs/?fbclid=IwAR3327PEqQPjPrv4oM58-8Gb2YPigakipHh_RaF2YB3uiBeaeKDaxCoE0_s).

Equity-Based Theories and Frameworks for GATE Recruitment and Retention

We now present an overview of key terms, theories, and frameworks that are critical in understanding recruitment and retention in GATE, as well as the barriers that negate progress. In understanding the barriers to recruitment and retention through the lens of theories and frameworks, we can develop solutions that work. We urge educators, administrators, and other decision makers to delve deeper into these works.

Table 9.2 presents several key theories and frameworks, with a sample of authors, not an exhaustive list, whose ideas are used in the recruitment and retention of underrepresented students in GATE. The discussion of these works does not imply that others are not helpful or are uninformative. For example, important models, paradigms, and theories on GATE students living in poverty are necessary and can inform the current discussion (e.g.,

Table 9.2 Theories, frameworks, and sample scholars regarding Black underrepresentation

Theory or conceptual framework/model	Sample of scholars
Deficit thinking; Implicit bias; Explicit bias; Microaggressions	Richard Valencia, Gordon Allport, Robert Merton, William Ryan, Mary Frasier, John Dovidio, Derald Sue
Voluntary and involuntary minority groups	John Ogbu
Paradox of underachievement	Donna Ford; Rosa Mickelson
Acting White	Signithia Fordham, John Ogbu, Donna Ford, Roland Fryer
Racial identity theory	William Cross Jr., Thomas Parham, Ron Sellers
Identity and achievement models	Gilman Whiting (scholarly identity model); Donna Ford (female achievement model for excellence); Kristina Henry Collins (Black student STEM identity model)
Afro-centric cultural styles	A. Wade Boykin, Asa Hilliard III, Barbara Shade, Janice Hale
Culturally responsive education; multicultural curriculum	Geneva Gay, Gloria Ladson-Billings, Barbara Shade, Jacqueline Irvine, Alexinia Baldwin, Donna Ford, Michelle Foster; James Banks, Carl Grant, Geneva Gay, Donna Ford, Margie Kitano

Adapted and updated from Ford, Moore, and Trotman Scott (2011)

Ambrose, 2002, 2005; VanTassel-Baska, 2010). While cognizant that a disproportionate percentage of Blacks live in poverty, the authors are also concerned about those who live above the poverty line. Therefore, select works were chosen that specifically target Blacks, regardless of income; they also have implications for other underrepresented students.

Microaggressions

Sue and colleagues (2007, 2011) described microaggressions as common verbal, behavioral, and/or environmental indignities, intentional and unintentional, that communicate hostile, derogatory, or negative racial slights and insults toward racially different individuals and groups. Microaggressions are categorized as micro-assaults, micro-insults, and micro-invalidations. These may include, but are not limited to, racial jokes, rudeness and insensitivities, and exclusionary comments.

Racial microaggressions pertain to variables that influence intergroup relations. Teachers may ask Black or Hispanic students who have the highest grade(s) if they received assistance or cheated. The question may be innocent and not ill-intended. However, when this and other situations are perceived as being tied to or as a function of racial and ethnic deficits, they take on a different meaning. Subsequently, Black and Hispanic students subjected to microaggressions may experience or respond with anger, hurt, self-guessing, and other negative feelings and thoughts. Having their abilities second-guessed and interrogated contributes to underachievement, which ultimately contributes to underrepresentation.

Deficit Thinking Theory

Deficit thinking is the major reason GATE underrepresentation exists, persists, and is so pervasive (Ford, Harris III, Tyson, & Frazier Trotman, 2002; Ford, Moore, & Whiting, 2006; Ford & Grantham, 2003). Educational deficit thinking—"blaming the victim" viewpoint—contributes the alleged deficiencies of racially and culturally different groups as mainly responsible for their school problems, academic failure, and social outcomes, while holding structural inequality and/or systemic inequities without blame (Valencia, 1997).

As with literature on expectations (e.g., Teacher Expectation-Student Achievement, Pygmalion Effect, and Galatea Effect), deficit thinking meaningfully influences decisions, practices, and policies, definitions, theories, models, identification criteria and measures, placement, and services. Misguided and distorted views interfere with rather than facilitate teaching, learning, and assessment. When deficit thinking exists, educators perceive Black students to be genetically and/or culturally disadvantaged, as evidenced by the work of Herrnstein and Murray (1994). It manifests in less challenge and rigor in the curriculum for Black students, which is a significant factor in the even larger issue of the achievement gap (Barton & Coley, 2009).

Degrees of Prejudice in GATE

Allport (1954) identified five degrees of prejudice: (1) antilocution, (2) avoidance, (3) discrimination, (4) physical attack, and (5) extermination (see Table 9.3. Note that extermination or genocide in schools is not applicable and thus excluded from the table).

The last three degrees are illegal under Civil Rights laws. Readers are referred back to the court case in Elgin, IL (Ford, 2013a, 2014).

Table 9.3 Gordon Allport's degrees of prejudice model adapted to GATE: Definitions and GATE examples

Degrees of prejudice defined	GATE examples
1. **ANTILOCUTION** Verbal comments against a person, group, or community, which are not addressed directly to the target. Remarks (including jokes) are often in terms of stereotypes. Generally referred to as "talking behind someone's back," the impact of it can be and is often overlooked. However, because antilocution creates an environment where discrimination/discriminatory behavior is acceptable/permitted, it frequently progresses to other more damaging forms of prejudice. Its use is overshadowed by the more modern term "hate speech," which can have the same meaning	Negative/disparaging comments about gifted and talented Black students (by educators, parents, and/or classmates): I don't think they should be in GATE programs They are not as smart as other GATE students I think someone made a mistake identifying them as gifted and talented If it weren't for affirmative action, they would not be in GATE Blacks are not identified as gifted and talented because they are lazy and unmotivated Administrators watered down the criteria to let more Blacks into GATE
2. **AVOIDANCE** The target individual, group, or community is actively avoided by members of the majority group. No direct harm may be intended, but harm results from isolation	GATE Blacks are actively avoided by members of the majority group/status quo: Parents place their gifted and talented children in private schools to avoid having their students in classes with Black students In a predominantly Black school, administrators place GATE classes in a wing separate (or floor) from other students GATE students refuse to participate in activities with Black classmates

(*continued*)

Table 9.3 (continued)

Degrees of prejudice defined	GATE examples
3. **DISCRIMINATION** The targeted individual, group, or community is discriminated against by being denied opportunities and services, which puts prejudicial beliefs and attitudes into action. The behaviors have the specific goal of harming the target by preventing them from achieving goals	Schools have instruments, policies, and procedures that contribute to under-representation Educators under-refer or do not refer Black students for GATE screening, identification, and placement Educators use instruments that have not been useful with identifying Black students as gifted and talented Policies and procedures are in place that hinder the representation of Black students in GATE (e.g., cutoff scores, grade level at which students are screened and/or tested, relying only on test scores for decision making, applying criteria differently, etc.) Not placing Black students in GATE when they have met the criteria
4. **PHYSICAL ATTACK** Starting fights with Black students; physical altercations. Intent to do harm	Classmate(s) bully and start fights with Black students Physical attacks and harm done to members of the target group. Blacks are attacked, threatened with harm, and/or their property is damaged The books, lockers, and/or desks of GATE Blacks are defaced with threats and hateful words and names

Adapted and updated from Ford et al. (2011)

Voluntary and Involuntary Minority Groups Theory

Similar to previous social scientists, we have been asked countless times to explain why Black students, on average, perform lower than White and Asian students in school and in tests. This is certainly a legitimate question. An even more intriguing question is why Asian students, on average, outperform White students. Fordham and Ogbu (1986) theory on voluntary and involuntary "minority" groups is enlightening.

According to the theory, all minority groups have a different history, culture, and experience in the United States (Ogbu & Simons, 1998). Therefore, they have different academic and social outcomes. In general, voluntary minorities (e.g., many Asians) have the common experience of immigrating to the United States, viewing the United States as the land of opportunity and believing in the American Dream. There is optimism, hopefulness, and a belief that their lives (e.g., educationally, socially, and financially) will improve or be better here than in their homeland. They are often willing to assimilate—to give up much of their culture—in order to succeed in the United States. Prejudice and discrimination are often viewed as a temporary setback that can be overcome, particularly with assimilation and effort (i.e., hard work, work ethic). Conversely, involuntary minorities are not immigrants. Slaves, for example, did not *choose* to come to this nation. They were neither seeking the proverbial American Dream nor wanting to assimilate. Consequently, they and their descendants adopted "secondary resistance attitudes" manifested by anger, resentment, and resistance to some traditional American beliefs, values, customs, and behaviors (Ogbu, 1992; Ogbu & Simons, 1998).

When Black students are angry, resentful, or even hostile toward following ways of being and behaviors associated with Whites, they may not want to participate in GATE opportunities that are primarily White (Ford & Moore, 2013). Educators must be mindful not to raise additional barriers, not to take the students' sentiments personally, and not to deny them access to GATE. Getting to know Black and Hispanic students by learning about their personal history and group experiences can help place attitudes and behaviors in context and increase referrals.

Paradox of Underachievement

Mickelson's (1990) work on the "paradox of underachievement" concerns the extent to which Black students show congruence in their academic beliefs and behaviors. According to the paradox, Black students who believe in the American Dream may demonstrate behaviors that say otherwise. For example, they will state or agree that doing well in school will increase their chances of going to college and finding a job. Paradoxically, their study habits and school attendance might be poor; school and academics may not be a high priority. When this discrepancy exists, educators often think that the students are not capable of doing well in GATE.

Mickelson (1990) distinguished between abstract and concrete ideas, which seem to be unique to Black students. The Black high school students in her study had dreams and goals, and believed in the American Dream (i.e., abstract values), but their belief in the American Dream was qualified (i.e., concrete values). The following statement illustrates this point: "If I work hard in school and get good grades, then I can get a scholarship and go to college. But I also know that because I am Black, I (and other Blacks) have to work harder than Whites to get into college." These qualified beliefs relate to educational settings (e.g., grades, subjective evaluations, and tests). Students recognize the existence of a glass ceiling, but one that is more resistant to breaking for them—like Plexiglas or even bulletproof glass (Ford, 2011a, 2011b). These realities undermine and compromise the motivation and aspirations of Black students who see fewer fruits for their labor and more barriers blocking their goals. When these students are less motivated and more disillusioned, educators are not likely to view them as viable candidates for GATE services—as hard workers, high achievers, or intelligent. This (mis)perception reduces their referral to GATE and their retention if placed.

Acting White Accusations

Many high-achieving and GATE students face negative peer pressures. An anti-achievement ethic, especially among secondary students, is pervasive. With Black students, as Fordham and Ogbu (1986) and Fordham (1988) reported, charges of "acting White" are commonplace and worsen racialized peer pressure. Ford, Grantham, and Whiting (2008b) found that many GATE and high-achieving Black students are accused of acting White, which is primarily associated with being intelligent, getting good grades, speaking mainstream English, and having White friends. When accused, Black students may sacrifice their high performance and enrollment in GATE to reduce or eliminate negative peer pressures. For them, achieving can become a pyrrhic victory (Fordham, 1988) where they feel forced to choose between achievement and affiliation (Whiting, 2006). Similarly, Black caregivers may not place their children in GATE due to social-emotional concerns, such as their children feeling alienated by other Black students and White students in general.

Racial Identity Theory

Many educators agree that self-esteem and self-concept significantly affect students' academic performance; those with positive self-images or self-perceptions are more likely to do well in school than those who have negative perceptions of themselves. Similarly, those who have positive self-images are likely to have more positive social skills and relationships.

When one is Black (or a member of any other racially and culturally different group), it is essential that racial identity also be validated within the notion of self-perception. Cross' (e.g., Cross & Vandiver, 2001) research and subsequent theory of Black racial identity can help all educators better understand Black students in the context of racial identity, salience, and pride. In the most recent version of the theory, there are three identity exemplars (e.g., pre-encounter, immersion-emersion, and internalization) (Cross & Vandiver, 2001).

The pre-encounter exemplar includes three identity types: (a) assimilation, (b) stereotypes/miseducation, and (c) self-hatred. Each identity shares a sense of low racial salience or racelessness and, instead, adopts an "American" identity. When Black students have a pre-encounter identity, they are ashamed of being Black and disassociate from the Black community. Movement from the pre-encounter exemplar to the immersion-emersion exemplar occurs with encounters, specifically, racial assaults and insults. Encounters can be direct or indirect, subtle or blatant, and occur as a major event or series of smaller events. Encounters can be verbal (e.g., insults, negative comments, and back-handed compliments), visual (e.g., negative, stereotypical images, pictures, and posters), or behavioral (e.g., discrimination and avoidance).

Immersion-emersion is the vortex of Black anger or rage, and includes two identity types (intense Black involvement or White hatred). The immersion-emersion exemplar results from racial encounters, such as microaggressions. Intense Black involvement is the epitome of immersing oneself in the Black community, with an almost obsessive dedication to all that is Black. The term "White hatred" is self-explanatory; when Blacks express a strong, intense dislike of Whites; they are not likely to want to participate in GATE classes that are predominantly White.

The internalization exemplar (the most positive and healthy identity) comes about when Blacks have more positive experiences with Whites. Internalization includes three identity types (nationalist, biculturalist, and multiculturalist). They also have access to advocates—mentors and role models—who provide them with effective skills to cope with anger, resentment, and other negative emotions and beliefs about racism, Whites, along with Black affirmation. These GATE students share a commitment to social justice and equity, along with a strong and positive racial identity, and commitment to the Black community.

Identity and Achievement Models

Confronting the culture-blind approach to identity and talent development, Whiting (2006), Ford (2013a), and Collins (2018) offered models that address the unique needs for nurturing gifts and talents of Black males and females. Whiting focused on scholar identity among males while Ford focused on female identity. Collins contended that "given that a student's cultural milieu and interactions with the academic STEM environment may differ based on an individual's race or ethnicity, it is important to examine student STEM identity and talent development through a lens that incorporates race and ethnicity" (p. 146). As a collective discipline-specific area of study within advanced academics, culturally responsive STEM identity development offers a model to strengthen recruitment and retention in advanced academics. At the core of any STEM identity, there exist experiences grounded in the cultural value and perceived benefit of the STEM skill set along with contexts surrounding race and gender (as a primary identity) at different stages and in different environments that have significantly influenced the development of that identity (Collins).

Afro-Centric Cultural Styles Model

The level and type of instruction students receive play a pivotal role in their understanding and applying the instruction. Boykin's (1994) initial and ongoing research and model (e.g., Boykin, Tyler, & Miller, 2005; Boykin, Tyler, Watkins-Lewis, & Kizzie, 2006) has important implications for understanding mismatches between teaching styles and learning styles, and how to make them more compatible. Boykin's model includes spirituality, harmony, affect, movement, verve, expressive individualism, oral tradition, communalism, and social time perspective. Ford and Kea (2009) used Boykin's model under the notion of "culturally responsive instruction," meaning that instructional styles are modified and adapted to respond to how many Black students learn (or prefer to learn). When students' learning styles are discounted (e.g., unaddressed, misunderstood, and unappreciated), their performance and grades can suffer; consequently, they are less likely to achieve at high levels, and not be viewed as gifted and talented. When instruction is colorblind or culture-blind, Black students may be misperceived and misdiagnosed as having learning disabilities, behavioral disorders, and/or other special education needs. For example, movement and verve (high levels of energy) can be misinterpreted as hyperactive; communalism may be misinterpreted as lacking independence or self-sufficiency; expressive individualism, similar to being creative, may be viewed as impulsive, non-conforming, and weak in critical thinking and problem-solving; affect may be misconstrued as being too sensitive and emotional or as immature.

Independently or collectively, misunderstandings about these cultural styles often contribute to underachievement, under-referral, and mismatches between learning styles and teaching styles. When these students underachieve, they often are not referred to or retained in GATE. Educator preparation on this model would be helpful in discussions about how to differentiate curriculum and instruction for all GATE students.

Multicultural Curriculum and Culturally Responsive Education

No discussion of curriculum, including differentiation, for GATE students is complete or comprehensive when multiculturalism is missing (Ford & Harris, 1999). Multicultural GATE is synonymous with a culturally responsive education that is student-centered, which means that it cannot be culture-blind. Ford's model (Ford & Harris, 1999) relies on the works of Banks (2006, 2008), Gay (2010), Ladson-Billings (2009), and Shade et al. (1997). This model consists of five components: (a) philosophy (about working with and teaching Black students); (b) learning environment (creating an environment that is family and community oriented; that values diversity and differences); (c) curriculum (multicultural, not culture-blind); (d) instruction (matches teaching and learning styles); and (e) assessment (equitable, fair, biased reduced).

Banks' (2006, 2008) model consists of four levels of how to infuse multicultural content into the curriculum—contributions level, additive level, transformation level, and social action level. These levels range from being somewhat culturally assaultive and reactive (contributions and additive) to being culturally responsive and proactive (transformation and social action) (Ford, 2011b). At the two lower levels, many stereotypes are created or reinforced in all students. Gay (2010) requested a moratorium on role models and heroes from different racial groups that are typically offered in PreK-12 classrooms. Students seldom learn about living or contemporary role models. At the two higher levels, there are meaningful changes in the curriculum with all students becoming more informed, empathetic, and empowered. The goal of culturally responsive education is to be comprehensive at understanding and proactive at addressing the needs of Black students; this framework is proactive and inclusive. It is a form of differentiation that does not rely on "business as usual" or "one size fits all" ideologies and practices. Ford's Bloom-Banks Matrix (Ford, 2011b; Ford & Harris, 1999) serves as an exemplar and guide for teachers and curriculum developers to promote both critical thinking and high-quality lesson plans that are culturally responsive. The Matrix combines Bloom's Taxonomy with Banks' Multicultural Infusion Model, resulting in a unique curricular model that is rigorous and relevant (https://12d9e5b0-b4ba-b916-f1ca-20b09d90331f.filesusr.com/ugd/55c01c_043cf2b2d14416e2728231a643fb43f3.pdf).

Several Black GATE scholars collaborated to create two documents that offer educators resources to be cognizant of the degree to which their GATE policies and procedures, measures, curriculum, leadership, and more are equity-based and culturally responsive. We urge educators to read and adopt the *Bill of Rights for Gifted Students of Color* and the associated evaluation checklist (Ford and colleagues, 2018; Ford et al., 2020). We are working diligently to remove barriers and excuses that deny access to GATE for Black and other underrepresented students.

Conclusion and Future Considerations

There is no single formula or magic bullet for decreasing or eliminating the persistent and pervasive underrepresentation of Black and other underrepresented students in GATE. There are many attitudinal and behavioral barriers and gatekeepers. Educators must acknowledge that many past and current practices have been ineffective. However, educators have many theories and conceptual frameworks or models to utilize in efforts to advocate for Black and Hispanic students who are under-identified and underserved in GATE and for those who one must retain once recruited. The probability that these students' needs are being adequately met in a general education setting is quite low. Subsequently, the existence of and need for equitable and inclusive GATE classes, programs, and services are paramount.

The problems that gave rise to the theories and frameworks in this chapter are relevant in every classroom and school district. They provide important insight and guidance relative to both recruiting and retaining Black and other underrepresented students in GATE. Further, they inform educators' understanding of such barriers as underachievement, poor motivation, low test scores, racial pride, peer pressures, stereotypes, and prejudicial attitudes and behaviors. They shed light on how these factors and others influence educators' low referrals, expectations, and decisions and, consequently, jeopardize the equitable participation of Black and underrepresented students in GATE. This collective body of scholarship can move the field of GATE closer to rectifying underrepresentation; to desegregating and integrating. They are a clarion call to educators—teachers, administrators, and decision makers to be sincere and purposeful in desegregating and integrating GATE and helping underrepresented students to achieve the American Dream, to which they are entitled.

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10

Approaches to the Identification and Development of Gifts into Talents in Russia

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The Russian Federation is the largest and ninth most populous country in the world, counting 146.7 million people in 2019. The country does not have a systematic program for its gifted and talented (GAT) children; rather, it has an array, some historical and some innovative, of approaches. Although not unified until now, regular investment in the education of GAT students in the Russian Federation has been estimated to potentially result in a 7–9% increase in the Gross National Product, GNP (Рубцов, Журавлев, Марголис, & Ушаков, 2009).

According to UNESCO indicators, the average value for Russia's public spending on education from 2000 to 2016 was 3.69% of its gross domestic product (GDP), with a minimum of 2.9% in 2000 and a maximum of 4.1% in 2008 (The Global Economy.com, 2020). Russia's TIMSS 2015 results in mathematics placed its children consistently ahead of its European peers, except for one instance, when its eighth graders were just behind Slovenia's.

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Russia's PISA 2015 results placed Russian 15-year-olds either at (for mathematics and reading) or just a notch below (for science) the OECD average. PIRLS 2016 results put Russian fourth graders at the top, followed by their peers from Singapore, Hong Kong SAR, Ireland, and Finland.

The current system of education in Russia is rooted both in the educational traditions of Imperial Russia and the post-revolutionary traditions of the Soviet Union (Alexander, 2001; Bronfenbrenner, 1970). Today, the process of identification, selection, education, and placement of GAT children is guided by statutory federal laws (Правительство Российской Федерации, 2015), executive presidential decrees (Президент Российской Федерации, 2016), strategic objectives of national development (Президент Российской Федерации, 2016), and administrative regulations (Министерство образования и науки Российской Федерации, 2010). This system identifies GAT children, places them into specialized schools, and focuses on three general domains: academics, sports, and fine arts (Grigorenko, 2000, 2017; Grigorenko & Clinkenbeard, 1994; Jeltova & Grigorenko, 2005; Jeltova, Lukin, & Grigorenko, 2009).

This essay only briefly outlines the main features of the GAT system in Russia, as recent comprehensive reviews are readily available and focuses primarily on the questions identified as key by the editors of this book. It presents the essential features of the GAT system in Russia, comments on the system's contribution to international GAT science and practice, and outlines the system's points of future possible growth. Importantly, it pays particular attention to the recent development of two residential programs for GAT youth, one newly reformed, *Artek*, and one newly developed, *Sirius*.

The Primary Conceptions of GAT in Russia

Russian psychology, since its early stages of development as an independent science, has viewed human development as a continuous transformation of the biological foundation of an individual into a culturally and socially conditioned individual (Выготский, 1982; Леонтьев, 1959). Thus, for example, Lev Vygotsky (Vygotsky, 1978) separated "natural" (lower-level, biological) and "higher" (upper-level, modulated by culture) mental functions, stressing that the emergence of the latter necessitates the inclusion, utilization, and transformation of the former in social activity. Aleksei Leontiev (Леонтьев, 1959) intentionally separated two concepts: the "individual," characterized primarily by biological characteristics (e.g., height, weight, metabolism, oxygen consumption), and "personality," characterized primarily by cultural-social characteristics (e.g., motivation, intelligence, grit). These views have impacted the field of GAT identification and education through the distinction of the concepts of "giftedness" and "talent" in such a way that giftedness refers to a constellation of genetic predispositions (i.e., the biological potential) and talent refers to a manifestation of the potential in the creation of socio-cultural products that are both significant and valuable (Брюно et al., 1995). Today's system of GAT education in Russia rests on two pillars. Its first pillar is identification, as children with these "gifted" characteristics should be identified. Its second pillar is exposure and continuous education, as children with such characteristics should be exposed and/or nurtured in environments that can trigger and solidify the constellation of "gifted" characteristics into talent.

Multiple theoretical influences define the field of studies of student talents and gifts in Russia today. Historically, the domain of Soviet psychology that is most influential for this field is the study of abilities. Boris Teplov (Теплов, 1961) developed a theory of abilities and giftedness, and Boris Anan'ev (Ананьев, 1977) investigated age-dependent changes in the structure of cognitive functions from a systemic point of view. Yakov Ponomarev (Пономарев, 1976) worked out a hierarchical model of creativity, differentiating logical (ordiscursive) and intuitive thinking, placing creativity in between these levels as an indicator of the transactional process required for a creative act to emerge.

Currently, there are also multiple theoretical approaches influencing theories of giftedness, first and foremost being the Russian theories of intelligence. Specifically, Marina Kholodnaya's (Холодная, 1997, 2002) ontological theory of intelligence stresses the importance of considering the complex structure of intelligence and its transformation throughout its development, as captured by the person's cognitive, metacognitive, and motivational experiences. Dmitry Ushakov (Ушаков, 1999, 2003), in his structural-dynamic theory of intelligence, views intellect as a developing entity whose lifespan functioning and transformation is driven by general principles of development.

Along with the importance of intelligence, Russian psychology stresses the importance of creativity for the manifestation of talent. Multiple authors (Богоявленская, 2002; Ушаков, 2011) have contributed to this field; here we briefly comment only on Ponomarev's ideas, as they have not been translated into English, to our knowledge, but are very important for understanding the Russian approach to GAT today. Ponomarev stated that there is a particular layer of experience that is not explicit (i.e., rational), but implicit (i.e., irrational). The former is accessed through knowledge and the latter can be accessed through intuition. The former is typically solicited in educational settings, while the latter requires the problem-solving context of project-driven settings. Both knowledge and intuition are important for the manifestation of talent.

Although numerous Russian psychologists have written on giftedness, these writings have not converged in any comprehensive theories of giftedness. One theory of giftedness (not yet empirically validated) is that of Marina Kholodnaya (Холодная, 2011). Kholodnaya is particularly interested in the question of why not all gifted children grow up to become talented adults, and why there are many talented adults that never demonstrated any specific gifts as children (e.g., the Soviet-American poet Josif Brodsky, who repeated second grade and dropped out of school in seventh grade; Юркевич, 2011). Kholodnaya also observes that giftedness identifiers are either too narrow (i.e., IQ) or too broad (i.e., personality characteristics) to differentiate between the groups. She stresses the issue is not how to identify and educate giftedness, but how to ensure that as many children as possible, whether demonstrating gifts in childhood or not, are able to become competent adults demonstrating high levels of expertise in their chosen domains.

Ushakov's new investment theory (Валуева, Григорьев, & Ушаков, 2015) discusses the phenomenon of desynchronization of cognitive development in gifted children. According to him, it is possible to predict, stimulate, or slow down desynchronization by identifying chronogenic factors (specific to developmental stages) and personogenic factors (individual's characteristics) in gifted children. Desynchronization occurs when the factors are misaligned, while the productive alignment assumes the construction of a suitable and individualized environment for the development of GAT children. Citing the ideas of the founders of Soviet/Russian Psychology, Lev Vygotsky and Sergey Rubinstein, Ushakov stressed the importance of the agency of the developing gifted child—his or her active participation in the "transformation" of gifts into talents. He emphasizes that the crucial elements for the transformation of giftedness into talents are the individual's "equipment" (e.g., ways of approaching and analyzing a problem, mobilizing existing knowledge, and unleashing intuition), which can be mastered only in apprenticeship and hard work on real problems (e.g., meaningful practice that is related to the making of products that are needed and appreciated by society).

Viktoria Yurkevich (Юркевич, 2011), talking about possible mechanisms of the conversion of giftedness into talent, introduced the concept of "developmental discomfort." It is a notion symmetrical to the tension of identifying major challenges and looking for ways to solve or address them. This concern about what happens to gifted children as they become adults has been echoed in the latest federal documents outlining the rules for the identification, support, and monitoring of the development of children with gifts and talents

(Правительство Российской Федерации, 2015) in an unprecedented attempt to register and track a substantial portion of GAT children into their adulthood through Academic Olympiads.

Essential Features of the GAT System in the Russian Federation

The precursors of the modern version of the GAT system in Russia can be traced to the nineteenth century, when the Astronomic Society of the Russian Empire held the first "Students' Olympics of the Mind" (Ushakov, 2010), hereafter, Academic Olympiads or simply Olympiads. When they re-emerged in the 1930s, these Academic Olympiads became very popular. Post-World War II, the country needed a steady influx of qualified scientists and engineers; so, to maintain that inflow, on top of the Olympiads, four specialized boarding schools for children and adolescents with gifts in math and science were established in Moscow, Leningrad, Kiev, and Novosibirsk in 1963. These schools recruited students by means of the Olympiads, but also by means of distance education (i.e., children corresponded with these schools by receiving and submitting assignments) and summer sessions held at these schools and other locations throughout the country.

As societal priorities change, so change the ways societies address the identification and education of its GAT youth. Commenting on this association, Ushakov and Shepeleva differentiate two general approaches to addressing the GAT issue at the societal level, namely, extensive and intensive approaches to giftedness (Ушаков & Шепелева, 2014). The extensive approach tends to identify the most accomplished youth, who form a fairly small group of top accomplishers. The intensive approach is aimed at identifying "the promise," especially among those youth whose academic opportunities are limited by their geographic location or minority status.

A special remark has to be made with regard to the utilization of psychological tests in the Russian educational system. Importantly, the usage of psychological tests in the context of education was explicitly prohibited in 1936 (ЦК ВКП(б), 1936). Although officially cancelled (Герейханова, 2020), the order created a breach in all child services domains, rendering them unable to conduct large-scale studies. Yet, there are relevant examples of research studies utilizing testing approaches developed in the West (Обухова & Чурбанова, 1995) and in Russia (Богоявленская, 2002). According to Druzhinin (Дружинин, 1995), high test results do indicate the presence of intellectual gifts. Yet low test results exclude neither the presence of intellectual gifts nor the possibility of these gifts developing in the future. Therefore, it is recommended that these tests be used for inclusion, but not exclusion purposes. Relatedly, in their analysis of the different systems of identification and education of children with gifts and talents around the world, Margolis and Rubtsov (Марголис & Рубцов, 2011) identified features of the Russian system that are common and those that are Russia-specific. Common features include: specialized after-school activities, competitions for specific talents, a network of specialized schools, and various partnerships with higher learning institutes. Russia-specific features include support of children demonstrating high competence and the minimal use of psychological and educational tests.

Thinking about the contributions to international GAT science and practice by Soviet/Russian psychology, a number of its strengths are notable. First, one needs to consider the indicators of performance that have been valued by the country. Such performance achievements are quite obvious in academic, fine arts, and sports arenas. Second, in the education of gifted and talented students, there is much to say about learning, training, and working within a school, and working within a particular approach to educating gifted and talented children that is known for the achievement of its students. In Russia, such schools are multiple and well known. For instance, the internationally prestigious Kolmogorov School of Math and Science, the Olympic level figure skating school of Tatiana Tarasova,[1] or the competitive study of violin with Elena Adzhemova.[2] Third, Russian mass media promotes excellence and uniqueness, acting as a "match maker," thus increasing the chances of children with "raw" talents to be identified and matched with a mentor to oversee their training from promise to performance. Although there are distinct accomplishments discussed above, there are areas of weakness in the field of giftedness in Russia. The assumption that the Olympiads system identifies GAT children has not been systematically validated. In fact, a single study that did look at the psychometric properties of the collections of questions used in a variety of Academic Olympiads reported poor psychometric properties of these collections (Ushakov, 2010).

Further, in their analyses of the state of GAT programs in Russia, Rubtsov and colleagues (Рубцов et al., 2009) outlined the main characteristics and directions for the development of these programs in Russia. The authors first acknowledged the growing interest in these programs by the government,

[1] Tatiana Anatolyevna Tarasova is a Russian figure skating coach and national figure skating team adviser.

[2] Elena Konstantinova Adzhemova is a Russian violin player and a professor at one of the most prestigious music academies, the academy named after the Gnesin family.

aiming to strengthen GAT programs from an economic, social, and humanistic point of view. Yet, while expressing cautious optimism, they observed that the GAT system, as it exists in Russia now, is still of the old style, driven by two key elements—the system of Olympiads for gifted and talented and the system of elite, highly specialized schools. As a consequence, the population coverage provided by these elements is very low, being about 0.1% of total high school graduates. These established systems are generally oriented toward the usage of standardized tests of intelligence and consider "giftedness" to be exhibited when the IQ value exceeds 1.5–2 standard deviations from the population mean of 100 (i.e., 122–130, which amounts to 2–10% of the general population, assuming that IQ is normally distributed). Moreover, it is not only the size of the system that requires enhancement, it is the system itself. It is argued that (Рубцов et al., 2009), while the system has elements that are worth keeping, it also has missing elements that need to be introduced. One such missing element pertains to the absence of a systematic scientific way to identify more covert giftedness in children.

While future directions in Russia seem promising, a number of developing tendencies seem worrisome. Specifically, there is a strengthening conception of human gifts and talents as economic capital and investments of a particular, in this case, Russian society (Духанина, 2009; Левашов, 2009). Correspondingly, there is growing pressure on educators and psychologists to develop programs for the identification and education of gifts and talents that are evidence-based and effective; yet, such pressure is perceived as technocratic (Юркевич, 2011). Finally, there is a concern with the homogeneity GAT children are immersed in, making them hyper-focused in only one subject, which may be counter-productive to becoming productive adults.

Exemplifying Theory and Sampling from Practice

Two points highlighted in the description above are particularly notable: first, there are very few empirical studies of GAT in Russia; and second, the references above, although recent, do not go beyond the year 2014. This is, in part, because 2014 was marked by the initiation of strategic plans for two residential centers for gifted youth in the Russian Federation, *Artek* and *Sirius.* The rest of this chapter presents both programs and their current frontiers.

Artek

Artek (Артек in Cyrillic) is an International Children's Center on the Black Sea in the town of Hurzuf, located on the Crimean Peninsula near the Ayu-Dag Mountain. It was established on June 16, 1925 as an all-year residential program catering to "the best" (including gifted) children from the country's republics. At its inception, *Artek* had a single camp with four tents, ran four sessions per year, and hosted only 80 youth per session, that is, 320 youth in total. In 2019, still gaining in popularity, it continues to grow and spread along 4.3 miles of the Black Sea's shore. Its territory hosts ten camps ("Кипарисный,", "Лазурный," "Лесной," "Морской," "Озерный," "Полевой," "Речной," "Хрустальный," "Янтарный," "Солнечный"). Currently, *Artek* administers 15 21-day-long sessions per year (all driven by particular themes, namely, Science, Literature, Theater, Space, Victory, Artek, Movies, Friendship, Arts, School Tourism, Unity, Profession, Business, Tradition). Altogether, *Artek* accepts about 35,000 youth aged 8–17 years annually. These youth are divided between different camps fitting their general interests and are further divided by age.

Mission and Goals

Historically, the mission and goals of *Artek* have changed, reflecting the development of the country, its education system, and its focus on a particular "facet" of its GAT program. In 2014, the Center underwent a significant reorganization that resulted in its new mission statement, referred to as "Mission Reload" (or Refresh, reflecting lack of precision in translating the Russian word). *Artek*'s mission is based on the humanistic values of the development of human individuality, self-determination, self-expression, self-realization, personal growth, collaboration, and civic engagement. It is stated to cater to gifted youth, to assist them in transforming their gifts into productive talents. Importantly, *Artek* preaches and practices its outreach internationally, becoming an international platform in 1926 after a group of German children attended.

Programs

Artek's operation is framed by three letters: E for **E**ducation, **H** for Health, and **R** for Recreation. In Russian, these words all start with O (**О**бразование,

Оздоровление, **О**тдых), so the abbreviation is known as the "Three O's of *Artek*."

For **E**, *Artek* operates on the basis of the Russian Federal Educational Standards of the second generation (Национальная ассоциация развития образования и науки, 2009, 2010, 2012), with its focus on competence-based rather than knowledge-based education. In turn, the *Artek* educational system is based on four pillars: (1) pedagogy of collaboration; (2) collective activity and creativity; (3) creation of a temporary children's collective; and (4) unity of care for mind and body. These pillars are used to implement a particular type of pedagogy that is referred to as the "technology of educational events." Such a technology is characterized by (1) age-appropriate and motivating gamification; (2) interdisciplinary content that allows the formation and crystallization of a holistic, rather than fragmented, perception of any event; (3) the derivation of meta-cognitive skills aimed at assisting building various competencies; and (4) team-based approaches to learning.

For **H**, *Artek* is systematic and purposeful in capitalizing on its location to promote health and well-being in its daily routines and dietary approach. In all sessions, children are expected to be engaged in various sports and physical exercise. The Center is adequately supported by medical and public health personnel, the majority of whom are also educators.

For **R**, although youth's time in *Artek* is filled with various activities and there is very little "down" time, the Center practices an active recreation approach, where youth are engaged in a variety of different activities that include a balance of cognitive, emotional, and physical components.

Selection

The core element of *Artek*'s strict selection process is that it represents an acknowledgment of and a reward for the youth's accomplishments, which have to be documented and submitted for scoring by the admissions team. The evaluation is portfolio-based and includes a list of accomplishments, supported by letters from coaches, mentors, and teachers. Importantly, based on the youth's profile of interest, there are placement opportunities within various camps, sessions, and programs that should allow youth to continue developing their strengths and, when needed and possible, addressing their weaknesses.

Personnel

Another distinct feature of *Artek* is the adults who are there. There are five main categories of *Artek* adults, who are rigorously selected.

The most populous group of these hires are young adults who serve as counselors (or assistant counselors). Each age-based team typically has three to four young adults who are, in different combinations, always with the youth. These counselors—often fresh college graduates or college students—are charged with making sure that the youth adapt to their new environment, become team members, and realize their potential to the maximum degree while at *Artek*. *Artek* prioritizes youth from partner colleges as counselors but leaves the door open for individuals to apply.

Another large group of adults working at *Artek* are teachers; there are approximately 100 teachers who support regular schooling (e.g., deliver grade-appropriate education) when the Artek school is in session (September–May). These are permanent personnel, most of whom are distinguished educators.

A critically important but smaller group consists of educators from partner organizations, who support the non-academic education at *Artek*, including various programs, events, and everything else that constitutes the texture of learning for gifted children at *Artek* outside of the classroom. *Artek* partners are various organizations that provide financial and personnel support to *Artek* and administer many of *Artek's* thematic programs through the provision of supplies and specialized personnel. To illustrate, among *Artek* partners are the Russian Space Exploration Corporation Roskosmos, the Russian Geographic Society, The Russian Ministry of International Affairs, and various sport associations, among many others.

Finally, there is a large management group that is responsible for the realization of *Artek's* mission and vision, the maintenance and development of the physical plant, and for the transmission of *Artek* values through the generations of Russian youth who attend. Importantly, and not accidentally, many members of the *Artek* administration are former *Artek* youth or counselors themselves.

Alumni

One of the most important aspects of *Artek's* mission is to maintain a connection to and support of youth after they return to their homes. This network of gifted peers is envisioned as a "stepping stone" to rely on for support (professional, educational, moral) while youth actively work on transforming their giftedness into talent.

Broader Context

Artek has a tremendous reputation, mostly national but also international. It celebrated its 95th anniversary in 2020. Throughout its existence it has developed multiple traditions, activities, attractions, and registered numerous accomplishments.

Sirius

The year 2014 was marked by one more very important event for GAT policy, practice, and science in the Russian Federation. As per the initial plan for post-Olympic use of the Sochi campus built for the 2014 Winter Games, a substantial portion of the newly built facilities was to be given to GAT youth (Шмелева, 2020). To detail and implement this plan, a nonprofit foundation, "Talent and Success," was created in 2014 to transform the facilities into what is now known as the Educational Center *Sirius* (Сириус in Cyrillic).

Today, *Sirius* is an intensively developing massive project, which was jump-started in 2015 as an in-residence center for gifted children using the physical plant of the Olympic Media Center. The center is steadily expanding, and the project in its entirety is still being overseen by a watchful President Putin—who developed and implemented *Sirius* (Евстифеев, 2018).

Mission and Goals

Sirius' mission is the development of gifted youth from all regions of the Russian Federation, both while they are in residence at *Sirius* (e.g., attending a 24-day regular session or a *Sirius* event and living in one of its dormitories or hotels) and while they are at home, when they may draw upon a network of highly accomplished professionals who can support and mentor these youth locally and at a distance. Its goals are directly connected with its mission, namely, to (1) become a flagship organization in GAT identification, development, and education; (2) create an inspiring educational environment for gifted children in science, arts, and sports; (3) develop and disseminate intensive educational programs for gifted youth; and (4) support *Sirius*' alumni, and to foster in them a continuing sense of responsibility for the future of Russia and the world. The goal is to have youth that are accomplished, with diverse talents and skills, and that have supporting, experienced, and specialized educators.

Programs

Sirius has a portfolio of programs that vary in terms of their length, intensity, and goals. First, it offers programs in three areas of human activity—science, arts, and sports. The *Sirius* science portfolio includes programs in mathematics, physics, chemistry, biology, and computer sciences and informatics. Its arts portfolio includes classical ballet, painting, academic music, and literary arts (e.g., writing, poetry, linguistics, journalist, drama, and classical literature). The Center's portfolio of sports programs includes ice hockey, ice skating, and chess. Second, these three "streams" are supported by different expert groups that combine educators in residence: educators associated with *Sirius* who work with youth when they return home, educators-professionals, who work with *Sirius* remotely, and educators-professionals who come to *Sirius* for brief visits. Third, capitalizing on the availability of different types of educators or educators-professionals, the Center utilizes them in a variety of different programs. Specifically, there are long-term 24-day in-residence programs for youth that are project-oriented. There are also short-term programs (conferences, contests, competitions) that are thematically focused and address real national and international challenges.

Sirius also has individual programs where particularly distinguished alumni can receive various grant support aimed at assisting them throughout their educational careers. Fourth, *Sirius* is embedded in the structure of a regional capital, Sochi. The Center has good relationships with the city and makes a special effort to accommodate the needs of the local gifted youth. Fifth, there is *Sirius on line*—a digital learning and problem-solving platform that permits both graduates and applicants to develop their gifts from a distance. *Sirius on line* also offers a variety of programs, ranging from the preparation for selection, to selection, to post-admission preparation for the trip to the Center, and support in preparation for entrance exams to colleges and universities. Finally, the Center tracks and maintains a database of its alumni, the purpose of which is not only to track their achievement, but also to connect the youth applying to or returning from *Sirius* to connect to local graduates.

Selection

A careful youth selection process is viewed as one of the foundational elements of *Sirius*' success. *Sirius* has multiple expert review groups that consider the applications submitted by the youth from all corners of the Russian Federation, then select the strongest youth based on expert consensus. But even to become competitive for this selection, the candidates should have already demonstrated their suitability through their results in all-Russian or international Olympiads, sports competitions, or performance contests. If there are no competitions that match the profile of *Sirius*' programs (e.g., engineering), *Sirius* uses its own selection mechanisms.

Sirius accepts up to 9600 youth annually. An important result of the sports stream at *Sirius* is the selection of players for the Russian junior ice hockey team. In 2018, out of 28 players invited to play for the team, 24 were *Sirius* alumni.

Personnel

The faculty of *Sirius* are one of its distinct and most important features. To work with the gifted youth, the Center hires permanent personnel and consultants who are (1) the best subject teachers, proven to be skilled in working with gifted children; (2) young scientists from universities, research centers, and institutes; (3) distinguished Russian scientists, engineers, writers and poets, musicians and dancers, sports-men and women; and (4) business people, representing leading Russian companies. These professionals constitute a great resource not only for *Sirius*-affiliated regional centers, but also for *Sirius* itself, as some of them are employed by the Center.

Alumni

Sirius graduates, before they leave and return home, take an oath "to invest time and energy in accomplishing high goals; to finish what is started; to use all knowledge, talent, experience, success only for the sake of the Common Good, in the Motherland and in the world" (Шмелева, 2017, p. 6). But the youth are not "left behind" when they leave *Sirius. Sirius* has been expanding its network to various regions in Russia; as of now, there are 52 *Sirius* regional centers, which play a very important role for gifted youth in their identification and motivation, teaching and learning, and support throughout their transition to professional life.

In addition to supporting the association of alumni and staying connected with its graduates, *Sirius* runs a competition to select for and administer Presidential grants for gifted youth (both affiliated and not affiliated with *Sirius*). These are given to support their tenure in higher-education institutions. Since its inception, *Sirius* has distributed more than 4864 such grants;

many recipients of these grants are *Sirius* alumni. The accomplishments of Russian gifted youth, both those who traveled to *Sirius* and those who did not, are reflected on the new information platform "ТалантыРоссии.рф"—Talents of Russia, supported by *Sirius.*

Broader Context

Creating the *Sirius* Center was the first step in the consolidation of the post-Olympic physical plant using the ideas and inspirations of new models of education. Currently, *Sirius* is expanding into a high-density "Park of achievement," with educational laboratories and high-tech workshops. The idea behind these developments is to keep building real science, arts, and sports enterprises that, in addition to accomplishing research and application goals, can serve as training fields for *Sirius* youth. They also envision to serve as a startup incubator with possibilities for special taxation and investment regimens.

Conclusion

In this chapter, we have attempted to outline the main features of the theory and practice of GAT identification and education in the Russian Federation. Concluding this chapter, it is important to comment on the following.

First, the theory and practice of GAT identification and education have developed mostly independently, with the former being primarily propelled by psychological theories of abilities, gifts, and talents, and the latter by pedagogical practices for identifying promising youth and placing them in specialized, highly demanding, and productive contexts of training and achievement. Yet, there are numerous cross-references in the two traditions, most notably in the importance of identifying gifts and then putting them into appropriate contexts to condition that transformation into talents.

Second, both examples of practice discussed here, *Artek* and *Sirius*, to the best of our knowledge, provide unique instances of substantial financial and political capital applied at the highest federal levels to GAT identification and education. Such investments have been questioned both internationally (Mandelman, Tan, Aljughaiman, & Grigorenko, 2010) and nationally (News.Ru, 2020), as potentially creating inequality in society. Moreover, although very few GAT programs in the world have been systematically evaluated, when they have, their effectiveness has not been demonstrated (Mandelman

& Grigorenko, 2013). Thus, it is particularly important to attempt to carry out unbiased and careful evaluations that will not only provide the needed feedback on this investment, but also generate some cost-benefit analyses. This information will be highly instrumental for both Russian and worldwide GAT programs.

Finally, it is important to mention that both of the programs discussed here, as well as many other programs in the world, in their mission statements, inevitably emphasize the importance of the civic, ethical, and moral development of gifted youth. This aspect of Russia's GAT programs is severely understudied and deserves as much research attention if not more as the returns to the economy. Hopefully, both or either *Artek* or *Sirius* can make this contribution to the world literature.

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11

Urban Bilingual Gifted Students

Sandra N. Kaplan and Eugenia Mora-Flores

Introduction

Recognizing and responding to giftedness manifested by urban bilingual students are often misunderstood. With the growing number of bilingual students in classrooms across the country, there is a pressing need to understand this unique subgroup of gifted students. The National Center for Education Statistics reports that roughly 9.6% (2016), 4.9 million, of all public-school students are English learners (NCES, 2019). These data include only those bilingual students who have been identified as English learners (EL). The number is larger when we consider students who also speak a language other than English but who did not indicate it on the home-language survey at the time of enrollment or who are identified early on as initial fluent proficient, indicating that they had sufficient English language skills to not need additional language support. This complex group of bilingual students, EL and non-EL, are sometimes perceived as unable to display the traits that distinguish their abilities due to discrepancies in experiences and language development. Qualities associated with living in a specifically defined minority-cultural environment coupled with the students' levels of English proficiency are credited by some educators and parents with prohibiting the formal display of

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indicators facilitating identification as gifted. Importantly, beliefs that certain living conditions or environments and English fluency are equated with abilities prevail among educators and parents. The literature is replete with the need to attend to issues of cultural, linguistic, economic and academic diversity, and equity in education; however, students who live in an urban area occupied by groups of people who share cultural, linguistic, and common values are not readily perceived as possessing traits of giftedness. Issues of "academic prejudice" both inhibit the identification of urban bilingual students and their access to the differentiated or challenging curriculum and instructional opportunities they deserve and should have access to receiving.

Identification

Educational commentary (Renzulli, 2005) refers to the need to ensure that the composition of the gifted population reflects the cultural and linguistic diversity of the general student population. This has been termed "academic prejudice." The concept of "academic prejudice" can be named as one factor that causes the disparity between the composition of the general and gifted populations. Academic prejudice refers to educators and parents' belief that differences in environmental conditions, life experiences, and the primary spoken language of students do not promote the identification of these students as gifted. Academic prejudice is perceived by some educators as a means to "protect" urban bilingual students from the identification process that will not easily yield the data to formally acknowledge and display these students as gifted. Adjustments and additions to the formal bank of identification instruments have mediated some of the issues of identification of urban bilingual students. Of major concern is still the language of administration and the inability of bilingual students to demonstrate their potential in English if the assessment requires extensive use of English-language skills to demonstrate their potential. A major problem for the urban bilingual is the basic or regular curriculum these students have consistently been experiencing that does not afford them the opportunity to express the qualities that define gifted behaviors. The basic or regular curriculum most frequently taught to urban bilingual students often limits or constricts expressions of innovative thinking and abstract reasoning and subsequently also limits their value for and expression of these traits. These are the traits that are often measured on tests to identify students as gifted.

As stated, achievement differences among ethnic and linguistic groups in urban environments are a general contemporary educational concern contributing to the underrepresentation of urban bilingual students in gifted programs. Rigorous curriculum, confusion about identification of gifted procedures, and a lack of programmatic features applicable to advanced and gifted learners (Olszewski-Kubilius & Thomson, 2010) are stated as causes. While suggestions to ameliorate the causes attributing to the underrepresentation of urban bilingual students in gifted programs, ideas affecting the situation often seem to be based on "academic prejudice" or the set of suggestions that align to the belief that urban bilingual students need to be rendered academic assistance to be recognized for their abilities. This type of "academic prejudice" results from the concept that differences in environment and language are interpreted as a "lack of readiness" to be identified or to exhibit giftedness. This perceived "lack of readiness" consequently is seen as a need to address personal and social undeveloped or underdeveloped academic areas in order for the student to be acknowledged for participation in challenging curriculum and/or identified for membership in an advanced learner group or in gifted services. The term "academic prejudice" has been created to represent educators and sometimes parents' belief that individual and group differences represent a potential disability rather than individual and group abilities. In the process of engaging urban bilingual students in a myriad of activities to ready them to be recognized and responded to as gifted individuals, both the students' time and self-concept are sometimes at jeopardy.

Arroyo, Rhoad, and Drew (1999), in their article, "Meeting Diverse Student Needs in Urban Schools: Research-Based Recommendations for School Personnel," labeled "Key Influences on Student Underachievement" (page 146): teacher behavior, teacher expectations, curriculum relevance, class size, disengagement from school-related activities, confidence in the student's ability to achieve high mobility attendance, parental expectations and involvement, level of parent education, and poverty or low income. Several of the areas addressed by the authors have relevance for defining and explaining "academic prejudice" (see Table 11.1).

Sociocultural Bridges and Academic Rigor

Teachers need to understand the assets of the urban bilingual student and see the connections between the context for learning within and beyond the classroom. Preparing teachers for creating instructional contexts that bridge community and family assets with school learning begins with understanding the urban bilingual context and language development. Language learning is a complex process that involves problem solving, critical thinking, and creative

Table 11.1 Defining and explaining academic prejudice

Concepts from the article	Relevance to defining "academic prejudice"
Teacher expectations	Teachers who have a predisposed belief that limited English language development is analogous to having limited knowledge of subject or skill application. A lack of understanding of the relationship between cognition and bilingualism (Bialystok, 2011) inhibits a teacher's perceptions of the abilities of bilingual students
Confidence in the student's ability to achieve	In the effort to "intellectually protect" students from embarrassment or failure, teachers sometimes avoid challenging urban bilingual students. Teachers sometimes avoid presenting urban, bilingual students a challenging experience to avoid confronting them with a lack of success and subsequently, "a fear of failure"
	This fear becomes an inhibitor to the student and disables them from the opportunity to "show what they know"
Curriculum relevance	Creating intersections among the basic or regular, differentiated, and culturally relevant curricula is a means to provide multiple opportunities to display gifted behaviors. Maintaining curriculum separateness rather than developing integrative features in the curriculum denies the urban, bilingual student's opportunities to "show" their multiple abilities. Using what would be considered a lower level skills-based curriculum with set developmental progressions and pacing guides often supersedes a responsive and rigorous curriculum for bilingual students. These curricular designs are meant to remediate rather than to accelerate the development of the students' abilities
Disengagement from school-related activities	The disengagement of urban bilingual students from school-related activities is often misunderstood as lack of interest in school or academic endeavors. In reality, many of the urban bilingual students are perceived as not being "ready" to engage in some of the activities and are not invited to attend these activities. In some situations, these activities are not clearly defined for parents to support the child's involvement. Misunderstandings about the purpose of the school-related activity, the responsibilities it requires, and so on are not articulated and communicated in a manner that makes participation clear and important to the student

thinking. For English language learners, these processes are paralleled with the challenges of keeping up with the rigor of academic content knowledge while still developing a second language. The challenges of learning in a second language can be supported by understanding the overlap in the processes as well as the experiences students bring with them from their homes and communities. Teachers can serve as advocates for English learners to build the bridges that can connect the day to day and language-learning experiences children bring from home to succeed in the classroom. Luis Moll, Amanti, Neff, and Gonzalez (1992) argued "that by capitalizing on household and other community resources, we can organize classroom instruction that far exceeds in quality the rote-like instruction these children commonly encounter in schools" (p. 132). Learning about students and their lived experiences opens up a range of teaching and learning assets that teachers can use as bridges to content standards and complex skill development.

Learning about students is an important step in the overall process of maximizing learning by capitalizing on their lived experiences. There is a range of low-stakes strategies that can encourage students to open up and share their stories and the funds of knowledge they bring from their homes and community.

Strategies for Getting to Know Your Students

I Wish My Teacher Knew This strategy can be used throughout the year as a way to learn about your students throughout the year. The teacher provides each student with a post-it note and asks them to complete the sentence, *I wish my teacher knew…* The teacher has a piece of chart paper up with the sentence starter, *I wish my teacher knew….* The students place their sticky note onto the chart paper. They do not have to write their name on their sticky note, so as to encourage the student to be as open and honest as possible. You can guide the sentence by adding additional parameters. For example, what you would want them to share about their families, their academic progress, their preferences in class, or simply keep it open ended.

Interest Surveys Open- or closed-ended surveys can help teachers gather a range of information from their students. Teachers can inquire about students' interests related to extracurricular activities, events they share with their families, favorite genres of literature or movies, technology preferences, social media activities, family trades, subjects of interest, and preferred learning modalities. The surveys can be completed as a written survey in class with older students who have more written fluency. They can be sent home to be completed with family members and they can also serve as the basis for a one-on-one interview protocol. Sample interest surveys are available in Appendix.

Cultural Bags A creative way to help students share more about themselves and their families is through an activity called cultural bags. Using a simple brown paper bag, ask students to decorate the bag with a variety of pictures, words, drawings, or clippings that represent who they are. Students should be encouraged to fill the outside of the bag with their visual representations of themselves. Inside the bag, have students place three items that represent them and/or their family. Students bring their bags to class to share with a small group.

I Am Video Technology is always changing so teachers can determine the best platform for students to create and present their videos. Currently, students can use their camera phones and upload a short 2-minute video to a Google Drive for easy access and review by the teacher and peers. An *I am* video can capture a great deal about a student from their own perspective. Teachers can guide the video with prompts. For example, students can complete the statement with *I am…*

– daughter/son of…
– sister or brother of…
– ethnic or cultural identity
– goals
– pet owner
– parents' occupation
– hobbies
– special skills
– interests

If a video option is not available, the students can craft their responses as a creative poem or art project.

All of these strategies can begin to elucidate the non-traditional learning experiences that reveal potential, abilities, and interests relevant to diverse areas of giftedness. In Mrs. Machado's class, her student, Isabel, shared that her father was a mechanic. She told stories of how she would help her father when he was fixing cars and talked about how fun it was to talk with her dad about how all the parts of the car had to work together for the car to run smoothly. During a science lesson on the parts of the body, Mrs. Machado was walking around while students worked on an experiment with blocks. They were to find a way to connect the blocks to show how the systems of the body are organized and work together for the body to function properly. When Mrs. Machado came to Isabel's group, Mrs. Machado prompted Isabel by asking, *Isabel, I remember you shared that you enjoy working with your father on cars. In what way is a car like the body?* Isabel started sharing with her group that the body was like a car; all the parts have to work together for a person to be healthy, just like a car. Isabel went on to talk about how the food we eat needs to be the right balance just like the fluids in the car help the car stay healthy.

Mrs. Machado began to see the complex thinking that Isabel was exhibiting by connecting the complex workings of a lived experience she shared with her father regarding her science lesson. Mrs. Machado asked Isabel to share her ideas with the class as a way to not only validate her experiences but to push the class to see how their learning was interrelated. Mrs. Machado provided a platform for Isabel to share her experiences and reveal her complex thinking.

- To identify areas of giftedness, educators and parents need to consider the non-traditional learning experiences that reveal potential, abilities, and interests. For example, in a situation where the students are asked to "talk to their partners" about some aspect of learning, a problem, and so on what are the cues that would distinguish a student's giftedness?
- How can a teacher connect or create parallel learning/curriculum experiences to facilitate the transfer of prior knowledge or funds of knowledge to a new situation? For example, a discussion about viewing artifacts in a museum requires the same skills as viewing plants or animals in your backyard. The skill of observing and comparing/contrasting in a familiar to unfamiliar setting to "show one's potential" rather than saying, well, that student has never been to a museum so he/she cannot participate fully in this learning experience.
- The teacher's role in uncovering ability and potential by utilizing Specially Designed Academic Instruction in English strategies, a range of listening, speaking, reading, and writing strategies for supporting language acquisition during the teaching and learning process.
- How does a teacher embed the English learner strategies within the context of the basic, regular curriculum all students study to uncover ability?
- What does attending to individual differences mean that do not single out but rather support and honor bilingual students.

Multiple Memberships

The allegiance of some urban bilingual students to both the sector of the urban city in which they live and their native language has distanced rather than facilitated their integration and subsequently membership into the larger urban environment. Aiding students in recognizing the concept of "multiple memberships" is a means to introduce the idea that one does not have to relinquish one's primary identity to attain many and different identities from affiliations in many and different groups. Illustrating how one can simultaneously be an "urban bilingual student," gifted or advanced learner, orchestra member, Scout, and so on is important to discuss. It also is important to help urban bilingual students retain their identity without having to choose among membership options. The idea of "multiple memberships" also is important to all students with advanced learning abilities, talents, or potentials. Affiliation in one group should not deter affiliations in many other groups. How and when students' multiple membership affiliations is a barrier rather than an asset to the student needs to be a serious concern of educators and parents of all students.

Historically, bilingual students have been denied the opportunity to utilize all of their language resources as an asset for learning and a celebration of identity and cultural awareness. Dual-language programs "promote bilingualism and bi-literacy, grade level academic achievement, and socio-cultural competence—a term encompassing identity development, cross-cultural competence, and multicultural appreciation—for all students (Howard et al., 2018, p. 3)." Within the last few years there has been a much-needed focus on dual-language education for all students. Dual-language programs provide the opportunity for the development of cultural and communicative competence.

Hanley (1999) outlines key tenets of cultural competence that can enhance learning experiences for all involved. These include:

- The awareness, knowledge, and skills needed to work with others who are culturally different from oneself in meaningful, relevant, and productive ways.
- The ability to work effectively across cultures in a way that acknowledges and respects the culture of the person or organization being served.
- One can gain a broader perspective that acknowledges the simultaneous existence of differing realities that requires neither comparison nor judgment.

- One can be aware of likely areas of potential cross-cultural miscommunication, misinterpretation, and misjudgment; anticipate their occurrence (knowing what can go wrong); and have the skills to set them right.

Communicative competence further contributes to the concept of "multiple memberships" as students learn to navigate different language communities, formal and informal, as members of a range of sociocultural groups. Hymes (1985) introduced the concept of *communicative competence,* which includes knowledge of a language and its use as a key to social acceptance. Students understand how language can inform, support, and enhance their membership in a group. Masgoret and Ward (2006) advanced Hymes' concept, adding that language skills are relevant for performance in daily life in a new cultural society and for establishing interpersonal relationships in society. Understanding the sociocultural contexts that students are members of is critical to an equity-minded approach to teaching and learning, in this case, the ability to identify, support, and develop gifted, urban, bilingual students.

Equity for urban bilingual students is sometimes considered to be modifications of the regular or basic curriculum rather than access to the advanced or differentiated curriculum for gifted students. Identifying urban bilingual students as gifted redefines equal opportunity to mean that the school is providing these students with access to the differentiated curriculum designed for gifted students. This definition of equity enables urban bilingual students to be recognized for their capabilities as well as their differences. While it is acknowledged that there are certain features that enable an individual to "try out" for membership on a team, orchestra, or some other specialized group, hidden talent sometimes needs the chance to be experienced and expressed in order to be realized and recognized. The opportunity to try out is warranted to urban, bilingual students who may not have had the experiences of their urban peers. "The greater the variation of the student population, the richer the learning opportunities for all and the more assets upon which teachers may draw" (CDE, 2015, p. 881).

The concept of "teaching for opportunity" underscores and facilitates the process for urban bilingual students to be recognized for their abilities and subsequently to be identified as a gifted student. The concept places the responsibility on differentiated curriculum and instruction as the medium to uncover the student's abilities. Experiences that are provided to students can be the catalyst that uncovers the student's needs, abilities, and interests. Curriculum and instruction evoke the opportunity to show what the student knows. While it can be argued by some that this process is too informal and opportunity-dependent, the argument that a formal testing experience also does prey on opportunity: an opportunity of another type. In the "teach for opportunity" paradigm, the tenets of a differentiated curriculum specifically articulated for the gifted become the basis for the opportunity to demonstrate the students' abilities through interactions with the curriculum. The underlying construct of the "teaching for opportunity" curriculum is that the elements that respond to giftedness can and should be the elements that facilitate recognition of giftedness. Teaching for opportunity recognizes differentiation as a source rather than a reward for "giftedness."

An analysis of differentiation (California Department of Education, 1995) includes these elements that can be aligned to stimulate the performance of the traits of giftedness in urban bilingual students (see Table 11.2).

In summary, recognition of urban bilingual students as gifted learners sometimes is thwarted by the misperceptions of educators regarding the types and range of their capabilities. Efforts to identify the potential of urban bilingual students as gifted have included curricular, instructional, and programmatic experiences that provide practice in the areas perceived to inhibit the display of gifted traits. "Teaching for opportunity" is a concept that can be employed in conjunction with the design and implementation of a differentiated curriculum and language strategies to recognize and respond to giftedness in urban bilingual students.

Appendix: Sample Interest Surveys

Interest Survey

- What do you do after-school?
- What do you like to watch? Where do you access your media?
- What do you enjoy doing with your family and friends?
- What are your goals for this year?
- What are your hobbies?
- What are your strengths?
- What are your weaknesses?
- What is your favorite/least favorite thing about school?
- What do you do on the weekends?
- What do you want to be when you grow up?
- What is something special you want me to know about you?
- Who is your role-model? And why?
- Describe yourself in two sentences.

Table 11.2 Relationships between differentiation and the urban bilingual student

Differentiated elements providing the opportunity to demonstrate traits of giftedness	Relationships to urban students	Relationships to bilingual students
Sophisticated knowledge of the discipline	Community and neighborhood characteristics of economics and cultural activities are related to advanced subject areas such as economics (goods and services), philosophy (cultural values and beliefs), and physics (recreational sites and activities)	Students' funds of knowledge and language assets are related to core subject areas and the skills used to access and extend their learning across the curriculum
Inclusion of universal concepts such as CHANGE, SYSTEMS, RELATIONSHIPS as themes to coordinate a study	A natural means for students to classify and organize ideas within personal and social experiences	Cross-language transfer (Cummins, 2000, 2005) explains that there are "common underlying proficiencies" (set of cognitive, metalinguistic, and language skills) that students transfer across languages. This includes knowledge of universal concepts learned in one language that are not relearned but transferred to their learning in another language. Students possess the deep conceptual understanding and will simply need to learn the surface-level output of the concept in the new language
Utilizing key words to examine and probe in depth and complexity of the knowledge and understanding of a subject under personal or school-related study	Initially, students apply key words such as why, when, how, and where to delve into a study. As students engage in exploration of a topic or area of study, they employ more sophisticated language such as rules, perspectives, context, original, and embark on translating and judging their learning to address and expand their knowledge	Complex thinking requires sophisticated language patterns and vocabulary. Students understand key words and concepts through their common underlying proficiencies though need explicit support on how to express their complex cognitive processes. Academic language is critical to support students to express their complex thinking

(*continued*)

Table 11.2 (continued)

Differentiated elements providing the opportunity to demonstrate traits of giftedness	Relationships to urban students	Relationships to bilingual students
Engaging in original interpretation of the subject matter	Students employ their personally defined curiosity to investigate more about how something was developed and works or is valued over time	Bilingual learners draw upon prior knowledge and experiences captured in any language. This knowledge base provides a strong foundation for ongoing curiosity and investigation to continue to build upon, challenge, or extend their learning
Embarking on an individual study or project	Students initiate a self-defined study related to an interest prompted by the environment or school	For all students, relevance is key. When students can explore areas of interest that are relevant to their personal lives, their community or society as a whole, the motivation for learning, followed by the exploration of knowledge and language are enhanced

- What is one thing you would like to learn by the end of the year?
- What do you consider your strongest subject? What do you consider the subject you need more support in?

Reading Interest Survey

- What do you like or dislike about reading?
- What is your favorite book or article?
- Do you have a favorite author?
- Do you read at home or outside of school?
- Do you read with someone at home? If so, with who?
- Where do you like reading?
- What is your favorite form of reading (ex: books, magazines, comics)?
- What is your favorite genre?
- Do you enjoy reading? What do you like about it, or do not like about it?
- What is your favorite thing to read about?

- What types of things do you read at home? (Examples: Books, recipes, instructions, games, magazines, lists)
- Do you think we spend enough time reading in class? What types of reading would you like to do more of in school?
- Write one reading goal you have for this year?
- Who is your favorite book character and why?
- Do you read in another language?
- Which language do you prefer to read in, why?

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12

Cognitive Ability, Personality, and Privilege: A Trait-Complex Approach to Talent Development

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Subotnik, Olszewski-Kubilius, and Worrell (2012) proposed that a comprehensive model of talent development needs to be based in psychological science, and presented a preliminary model that incorporated psychological research on the developmental trajectory of general and specific abilities, non-cognitive traits, and environmental supports needed to guide gifted students toward eminence. Our concept of giftedness and talent development, which is very similar to this model, is influenced by our fifteen years of counseling and research with creative and gifted students at the Counseling Laboratory for the Exploration of Optimal States (CLEOS). This research through service counseling center provides career development services to adolescents identified using a profiling method. The profiling method matches students to profiles of characteristics of eminent people when they were sixteen years old (Kerr & McKay, 2013). Profiles are created across five domains—writing, visual arts, music, scientific and technology invention, and interpersonal leading and healing. We use trait complexes, including general and specific abilities, general and vocational personality traits, and privilege as defined by

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levels of gender, race, socioeconomic, and other forms of privilege. Our concept of giftedness, therefore, is similar to the talent development model of Subotnik et al. (2012), but more specific concerning the interaction of ability, personality, and privilege in the development of talent. In addition, our model relies more heavily on the psychological science on personality traits than upon social cognitive traits like “grit” that are less used across disciplines and internationally. It is a diagnostic-prescriptive model (Stanley, 1980; Cohn, 1988) that assesses ability, personality, and privilege and then prescribes the kinds of academic experiences, social and cultural capital, and career goals that may lead to the fulfillment of potential (Kerr & Vuyk, 2013). Although the model cannot be fully described here, an earlier model is comprehensively detailed in Kerr & McKay (2014).

A trait-complex approach to adolescent talent development implies that there is no one way to develop talent. Rather, different combinations of levels and types of abilities with dominant personality traits and levels of privilege suggest different educational and career pathways, as Worrell, Subotnik, and Olszewski-Kubilius (2018) suggest. In this chapter, we review the foundation of our trait-complex model in studies of cognitive ability, personality, privilege, and interactions of those variables on talent development.

Cognitive Abilities and Gifted Education

Gifted education has moved away from both the discussion of the meaning of intelligence as well as the exclusive use of intelligence tests for placement in gifted education (Warne, 2016). Racial and socioeconomic disparities in prenatal care, early nutrition and breastfeeding, and exposure to adverse experiences are reflected in intelligence test scores (Tong, Baghurst, Vimpani, & McMichael, 2007). Children from groups that have experienced poverty, racism, and discrimination are likely to be underrepresented in gifted education programs that rely solely on intelligence tests for entrance, according to Ford (2014).

Despite the problems with using intelligence tests for identification for gifted programs, they remain the important predictors of general academic achievement. Studies consistently find correlations between $r = 0.30$ and $r = 0.70$ between intelligence and grades in school, and a recent meta-analysis found a population correlation of $\rho = 0.54$ (Roth et al., 2015) in an investigation that included over 105,000 participants in 33 countries on all continents. Correlations between measured intelligence and scores on standardized achievement tests are very high (Calvin, Fernandes, Smith, Visscher, & Deary, 2010). Frey and Detterman (2004) developed a method of converting SAT scores into intelligence scores, and vice versa, given they say, the average correlation of 0.82 for the relationship of SAT scores to intelligence. Because so few students in the Midwest where CLEOS is located have intelligence test scores, the CLEOS project uses ACT, which correlates highly with intelligence tests and predicts scholastic achievement in college (Allen, Radunzel, & Moore, 2017) and SAT scores as a substitute for these scores.

Unlike intelligence tests that measure four or five broad CHC abilities with tasks keyed to specific abilities, the ACT and SAT only provide, respectively, scores in English, Math, Reading, and Science and Reading/Writing, Math, and cross-test scores in Science and Social Studies. These subscales, however, can be important to the identification of strengths in abilities related to career development of adolescents. Like intelligence tests, scores may be influenced by non-cognitive factors related to gender, race, and SES (Frey, 2019).

Personality and Gifted Education

Personality is widely considered by psychologists to be an important predictor of academic achievement (Bergold & Steinmayr, 2018), second only to intelligence. Personality is defined as characteristic ways of thinking, feeling, and behaving (DeYoung, 2015). Personality arises out of inborn temperaments and develops throughout childhood as the child is affected by family, school, and other environmental variables. Although there may be some changes in personality in early adolescence, longitudinal studies show a stabilization of personality beginning in middle adolescence and reaching maturation at about age thirty (DeYoung, 2015). On the other hand, personality development may be sensitive to social, occupational, and romantic roles (Roberts, Wood, & Smith, 2005) or major life events (Moffitt et al., 2011), and individuals form these roles over an extended period of time.

Although differences in the relative importance and valuing of the five factors are evident in different cultures, the five-factor structure and the descriptors used for traits are similar across cultures. Scholars are increasingly finding neural correlates and systems that are associated with personality traits in humans (DeYoung, 2015). In addition, integration of vocational interests with personality has led to findings about dominant vocational interests of personality types (Perera & McIlveen, 2018).

Brief descriptions of the five factors and their relationship to ability, achievement, and interests are presented here.

Openness to Experience

Openness to experience, the personality factor characterized by inventiveness, curiosity, and an appreciation for a variety of experiences, is the personality variable most often associated with creativity. Facets of openness to experience include fantasy, feelings, ideas, aesthetic sensitivity, actions, and values. This personality factor represents a trait long associated with intellectual and aesthetic interests and characteristics (Limont, Dreszer-Drogorób, Bedyńska, Śliwińska, & Jastrzębska, 2014; Vuyk, Kerr, & Krieshok, 2016). It is also one of the most robust measures of creative personality, with aesthetic facets predicting creativity in the arts and intellect facets creativity in the sciences (Kaufman et al., 2016). Research shows that this personality trait shows the largest correlation with intelligence tests (at least $r = 0.32$) of any of the big five personality factors; with at least moderate effect sizes (Ackerman & Heggestad, 1997; Bartels et al., 2012; Harris, 2004; Chamorro-Premuzic, Moutafi, & Furnham, 2005; DeYoung, Quilty, Peterson, & Gray, 2014; Moutafi, Furnham, & Crump, 2006). The findings showed also this factor most highly correlated with divergent thinking (Kaufman et al., 2016). It is likely, therefore, that many creatively gifted students will score well above average in their openness to experience; however, given the correlation of $r = 0.32$, it is also clear that some highly intelligent students will NOT score high in openness to experience, and therefore may not show the characteristics most often found in creative people.

Open individuals are more likely to invest in activities that stimulate the acquisition of knowledge (Chamorro-Premuzic & Furnham, 2004, 2006). It appears that the facet of openness, reflecting a curiosity about the world and a need to discover facts and information, can support academic achievement, particularly when creativity is a part of schooling (Paunonen & Ashton, 2001). Poropat (2009), however, found low correlations between openness and achievement, however, with the correlation decreasing with age. Extremely high scorers in openness may have difficulty staying focused and making decisions and may exhibit low levels of latent inhibition—a hallmark characteristic of both individuals with trait creativity (Carson, Peterson, & Higgins, 2003), as well as those with attention-deficit hyperactivity disorder (ADHD). In addition, creative students who score high in Openness to Experience are more likely to be selective in their achievement, performing at high levels only in the areas that interest them. Students high in Openness most frequently have combinations of Artistic and Investigative interests (Kerr & Vuyk, 2013).

Neuroticism

Within the five-factor model of personality, the facet which most directly captures components of maladjustment is neuroticism (Costa & McCrae, 1992a). The factor of neuroticism typically includes six sub-facets of anxiety, depression, vulnerability, anger-hostility, impulsiveness, and self-consciousness and is generally characterized as a sensitivity to threat and punishment. The majority of studies of neuroticism show that intelligence is negatively correlated with neuroticism; from Terman's findings of general good adjustment of gifted students to more recent studies of well-being, high intelligence is generally associated with good mental health. The findings of an inverse relationship between neuroticism and intelligence have continued to be confirmed in studies of personality and intelligence (Ackerman & Heggestad, 1997; Moutafi, Furnham, & Crump, 2003; Moutafi, Furnham, & Paltiel, 2005), showing a range of $r = -0.16$ to -0.25. Despite the strong evidence for an inverse relationship between intelligence and emotional vulnerability, "intense," "emotional," and "sensitive" gifted students are all common phrases in the gifted education literature (Vuyk et al., 2016). Among gifted students, however, only highly creative students have shown some tendency toward neuroticism (Perera & McIlveen, 2018).

Extraversion

Extraversion has various definitions across research domains and research questions. Generally, it is conceptualized on a continuum (e.g., introvert to extravert) intended to reflect how an individual relates to other people. Extraversion is often associated with outgoingness and leadership and introversion is associated with reserve and reflection. Extraversion is described as sociable, assertive, active and talkative, cheerful, upbeat, energetic and optimistic (Costa & McCrae, 1992b). In contrast, those low in extraversion are described as reserved, independent, and even-paced, but not unhappy or pessimistic (Costa & McCrae, 1992b). Research on the relationship between extraversion and intelligence has produced conflicting results (e.g., Saklofske & Zeidner, 1995; Zeidner & Matthews, 2000). Earlier studies such as Ackerman and Heggestad (1997) found positive correlations, and later studies showed consistent negative correlations between extraversion and intelligence tests (e.g., Ackerman, 2000; Ackerman, Bowen, Beier, & Kanfer, 2001; Roberts, 2002). Extraversion may enhance academic achievement at the primary level of schooling but detract from academic achievement in secondary school. Recent investigations of extraversion and academic performance suggested sociability-induced distractibility may partly explain this (Vedel & Poropat, 2017).

Given the mixed results of studies on the relationship of extraversion to intelligence, it is important for educators of gifted students to recognize that highly intelligent children and adolescents may be extraverted or introverted. While extraversion has been typically associated with greater well-being and leadership, it is the aspect of enthusiasm that seems to contribute not only to well-being but to the positive perceptions of the extraverted individual (Sun, Kaufman, & Smillie, 2018). Therefore, gifted students who are introverted—which is typical for mathematically and scientifically talented students—may be less likely to be seen positively and recognized for their abilities. In addition, although extraversion may enhance achievement in early grades, it may detract from achievement in high school—except in leadership activities, in which the extraverted students excel. They tend to demonstrate dominant enterprising vocational interests.

Agreeableness

Agreeableness is defined as kind, sympathetic, warm, cooperative, and considerate, and it encompasses the facets of trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness (Costa & McCrae, 1992b). People who score low on agreeableness tend to be argumentative, proud, and unhelpful. Although correlated, it is not the same emotional intelligence (EI), defined as "the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to effectively regulate emotions so as to promote emotional and intellectual growth" (Mayer & Salovey, 1997, p. 5) and is considered to have additive value in predictions of occupational achievement. While there is some overlap between how EI is operationalized and the measurable facets of the NEO-PI-R, they are distinct constructs. Specifically, agreeableness is conceptualized more accurately as a trait, and EI is more frequently conceptualized as an ability.

The literature on the relationship between agreeableness and intelligence has been inconclusive. Zeidner and Shani-Zinovich (2011) summarized the available literature by stating that the link between agreeableness and intelligence has consistently been of negligible importance. Farsides and Woodfield (2003) found that agreeableness may be related to verbal IQ as defined by the AH5 Group Test of High Intelligence, but their findings showed no significant academic advantages of agreeableness.

Since agreeableness is critical to forming and maintaining relationships with colleagues and teachers, students high in agreeableness may have an advantage in terms of academic adjustment (Hair & Graziano, 2003). Furnham, Chamorro-Premuzic, and McDougall (2003) demonstrated that agreeableness is related to positive classroom behavior. If gifted students are, on average, lower in agreeableness, this may represent a barrier to their academic development (Baudson & Preckel, 2013).

In studies of eminent women and research on gifted girls, Kerr (1997) and Kerr and McKay (2013) suggested that most "gifted women are too well adjusted for their own good" (p. 151) so that they compromise their goals rather than achieving eminence. They suggest that girls and women may need to be less agreeable if they want the same educational and institutional opportunities as men.

Despite the observations that low agreeableness may be characteristic of eminent and highly gifted adults, it seems that low agreeableness of gifted students may lead to teachers' overall negative perceptions and evaluations of performance. Teachers' perception of gifted students may be that they are less agreeable than their nongifted counterparts (Baudson & Preckel, 2013). Kerr & McKay (2013) found that high Agreeableness was associated with interest in helping and healing careers; therefore, despite the mixed findings for achievement, agreeableness may enhance those career goals. People with high Agreeableness also tend to have dominant social interest profiles (Perera & McIlveen, 2018).

Conscientiousness

Conscientiousness is the personality factor most often associated with academic success and is a strong predictor of academic performance (O'Connor & Paunonen, 2007). Conscientiousness is described as a person's tendency to plan, be goal-directed, delay gratification, and adhere to social norms and rules (Jackson et al., 2010). Conscientiousness facets include achievement striving, competence, deliberation, dutifulness, order, and self-discipline, and all are positively correlated with academic success (Gray & Watson, 2002). In a meta-analysis examining the five-factor model of personality and academic performance, conscientiousness was associated with academic performance even after controlling for intelligence and is considered a predictor of academic performance that is independent of intelligence (Poropat, 2009).

It should also be noted that the construct of grit has been used as a stand-in for the idea of conscientiousness in gifted education and overlaps with conscientiousness. The leading instrument for the measurement of grit, however, is a poor predictor of academic achievement, and not advised for use with students (Credé, Tynan, & Harms, 2017).

Moutafi, Furnham, and Paltiel (2004) found conscientiousness to be significantly negatively correlated with fluid intelligence (−0.21), but not significantly correlated with crystallized intelligence (0.01). The rationale for the negative correlation between conscientiousness and intelligence lies in the intelligence compensation hypothesis, which posits that those who are at a disadvantage because of lower intelligence will compensate by becoming more conscientious (Moutafi et al., 2004, 2006). In turn, this high display of conscientiousness allows them to perform well in academic settings regardless of their lower level of intelligence.

Such findings highlight the significance of conscientious traits within academic contexts and also highlight an academic dilemma: what happens to the students who are high in intelligence, but do not perform well academically because of low conscientiousness? This dilemma is often seen in creatively gifted students who tend to have lower levels of conscientiousness and who may have lower achievement in courses that are of no interest to them or are not related to their creative domain (Feist, 1998; Kerr & McKay, 2013). Creative attitudes associated with risk-taking, impulsiveness, and unconventionality are qualities that are directly opposite of the conscientiousness facets, leading to problems with schooling (Kim & Hull, 2012). Conscientious students often have career interests that are dominant conventional, that is, occupations that involve orderliness, rules, and conformity.

Privilege and Gifted Education

In even the most egalitarian societies, some groups are more privileged than others in that they have more access to valuable opportunities and resources. In multicultural psychology, intersectionality is a theoretical approach for understanding privilege that simultaneously combines multiple categories of identity, difference, and disadvantage (Cole, 2009). An approach to assessing privilege is considered intersectional if it considers multiple dimensions of inequality "and considers how they interactively define the identities and experiences … of individuals and groups" (Ferree, 2010, p. 428). Intersectional privilege is a construct that arose from critical race theory and feminist theory (Few-Demo, 2014) in order to counter the tendency among researchers to consider a social category, such as people labeled with one race, to be homogeneous, rather than heterogeneous across a wide variety of dimensions such as social class and gender.

One model of the talent development of gifted women created by Noble, Subotnik, and Arnold (1999) presented a unique construct to represent privilege in the literature of giftedness: talented women's relative distance from the mainstream. Noble and her colleagues considered the mainstream to be the cluster of traditions, values, and practices that constitute what has been termed the dominant culture within a given society. Their model posits that predictions of potential based on ability should include the capacity to overcome certain barriers created by the individual's distance from the center of privilege and power. It is similar to but more comprehensive than comparing students to those who have had a similar opportunity to learn (OTL) recommended by Olszewski-Kubilius and Corwith (2018).

Kerr et al. (2012) operationalized this construct as distance from privilege (DFP) in their National Science Foundation gender equity project, and developed and validated an instrument for measuring subjective distance from privilege, integrating all major variables that multicultural psychologists have found to be important in shaping attitudes and behaviors: (a) age, (b) disability, (c) religion, (d) ethnicity, (e) social status, (f) sexual orientation and gender identity, (g) indigenous heritage, (h) national origin, and (i) gender (Hays, 2001). Unfortunately, studies using this measure of privilege are still rare. Most studies of privilege and achievement continue to use race, gender, and socioeconomic status as discrete measures. Internationally, only socioeconomic status is used in studies of achievement. In the United States, race and socioeconomic status are highly overlapping in their impact on achievement, but not the same. Differences in academic performance between racial minority and majority students are referred to as racial achievement gaps. According to the National Assessment of Educational Progress (NAEP, 2018), in the United States, white-black and white-Hispanic achievement gaps in every grade and subject have been declining since the 1990s. While these trends are encouraging, the white-black and white-Hispanic gaps that remain are still quite large and range 0.5–0.9 standard deviations.

These achievement gaps can be attributed to a number of economic and social factors such as poverty, quality of schools, economic resources, and academic preparation (Bowen, Kurzweil, Tobin, & Pichler, 2005; Pascarella & Terenzini, 1991), but they may also reflect psychological factors to the extent that minority students feel less engaged in their classes, feel stigmatized, feel stereotype threat, or worry about whether they belong in the course or at the university (Johnson, Richeson, & Finkel, 2011; Ostrove & Long, 2007).

Gender, as differentiated from biological sex, is the description of one's identity given by society and accepted to various degrees by the individual. Socialization for gender roles begins at birth, with assigned colors, presumed interests, and different parenting behaviors. A century of studies of biologically based sex differences has failed to reveal anything but small differences in abilities between males and females, despite a strong preference in popular as well as scholarly journals for findings of differences rather than findings of similarities (Kerr & McKay, 2014). Meta-analyses of cognitive abilities show that males and females are more similar than they are different with only spatial abilities showing consistent differences (Hyde, 2014).

With regard to academic achievement, in general, girls outperform boys in course grades all the way through school and outperform boys in verbal achievement in high school (Hyde, 2014). Voyer and Voyer (2014) found a consistent female advantage in school marks for all course content areas. In contrast, meta-analyses of performance on standardized tests reported sex differences in favor of male's mathematics (Else-Quest, Higgins, Allison, & Morton, 2012) whereas they have shown a female advantage in reading comprehension (Hyde, 2014). This contrast in findings makes it clear that the female advantage in school grades contradicts the popular stereotypes that females excel in language whereas males excel in math and science (e.g., Halpern, Straight, & Stephenson, 2011). Bright women, nevertheless, continue to face both internal barriers and discrimination and bias unrelated to their actual abilities, often leading them to compromise or give up on high aspirations, even after attainment of higher degrees. (Kerr & McKay, 2013).

The terms socioeconomic status, socioeconomic position, and social class (collectively, SES) are used across the social sciences, reflecting widespread recognition of the importance of socioeconomic factors for educational outcomes. In general, SES describes an individual's or a family's ranking on a hierarchy according to access to or control over some combination of valued commodities such as wealth, power, and social status (Sirin, 2005). Despite the expert consensus that SES is complex and multifactorial, too often SES is merely a composite of father's income and education level. That SES is a powerful predictor of achievement has been found in most studies, according to Sirin's meta-analysis of studies of over 100,000 students (2005). In addition, minority status moderates the correlation between SES and achievement; students from racial minority groups are more impacted by minority status than SES, but in combination show lower academic achievement. Sirin's results also suggested that the average SES of the school and the community were as important as or more important than family SES.

Rothstein (2004) says the exclusion of student background characteristics from prediction models attenuates the SAT's apparent validity, as the SAT score appears to be a more effective measure of the demographic characteristics that predict GPA than it is of variations in preparedness conditional on student background. In Rothstein's study, childhood socioeconomic indicators, such as father's occupational status and mother's education, are related to outcomes, such as grades, educational attainment, and eventual occupational attainment, even after controlling for the remaining variables.

Using Trait Complexes in Talent Development

Models of prediction of achievement and occupational attainment often use the trait-complex approach (Ackerman, Kanfer, & Beier, 2013). The Ackerman and Heggestad (1997) study frequently quoted in this paper was an example in which cognitive abilities, personality traits, and interests provided clear profiles of clusters of characteristics that matched academic and occupational domains. Trait-complexes have been applied to gifted students in order to understand the relationship of constellations of preferences to adult achievement in students. Achter, Lubinski, Benbow, and Eftekhari-Sanjani (1999) showed that psychometric assessments of abilities and preferences each add value to the prediction of achievement ten years later. Wai, Lubinski, and Benbow (2005) used the math/scientific and verbal/humanistic constellations of abilities and preferences to predict contrasting occupational outcomes after 20 years. Understanding how trait complex work has progressed may be helpful to educators of gifted students because multiple criteria for identification are often used, but often without the analyses that might make it possible to predict success and satisfaction with their academic and career goals.

Personality traits contribute to the prediction of educational and occupational attainment even when intelligence and socioeconomic backgrounds are taken into account. For example, adolescent ratings of neuroticism, extraversion, agreeableness, and conscientiousness predicted occupational status 46 years later, even after controlling for childhood IQ (Judge, Higgins, Thoresen, & Barrick, 1999). In a meta-analysis of predictions of occupational attainment, Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007) found SES to be as powerful a predictor as personality and ability. They point out, however, that these variables are interrelated in complex ways. For example, students with higher cognitive abilities tend to obtain better grades and go on to achieve more in the educational sphere across a range of disciplines (Kuncel, Credé, & Thomas, 2007); in turn, educational attainment is the best predictor of occupational attainment. This observation about cumulative indirect effects applies equally well to SES and personality traits, with the advantages of each building upon each other.

Trait complexes of intelligence, personality, and SES were studied by Damian, Su, Shanahan, Trautwein, & Roberts (2015). They investigated the prospective effects of personality traits and intelligence in predicting educational attainment, annual income, and occupational prestige 11 years later, as well as the way parental SES moderates these links. They found that intelligence had a stronger effect on educational attainment at high (as opposed to low) levels of parental SES. The main effects of intelligence, as well as the interaction effects between intelligence and parental SES, on educational attainment, were very strong. These effects remained virtually unchanged when individual personality trait controls were included in the regression models. The effects of intelligence also remained unchanged when controlling for all personality traits and their interactions with SES simultaneously.

Damian et al. (2015) found that as the discrepancy with SES increased (such that IQ was higher), educational attainment and occupational prestige increased, showing that intelligence could compensate for background disadvantage. Certain personality traits like conscientiousness and extraversion compensated for background disadvantage (in the absence of intelligence controls), but the effects were not large enough to overcome the main effect of SES. Unlike cognitive ability, personality seems to develop independently of SES. Personality traits predicted educational level and SES attainment better in low SES families than in high SES families.

Poropat (2009) summed up the importance of the three variables of intelligence, personality, and privilege in this way: "The idea that intelligence, socioeconomic status, and personality each affect socially valued behaviors is consistent with the proposal that performance in both work and academic settings is determined by factors relating to capacity to perform, opportunity to perform, and willingness to perform" (p. 324).

Trait-Complexes and the CLEOS Beehive Model

The Beehive Model organizes trait complexes into predictions of future roles in society: Professionals, Nurturers, Scholars, Strivers, Innovators, or Visionaries. The size of each level of the Beehive is based on the proportion of high ability people found in those roles, and each level is associated with the types of abilities, personality and interests, and talent development needs related to privilege. A description and example follow.

Beginning at the broad base of the hive, Worker Bees are the gifted students who become professionals who maintain society. Representing the largest group, these students are moderately high in general intelligence, with moderately high composite scores on ACT and SAT. Their dominant personality type is Conscientiousness and they have low Neuroticism; their interests may be high across vocational types, often with somewhat higher elevation on scales related to their strongest interests. Engineers will have very high Realistic interests, physicians Investigative, and managers Enterprising interests. They are the professionals and generalists of society. Those with high social capital and high SES will become lawyers, physicians, engineers, and mid-level managers who keep society running. Worker Bees with low SES and low race privilege need to capitalize on the Conscientiousness, Extraversion, and Agreeable aspects of their personality in order to attain the same goals as white, high SES students. In addition, they may need coaching for achievement tests, scholarships to selective colleges (athletic scholarships provide this for many); mentors and peers who provide social networks, and cultural capital provided by a broad-based liberal education as well as pre-professional education. Women tend to be well represented in this group, except in Engineering, where high mathematics and science abilities, spatial-visual abilities and training, early involvement in STEM fields, and continuous mentoring are critical.

Honey Bees are the next largest group, the "sweeteners" and nurturers of society. They are moderately high in general ability, although verbal ability usually exceeds mathematical and scientific abilities. Their dominant personality is Agreeableness, with aspects of Extraversion in particular occupations. They become the teachers, counselors, nurses, and social workers, mending conflict, nurturing, and bringing cohesion to the community. Because this group is dominated by people who identify as women, as well as high numbers of minority racial groups, they need to capitalize on their Extraversion aspects of personality to assert themselves and achieve appropriate recognition and compensation. In addition, those with the lowest privilege need coaching, particularly in mathematics, to achieve their high composite scores on achievement tests that will propel them into high-ranked pre-professional programs in these fields, and they need to make use of scholarship opportunities. Early involvement in professional organizations can provide social and cultural capital needed for advancement.

At the next level, a somewhat smaller group of Striver Bees are ambitious, dominant, energetic people who become politicians, CEOs, and business and professional leaders. Their dominant personality type is Extraversion. Vocational personalities are dominated by Enterprising interests, and they become society's drivers, seeking influence and prosperity. Women will face stronger discrimination and bias as they advance and must emphasize the assertive and expert aspects of their personality. Most of this group come from mid to upper SES groups, so for less privileged SES and racial groups, access to mentors, financial aid, and social networks are critical. Low SES people need to emphasize their Extraversion and become involved in leadership activities at an early age and multiple social networks of Strivers.

At the next level, Forager Bees are the people who gather knowledge for society. They have very high general intellectual abilities and their dominant personality tends to be Introversion, with the Intellect aspect of Openness being especially strong. Scientists' vocational interests are strongly focused on Investigative, while scholars in the humanities social sciences have aspects of Artistic and Social interests. These people become scientists and scholars of all kinds, whose curiosity leads them to gather and synthesize knowledge. Although as many women as men enter training in these fields, women are more likely to drop out in societies that provide little support for young families. Women (and the men they marry) therefore need preparation for the challenges of gender relations they will meet at critical points of their career. People with low race and SES privilege need to capitalize on their Conscientiousness and receive assistance in achieving high scores, especially in mathematics for scientific fields. Scholarships are critical, but so is exposure to the culture of the university and scholarly fields at an early age, at least one inspiring teacher, hands-on science or engagement in humanities, and enrollment in a selective college or university that provides a strong education in the young scholar's field of interest and the potential of individual mentoring.

At the next level are Drones, aptly named because most of the rest of the hive doesn't understand their uneven achievement and productivity. As the people who fertilize the culture of society, they are the creatively gifted who score high in fluid intelligence. Their achievement test scores tend to be tilted, as a result of their strong focus on a creative domain, rather than general high achievement. For example, a potential STEM inventor may score in the 99th percentile on Mathematics but the 85th percentile on Reading/Writing. They do well on tests of Divergent Thinking. They score very high in Openness to Experience, and as adolescents tend to score low in Conscientiousness. They tend to be more Introverted than Extraverted. Their vocational personalities are dominated by Artistic interests, with Investigative often a secondary aspect that reflects analytical thinking and curiosity. Because success in creative fields requires intensive training with a master teacher in a domain, people at all levels of privilege require specialized higher education such as art institutes, musical conservatories, and polytechnical institutes. For people of low SES privilege, financial support is critical. Creative fields are unique in their tolerance and racial diversity, and many eminent creative people come from marginalized groups. Women, however, may find advancement to the highest levels difficult without mentoring, access to gatekeepers, and a broad network of supporters.

Finally, a very small and little understood group of gifted students make up the category of Queen Bees, or royals. These are the Visionaries who transform society, who "move the hive." They may have polymathic abilities, with extraordinary talents across a number of domains. They are likely to score very high in Openness to Experience, given their imaginativeness and their capacity for transcendent experiences, but may also have Conscientiousness reflecting their persistence and endurance and Agreeableness aspects reflecting their compassionate concern for the human condition. Their interests are broad, encompassing most of the vocational personalities, and they are therefore capable of understanding most of the rest of the hive. Variously called fully functioning, self-actualized, or enlightened by psychologists, they tend toward religious and spiritual vocations, as well as leadership of social justice, freedom, and humanitarian movements.

The Beehive Model is a work in progress, continually updated to incorporate new findings in psychology, education, sociology, and other social sciences. With a wealth of new findings in trait complexes of ability, personality, and privilege, it is sure to expand.

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13

Eminent Women Were Once Gifted Girls: How to Transform Gifted Potential into Eminent Talents

Leonie Kronborg

Kronborg's Model of Talent Development for Eminent Women was underpinned by the Model of Adult Female Talent Development. Additionally, the purpose of the feminist research which underpinned the model was to explore the lives of ten eminent women in seven talent domains in order to gain knowledge and understanding from the women's reflections, as to what contributed to their talent development across the lifespan. It was anticipated that gaining an understanding of factors that contributed to talent development in eminent women would provide important information on how to identify gifted potential in young individuals and provide relevant teaching experiences which lead to outstanding talent development. Various psychological and sociological themes were identified which influenced the talent development of these gifted females leading to their eminence in diverse talent domains.

Conception of Giftedness and Talent

Kronborg's Model of Talent Development of Eminent Women (Kronborg, 2008a, 2008b, 2009, 2010) is a model to which teachers are exposed in their teacher-education programs on gifted education (Kronborg, 2018a, 2018b,

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Kronborg & Cornejo-Araya, 2018). It has been utilized to gain insights into educating gifted adolescents in secondary programs in Australia and New Zealand (Bartley-Buntz & Kronborg, 2018; Tweedale & Kronborg, 2015).

Eminence for this study was considered to be the highest level of talent development and was perceived as the recognition bestowed upon significant individuals because of their accomplishments, achievements, and prowess within a domain (Reis, 1995). A woman nominated as eminent achieved national or regional recognition in her profession (Yewchuk & Edmunds, 1992).

Yewchuk and Edmunds (1992) proposed that exemplary or outstanding vocational achievement was central to eminence. Furthermore, a gifted adult is seen as a gifted "medical scientist," a gifted "law reformer," a gifted "actor," and so on, and the measure of a gifted individual's achievement is the individual's relative standing in a domain.

Eminent individuals are perceived as capable of great performance or transformational achievements in valued social arenas where they set new directions and alter practices and perceptions (Arnold, Noble, & Subotnik, 1996; Noble, Subotnik, & Arnold, 1999; Subotnik, Arnold, & Noble, 1995). However, eminent women have generally been studied in the context of a predominantly male conception of eminence. The vast majority of research conducted on eminence and productivity has tended to have concentrated on men (Albert, 1995; Albert & Runco, 1990; Goertzel, Goertzel, & Goertzel, 1978; Simonton, 1994).

The eminent women who had their lives examined in this study of talent development were nominated for their outstanding accomplishments and achievements across seven talent domains. Yet, we know that Australian women remain relatively rare in the top levels of the arts, sciences, music, letters, finance, business, and politics, and in the ranks of the eminent. The relative rarity of high-achieving and eminent women alerts one to question why this is so when many girls are able to reach high levels of achievement early in their lives.

In the Australian academic context in the secondary years of schooling, Kamperos (2001) examined the academic performance of female and male students in final public secondary school examinations between 1884 and 1995 and found that females in New South Wales (NSW) had consistently achieved more highly in academic performance than males, since the earliest days of public examinations. However, in 1990, higher education students aged 20–29 were still predominantly male, but by 2002 females were outnumbering male students in all age groups (Milburn, 2002). By 2010, women were in the majority at Australian universities, receiving upward of 55% of bachelor's degrees (Norton, 2014). But, the educational and professional cultures to which most of the eminent women in this study were exposed did not encourage high levels of female participation.

The purpose of the feminist research that underpinned Kronborg's Model of Talent Development of Eminent Women was to explore the lives of ten eminent Australian women in seven talent domains in order to gain knowledge from the women's reflections, as to what they perceived to contribute to their talent development. The Model of Adult Female Talent Development (Noble, Subotnik, & Arnold, 1996; Noble et al., 1999) was used as a basis to frame this study. This Talent Development Model was chosen for investigation, as it incorporated sociological and psychological perspectives, taking a holistic understanding of talent development for gifted females. By viewing talent development as more than a social context of individuals' characteristics and life paths, the model was synthesized from the diverse life experiences of talented females internationally. However, it was a new approach to consider talent development from an eminent female perspective as was done with this study, as previous studies of eminent individuals tended to focus on eminent males.

Empirical Evidence That Supports Kronborg's Talent Development Model

The findings from the ten eminent women who participated in this study were based on data from a questionnaire, interviews, a reflexive journal, public documents on each of the women, as well as biographies for each of the women who were all identified in the Who's Who in Australia (De Micheli & Herd, 2004). The Model of Adult Female Talent Development (Noble et al., 1996, 1999) was used to frame the semi-structured question protocol used with the eminent Australian females. The semi-structured interviews were used subsequently to form explanations that were grounded in the details and examples of the women's reflections and life experience (refer to Kronborg, 2008a, 2010; for a more detailed explanation of data collection and analytic process).

It was anticipated that gaining an understanding of factors contributing to talent development in eminent females could provide important information for educating gifted girls to outstanding talent development, parenting gifted girls, counseling gifted females, and for providing insights into the talent development process specifically for talented females, as historically, talented males were often the principal participants in studies of eminent individuals (Goertzel & Goertzel, 1962; Goertzel et al., 1978).

A purposive sampling procedure was used in this study of eminent Australian women, and although the sample size was small, this is an in-depth representation of perspectives of talent development in eminent women. However, additionally, the research literature of gifted and talented individuals was used substantively to compare, integrate, and support the broad range of findings on disparate aspects of talent development in regard to this study.

Furthermore, this study of eminent women adds to the previously developed Model of Adult Female Talent Development (Noble et al., 1996, 1999), as the focus of this study was specifically on eminent women in the Australian context. Hence, it provided another perspective of talent development which supported and built on the initial Model, in addition to providing another context for talent development, as well as shedding light on particular aspects of the Model which were synthesized from previous studies of talented women.

Kronborg's Model of Talent Development for Eminent Women

Kronborg's Model of Talent Development for Eminent Women was developed from the analysis and synthesis of the eminent women's semi-structured interview data and reflected three stages of the developmental process of talent development. These three stages were identified as: Foundations, Filters and Catalysts, and Spheres of Influence in the gifted females' talent development process (refer to Fig. 13.1).

In the Foundation stage of the eminent women's talent development model, the first theme to be identified was the sociocultural context of the women's lives which consisted of a range of demographic variables that advantaged, disadvantaged, or had a neutral influence on the women's gifted potential. Demographic variables that impacted the eminent women's potential for developing their talents included socioeconomic status of their family of origin, nationality, ethnicity, gender, religious affiliation, geographic location, birth order, loss of a parent when growing up, and subsequently, another gender-related issue—marital status and number of children born to the women. It was evident that all of these eminent women's lives were impacted by two or more of these demographic factors, but in different combinations and to varying degrees.

In the Kronborg Talent Development Model, *Psychological Qualities and Individual Abilities* was a strong theme to emerge from the interview transcripts in the lives of the eminent women. This theme related to how the women perceived themselves, how they dealt personally with obstacles in

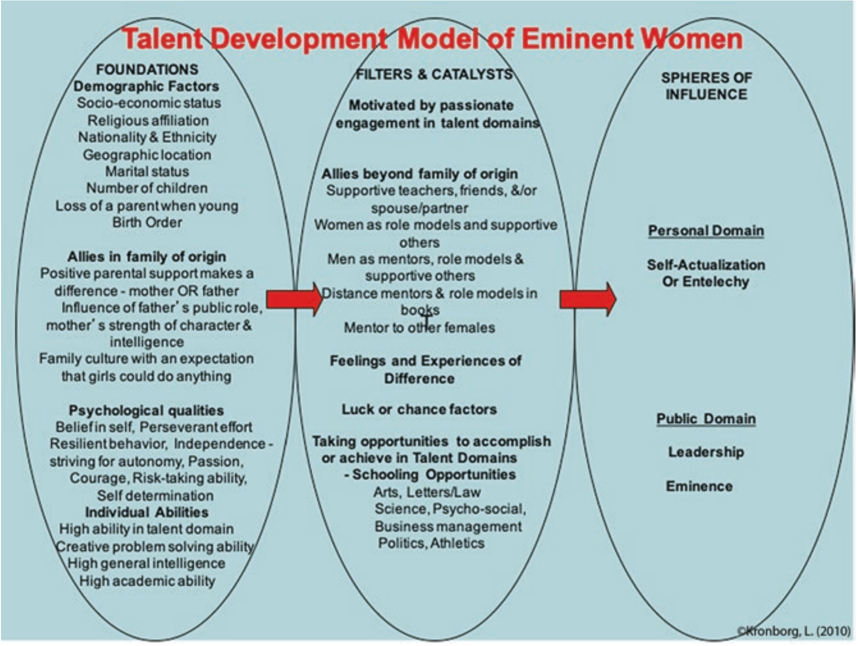

Fig. 13.1 Talent Development Model of Eminent Women with three stages: foundations, filters and catalysts, and spheres of influence

their lives, and how they developed their talents. In each of the interview transcripts, it became clear that these women were able to describe and identify particular psychological qualities and individual abilities that contributed to their talent development across the lifespan. Although, eminent men were not nominated and selected for interview in this or a subsequent study, one could hypothesize that eminent men would have similar psychological qualities and individual abilities that would contribute to their talent development process and eminence. This is a hypothesis that still needs to be investigated in research. It was evident that the eminent women in this study were very self-aware, as they made choices throughout their lives as to what talent goals to pursue and how to pursue those goals.

It was evident from an early age, that these eminent women were on track to realize their potential gifts, and yet, from their reflections and perspectives shared, their goals were achieved often at high personal cost. These women's personal qualities and abilities appeared to emerge in reaction to the way societal groups often reacted to their gifted qualities, so that in some environments these women were able to develop their talents readily, while in other contexts they had to overcome or work around obstacles, and hence had to develop personal qualities which enabled them to realize their goals.

Psychological qualities evident in these eminent women's lives that contributed to their gifted potential being developed into talents included belief in self, resilience, perseverant effort, independence, passion, courage, risk-taking ability, and self-determination. In addition, there were individual abilities that were strongly evident by their various outstanding achievements and accomplishments, which contributed to the eminent women's gifted potential being realized, such as: high ability in talent domains of interest, creative problem-solving ability, high general intelligence, and high academic ability.

Furthermore, in the eminent women's talent development model, another theme to emerge in regard to the foundation stage was *allies in their family*. These eminent women were aware they did not achieve in their talent domains by themselves. Their stories from their earliest years indicated they had allies in their family who enabled and supported each of them to develop their talents. Within the theme of *allies in the family* who influenced the talent development process, different sub-themes also emerged. These included: *Supportive parents who made a difference, Self-in-relation to a highly supportive mother, Self-in-relation to a highly supportive father, Influence of father's public role, Mother's strength of character, Mother's high intelligence, and Growing up in a family where girls were not constrained by gender*. It was evident that these eminent women experienced their families as supportive from an early age, with one or more immediate family members modeling high capabilities and competencies, as they supported their gifted girls to develop their interests and high abilities in talent domains without gender constraints (Kronborg, 2008b).

Filters and catalysts in the talent development process formed the second stage of the Talent Development Model, where themes built on previous themes. The eminent women described how they took risks and took advantage of learning opportunities that came along in their lives. In order to develop their talents across their lifespan, themes included: *Passion for a talent domain, Allies beyond the family of origin, Feelings and experiences of difference, Luck or chance factors, Taking the opportunity to accomplish and achieve in talent domains, with a sub-theme of Schooling experiences.* These women were given many opportunities to develop their talents, as they demonstrated passion for a talent domain or talent field, and were able to find and build allies beyond the family of origin, as they experienced luck or chance factors, which they believed contributed to their talent development.

Passion for a talent domain was an evident theme that motivated these eminent women. All women identified a specific time when the importance of a talent domain, or particular talent field, crystallized for them. For most participants, there was an emphasis on their passionate engagement in a talent domain, but for one, her choice of talent domain was a logical and obvious choice based on her verbal talents, past achievements, and family background of parents who were lawyers. This perspective contrasted with the views evident in the other interview transcripts, where the women referred to engaging in their talent domains much more often, in terms of *"passion" and "joy."* These women described how their experiences of finding and matching a specific talent domain or field to their specific talents provided the resonance for the direction in life they were impelled to take subsequently.

Allies beyond the family of origin was another theme, which influenced the eminent women's talent development. This theme was based on a range of interdependent relationships between these women and others. Each woman acknowledged a pattern of affirming relationships that contributed to their self-confidence and talents, as they developed as adolescents and young adults. Allies were especially important in the women's lives when they were at school, in the workplace, and when they were experiencing adversity. Sub-themes that were evident in this data included: self-in-relation to supportive and unsupportive teachers; self-in-relation to supportive personal friends; self-in-relation to supportive spouse/partner; self-in-relation to lack of support from female colleagues; self-in-relation to a lack of women mentors and role models in the workplace; self-in-relation to men as mentors, role models, and supportive others; self-in-relation to distance mentors and role models in books—biographies and autobiographies; and self-in-relation to mentoring other women (Kronborg, 2008b, 2009).

However, these specific eminent women did not have women mentors as adults, as most were pioneers in their talent fields; whereas women mentors were found to be important to gifted, high-achieving adolescent females in a subsequent study examining contributing factors of talent development in relation to the Kronborg Talent Development Model (Tweedale & Kronborg, 2015).

These eminent women identified allies beyond the family of origin as essential for them to be able to achieve in their talent fields, because all navigated their way through positive and negative sociocultural experiences in their talent fields. Hence, these women acknowledged that achievements or accomplishments would have been difficult for them often, without the strong support of authentic interactions with key allies in their lives.

Another theme of *luck or chance factors* was perceived by the women to have influenced their talent development. Luck was attributed to influencing their lives in terms of the timing of when they were born compared to the broader context of academic achievement for women, for having a supportive parent or parents, for having the opportunity to go to university at a time when women tended not to go to university in the Australian context, and for career opportunities afforded to those with university qualifications born of their generation. Most perceived themselves fortunate for the various opportunities they were given to develop their talents, and to be able to have control over their lives.

A theme of *feelings and experiences of difference* was evident in the interview transcripts when the eminent women discussed when they were young, and how they perceived a difference in their individual lives relative to others, which occurred for varying reasons. Sometimes, it was a difference due to being different from one's peers in socioeconomic status, or ethnicity, for losing a parent when young, for being a high-achieving female in a co-educational environment where boys were expected to be high achievers and girls were expected to be supportive, for being academically high achieving in a rural community when high academic achievement was not valued, or for achieving highly in a talent field where females tended not to perform or be high performers.

Furthermore, most women perceived they grew up in families that had values different from the norm. In particular, experiencing one or both parents who encouraged them to believe they were capable of doing whatever they set their minds to achieve. Consequently, these women were empowered from their homes to overcome traditional female gender role constraints which occurred in the mainstream sociocultural environment around them.

Positive responses from others toward the young gifted women with their high potential as they were developing their talents helped them to counteract difficult sociocultural experiences and contributed to them viewing themselves positively. Hence, authentic relationships experienced with significant allies in each of the women's lives affirmed the individual woman's potential talents.

Taking opportunities to accomplish or achieve in talent domains for these independent, risk-taking, courageous, eminent women was another theme, and filter, evident in their talent development process. These eminent women's accomplishments and achievements reflected individual profiles of talented performance in their relative talent domains. It emerged that the many diverse opportunities taken by the women to accomplish and achieve in their talent domains contributed to the ongoing development of the women's identities, in relation to their talents across the lifespan. Additionally, the women's self-perception and high abilities appeared to be related to their preferred talent domains. These women grew up identifying strongly with particular talent domains, although sometimes special training opportunities in talent fields helped them find a more refined match. For instance, one saw herself as an actor, another as a lawyer, one as an economist and strategic thinker in business, while another as a doctor and epidemiologist, and so on. Fortunately for these women, they were able to find a psychological match with a talent domain as they developed through various stages of life.

Opportune schooling experiences was a sub-theme evident in these eminent women's transcripts. Most women spoke of their many curricular and extra-curricular opportunities that motivated them to engage in their talent development while they were at school. At critical times in their development, most women were exposed to the relevant content knowledge or learning experiences required to develop their talents, hence they were able to achieve or accomplish highly in specific talent areas in which they were interested and motivated to learn, even in their final years at high school. The ongoing learning opportunities helped prepare them for their next steps in their talent development. Furthermore, most of these eminent women attended single-sex secondary schools for girls where there were some excellent extended and challenging learning opportunities provided by teachers.

Additionally, most women experienced accelerated learning opportunities in their early years of learning while at school, and sometimes received specialized learning opportunities. Even the actor was given opportunities to lead and develop her talent in acting and directing in theater arts at her particular high school. Also, most eminent women were awarded scholarships to continue developing their talents in relevant courses of their choice at university, although one switched subsequently, from university to the National Institute for Dramatic Arts.

When reviewing the talent profiles of the eminent women, the trends of achievement and accomplishment reflected development of particular talents which tended to cluster together in their early or formative years, when they demonstrated their individual gifted potential in different talent domains. Subsequently, they were intrinsically motivated to develop their talents further, as the women reflected and described their advanced development as adolescents, and as young adults, in their relative talent domains which tended to build on previous high achievements and accomplishments.

A final stage of the Talent Development Model for Eminent Women included the Spheres of Influence: Personal Domain and Public Domain. In this final stage of talent development, a theme emerged from the transcripts involving these gifted women's self-experiences of difference which culminated in the actualization of each woman's potential through autonomous self-determining choices. This actualization of the self became the woman's reason for *being*, while the reason for *doing* for each of the eminent women was linked to the actualization of their potential talent. This theme was identified as *self-actualization or entelechy* and led to the woman's eminence evident in the interview transcripts.

Each of these individual women was intrinsically motivated to actualize her talent potential in her *best fit* talent domain and talent field. Using her talents and reflecting on her experiences of difference, each woman visualized a better future that she strived to realize. It emerged from each individual woman's perspective that they were intrinsically motivated by a sense of purpose to make a positive difference in their talent fields. But, due to the differing ways of knowing, or the differing "psychological fit" for the talent domains, they used their highly developed talents in different ways in the public domain.

A common aspect that existed in the transcripts of the women was to go on improving themselves and their talents for personal reasons, and at the same time improving or making a positive difference in their talent field, and in the lives of other people, as they set out to make the world a better place. These eminent women were able to do this across their lifespan, as they were able to maintain key allies in their lives who provided them with authentic relationships.

Affirming, honest, nurturing relationships enabled these women to keep the reality of their outer experiences in balance with their inner experience. Gradually, they moved from feelings of difference or asynchrony with the outer world, to where they brought their *inner vision* of a better world into synchrony with who they were, and what they believed was possible to achieve through their developed talents in the outer world.

The self-actualization process (Kaufman, 2018; Maslow, 1976), which appeared to emerge in these women, and is evident in other studies of high-achieving and eminent women (Arnold et al., 1996; Kerr, 1997; Piechowski, 1990; Roeper, 1995), reflected the uniqueness of each of these passionate, independent, and highly able women. Throughout their lives, they continued to honor their inner self and to realize their talents.

Furthermore, the self-actualizing process, sometimes referred to as an expression of *entelechy*, or a striving for autonomy that was evident in these women's lives (Jacobsen, 1999; Lovecky, 1995; Piechowski, 1998), appeared to drive these women to develop their gifted potential, evident when they were young, into outstanding talents in talent fields, which led the way for other women to follow. For each of these eminent women, the process of *entelechy* appeared to contribute to the talent development process, leading them ultimately to their extraordinary accomplishments and achievements, so that they were perceived by others as leaders and eminent in their fields (Kronborg, 2008a).

The Advantage of This Conception of Talent Development

Kronborg's Talent Development Model of Eminent Women is most relevant for educating gifted girls, as it is based on ten eminent women who were originally identified as gifted girls, who developed their talents across seven different talent domains and their lifetime, when their outstanding accomplishments or achievements as adults led to them being identified as leaders, and/or eminent in their fields. These talent domains included: *Arts, Letters/Law, Sciences, Psycho/Social, Business Management, Politics, and Athletics***.** However, the themes found in this model could reasonably apply to gifted males as well, as not all aspects of themes applied to all gifted females, but this does need to be explored and examined in further research.

Furthermore, this model is significant as many girls with high potential are still not being identified in schools, or being given talent opportunities in their early, middle, and adolescent years of schooling, as talents are often constrained or not acknowledged. In their adult years in universities, and workplaces, talented females are often overlooked due to conscious and unconscious gender bias, gender constraints placed on gifted females, and limited career opportunities (Australian Academy of Sciences, 2015; Gornick, 2009; Pollack, 2015). However, as teacher educators in gifted education, we have been trying to raise teachers and society's awareness of the need for gender equality of gifted females, for more than 40 years in Western democracies, yet this is still an ongoing educational problem (Pollack, 2015; Slaughter, 2015). This model highlights themes and subthemes that impacted the talent development process of the eminent women at various times of their development, of which we still need to be more aware. Additionally, this theory of talent development was examined in a study of gifted and high-achieving adolescents in a New Zealand school to see what conditions contributed to the talent development of the high-achieving girls in the single-sex school. It was evident that the study's findings supported Kronborg's Talent Development Model (Tweedale & Kronborg, 2015).

In Kronborg's Talent Development Model of Eminent Women, at the Foundation Stage of the talent development process, various sociocultural demographics created the foundation that talented individuals often have to learn to rise above or think divergently to work around. Allies in the original family of an individual with gifted potential are crucial for supporting female talent development, especially in the early years. The individual's high potential abilities and psychological qualities start being nurtured in the early years through family interaction and support, and opportunities for learning; and the individual's perception of self and learning springs from these early experiences. Young gifted females need to be exposed to the joy of learning experiences in various talent domains in their early years, so that they are intrinsically motivated to learn. Furthermore, the interaction between these various factors is evidently important to the gifted female's talent development.

Various filters and catalysts occur, which impact the talent development process. Gifted and highly able females need to be exposed to learning opportunities in talent domains that motivate them to want to find out more! Allies beyond the family, such as teachers, friends, mentors, and different role models, need to be supportive of gifted females from their first year of schooling, so they can provide diverse learning experiences that motivate highly able girls to take risks to engage in various learning opportunities, persist in talent domains, and be encouraged to be self-determining in their learning environments. Gifted females need to start developing self-belief and courage to take on challenges early, so they master their learning experiences in talent domains, and build their belief in self about their learning potential. This requires diverse learning opportunities; and supportive, intelligent parents who encourage and guide their daughters to engage in diverse learning opportunities, especially in the adolescent years (Tweedale & Kronborg, 2015); and supportive teachers, coaches, and role models who are willing to mentor highly able females in their learning at the more advanced stages of the various talent domains (Bartley-Buntz & Kronborg, 2018).

As gifted females develop their high abilities, and knowledge and understanding in their "best fit" talent domains, often these chosen talent domains lead to further related studies in other talent domains. Individuals who move from school to university and into specific fields of studies of interest tend to build on areas of specialization in a talent domain where they have gained mastery. Individuals need to be intrinsically motivated in their chosen talent domain, or field of talent, so that they build on their self-belief in what they are doing in their talent domain, and hence strengthen their identity related to their talent field. This also contributes to the self-belief, and psychological health of the gifted female, as the self-actualizing individual realizes their gifted potential in their chosen talent domain and talent field.

This Talent Development Model for Eminent Women is used to underpin teaching gifted and highly able girls at school, and it is considered in relation to other theories of giftedness and talent development that have been researched and constructed to explain the talent development process. In the Australian context, this model, alongside other models of talent development based on research investigations and research literature of gifted, highly able, and talented students in relation to their talent development (Gagne, 2004, 2018; Kronborg, 2010; Piirto, 2007; Renzulli, 1986, 2016; Subotnik, Olszewski-Kubilius, & Worrell, 2011, 2018; Tannenbaum, 2003), is used by teachers to identify and educate gifted students in their care.

Identifying Gifted and Talented Children

Student behaviors indicating gifted potential from Kronborg's Talent Development Model are based on evidence from the descriptions of life experiences of eminent women. Teachers would need to observe a range of the following indicators in relation to perceived gifted students and their behaviors in talent domains in class; and develop an individual profile on each gifted/highly able female in their class in order to develop relevant, extended, and challenging curriculum in relation to the student's potential high abilities. Teachers would need to be aware of talent domains and what a student's high performance looks like compared to other students at various points along the learning continuum of the talent domain from beginner to expert. The aim is for teachers to be particularly conscious of the educational needs of gifted girls and their talent development.

Evidence of observations and student achievements, accomplishments, and behaviors to be kept in a gifted student's portfolio could include:

– High abilities, or aptitudes in talent domains of interest evident in a student from early childhood to late secondary years of learning, relative to peers (K-12 years).
– High academic ability evident by high achievement in reading, numeric, and/or spatial ability standardized testing in individual students from the early, primary, and secondary years.
– Creative problem-solving ability evident in various talent domains—divergent thinking, problem-solving behavior, and/or high aptitude for inquiry learning evident in classroom activities if structured as discovery learning, problem-solving, or inquiry learning.
– High general intelligence (above 90th percentile) identified from cognitive ability testing, such as individual intelligence tests conducted by an educational psychologist, for example Wechsler Intelligence Test, Stanford-Binet Intelligence Test, or group cognitive ability testing. (Independent schools and government selective schools conduct cognitive or aptitude assessments.)

- Strong interest evident in any talent domain, hobbies, sporting, musical, and/or dramatic behaviors described by student/parents about behavior at home.
- A student's motivated behavior evident in a talent domain in the classroom, at any age.
- Psychological qualities evident in student, such as belief in self, resilience, perseverant effort, independence, passion, courage, risk-taking ability, and self-determination. (These psychological qualities would be more evident in older gifted females, but there would be indicators of these, or related qualities in younger gifted females.)
- Teacher observations of classroom conversations of what questions students ask, depth of content knowledge and understanding evident in specific talent domains obvious in student responses or questions, passion for a talent domain, complexity of sentences and understanding evident, higher order thinking, advanced vocabulary, an inquiring mind, an alert student, a student who demonstrates focused engagement in learning, a good listener, a good communicator—at any level of learning.
- In addition to supportive relationships from allies evident, for example, from one or both parents, caregivers, and/or family members at home.

Teaching Gifted and Talented Children

Teaching gifted and talented students based on the Kronborg Talent Development Model of Eminent Women, and other talent development models which underpin the teaching of gifted students, emphasizes nurturing, motivating, and developing students' gifted abilities in talent domains. In particular, teachers also need to be conscious of gifted girls' educational needs and ways to develop their talents in classes from the early years until Year 12.

A teacher could provide enriched, extended, and accelerated curriculum where appropriate (Krisel, 2018) for a cluster of gifted students in a mixed-ability class, or for a whole class of students in a particular domain of learning depending on the talents evidenced in the gifted students in a class. High ability grouping and acceleration for gifted students with similar talents in a domain have been found to be beneficial to gifted students' learning in the secondary years (Steenbergen-Hu, Makel, & Olszewski-Kubilius, 2016).

Professional learning for pre-service teachers and teachers of gifted students in regard to talent development is vital (Kronborg & Meyland, 2003; Kronborg & Plunkett, 2012, 2013; Plunkett & Kronborg, 2011, 2019). A teacher would need to be expert in their curriculum content in regard to scope and sequence of what needs to be taught; however, knowledge and understanding of gifted students, identification, talent development, curriculum differentiation according to gifted students' high abilities and talents, and evidence-based knowledge is most relevant.

A teacher could modify or differentiate the curriculum for identified gifted students' educational needs, providing for individuals' faster pace and challenge in learning so that gifted students can make choices in independent learning projects across talent domains. A teacher needs to understand there are individual differences among gifted student learners and that gifted learners still need to be encouraged, stimulated, and motivated to engage in their curriculum content where they have learning strengths. Teachers need to differentiate curriculum in regard to content, process, concepts, learning environment, and student products (Maker & Schiever, 2010; Stambaugh, 2018), so that advanced learning opportunities are provided for gifted students in their talent domains.

Furthermore, when gifted students are working in groups, teachers need to give opportunities for gifted females to explain their learning strategies to others in the group or classroom, in relation to their chosen talent domain of interest, and to use their preferred learning processes. Learning is developmental when providing opportunities for gifted students (Stambaugh, 2018). Teachers need to be mindful of gifted students' psychological needs which need to be considered when providing challenging learning opportunities for students. Gifted students need to be encouraged, motivated, and supported to take risks, to develop their resilience, to focus on their problem-solving in talent domains, and to work on independent projects that provide opportunities to stretch their competencies, and skills as well as knowledge and understanding to become expert learners.

Conclusion

Talent Development Models that have been developed based on the investigation of gifted and talented students across talent domains can be used to inform and explicate the talent development process for teachers of gifted students in their primary and secondary classrooms. More specifically the Kronborg Talent Development Model of Eminent Women can be used to inform teachers on relevant issues important when teaching gifted girls in their talent domains. Teachers need to be motivated and educated to understand the importance of providing for the educational needs of gifted students as a matter of social justice, so that this group of students are motivated to transform their gifted potential by developing their talents over time, in relation to their developed identity, and choosing a life and career that has purpose.

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14

Finnish Conceptions of Giftedness and Talent

Sonja Laine and Kirsi Tirri

Introduction

In this chapter, we present Finnish conceptions of giftedness and talent based on recent Finnish research and reports related to this theme. Conceptions of giftedness and talent are always dependent on the cultural context in which they are discussed. This fact implies that the cultural context is the starting point in our efforts to identify the Finnish conception of giftedness and to support gifted and talented students.

In this chapter, we first present the Finnish context of gifted education. This is followed by research results on Finnish teachers' and students' conceptions of giftedness and intelligence. The Finnish National Core Curriculum is then introduced, as it guides teachers' pedagogical thinking and teaching practices in Finland. We also reflect upon the theoretical frameworks behind identified Finnish conceptions: giftedness is domain-specific and developmental.

Differentiated teaching is presented as the main initiative to meet the needs of gifted students in Finland. Furthermore, we discuss options for identifying gifted students in the Finnish holistic educational context.

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Finnish Context of Gifted Education

The Finnish educational system can be best described as highly egalitarian. Since the 1970s, the main principle has been to maintain equality, which is manifested in the care given to the weakest students, such as children with learning difficulties (Tirri & Kuusisto, 2013). Today, students are educated in inclusive classrooms and teachers are expected to tailor their teaching practices in a way that considers students' individual characteristics, needs, and interests. The development of the child is emphasized, and individually personalized student support is provided by multi-professional teams. However, inclusion is often connected more to children with disabilities and special education. This perspective represents a narrow definition of inclusive education.

In our work (Tirri & Laine, 2017a, 2017b), we have used a broad definition where inclusion is defined as nondiscriminatory quality education for all (Saloviita, 2015; UNESCO, 2009). The broad definition of inclusion gives room to gifted and talented students and their educational needs as well (Tirri & Laine, 2017a). We have also promoted "growth mindset pedagogy" (Rissanen, Kuusisto, Tuominen, & Tirri, 2018) that can be applied to gifted students in inclusive education, for whom opportunities to learn and develop by doing challenging tasks have been almost systematically neglected. In Finland, gifted education has depended on individual teachers, since neither the educational system nor teacher education programs have addressed the topic (Laine & Tirri, 2016; Tirri & Uusikylä, 1994). American policy experts Finn and Wright (2015) also identified a "Finnish mindset," in which "standing out" is unfashionable except in music and sports, and which encourages both inclusion and uniformity in education (Finn & Wright, 2015; Tirri & Laine, 2017a).

Individualized values became concrete in education when the Finnish "National Core Curriculum in Basic Education 2004" was published. For the first time, there was a notion that the individual student is entitled to teaching which corresponds to his or her personal abilities, special needs, and the development of the student's abilities (Finnish National Agency for Education [FNAE], 2004). The position of students' individual needs has been strengthened further in more recent versions of the Finnish core curriculum for basic education. The newest national core curriculum (FNAE, 2014) emphasizes differentiated teaching as the pedagogical basis of teaching. Thus, all students, including the gifted, should be given education that addresses their individual needs. In this respect, the system is highly developed with regard to gifted education (Laine, Hotulainen, & Tirri, 2019).

Internationally, templates of how the gifted and talented are identified and educated vary (Freeman, 2005). To illuminate the different gifted education templates around the world, Dai and Chen (2013) presented three paradigms of gifted education: the gifted-child paradigm, the talent-development paradigm, and the differentiation paradigm. Paradigms are defined in a framework of questions of what, why, who, and how. Finland represents most strongly the differentiation paradigm. In Finland, the educational strategy to address students' differing educational needs is differentiated teaching (how), and it is done for the purpose of valuing and addressing every student's right to learn and develop themselves (why). Teachers are seen as key persons in identifying gifted students and addressing their educational needs (who). However, there is no particular definition of giftedness, but rather, teachers should recognize the mismatch between the student and the curriculum and find an appropriate curriculum and suitable instruction for those students for whom there is a mismatch (what).

The long-lasting question in Finland has been whether teachers are capable of fulfilling these requirements, as there is no mandatory training in gifted education for teachers. Furthermore, the egalitarian nature of the school system as well as a narrow perspective on inclusion might still neglect the support for the gifted. This, in turn, questions the practical validity of the differentiation paradigm in Finland, at least for gifted children.

Background for Finnish Conceptions of Giftedness and Talent

Research on Teachers' and Students' Conceptions of Giftedness and Talent

Cultural conceptions are meaningful, as they affect which abilities are seen as gifts and which people are considered gifted (Freeman, 2005). More particularly, conceptions of giftedness serve pedagogical purposes, as educators use them as a framework to guide identification of gifted students, and for planning curriculum modification to best address gifted students' needs (Phillipson, 2007). In the context of no official definitions, it is crucial to know how giftedness is conceptualized among educators.

A qualitative study (Laine, Kuusisto, & Tirri, 2016) on Finnish elementary school teachers' (N = 212) conceptions of giftedness indicated that giftedness is seen often as multidimensional, meaning that giftedness can occur in different areas, and it is seen more often as domain-specific than as domain-general. It was also often described as different from others and via describing the characteristics of gifted students. Mentioned characteristics were mostly connected with cognitive, creative, and motivational features of the gifted. However, teachers rarely expressed their views about the nature of giftedness in their open written definitions; but when they did, fixed views were more prevalent than malleable views. Another study (Laine et al., 2016) examined teachers' conceptions of the nature of giftedness in the light of Dweck's (e.g. 2000, 2009) mindset-theory. Findings indicated that most of the teachers (n = 250, 54%) had a growth mindset about giftedness—a belief that giftedness is something that a person can develop further. Conversely, one-third (n = 140, 30%) had a fixed mindset—a belief that giftedness is static, something that cannot be changed. The rest had a mixed mindset.

More recently, Finnish schoolchildren's and adolescents' (N = 791) implicit conceptions of giftedness and intelligence were studied qualitatively via interviews and questionnaires (Laine, Kuusisto, & Tirri, 2020). The results indicated that giftedness is mostly seen as multidimensional—as a person being very good and skillful in some specific subject or area. The nature of giftedness was quite often addressed, and it was seen as inherent, whereas the developmental aspects of giftedness were only rarely mentioned. While describing intelligence, the nature of intelligence was rarely brought up. Most of the participants described intelligence by addressing cognitive features of an intelligent person. Intelligence was connected with knowledge, knowing, and understanding. Another study, using a quantitative questionnaire, found that Finnish school children and adolescents (N = 607) more often hold a growth mindset of intelligence and giftedness than fixed mindset (Kuusisto, Laine, & Tirri, 2017). However, the results also indicated that intelligence is perceived as more malleable than giftedness (Kuusisto et al., 2017).

Finnish National Core Curriculum for Basic Education

As mentioned earlier, the newest Finnish national level curriculum for basic education (FNAE, 2014) now addresses talented students for the first time in history. The curriculum also guides us on the conceptions related to talent. Therefore, it is important to explore this conception in the curriculum more deeply.

In the curriculum, talented students are mentioned briefly under the sections where differentiated teaching in different school subjects is the focus. The curriculum does not define giftedness nor gifted students. However, this is not typical regarding other special needs. Direct translation from the Finnish word used to address talented students' needs for differentiation in the curriculum is "*skillful students*". Another typical connotation of talented students is "*students who progress rapidly*"; this is especially used in describing differentiation in foreign languages. In general, curriculum also discusses "*students' strengths*", and how students should be advised in both finding their strengths and utilizing their strengths in learning.

In summary, the conception of giftedness in the curriculum represents the idea that giftedness is something that can be seen as skillful behavior in the early beginnings of the school path. Skill separates the gifted person from others. This view is very simplistic, and it emphasizes successful behavior: it ignores the multifarious nature of giftedness and talent, and how it emerged itself. In the curriculum, the notions of "finding students' strengths" is the closest connotation to gifted potential. However, in practice, it is most often connected with the strengths of the character, not about gifts. Finally, the curriculum represents a domain-specific conception in that upward differentiation is described qualitatively differently under different subjects.

Theoretical Background of Finnish Conception of Giftedness and Talent

Based on empirical studies done in Finland, two main conceptions of giftedness stand out: (1) giftedness is domain-specific, and (2) giftedness is developmental.

First, giftedness in Finland is seen mostly as domain-specific, which is in line with many theories and models of giftedness and talent development (e.g. Gagné, 2005; Gardner, 1999; Subotnik, Olszewski-Kubilus, & Worrell, 2012). Originally domain-specific models of giftedness were developed as a response to domain-general models, in which giftedness was straightforwardly equated with high IQ, a view that was not accepted by all the experts in the field (Kaufman & Sternberg, 2008). The domain-specific nature is included in many later, different theories and models of giftedness. Based on a domain-specific conception, consequently, gifted individuals are a heterogeneous group of people with varying potential and abilities in one or many domains (Reis & Renzulli, 2009). The profile of a gifted person can be uneven; these twice-exceptional students can simultaneously be gifted and have learning difficulties (e.g. Foley-Nicpon, Allmon, Sieck, & Stinson, 2011). When planning gifted education and differentiation, recognizing the domain-specific nature of giftedness is a critical element (Davis, Rimm, & Siegle, 2014).

Second, giftedness in Finland is seen mainly as developmental. In developmental models, giftedness is understood as a potential that can be developed further with appropriate levels of intrapersonal and environmental factors (e.g. Gagné, 2005; Subotnik, Olszewski-Kubilus, & Worrell, 2012). Giftedness is thereby a "probabilistic developmental outcome of complex multilevel interaction of genetic, neural, behavioral and environmental factors" (Dai, 2011, p. 721). In our studies, we have used Dweck's (e.g. 2000, 2009) theory of mindsets as one main theory to address the nature of giftedness. The malleable view (growth mindset) is the belief that personal qualities and abilities are changeable, something that can be developed further. In this mindset, ability is seen to grow incrementally over time and with appropriate opportunities to learn (Matthews & Folsom, 2009). The opposite belief is a fixed view (fixed mindset), in which it is believed that personal qualities and abilities are static and unchangeable (Dweck, 2000, 2009). In this latter mindset, some students are categorized as inherently smart, while others are not (Matthews & Folsom, 2009). The developmental view is also crucial from the perspective of gifted education. It underlines the important role of environmental factors, including teachers, schools, and provisions. Dai (2011, p. 721) emphasizes developmentally responsive gifted education, in which practice should be based on an understanding of giftedness as a non-fixed entity.

We think that the fundamental starting point in addressing effectively gifted students' needs in practice are proper conceptions of different professionals bound up to executing gifted education. As the earlier chapters have shown, the conceptions of teachers and students, as well as the national curriculum, are promising. However, conceptions of professionals need to be expanded. Domain-specific nature means much more than only understanding that giftedness can occur in different areas. Similarly, the developmental view toward giftedness needs to be strengthened. There are still teachers with fixed or mixed views toward giftedness, which in turn might lead them to neglect differences between students who are seen as gifted and those who are not, but whether the identified gifted are thought to need developmental opportunities during their schooling.

Education for Gifted and Talented Students in Finland

Differentiated Instruction

Differentiated instruction is the pedagogical basis of all teaching in Finland. In the national core curriculum for basic education (FNAE, 2014), differentiation is based on knowing students and students' needs, and on students' possibilities to plan their learning, choose different working methods, and progress individually. The curriculum presents different ways to differentiate curriculum for talented students. Strategies such as offering more challenging materials, tasks, and readings, possibilities to deepen understanding, alternative ways of learning, and possibilities for enrichment of the content are mentioned (FNAE, 2014). Literature also mentions some other strategies such as promoting independence, encouraging higher-level thinking, using problem-based learning, and adjusting the pace of learning (e.g. Rogers, 2007; Tomlinson et al., 2003).

However, differentiation is more than a set of singular strategies. It is a philosophy, a particular way of seeing, learning, and teaching (Tomlinson & Imbeau, 2010). It is rooted in a student-centered philosophy and ethic of teaching (Tomlinson & Imbeau, 2010). In the educational literature, differentiated teaching means that teachers modify the content, process, and products to be more appropriate for students' differing needs, learning profiles, and interest in order to maximize every student's opportunity for learning (Tomlinson, 1999; Tomlinson et al., 2003). As stated in van Geel et al. (2019, p. 60): "The core of differentiation is in teachers' deliberate and adequate choices considering instructional approaches and materials, based on well-organized goals thorough analyses of students' achievement, progress, and instructional needs, combined with continuous monitoring during the lesson." Consequently, differentiated teaching is a complex teaching skill (Van Geel et al., 2019). Differentiated teaching should be well-planned and target-oriented, to be truly effective.

There is evidence that teachers do not regularly differentiate instruction (e.g. Latz, Speirs Neumeister, Adams, & Pierce, 2009; Westberg & Daoust, 2003). There is also some indication that gifted students are not necessarily included in a group that is seen to need differentiation (Hertberg-Davis, 2009). Research on Finnish elementary school teachers showed that they see differentiated teaching as the second biggest pedagogical challenge they have faced in their work (Atjonen et al., 2008). There is also some indication that

Finnish teachers do differentiate in their teaching (Laine & Tirri, 2016; Saloviita, 2018), but, at least with the gifted students, they do not use necessarily the most effective and evidence-based methods (Laine & Tirri, 2016; Tirri & Uusikylä, 1994). For example, the opportunity of progressing individually with one's own speed does not necessarily actualize with gifted students in practice, nor do the possibilities to work with other students with similar abilities.

We argue that in Finland, different types of acceleration should be seen as a valid option for gifted students, and gifted children should have more possibilities to progress at their own speed. There is a wide range of international research evidences that supports the use of acceleration with gifted students (e.g. Colangelo & Assouline, 2009; Hattie, 2009), and thus, it would offer a solid background for developing acceleration possibilities in Finland as well. Moreover, many of the acceleration options are already possible for gifted students in Finland. For example, a child can start comprehensive school one year earlier, at the age of six, if the child is seen as ready according to psychological and/or medical tests (Basic Education Act, 628/1998, section 27). It is also possible for a gifted student to skip a grade later or to be accelerated in a particular subject according to their talent area.

We advocate differentiated teaching as a promising approach for educating gifted students in inclusive classrooms in Finland. It is well in line with the Finnish educational atmosphere and the cultural context, which is based on an egalitarian ethos and in which all segregation options would face opposition. Teachers' attitudes toward practice are also positive and supportive (Laine, Hotulainen, & Tirri, 2019). Teachers favor keeping gifted students' in regular classrooms with their peers (e.g. Laine et al., 2019; Tirri & Uusikylä, 1994; Tirri, Tallent-Runnells, Adams, Yuen, & Lau, 2002). Thus, we believe that improving gifted education in Finland must be done by strengthening awareness of gifted students' needs and of how to implement differentiated instruction effectively for them. This knowledge should be provided already in pre-service teacher education. Pre-service teachers should be offered training opportunities that allow them to try different teaching strategies with different student populations (Tirri & Laine, 2017a).

Identification of Gifted and Talented Students

How best to identify gifted and talented students is a long-lasting debate in the field of gifted education. During the past decades, nontraditional ways have come to replace the more traditional ways of identification

(VanTassel-Baska, 2005). The task is to identify both those students who already demonstrate giftedness and also those students with undeveloped potential in some specific areas (VanTassel-Baska, 2005). How to best identify gifted students depends on the provision for which the identification is aiming at.

In the Finnish context, which represents the differentiation paradigm, the main object in identification is to diagnose the mismatch between the student and the curriculum. Thus, differentiated teaching according to students' readiness and needs starts with teachers evaluating what students already know about a topic (knowledge, skills, and understanding). In this phase, teachers usually use a type of pretest that is connected to the goals and the content of the curriculum. This phase can be seen as one part of the *identification of students' educational needs* (Prast, Van de Weijer-Bergsma, Kroesbergen, & Van Luit, 2015). Based on the pretest, the teacher then plans the following unit and lessons accordingly: the content, processes, and products are planned to be suitable, motivating, and adequately challenging for different subgroups of students. Throughout this process, those students who already have mastered the content of the unit in advance are differentiated upward. The good aspect of this kind of identification is that it is done regularly and it is not an endpoint but rather the beginning. However, it is mainly about the knowledge students hold beforehand and about achievement, and thus it is only one aspect of the identification.

From the perspective of potential, teachers should also be conscious about students who demonstrate great learning potential. These students might be those who have not had possibilities to develop themselves and to gain knowledge earlier, but who learn fast and progress rapidly with proper instruction and support. This means that their zone of proximal development (Vygotsky, 1978) is wide, which in turn indicates great learning potential. These students might start the new unit with low pre-knowledge but end up gaining a great amount of new knowledge during the well-planned learning unit. This type of identification can be called *dynamic identification* (Kanevsky, 2000), and it has been seen as an alternative to traditional testing. Dynamic identification is normally used more in formal assessment situations, and it concentrates on the learning process instead of products (Lidz & Elliot, 2006). It is also seen to serve well students with diverse backgrounds (Lidz & Elliot, 2006). However, we suggest that teachers should use a dynamic-assessment strategy to identify students' learning potential and to take this into account when planning differentiated teaching and forming flexible groupings. The early identification of potential will help students to develop their talents.

Teachers should also be aware of their students' different strengths and support them in finding and developing their strengths. This idea is also presented in the Finnish national core curriculum (FNAE, 2014). One useful tool for teachers to identify students' strengths is *Multiple Intelligences Profiling Questionnaire* (MIPQ; Tirri & Nokelainen, 2008; Tirri & Nokelainen, 2011). It is a five-point Likert scale self-rating questionnaire to assist teachers in understanding their students' strengths. It is based on Howard Gardner's theory of Multiple Intelligences (Tirri & Nokelainen, 2008). As it is based on a domain-specific conception of giftedness, it fits well within the educational system in Finland. It is also a tool for students' own self-reflection about their strengths. Knowing students' strengths (and weaknesses) helps teachers to support them accordingly. For example, studies (Tirri & Nokelainen, 2011) have indicated that girls rate themselves lower in logical-mathematical intelligence than in other intelligences. This type of information is important for teachers and counselors to best support the students to fulfill their full potential.

Summary

In Finland, holistic education is promoted in the national curriculum, in teacher education, and in schools (Tirri, 2011a). In this holistic approach, human beings are lifelong learners who need to be educated in all educational domains to actualize their full potential. These domains include the three domains in learning as identified by Benjamin Bloom (1956): cognitive, affective, and psychomotor. Many learning tasks—for example, the skills related to morality—require teaching and learning in both cognitive and affective domains (Tirri, 2019). The Bildung tradition that is the basis of education in Finland and Nordic countries aims at educating individuals to become competent citizens who actualize their individual talents and also benefit the society with their competences. Bildung advocates the importance of individual and societal transformation through education (Tirri & Toom, 2020). In the Bildung tradition the goals of education include both excellence and ethics. Academic achievement is not the only aim of schooling, but it should be complemented with lifelong learning to find wisdom to live a moral life. In gifted education the search for goodness and wisdom should be emphasized more, and Bildung provides a good philosophical framework for this kind of education.

Tirri (2016) has presented three perspectives that are important for the holistic education of gifted students in the twenty-first century. They include values and worldviews that help young people to find purpose in their lives, a growth mindset for learning that promotes creative thinking, and ethical skills that are needed to live a moral life. Gifted students also need an ethic of empowerment that is built on their own inner drive to excel and create new things. "The hacker work ethic" includes many aspects that suit for education for gifted and creative students (Tirri, 2016, p. 107). A holistic approach to gifted education challenges educators to acknowledge the multiple intelligences of their students, including moral and spiritual domains. Educators should also follow a growth mindset pedagogy and encourage gifted students to try harder and look for hard challenges instead of easy wins. Excellence should be combined with skills in ethical sensitivity and motivation to live a moral life (Tirri, 2011b).

In this chapter we have shown that, during the past decade, gifted education has advanced in Finland. According to our empirical studies, the Finnish conceptions of giftedness and talent are well in line with the current theories and models in the field. Taking this together with teachers' rather positive attitudes toward gifted and educating gifted in regular classrooms (Laine, Tirri, & Hotulainen, 2019), differentiated teaching for the gifted appears as a promising avenue. This means that in Finland gifted education teacher education should be modified to change the current practices in schools (Tirri, 2017; Tirri & Laine, 2017a). Teachers are the key agents in identifying and nurturing all kinds of talent. Finnish teachers are ethical professionals who have the freedom to design their classroom curricula and their students' learning environments (Tirri, 2014). When teachers learn and commit themselves to the goals of gifted education, we can see great changes in schools. Researchers and scholars in gifted education should include this mission in their work and commit to cooperation with schools.

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15

Children with High Intellectual and Creative Potential: Perspectives from a Developmental Psycho-Environmental Approach

Sylvie Tordjman, Maud Besançon, Caitriona Pennycook, and Todd Lubart

This chapter is based on work in France concerning giftedness with a focus on high potential. In particular, the multidimensional and environmental approach developed at the National Center for Assistance to children and adolescents with High Potential (CNAHP) is presented. The chapter provides an overview of the concept of high potential, its empirical support and interest, the evaluation and practices used to identify and develop it. A developmental model is proposed on the role of environmental factors in the expression of children's potential and provides the basis for clinical practice and research on high potential. This model examines developmental processes involving particularly certain environmental factors (fostering motivation,

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providing enrichment opportunities, valuing effort, offering support to the child) within and across family, school/professional, and societal environments.

Conceptions and Representations

In France, there has traditionally been debate about the terminology used to describe gifted children, which varies according to the underlying theoretical conceptions and representations (e.g., gift, precocity, talent, or potential). These conceptions are discussed below.

The Concept of Giftedness

The term *gifted* refers generally to an additional amount of intelligence compared to the general, peer-referenced population. In French, the term "surdoué" implies an excess and has a stigmatic connotation in a society that values equality. The term gift, or "don" in French, suggests furthermore that one has received an endowment, which is generally conceived in terms of a genetic heritage. The idea of a gift is also connected with a debt that it can generate, in particular, a debt with respect to the gifted individual's family (parents, siblings), the school environment (peers), or the social/societal environment (friends, society). This "excess" of intelligence can sometimes lead to or be associated with emotional, behavioral, and/or school problems.

In 2005, a public national center was created in a French hospital-university department of child and adolescent psychiatry. It provides services to help gifted children and adolescents with psychological and academic difficulties. Given that the CNAHP is part of a public hospital, the assessments conducted at the center are free of charge for children who live within the region. Evaluations are therefore widely accessible for families of all socio-economic levels and reflect the value of equality, which is important in French society. In this national center, the term *gifted* (surdoué) was used initially and the focus was on the possible psychological consequences of this "excess" of intelligence in the children attending to the center. Out of the first 338 children and adolescents participating in the activities of this center, a high proportion displayed school problems (78%), including school failure (defined as having or foreseeing repetition of a grade, which corresponds to 7.5% of children with high intellectual potential consulting at the center), and the following disorders according to the ICD-10 and the DSM-5 diagnostic classifications based on child-psychiatrist reports: anxiety disorders (40.5%), learning disabilities (6.8%), conduct disorder (9.5%), depressive disorders (8%), personality disorders (3.5%), ADHD (attention-deficit/hyperactivity disorder: 3.5%), obsessive-compulsive disorder (1.5%), and other problems (26.6% including, e.g., family problems with sibling conflicts) (Guignard, Kermarrec, & Tordjman, 2016).

Over time and after receiving more than 1200 children in the center, we discovered that the term *gifted* was problematic. Indeed, the term "gifted" was not used as an adjective ("gifted child") but as a substantive ("the gifted") that became quickly the main qualifier for the child and could have negative consequences for the individual and his/her family. Indeed, the use of the term *gifted* heightened the risk of the child being defined only by his/her "giftedness" in his/her family, school, or social environment. Identity construction cannot be limited to the child's giftedness alone. From the first appointment in the center, these children try often to show off their intellectual capacities and sometimes engage in an intellectual competition with others. This is often a sort of verbal jousting match in which the children use witty words to test the other person. These behaviors can irritate teachers and other children. However, they can also reveal a lack of self-confidence and social-relational difficulties. In our center, we observed the possible negative effects of a "gifted identity" on children's development and their families (Tordjman, Kermarrec, & Guignard, 2014). In particular, we observed some depressive symptoms shown by certain children and sometimes by their parents when over time the child no longer met the criteria of being "gifted" due, for example, to methodological issues (such as the use of a new version of the intelligence test). All these reasons led us to abandon the term *gifted*.

The Concept of Intellectual Precocity

The term *intellectual precocity* refers to the advance of the child's mental development compared to the children's chronological age. This term was widely used in the French school system (with a historical reference to mental age, which was part of the IQ concept many decades ago). The logic of "skipping classes" is a practical solution related to this conception. However, it is not fully satisfactory. Indeed, whereas the term *intellectual precocity* refers to a child's advance in cognitive development, it does not consider his/her psychoaffective development. Concerning the range of academic disciplines, the precocity may only concern some cognitive domains, although it is usually treated as a general developmental advance. Finally, the use of the term *precocity,* when describing adolescents, young adults, or elderly people with high intellectual potential, seems odd as the developmental advance loses its meaning, and wasdroped officially in 2019 by the French national education system.

The Concept of Talent

The term *talent* refers to the child's skills in a particular and specific field (such as musical talent). The investment in a specific domain or activity to the level of recognized talent raises a first question of opportunity. For talent to be expressed, and therefore recognized, an individual must express his/her potential in action that is recognized by the environment. Talent is therefore the "tip of the iceberg" of giftedness because not all children have the opportunity to develop and express their potential and be recognized. In addition, talent is sometimes associated with atypical cognitive development, which may lead to skewed psycho-affective development and associated disorders. Psycho-affective developmental disorders could also lead to a specific cognitive over-investment from the child. For example, impairments in early social interactions could provoke social isolation of the child, which in turn could lead to an intellectual overinvestment in a specific domain with the development of talent. Inversely, a talented child could be rejected from his/her social environment due to his/her difference, and therefore experience situations of exclusion and social isolation.

The Concept of High Potential and Presentation of the Model

The term *high potential* reflects both the cognitive capacities of the child and the fact that this potential can be expressed or inversely inhibited by the child's difficulties. The concept of *high potential* highlights the difference between an aptitude or a capacity, which may be expressed or not depending on the environment, and a performance which is the concretization of an aptitude in an activity (Lubart & Jouffray, 2006). The term *high potential* reflects a clinical posture toward the child's family, school, and social environments, referring to the child as not being defined solely by his/her "giftedness". Also, an advantage of using the term *high potential* is that the field of expression remains open and offers the opportunity to expand the concept of giftedness beyond the traditional intellectual (IQ) realm. Numerous authors consider that creativity may be a form of high potential, which relates to the ability to produce original work that is meaningful in its context (Sternberg & Lubart, 1993). Creativity is distinguished from "academic" intelligence as measured by IQ tests. Other theorists view creativity as a dimension of intelligence that can complement the measurement of IQ in the identification of high-potential individuals (Treffinger, 1980; Naglieri & Kaufman, 2001). In this enlarged perspective, the term *high potential*, including both intellectual and creative potential, was adopted and the national French center was renamed the "National Center for Assistance to children and adolescents with High Potential" (CNAHP). The CNAHP is a reference center for diagnostic evaluations, therapeutic care, training, and research. The objective is to identify and help high-potential children and adolescents with emotional, behavioral, and/or school problems, to provide adapted care, enhance their well-being, and enable them to express and develop their intellectual and/or creative potential. In this approach, intellectual and creative potential can be expressed or inhibited depending on several environmental factors during the child's development. Across family, school, social/societal environments, certain shared factors, provided by these different environments, can facilitate the development and expression of high intellectual and/or creative potential, such as motivation (fostering and sustaining motivation), enrichment opportunities, effort (rewarding the work effort), and environmental support (see Fig. 15.1 based on Tordjman, 2020). These factors are described as follows:

– The development of the child's *motivation* is fostered and sustained by the representations of success in the child's environment (family, school, and societal environments). More precisely, the development of the child's motivation depends on family motivation (e.g., parental representations of success achieved through learning or getting a social position, etc.), school motivation (e.g., teachers' representations that succeeding at school is a key way to succeed in life or to change possibly the world, and teachers' beliefs in their educational missions) including supporting achievement motivation (goal achievement leading to perseverance), and societal motivation (based on socio-cultural representations of a possible place, recognition, and role of the high-potential individual in his/her society) including fostering social commitment.
– Opportunities of *enrichment* can be found in the family environment (enrichment of the milieu with books, etc.), school environment (enrichment through practice with mastering techniques, and through learning including methods of learning and encounters at school/university with

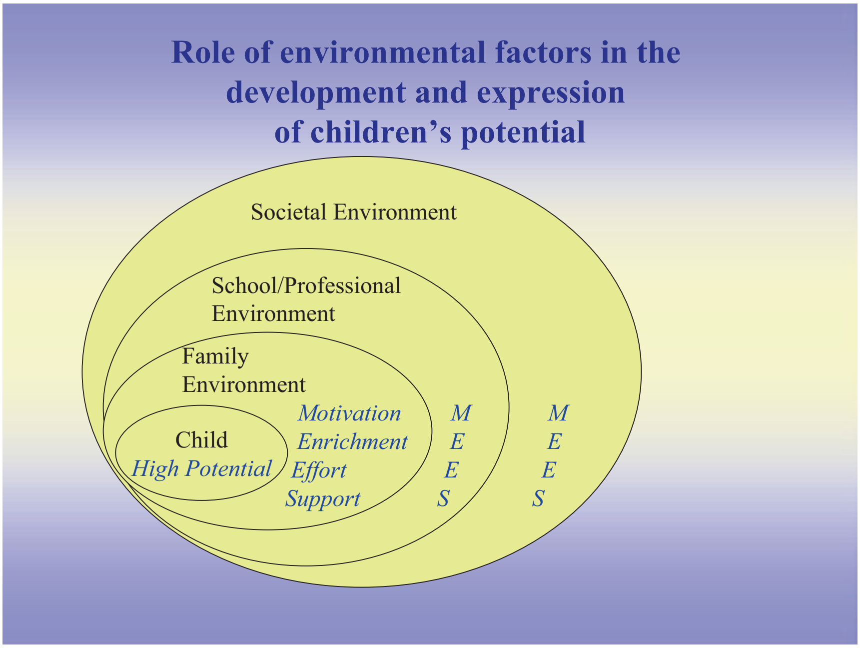

Fig. 15.1 Role of environmental factors in the development and expression of children's potential (based on Tordjman, 2020)
The main environmental factors described in this model are: fostering and sustaining motivation, providing opportunities of enrichment, valuing effort, and offering support to the child. *MEES* means *Motivation*, *Enrichment*, *Effort, Support*

experts), and societal environment (importance of socio-cultural factors of openness, flexibility and change through traveling, experience of other cultures, meeting experts who introduce their respective ideas or practice, etc.). These enrichment opportunities nurture children's potential.

– *Effort* and working hard can be valued across environments (family environment through parental rules, school environment with teachers rewarding students' efforts, societal environment with socio-cultural factors valuing effort and work), in particular by providing children with an adapted level of challenge taking into account their interests.
– Children can benefit from various *support* (such as affective, psychological, or financial support) across different environments (family, school, societal environments). This support is provided by family members, friends, teachers, peers, mentors, encounters (people who believe in the child's potential), and/or institutions. For example, affective and emotional support can be provided by parents and siblings (family environment), but also by

teachers and peers (school environment) and/or friends, mentors, and encounters (societal environment).

Reciprocal interactions should be acknowledged between these environmental factors, within and across environments (family, school/university/professional, societal environments). For example, affective and psychological support of the child provides an emotional frame facilitating the effects of fostering motivation, valuing effort, and offering enrichment factors on the development of high potential. The rationale concerning the role of these environmental factors in the development and expression of high potential is described below in the next section.

Empirical Evidence That Supports the Model and Its Interest

Empirical Evidence

In the model presented in Fig. 15.1, four main environmental factors contribute to the development and expression of children's high potential: fostering and sustaining motivation, providing enrichment opportunities, valuing effort, and offering support to the child. The child's environment plays a central role in providing these four factors, notably his/her family, school, or societal environment. These different environments interact, in accordance with Bronfenbrenner's ecological systems theory, which specifies how a child's development is affected by various environments and the interaction between them (for empirical studies supporting this theory, see Crawford, Snyder, & Adelson, 2019; Bronfenbrenner, 1979; Bronfenbrenner & Evans, 2000).

This model of the role of environmental factors in the development and expression of children's potential (Fig. 15.1) is supported by the clinical experience of the CNAHP based on the follow-up of 1200 children and adolescents with high intellectual and/or creative potential as well as qualitative analyses of case studies following recommendations from Paillé and Mucchielli (2015), and empirical studies as discussed in the following text.

First, this model highlights the need to differentiate creative from intellectual potential. A study conducted at the CNAHP on 338 children, including 118 children with high intellectual potential (IQ>130) and 220 typical children (IQ<130), showed weak correlations between intelligence and creativity. These results suggest that high potential should be conceptualized by distinguishing intellectual and creative potential (Guignard et al., 2016). Second, the role of the four environmental factors (motivation, enrichment, effort, and support) and their effects are developed below within each environment (family, school, and societal environments).

Family Environment

Olszewski-Kubilius, Worrell, and Subotnik (2018) highlighted the important contribution of parents in the development of children's high potential by recognizing this high potential, providing educational opportunities, and supporting cognitive, psychological, physical, social, and emotional development. In particular, parents can provide enrichment opportunities (e.g., finding teachers or coaches, supervising practice at home) and emotional support (encouragement, praise, and feedback from families facilitate the development of the child's self-efficacy and self-esteem). These authors described also how parents help their children to develop effort, grit, and perseverance. Furthermore, supportive families enable children to expend their physical and psychic energy on deliberate practice and study, which is part of enrichment of the milieu (Ericsson, Nandagopal, & Roring, 2009). Finally, the case study of Michael Jackson is a good illustration of the role in the family environment of the combined motivation, enrichment, effort, and support factors on the development of high creative potential (Tordjman, Pereira da Costa, & Schauder, 2020).

School Environment

Teachers' motivation, which involves teachers' representations of success, intelligence, and mission as educators, plays an important role in school investment and development of children's high potential. Hertzog (2003) conducted a retrospective study on 50 individuals who experienced gifted programs at school and reported that the most important benefit of these gifted programs from the students' perspective was the teachers' motivation and enthusiasm. How learners perceive and interpret their educational environment is important for understanding their motivation. For example, feedback even when positive can actually reduce motivation if it is provided in a context that views capacity as genetically determined (Dweck, 2010), or when it is perceived as controlling by the learners (Ryan & Deci, 2017; Deci & Ryan, 2002).

In addition, Colangelo and Davis (2003) highlighted the effects of learning as an enrichment factor facilitating the development of high potential. In the same vein, Ericsson et al. (2009) and Mudrak, Zabrodska, and Machovcova (2019) shed light on the key role of teachers and educators in the development of excellence. They showed that individualized instruction from an expert in the discipline and practice is necessary for the child to reach a high level of achievement. Theories of practice even state that all learners can reach the level of an expert after intensive deliberate practice and can succeed with effort and supportive conditions (Ericsson, 2017; Ericsson & Charness, 1994; Ericsson et al., 2009; Ericsson, Hoffman, Kozbelt, & Williams, 2018; Howe, Davidson, & Sloboda, 1998; Simon & Chase, 1973).

Furthermore, Matteucci et al.'s studies suggest that value attributed by the teachers to the students' efforts is a key factor of school environment (Matteucci, 2007; Matteucci, Tomasetto, Selleri, & Carugati, 2008). Kirsi Tirri's empirical research showed that acknowledging and praising students' efforts was a predictor of school success and enhanced intellectual development in children (Tirri, 2016; Tirri, Kuusisto, & Aksela, 2013; Tirri, personal communication, ECHA Congress in Paris, 2010). Education based on the theory of growth mindset (Dweck, 2000) encourages high-potential students to try harder instead of simply trusting their current abilities (Tirri, 2016) or staying in their comfort zones (Kuusisto, Laine, & Tirri, 2017).

Tirri is developing a pedagogical program to educate a growth mindset in the school environment, where students are taught that they can practice using their brains to continue development in the domains of multiple intelligences (Tirri, 2017). Interactions between the factor of *valuing effort* at school and other factors or environments should be acknowledged. Indeed, the value attributed by the teacher to the students' efforts is influenced by his/her motivation related to his/her representations of success and intelligence, themselves influenced by societal representations. It is noteworthy that Matteucci (2007) reported that the "lack of effort" causal attribution for students' failure and effort retribution-based educational practices adopted by 122 high school teachers are predicted by their social representation of intelligence "as a gift". This representation ranges from beliefs of a stable heritable intelligence (theory of a fixed mindset) to a growth mindset (developmental theory).

Empirical studies suggest that students' perceptions of supportive teacher relationships contribute to the development of high potential by acting positively on the students' school motivation (including participation in the academic community), learning, performance, and school completion (Connell & Wellborn, 1991; Davis, 2003; Davis & Dupper, 2004; Davis, Chang, Andrzejewski, & Piorier, 2014; Freeman et al., 2007; Hughes et al., 2008; McCombs, 2003a, 2003b, 2004; Parkes, 2014; Skinner & Belmont, 1993; Valiente et al., 2008), whereas students' motivation and school adjustment are negatively affected when their relationships with teachers are distressed (Cornelius-White, 2008; Finn & Rock, 1997; Roorda, Koomen, Spilt, & Oort, 2011; Smyth & Hattam, 2004). Furthermore, Cornelius-White (2008) and Roorda et al. (2011) performed meta-analyses and reported positive correlations (from 0.25 to 0.55) between students' perceptions of supportive teacher relationships and their motivation (reflected by increased attendance and participation) or academic achievement (reflected by higher grades). Also, longitudinal studies highlighted the importance of teacher relationships for students' task commitment (a form of motivation involving energy focused on a task) by mediating their effortful engagement. Finally, the PISA 2012 data showed significant differences between academically gifted and normative students for students' perceptions of the teacher-student relations in five countries (France, Belgium, Germany, Netherlands, and United Kingdom) with a small to moderate positive effect (Godor & Szymanski, 2017).

Societal Environment

In the societal environment, valuing effort (socio-cultural factors valuing effort based on the growth mindset theory) and support (affective and psychological support provided by friends and/or people believing in the individual's high potential) are also key factors for the development and expression of high potential.

As indicated previously, the child's motivation is fostered by societal representations that he/she can possibly get a place, role, and recognition for his/her high potential, allowing him/her to develop and express this potential. For example, it would probably not have been possible for Michael Jackson to develop and express his high creative potential in the American society of the eighteenth century, regardless of his high musical ability (Tordjman et al., 2020). Socio-cultural factors provide a societal context that facilitates or inhibits the development and expression of children's high potential, but they shape also children's societal commitment. Societal commitment can drive the high-potential individual to accomplish something in the world that goes beyond the self (Damon, Menon, & Bronk, 2003; Bundick & Tirri, 2014). This involves still a possible personal gratification, given that societal commitment can fulfill personal needs. In turn, positive societal feedback provides also the individual with societal motivation and/or reinforces it.

Similarly, Mudrak and Zabrodska (2015) highlighted that the societal environment provides feedback that influences the expectancies of success as well as the value of the intellectual and creative activity. Furthermore, these authors pointed out that societal environment offers enrichment opportunities (e.g., the proximity of a library, etc.). Also, the societal environment can provide enrichment opportunities by exposing the high-potential child/individual to different cultures, people, or societies. This introduces for the child/individual a change in perspective with new ideas, possibly enhancing the development and expression of his/her high potential. Leung et al. (2008) demonstrated empirically that exposure to multiple cultures can foster creativity. They showed that creative benefits resulting from multicultural experiences depend on the extent to which individuals open themselves to foreign cultures. These findings have important implications for promoting the development of creative/intellectual potential through enrichment from various societal environments.

Interests of the Model

The model presented here is a developmental model involving *processes* occurring throughout the lifespan. This model examines developmental processes leading to intrapersonal characteristics of high-potential children/individuals usually reported in the literature, such as task commitment or motivation. By exploring different paths of the developmental process leading to the same high-potential characteristic, this model offers multiple perspectives for allowing the development and expression of high potential in children. For example, many authors (including Mackinnon, 1965; Renzulli, 1978, 1986; Roe, 1952) have described task commitment as a main characteristic of creative-productive individuals. Task commitment is even one of the three dimensions of the three-ring conception of giftedness in Renzulli's (1978, 1986) model. This is essential but our approach is focused on the different processes leading to the development of task commitment, such as processes involving supportive teacher relationships, achievement motivation (goal achievement), valuing effort, or methods of learning (part of enrichment programs). It should be acknowledged that Reis and Renzulli (1982) underlined themselves that task commitment can be developed through appropriate learning or stimulation experience. Similarly, encounters are described in Gagné's model (2010) as part of the environmental events influenced by the chance factor. However, it is not the encounter in itself that is important but rather the mechanisms underlying the "encounter's effects" on the development of high potential, such as the enrichment process (e.g., meeting experts in a specific field) or the affective, psychological, and/or financial support provided by encounters with people who believe in the individual's potential (e.g., encounter with a mentor who supports the individual and enhances his/her self-confidence, self-esteem, and risk-taking).

The proposed model focuses on the role of *environmental factors* in the development and expression of human potential. It does not rule out possible effects of genetic factors but emphasizes the effects of key environmental factors facilitating or inhibiting the expression and development of high potential. A better understanding of the role of these environmental factors opens intervention strategies to provide the optimal environmental conditions for the development and expression of children's high potential. This developmental perspective implies working on facilitatory or inhibitory environmental factors of high potential and is opposed to a wholly innate perspective on intelligence. It is noteworthy that even genetic factors cannot be reduced to a purely innate perspective, given that environmental factors modify the expression of genes due to epigenetic mechanisms. Interestingly, the definition of genetic heritability (h^2) includes the effects of environment ($h^2 = GV / (GV + EV)$) where GV is the cumulative genetic variance and EV, the environmental variance (Hegmann & Possidente, 1981).

Finally, this model is based on the *dynamics of interactions* between environmental factors and between environments with reinforcement loops. The proposed model is therefore not a linear model of one-way causality. It involves a multidimensional approach with multifactorial interventions following the hypothesis that acting on a combination of factors in several environments is more efficient than acting on only one factor in one environment. It offers a framework for clinical and educational practices as used at the CNAHP where simultaneous interventions are conducted in the family, school, and societal environments in collaboration with parents, teachers, and caregivers, taking into account the motivation, enrichment, effort, and support factors (as described previously).

Identification of Children with High Potential in the Context of Their Environment

It is necessary to evaluate not only the child's cognitive functioning but also his/her psycho-affective, behavioral, and academic difficulties. This should be done in an integrated and global approach, taking into account the child's cognitive, socio-emotional, and physical development across the relevant environments previously described (family, school, and societal environments) (see Table 15.1).

The identification of children with high potential requires an extensive, multidimensional, and comprehensive approach. Indeed, the Intelligence Quotient (IQ) is an important source of information to identify high intellectual potential, but it does not always meet the needs raised by the child and his/her family in the context of his/her cognitive, socio-affective, and cultural development. Thus, it is necessary to complete the IQ measure with other assessments and clinical interviews in order to understand better the general functioning of the child and to identify the high potential but also the child's needs. The identification of children with high potential is based on several aspects, both in relation to the child (taking into account different domains of functioning) and the environment in which he/she evolves (taking into account environmental representations). Identification involves at the CNAHP several chronological steps: (1) a first step: parental phone interview and family meeting with the child; (2) a second step: standardized assessments

Table 15.1 Main assessments performed at the CNAHP for the identification of high intellectual/creative potential children with psychological and/or school difficulties

Evaluation	Assessments
Cognitive functioning	Wechsler scales which measure IQ (WPPSI, WISC-V, WAIS according to age)
	EPoC (Evaluation of Creative Potential)
	Evaluation of attentional capacities (cognitive evaluation using the TEA-Ch) completed by a behavioral evaluation using the DSM-5 criteria
	DISCOVER program (social intelligence)
Psycho-affective and behavioral difficulties	Depression and anxiety scales including self-esteem evaluation
	Evaluation for hyperactivity (using the DSM criteria and the Conners questionnaires with different observational sources: father, mother, teacher, and child)
Personality	Projective tests
	Questionnaires adapted from the Big-Five
School investment	School interview with a teacher and a psychologist of the CNAHP
	Self-report questionnaires: pleasure in going to school, implicit theories of intelligence, School Attitude Assessment Survey-Revised (SAAS-R)
Other evaluations	Systematic evaluation using the 'Draw-a-person' test, 'Draw your family' test, and the Complex Figure of Rey followed by a psychomotor assessment (if necessary)
	Speech and language report (if necessary)

of cognitive functioning, personality, psycho-affective and behavioral problems, as well as school investment and difficulties; (3) a third step: discussion time with the CNAHP team including the professionals who met the child (child psychiatrist, psychologists, CNAHP teacher, other professionals); (4) a fourth step: feedback time with the child and his/her family to explain and discuss the results. The content of these different steps is described below.

It is important, when assessing children with high intellectual/creative potential, to consider the child as a whole. Psychological and physical aspects as well as the child's interactions with his/her family, school, and societal environments are assessed, preventing the evaluation from being restricted to a strictly cognitive assessment. Taking into account several dimensions in the assessment of high intellectual/creative potential enables a better understanding of the psychological profile of each child and provides additional information which can be used to offer different choices and perspectives on his/her future therapeutic and educational project.

Family Environment: Parental Phone Interview and Family Meeting

First, a parental questionnaire is used during a semi-structured phone interview conducted systematically for all parents by the same trained secretary when parents call to get an appointment for their child at the CNAHP. This interview includes a part on the school, behavioral, and/or emotional difficulties in order to check if help provided by the CNAHP corresponds to the parental request. If it is the case, i.e. a parental request of identification of possible high intellectual/creative potential in a child with psychological and/or school problems, an appointment with at least the parents and the child is proposed.

It is noteworthy that no evaluation with standardized tests starts before meeting the parents and the child. The appointment with the CNAHP child psychiatrist and the child with both parents is the starting point of this evaluation. The identification of high potential has to be situated in the frame of the family environment (family representations and meaning of giftedness and high potential, existence of other family members with high intellectual/creative potential, expectations, place and relations of the high-potential child with his/her siblings, etc.). Also, this family meeting offers an understanding of the child's difficulties in the context of the family dynamics and provides some clues for designing the therapeutic project. Based on the information gathered in this first meeting, the cognitive, conative, and psycho-affective evaluations can then be administered.

When all the assessments have been performed and scored, a meeting with the whole team occurs to discuss the results and finalize a written report. The results and the written report are then given and discussed with the child and his/her parents during the last family appointment involving the same child psychiatrist present at the first family meeting. This restitution meeting is important as it enables the child to gain a better understanding of him/herself and his/her functioning. It is also important for the family, as it allows the parents to know and respond better to the needs of their child and therefore favors the child's development and facilitates the intellectual and/or creative potential to be expressed.

Cognitive, Conative, and Psycho-Affective Evaluation

Cognitive Assessments

The evaluation of cognitive functioning at the CNAHP includes an assessment of intellectual potential using the Wechsler scales according to the child's age. This cognitive evaluation is not, however, limited to the traditional IQ measure. Notably, creativity is assessed using EPoC battery, to allow identification of creative high potential. In addition, social intelligence (DISCOVER tasks), attention including flexibility (TEA-Ch: Test Everyday Attention for Children), and other diverse cognitive skills (Complex Figure of Rey) are assessed.

Whereas several tools can be used for the assessment of the child's intelligence, the use of the Wechsler scales is recommended in France. These scales measure the intellectual functioning of a child by evaluating several dimensions: Verbal Comprehension Index (VCI), Visual Spatial Index (VSI), Fluid Reasoning Index (FRI), Working Memory Index (WMI), Processing Speed Index (PSI). High potential should be identified on the Full-Scale IQ but also on at least one index (VCI, VSI, FRI, WMI, or PSI) (Cuche & Brasseur, 2017).

It is important to note that the cutoff score of 130 (two standard deviations above the mean) to define a high intellectual potential is debated by certain authors (e.g., Terrassier, 2005). We take the confidence intervals into consideration when analyzing the WISC-V scores, so the score ± 6 points (90% CI: [x-6; x-6]) allows high potential to be detected based on an IQ score of 125. At the CNAHP, we decided to present the WISC-V results to families and to professionals in the form of confidence intervals. This decision was made to avoid a focus on exact scores and to encourage and foster discussion on the child's cognitive profile in the different dimensions evaluated by the test.

Furthermore, creativity is another very important cognitive skill that must be considered. We use the "Evaluation of Creative Potential" battery (EPoC; Lubart, Besançon, & Barbot, 2011) which makes it possible to assess the two types of thinking (divergent-exploratory thinking and integrative-convergent thinking) in several domains (verbal, graphic, social, mathematical, musical). Although there is no general creativity score, this test provides an estimate for each type of thinking and each domain represented by the following index scores in, for example, the verbal and graphic domains: Verbal Divergent Thinking (VDT), Verbal Integrative Thinking (VIT), Graphic Diverging Thinking (GDT), and Graphic Integrative Thinking (GIT). Thus, a child who obtains a score for verbal divergent and integrative thinking which deviates significantly from the average level (VDT> 130 and VIT> 130) would be considered as a child with high creative potential in the verbal domain. As some partial compensation can occur between divergent and integrative facets of a content domain, such as the verbal domain, the identification of creative high potential is based on the combination of the divergent and integrative scores, with a minimum score of 115 points for each.

To expand the scope of cognitive assessment, social intelligence is also taken into consideration, and the tangram task in the DISCOVER program is used to assess interpersonal intelligence based on social interactions and collaboration observed during the task. Albrecht (2006) defines social intelligence as the ability to get along well with others while winning their collaboration. This is the only evaluation conducted by the CNAHP that is carried out in a group situation (group of four children).

Finally, the Test Everyday Attention (TEA-Ch; Manly, Robertson, Anderson, & Nimmo-Smith, 2006) is also used. It assesses the child's ability to focus his/her attention in different situations (selective attention, sustained attention, flexibility of attentional capacities, attention vigilance in the face of an unforeseen event, and divided attention). It is noteworthy that, even when children with high intellectual potential have scholastic and/or psychological difficulties, some of their cognitive skills can be preserved contrary to appearances, with for example, as seen in the CNAHP results, excellent attentional capacities shown by cognitive tests, such as the TEA-Ch, contrasting with behavioral attention-deficit reported by parents or teachers (Tordjman, Vaivre-Douret, Chokron, & Kermarrec, 2018). These attentional skills are important to identify as they are resources which support the therapeutic and educational project. In addition, the Complex Figure of Rey (Rey, 1959; Wallon & Mesmin, 2009) provides complementary information on the child's cognitive functioning. This task requires children to reproduce a complex geometric drawing, first by copying it and then by drawing it from memory after a short delay. It assesses different cognitive functions, notably episodic visual memory and visuo-constructive skills which involve the coordination of fine motor skills with spatial abilities. Also, the test measures several cognitive processes indirectly such as planning, organizational skills, problem-solving strategies, and perceptual and motor functions.

Conative Assessments

Several constructs can be evaluated. The child's personality is assessed in different ways, depending on his/her age. It is possible to use questionnaires that are based on the Big Five theory such as BB5 (Barbot, 2012). To complete this evaluation of personality, two assessments involving drawings ("Draw-a-person" test and "Draw your family") are proposed to the child. These two drawings are analyzed taking into account (1) the graphic level, (2) the structure, and (3) the content. Analysis of content of the "family drawing" is particularly important and focuses on generational, fraternal, and educational relationships. Projective tests such as the Thematic Apperception Test (TAT; Murray, 1943) or the Children's Apperception Test (CAT; Bellak & Bellak, 1952) are also used with children. The analysis of the content of children's responses enables hypotheses to be made about the child's psychic functioning. Furthermore, the "Draw-a-person" test is administered at the CNAHP in combination with the Complex Figure of Rey, to assess body image, at the interface between physical and psychological aspects (Nevoux & Tordjman, 2010).

Psycho-Affective Assessments

With regard to the high frequency of psycho-affective disorders observed in the population of high-potential children with difficulties received at the CNAHP, assessments of anxiety and depression are systematically conducted at the CNAHP. They are performed according to three different observational sources: child psychiatric evaluation, parental evaluation, and the child's self-report evaluation. The child psychiatric appreciation of ICD-10 and DSM-5 diagnostic criteria for anxiety disorders and depression, based on the psychiatric observation of the child, provides a clinical psychiatric judgment. The parental evaluation is based on a semi-structured interview conducted during the phone interview and meeting with the parents and the child psychiatrist. Finally, the child's self-report evaluation of anxiety and depression is conducted using specific, standardized, and validated tools, such as the R-CMAS (Revised-Children's Manifest Anxiety Scale; Reynolds & Richmond, 1999) and the MDI-C (Multiscore Depression Inventory for Child; Berndt & Kaiser, 1999). It is noteworthy that anxiety disorders were the most frequent psychiatric disorders observed in this population (Guignard et al., 2016; Tordjman et al., 2018; Kermarrec, Attinger, Guignard, & Tordjman, 2020).

Hyperactivity is also systematically evaluated using the Conners Rating Scales (Conners, 2008). These scales are used to assess symptoms of hyperactivity disorder (Volpe & DuPaul, 2001). There are different validated forms of the Conners Rating Scales (a parent form, a teacher form, and a self-report form for the child or adolescent) which enable hyperactivity to be assessed across different observational sources (father, mother, child, and teacher). This approach, combining information from multiple sources, has been shown to improve the confidence in the diagnosis of mental disorders (Risi et al., 2006).

School Environment: Parental School Interview and Child's-Report Evaluation

In order to understand better the psychological and academic functioning of the child in his/her school environment, a parental school interview is conducted by a teacher and psychologist working at the CNAHP. This school interview is completed by the administration of child's self-report questionnaires on school investment to assess the child's motivation (see Table 15.1).

Furthermore, in case of recurrent school problems, the CNAHP teacher can also contact the teaching staff of the child's school (with authorization of the school director and the parents). It is very useful to contact the teaching team in order to gather information on the socialization and behaviors of the child within the school environment. Sometimes, the feedback from the teaching team is consistent with the family's feedback. However, other times, it can shed a completely different light on the child. This highlights the importance of considering the child's different environments.

Toward a Multidimensional and Integrative Approach for the Identification of Children with High Potential

Taken together, it appears necessary to consider the complexity of the concept of *high potential* and to propose a multivariate psychological profile-based approach. Each domain of high potential (intellectual, creative) is then described based on a specific multivariate profile. It is important to remember that assessments of cognitive functioning do not directly measure the child's real potential, but only the expression of his or her potential. These tests measure indeed the child's production, that is, the observed skills that depend also on the environmental factors and the child's motivation. All these tests, including IQ tests, are and must remain as tools. The clinician must interpret the scores in the context of the child's environments (family, social, and school environment) and his or her unique history. Furthermore, it is essential to stress the importance of interindividual differences within the population of children with high potential, whereas the mainstream literature tends to reduce these children to a list of characteristics. A multivariate approach reduces the risk to see children with high potential through a reduced representation and typology that are not representative of their diversity and singularity.

Furthermore, based on the CNAHP experience, the cognitive assessment should not just be a matter of systematic screening and identification given that this practice can create or strengthen the construction of a "gifted child" identity. The possible deleterious effects of this approach on child development have already been discussed. Not all authors, however, adopt this position, as some consider that systematic screening of children with possible high intellectual potential can contribute to the prevention of problems that may be associated with high intellectual potential. The clinical posture that one adopts when sharing results related to the identification of high potential with children, their families, and school professionals is probably as important as the results themselves.

Finally, it appears important in this multidimensional approach to the identification of high potential not to dissociate cognitive development from socio-affective development. Children with high potential can have psychological/affective needs and difficulties to express their high potential in their environment (family, school, and/or societal environments). A better knowledge of these needs and possible difficulties could enable practitioners to propose therapeutic and/or educational orientations in the context of the child's individualized and adapted project and in collaboration with caregivers, schoolteachers, and parents.

How to Develop High Potential in Children Based on the Psycho-Environmental Approach

It is essential to situate the child in his/her family, school, and societal environments in order to understand better the child's needs and possible difficulties and to facilitate and development expression of his/her high potential.

Family Environment and Therapeutic Project

The therapeutic project of children with high intellectual and/or creative potential has to be designed in the context of the family environment and in alliance with the parents. Psychological assessment is often the first contact that the high-potential child or adolescent and his/her family have with a child psychiatry team. For parents who are reluctant to consult in a child or adolescent psychiatry department or in private practice, the recognition of high potential associated with psychological problems can initiate or strengthen the therapeutic alliance with caregivers. It is important to address the issue of therapeutic care at the right moment. It is noteworthy that identification without therapeutic care and/or an educational project could have deleterious effects.

If the assessment confirms the child's high potential and psychopathological difficulties, the possible therapeutic interventions are discussed with the child and his/her parents. These therapeutic interventions may be very different, depending on the symptoms presented by the child, his/her environment, and clinical practice of the therapist(s). Parental support and guidance are also often needed (Kermarrec & Tordjman, 2010). The existence of several therapeutic options is essential so that it is possible, first, to provide the most appropriate care, and second, to offer the child and his/her family a choice that will enable them to be active in the therapeutic project. This therapeutic plurality ranges from art therapy (Nicolas, 2010) to different workshops, such as a magic-focused workshop (Bourgeois-Parenty, 2010). This workshop focuses on illusions allowing the child to engage the audience, but with benevolence, without aggression, sarcasm, or cynicism.

School Environment and Education for High-Potential Children

French Educational System and Children with High Intellectual Potential

In France, school is mandatory from three years old. Most children are educated in public schools in which the teachers have all been trained by the national education system. In addition to "traditional" public schools, there are a small number of private schools in which some teachers may adopt different teaching practices. In a well-known ministry of education report on the gifted, Delaubier (2002) made the following recommendations:

- Teachers must have a friendly and an understanding attitude toward each child;
- It is possible to provide special programs to respond to the needs of the children;
- Teachers must stimulate learning in all children;
- The school environment must stimulate not only the intellectual development but also other domains such as the social, physical, emotional, moral ones (etc.).

This report led also to the creation of resource people in each academic region whose role is to support teachers and families and to raise awareness on "giftedness" among all the actors of the institution. In March 2019, the national education system made available a document presenting the resources and educational opportunities that could promote the education of children with high intellectual potential.

The French educational system provides several ways to cater to the various needs of children and to foster their potential. At the different levels, teachers try to adapt the educational project to the rhythm of children's learning. When children encounter difficulties, help can be requested from appropriate caregivers. The French educational system offers differentiated paths and possibilities of enrichment based on children's interests and their capacities. Although various options are available for pupils in the school system, most teachers have difficulties in practicing differentiated pedagogy. In fact, a gap exists between educational policies and the reality of classrooms.

Service-Delivery Models and Curricula for Children with High Intellectual Potential

In France, like most other countries, the system can support children with high intellectual potential in regular schools based on (1) acceleration, (2) enrichment, (3) discipline-oriented training delivered in electives and optional courses, and (4) special initiatives.

For acceleration, two options are possible: (1) class advancement and (2) intensive programs. Class advancement is the most well-known practice in France to deal with gifted children. This option is often used because it does not require the structure of the school system or program to be modified. The intensive-program option corresponds to compacting curriculum (e.g., a three-year program or "cycle" is completed in two years) and is rarely used in France.

Programs with enrichment take advantage of the faster pace of learning demonstrated by children with high intellectual potential in order to widen the field of their intellectual activities. The principle of enrichment is to use this time gained to propose supplementary activities that are not usually included in school programs. Whereas this educational option can be implemented theoretically in every school, it is rarely used.

Discipline-oriented training is popular in French middle- and high-schools, with students admitted to special sections for foreign language, music, or sport. The recent high school curriculum reform enhances the options that students can choose for specialization.

In France, a very limited number of schools offer special dedicated classes for high-potential children. Some schools offer highly individualized educational opportunities, usually in private schools with low children-to-teacher ratios. Finally, some schools offer a support teacher for high-potential children with difficulties, including a special activity room for recess activities (Blaquière, 2006).

Educational Project Based on the CNAHP Experience

Following the different meetings involving the CNAHP teacher (with the parents, the schoolteacher, and the CNAHP team), an individualized educational project is designed in collaboration with the schoolteacher. This educational project takes into account the child's school problems but also the psycho-affective difficulties reported through the CNAHP assessments. It takes furthermore into account the school environmental factors highlighted in our model of development and expression of high potential, that is, fostering and sustaining motivation (including achievement motivation), providing enrichment programs, valuing effort, and offering support to the child.

Concerning the value placed on effort, it is important to create a challenge for the child allowing a certain level of effort to be maintained (based on the child's capacities) associated with pleasure, with tasks invested by the child (task commitment). This involves proposing tasks based on the child's interests. One of the first signs of school dropout observed in children with high potential and difficulties received at the CNAHP is low school investment.

Finally, the support provided by the teacher to the child is crucial. According to Lautrey (2006), a French professor in individual-differences psychology and a former schoolteacher, the quality of the relation between the teacher and the student is more important than the type of school program itself.

Family, School, and Societal Environments

In France today, the focus on high potential remains centered on high intellectual potential. The assessment program developed by the CNAHP is mainly used at the CNAHP and by psychologists trained by the CNAHP. Trainings are organized by the CNAHP to extend this assessment program. Creativity should be valued and stimulated in the family, school, and societal environments, for all children regardless of their potential, in preference to conformity and lack of risk-taking. Also, the family, school, and societal environments should highlight the child's competencies rather than his/her deficits. This will strengthen the child's self-esteem that favors the development of effort, perseverance, and resilience. Finally, the factors *motivation* (fostering and sustaining motivation), *enrichmen*t, *effort* (rewarding work effort), and environmental *support* should be taken into consideration within family, school, and societal environments to stimulate in children the development and expression of intellectual and/or creative potential (see Fig. 15.1).

In this global approach to children with high potential, it appears important to work on the links, including the social links but also the mind-body connection. Indeed, children with high potential can have social-relational difficulties despite excellent verbal skills, and problems of mind-body connection due to hyper-intellectualization and body inhibition of emotional regulation. This highlights the interest of therapeutic work building links with different professionals, teams, and institutions (school directors and schoolteachers, caregivers, families).

Conclusions

It seems important to offer to high-potential children with psychological and/or school difficulties, identified as early as possible, therapeutic care with pedagogical support and family guidance. This can allow the child's high potential to be expressed in the family, school, and societal environments and not become a handicap. This leads the child's differences to be a source of growth and personal development rather than a source of exclusion and isolation. It is probably through close collaboration between professionals from education, health, and research, in alliance with the family (parents, child, and siblings), that advances will be made. Finally, it is important to expand this approach to all children, regardless of their potential. What can be learned and applied to help high-potential children with difficulties can also benefit all children. It is essential to facilitate the development and expression of the children's potential in their family, school, and societal environments, to value their skills, and to help them to remove possible inhibitions of their potential based on individualized projects. Accepting the child's singularity and differences can enhance tolerance and creativity in the interest of the individual and society.

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16

Giftedness, Talent, and Human Evolution: A Framework for Understanding Extreme Behavior

Roland S. Persson

The fact that there exist a number of formal definitions and practical perceptions of giftedness and talent in education, psychology, and business management is a long-standing and well-recognized problem. Attempts have been made to make some sense of this complex field in search of a shared understanding of high ability (e.g., Brown & Hesketh, 2004; Dai, 2010). The anthology of which this chapter is part is an important example of current theoretical diversity including its agreements and disagreements.

How high ability is construed is dependent on the social function that high ability is assumed to have in any given context. Different settings, therefore, have developed different understandings and diverse reasons for exploring human high ability (cf. Persson, 2014). Despite multiple positions, however, it is reasonably straight forward to explain why views and practices abound. There is as yet no common basis on which all stakeholders can operate or, indeed, agree upon.

The tradition of studying and educating individuals with extreme skills and abilities systematically has a long history. But it has been largely pursued in disciplinary isolation leaving several fundamental issues relevant to giftedness and talent unaddressed, even though these issues are well-known to academic disciplines other than education and psychology. Exploring these issues

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provides a suitable framework within which to construe a more sustainable knowledge base for all pursuits of understanding high ability.

First consideration must be to ponder why we want to study giftedness and talent. Being aware of motives is paramount to coping with bias. Whichever the original incentive, scholars in the field have changed their reasons dramatically over the last 40 years or so. They began studying exceptional achievement and human prowess to understand and support individual needs and well-being. But the focus has since then changed to relating giftedness and talent to support national wealth, pride, political influence, and global problem-solving (Persson, 2015a).

Another consideration is the fact that scholars have a tendency to remain insensitive to cultural differences. Most research to date is American or is derived from American scholarship. This is a problem. Transferring socially related science from one culture to another is fraught with validity issues rarely considered (van de Vijver & Leung, 2010). The problem has been known since psychological studies of cross-cultural behavior began more systematically by the end of the 1970s (Persson, 2012). It is, however, knowledge and experience that remain largely ignored in the social science community.

The most significant, but surprisingly also the most contentious, issue that needs considering is a pervasive neglect of tying *all* human behavior and derived practices to the biological and evolutionary reality to which all organisms are inescapably tied. A personal observation is that natural scientists, mathematicians, and even computer scientists, by increased computer power and the increasing accumulation of "big data," have entered the domains of social science and act more boldly than most other traditional social-science scholars tend to do. These scholars are interested in collective rather than individual behavioral patterns, the latter being typical of scholarship in the Western World and the sole focus of gifted and talent education. While the discoveries made from studying enormous amounts of data are sometimes applied to constructive endeavors like city planning (Batty, 2013), they are increasingly considered in seeking to exploit people for commercial purposes and for social control (Bliss, 2018; Levine, 2019; O'Neil, 2016). Occasionally, this research reveals characteristics of ourselves as a collective species, which are not particularly flattering in the light of the virtuous ideals we tend to hold dear and be proud of (e.g., Stephens-Davidowitz, 2017). While we are unaware by default of population-level behavior, it nevertheless constitutes an indomitable expression of human nature rarely considered in psychological research and *never* in general education or, importantly, in gifted and talent education (Persson, 2016). Yet, in order to make sense of any human behavior, including gifted and talented behavior, our pervasive human nature and its dynamics must be considered.

The Purpose of This Chapter

I do not aim to present yet another theory or perspective of giftedness and talent. I am proposing, however, a framework of important issues, based on well-established knowledge in biology and evolutionary theory (Buss, 1995; Geak & Gross, 2008; Gorelik & Shackelford, 2014). A framework such as this serves as a measure by which to evaluate and calibrate *all* current theories and practices no matter to which tradition, culture, or context they belong, for better fit with a more objective and largely universal reality.

Evolutionary studies are intrinsically interdisciplinary and *cannot* be considered a mere perspective, a position, or a scholarly tradition. A vast body of empirical evidence from the natural sciences allows for a solid foundation of facts to which all other theories and perspectives of giftedness and talent must relate, at least on some level, to achieve and retain validity (Buss, 2016). While we do not have all knowledge of evolutionary processes, we certainly have enough to consider evolution and its direct impact on human behavior as *absolute* and non-negotiable. The framework presented here does not exclude the study of socially constructed realities. If research and practice endeavors are to claim universal validity or application, however, then evolutionary dynamics as expressed through universal human nature must be considered. In the following I will present, according to my understanding, the currently most important issues in constituting a suitable evolutionary framework for the study of gifted and talented behavior and the applications derived from it. I will focus on selected aspects of human behavior, generally regarded as indispensable in the giftedness and talent literature, but that are, in fact, contrary to well-established and uncontroversial findings of pertinent research in the natural sciences.

A Brief Summary of Basic Evolutionary Dynamics

The Darwinian model of evolution outlines phylogenetic species development as a constantly repeating pattern of *mutation* creating variation, *replication* through genetic transmission, and *selection,* which in time will create species *adaptation* to a certain environment and its conditions for the purpose of survival. While Charles Darwin is the most iconic scholar in the field, he is only one of several with similar ideas who either preceded him or were his contemporaries.

In phylogenetic evolution genetic mutation occurs *at random*. If it leads to something beneficial, the mutated organism gains an advantage in comparison with other organisms competing for the same resources. This organism becomes *naturally selected*. If it also propagates, the advantageous gene will be transferred to the next generation. The next generation again will transfer the gene to its offspring, and so on. Unless there is a cataclysm causing mass extinction, the advantage will spread until every member of the species carries the same gene, the end result of which will be species adaptation leading to *reproductive fitness* (Bond & Grasby, 2017; McElwain & Punyasena, 2007). Less beneficial mutations will not be selected, since they constitute a disadvantage in comparison. A majority of scholars hold that natural selection pertains to *individuals* in any phylum even though some species, including humans, are social and exist in groups (Abbot et al., 2011). A few, however, have suggested that natural selection could also occur on a group level (e.g., Sloan-Wilson & Sober, 2010).

Importantly, Charles Darwin and his colleagues had no knowledge of the genome and the genetic mechanisms by which evolutionary processes function. Through a rapidly increasing understanding of genetics and epigenetics in recent years, aided by increasing computer power, we now know that it is the frequency by which certain genes are transmitted to the next generation that is important in causing evolutionary changes. Evolution may also proceed at different rates. Epigenetic research has established that once genes have been transmitted, they do not necessarily remain passive as was previously thought. Our physiology, and indeed our psychology, will to some extent *change* in response to the environment throughout our individual life spans and without the genetic blueprint being changed (Dupont, Armant, & Brenner, 2009). In other words, all species, humans included, are actively *adaptive* to the environment.

This brief overview can by no means cover the complexity of evolutionary study, its findings to date, and implications, but it does represent the rudiments of a developmental and universal process of all living organisms on which all scholars of the natural sciences agree. As such, this knowledge base has considerable implications for the study and understanding of human behavior in general and of gifted and talented behavior, in particular.

Adaptive *Homo sapiens*: Changing with the Context

Few scholars challenge the importance of the normal distribution and its mathematical assumptions. Not many, however, are willing to accept its practical implications. The near-inevitability of a normal distribution effectively curtails the commonly held belief that everything is possible for everyone for as long as they apply themselves relentlessly. In a democracy proper we may well be given the opportunity to embark on any trajectory we desire, but because of the normal distribution, chance, and the way that evolutionary dynamics will affect our daily lives, not everyone is guaranteed to succeed no matter how hard they try, how expertly they have been taught, or how wisely they have been supported and promoted.

There are two further fundamental reasons why not everyone can succeed with anything they desire to do or achieve. First of all, we are not all genetically the same (cf., Sternberg, 1996). For many years it was argued that the human genome did not differ between individuals by more than 0.5%. This compelled some scholars to insist that this seemingly small difference had little or no significance for how we develop various abilities and skills, and to what level. Forced—or deliberate—practice correctly pursued has therefore been considered the most significant key to achieve high performance for anyone (e.g., Ericsson & Pool, 2016; Howe, Davidson, & Sloboda, 1998). While practice is a necessity for developing any skill, recent research has suggested that we differ genetically by up to 12% (Redon et al., 2006) and, importantly, the skill by which we train or practice is itself subject to genetic variation (e.g., Hambrick et al., 2014; Mosing, Madison, Pedersen, Kuja-Halkola, & Ullén, 2014).

The other reason preventing guaranteed success is the fact that evolutionary programming affects acceptance and tolerance in a group to make possible, and also to maintain, social cohesion. Extreme behavior, such as intellectual giftedness, is often disruptive in a mainstream collective. A collective is held together by similarity. The intellectually gifted individual, however, deviates considerably. We accept and reward some extreme talents but remain suspicious of others, especially those who we cannot comprehend, or who have the potential to threaten leadership as well as social cohesion by, intentionally or unintentionally, challenging these. There is a reason why gifted children and adults often seek to hide their giftedness (Foust, Rudasill, & Callahan, 2006). They do this unaware of evolutionary programming. The human default is to be like everyone else, or at least not to be too dissimilar, an impossible aspiration for the extremely gifted.

A range of intraspecies variability *must* exist in order to achieve reproductive fitness. Variation determines which differences in a population have survival value over time. We have no control over this variability. Evolution, in a sense, also has direction. When an advantageous genetic mutation occurs, given procreation, it spreads throughout the species and becomes part of *every* member's genome. Looked at in another way, that which originally was "extraordinary," will eventually become *average* in the sense that everyone will then have that characteristic. Evolution is the great equalizer relentlessly striving toward the average, aiming at creating equality and similarity between species members (Wilkinson & Pickett, 2009). This dynamic creates an interesting paradox, without which we could not survive as a species. Similarity (equality or average) between members of a species is necessary, but so is difference (inequality or extremes). Evolution relentlessly strives toward the average for all, but the engine driving this development is the non-average. All social groups will contain this dynamic and it will always create a tension between the two.

It is far better to speak of *extreme human behavior* when referring to individuals at either end of normal distribution. This is a more functional and neutral term rather than labeling someone as talented, gifted, high-achieving, eminent, and so on; all labels having in common that they reflect cultural bias. The labels we use to categorize a gifted and talented population are all imbued with attributes and qualities perceived as desirable and positive in their context. Only few scholars have ventured behind this cultural imperative of positivity to address gifted and talented behavior as also potentially asocial or criminal (e.g., Cropley, Cropley, Kaufman, & Runco, 2010). While we may find this plethora of labels culturally valuable, it is essential that we realize that evolutionary processes do not recognize morality or ethics in any other way than as pragmatic tools for optimizing species survival (Krebs, 2011).

Humans, like all other living species, are dynamically adaptive. For this reason, the human behavior repertoire is not well suited for psychometric predictions on an individual level (Losos, 2017; Plomin, 1994), especially not in terms of personal characteristics. These change with context and circumstance (see Persson, 2019a). While such change is taken for granted by most members of collective cultures, where self is construed as dependent and variable, it is more often denied by members of more individualist cultures. The latter tend to understand self as independent and always stable (Markus & Kitayama, 1991). Striving to become "your own self-made man or woman," while at the same time being a member of a social and largely collective species, is likely to be the result of learned cultural values (Heine, Lehman, Markus, & Kitayama, 1999). This difference in cultural self-perception could in part be explained by the fact that *Homo sapiens* is also motivated by *illusion*. Without being aware, we will do whatever it takes to maintain group cohesion, thereby optimizing the survival of the group with which we identify ourselves. When illusion serves this purpose, we will choose to benefit from it. A culture-based understanding of ourselves and the group to which we belong, however, may well be perceived subjectively as correct, but at the same time, it may also be objectively flawed in terms of empirical science.

Delusional *Homo sapiens*: Always in Favor of Positive Thinking

Social psychologists have known for some time that we universally have a propensity for positive thinking and envisioning happy endings, even though we are presented with proven facts to less favorable outcomes (Menzulis, Ambramson, Hyde, & Hankin, 2004; Humphrey, 2011; Viviani et al., 2010). We are in trouble, however, when unable to maintain a positive outlook. We then struggle to return to a more balanced and positive state of mind (Andrews & Andersen-Thomsen, 2009). Illusion, or our ability to ignore, on some level willfully misinterpret, or indeed deny objective facts, serves our species well when this is what we perceive as necessary for survival. We are programmed to function in this way (Haselton, Nettle, & Murray, 2016; Wuketits, 2008). When we seek objective knowledge through empirical research, however, cognitive biases and our inherited propensity for choosing illusion over fact easily become dysfunctional. For this reason, scholars may certainly confuse wishful thinking with scientific fact, even though a vast body of well-established research disagrees with one's own research findings. Values, identity, and social status are more important for most people than considering contradictory facts and opposing theories no matter how well argued and supported they are. We are, as Hofstede (1991) so aptly has phrased it, collectively and mentally programmed by the culture we exist in.

Competitive *Homo sapiens*: A Potential Leader with Psychopathic Tendencies

Two illusions, both scientifically troublesome to how we often think of highly able individuals and plan for their education, are competitiveness and leadership. Both scholars and practitioners tend to argue that once recognition and suitable support are in place, the gifted and talented are likely to be destined for greatness and leadership. It is often argued also that this is the result of being suitably competitive. Such an understanding, however, is incompatible with known algorithmic dictates of evolution.

The value of competitiveness is specific to American culture. It is valued and admired in a way that has few equivalents in any other culture worldwide (Duina, 2011; Stewart & Bennet, 1991). It is true, however, that all humans are indeed competitive by genetic programming, but lost in the scholarly discourse is that competing *only* has three fundamental functions, namely competing for survival (resources), for a partner, and for social status (Keddy, 2001). If we engage in a competitive mode, our physiology will automatically optimize our chances to achieve survival, gain a partner, or reach a higher social status. The hormonal changes taking place as we compete impact cognition. None of the resulting effects are conducive to formal intellectual pursuits, which renders competition as an educational and a management tool doubtful indeed. The competitor unwittingly adapts his or her personal characteristics toward risk-taking and psychopathy, all in the interest of one or several of the three objectives for which natural selection has programmed us (see Persson, in press, for a literature review). Importantly, the same is true also of emerging leaders aiming for power and influence.

Leadership as a social function is universal, but different cultures have different ideals of what makes a good leader (e.g., Kessler & Wong-Mingji, 2009). The characteristic leadership outlined in the literature, however, tends to be American in nature also (Persson, 2019b). The perceived value of any leadership is not only the result of cultural ideals but also the result of a great deal of wishful thinking. We all project positive expectations onto leaders. Irrespective of culture, however, we tend to hope that our leaders will be able to achieve the impossible. Leaders, too, fall under the spell of positivity (Alveson & Einola, 2019). As the University of California scholar, F. G. Baily (1988), has pointed out, a leader "makes people act as if the simplified picture was reality. This cannot be done in any honest, open, reasoned, dispassionate, and scientific fashion … LeadershipS is a form of cultivating ignorance, of stopping doubts and stifling questions" (p. 2).

The study of leadership has not fared well over the years (de Vries, 1997). Its research suffers from the same problem as gifted and talented education study. Until recently it has lacked a common empirical knowledge base. This is now slowly changing. Leadership is now increasingly thought of as an evolutionary function aiming at dominance and coercion. Humans, like all other organisms, are essentially self-organizing as part of the evolutionary process (Kauffman, 1993). This means that functional leadership, sometimes distributed between several individuals, will come into action only when there is a perceived need for it to emerge within the group (van Vugt & Ahuja, 2010). An overlooked aspect of rising to leadership is that gaining power and influence comes with a change of personal character toward psychopathy or narcissism, not because of traits or learning, but prompted by the physiological changes taking place to make a functional leadership possible (Robertson, 2012). Few American Presidents and British Prime Ministers seem to have escaped this fate. They all notably have their changed characteristics toward psychopathic or narcissistic behavior during their tenure (Owen & Davidson, 2009).

Practical Consequences of an Evolutionary Framework

Clearly, adopting an evolutionary framework in understanding extreme behavior has consequences for how we theorize empirically study and also how we put scholarship into useful practice. Irrespective of tradition and epistemological preference, scholars and practitioners need to consider that unaware human nature makes all of us, to varying degrees, adaptive to environment, normally distributed, genetically different from one another, biased by positive thinking and driven by cultural values, group oriented, and also competitive; but *only* for very specific purposes (Fig. 16.1). The biological aspects of human behavior will reconstrue gifted and talented behavior from a largely illusory ideal of world-saving superhumans into a more transitory and normally distributed occurring phenomena serving the survival of the human species.

While an evolutionary framework does not necessarily change the content of education and training, it most certainly affects its targets and the expectations that usually follow such targets. It also changes our understanding of behavior in an educational or work context. For example, neither leadership nor competitiveness should be made intentional use of without taking evolutionary dynamics into consideration. Highly able—or extreme—they may well be, but as with everyone else, they too are subject to human nature and will be unaware to respond to both environment and situation in a way that has been algorithmically inscribed into their genome by evolution.

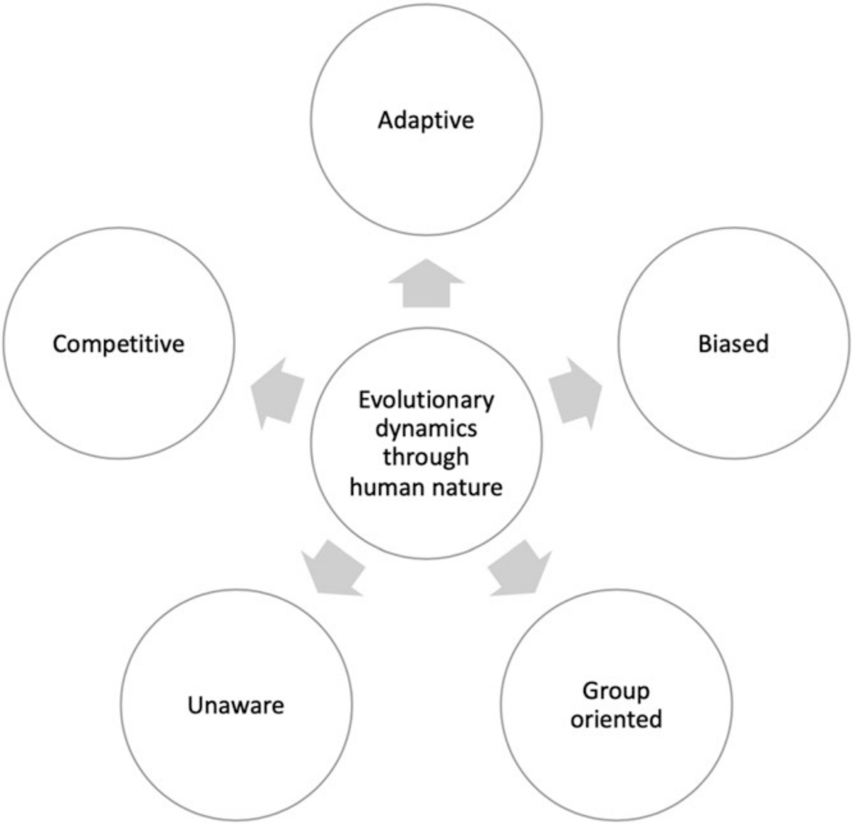

Fig. 16.1 Evolutionary human nature and a few of its dynamics affecting everyday behavior, also for the gifted and talented population

Education, training, or management benefiting extreme individuals needs to return to understanding and supporting individual needs in a mainstream social context which does not always understand or fully accepts them. Their education should reasonably, at a suitable age or level of maturity, include a frank explanation of why it is a challenge at any age to be extremely different, and why their amazing skills and insightful ideas are not always welcome, no matter how objectively true and creative they are (Persson, 2015b). For the gifted and talented, facts and understanding are likely to be more precious than illusions, ideologies, and impossible promises of grand futures, particularly so when these are contrary to reality and often their own lived experience.

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17

Smart Contexts for 21st Century Talent Development

Jonathan A. Plucker, Jacob McWilliams, and Jiajun Guo

The context in which we live changes with ever-increasing speed. In particular, technology and social changes have had a large, likely permanent impact on workforce preparation, transportation, culture, and education. The access and ease of use that are characteristic of networked technologies have changed how education, work, and creative activity are nourished and supported. As a result, the skills and achievements that enable individuals to stand out as "talented" or "successful" in any given field have shifted, yet our approaches to gifted education and talent development have not changed at the same pace.

For example, consider one of the most important societal and developmental contexts in which students live: the family. Over the past few decades, family structure has changed tremendously; 30% of children in the U.S. under the age of 18 now living with one or no parents, a rate that has been largely stable since the mid-1990s but is sharply higher than during the post-war era (U.S. Census Bureau, 2019b). At the same time, the past decade has seen a

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steady increase in the number of multigenerational households, with recent estimates of about one in five Americans living in households with three or more generations—with multigenerational and single- or no-parent families more prevalent in non-White households (U.S. Census Bureau, 2019a, 2020). On top of that, add a 19% increase in the number of students since the great recession receiving lunch assistance in schools and the increasing diversity of two-parent families due to progressive advances such as same-sex marriage. At the end of the school day, a large number of students return home to a diversity of family, household, and economic circumstances that simply did not exist in such large numbers even 20 years ago. Many of these changes are positive developments (e.g., progressive advances such as same-sex marriage and partner benefits), others, likely negative (e.g., children growing up in single- or no-parent homes), yet others, neutral. But there is no question that the concept of "family" is much more diverse than it was a couple of generations earlier.

In other words, one of the most foundational building blocks of society and human development—the family—represents a diversity of structural and economic circumstances that we did not experience even at the turn of the previous century. This development, on top of massive technological change and many other developments, begs the question of how conceptions of giftedness and models for gifted education have kept pace with these changes. One conceptual change that has been applied to other fields is the rise of sociocultural theories that emphasize the interrelated nature of the individual and their social and cultural contexts. Such sociocultural perspectives have been applied to the study of creativity and intelligence (Glăveanu, 2014, 2015; Glăveanu et al., 2019; Plucker, Beghetto, & Dow, 2004; Sternberg, 2003, 2019; Sternberg & Grigorenko, 2004), but they have been applied in only limited ways to conceptions of giftedness, gifted education, or talent development—despite having been applied widely in other fields for decades.[1] Even recent, well-regarded models of talent development, such as Subotnik, Olszewski-Kubilius, and Worrell's (2011, 2017) megamodel of talent development, remain focused on the individual student, with only a mild emphasis on the context of talent development.

The purpose of this chapter is to describe what a sociocultural perspective of talent development or giftedness could look like. In particular, we discuss examples of how a sociocultural conception helps guide efforts to develop student talent in equitable ways.

[1] For exceptions that prove the rule, treatments of changing and evolving contexts applied to gifted education can be found in Ambrose and Sternberg, 2016a, 2016b; Cross and Borland, 2013; and Plucker and Peters, 2018.

The Importance of Context

Context should be the primary concern of educators working with advanced students. C*ontext* is a crucial unit of analysis for understanding how talent emerges, is valued, and can be supported. We would even go so far as to say giftedness, talent, intelligence, creativity, and related terms need to be defined solely within context. For example, Plucker et al. (2004) center context in their definition of creativity, arguing creativity is best determined in the presence of unambiguous evidence of extraordinary achievement (i.e., both novelty and usefulness) within *a specific social context*. From this perspective, looking for universal examples of creative potential in K-12 students does not make sense. A student's creativity will be highly intertwined with their personal context, for example, that of a student in fourth grade with their particular interests and social relationships, and holding a student to a universal, context-independent standard is unhelpful regarding efforts to develop that student's creative talents.

In a similar vein, what counts as talent is defined at the cultural level, and achievements are only marked as such insofar as they align with culturally valued forms of behavior and knowledge production. As Barab & Plucker (2002) noted, talent and aptitude are either revealed or concealed by social norms and expectations—and these norms and expectations can reflect societal inequities. Gardner's work on human intelligence often emphasizes the important role of cultural context, noting that, "intelligence is best conceived of as the product of dynamic process involving individual competencies and the values and opportunities afforded by society" (Kornhaber, Krechevsky, & Gardner, 1990, p. 177).

For example, Barab and Plucker (2002) described a student selected for an intensive academic summer program for talented students. The student struggled during the program, which emphasized collaborative projects, self-regulation, and creativity. Her initial poor performance, combined with difficult interactions with peers, led instructors to question why the student had been admitted to the program in the first place. Eventually, however, it became clear that the instructional approach emphasized in this student's home school in an urban district focused on lectures and did not foster self-regulation in students; the student, furthermore, expressed discomfort with being surrounded by middle-class, suburban peers. The context of this summer program, then, was not designed to illuminate the student's talent or aptitude, but rather provided a context that concealed her skills and invited failure. From a sociocultural perspective, the question is not "Why did this student fail?" but rather "How could the contexts of the regular school program and summer program be modified to allow the student to succeed?"

Sociocultural Theory: Moving from "Smart People" to "Smart Contexts"

Our effort to emphasize the importance of context reflects a growing body of scholarship in the social sciences that advances sociocultural perspectives on learning and social production (e.g., Barab & Plucker, 2002; Chaiklin, 2003; Cole, 1996; Lave & Wenger, 1991; McDermott, 1996; Roth & Lee, 2007; Wertsch, Tulviste, & Hagstrom, 1993). Based on the assumption that separating a person's thinking from their social and cultural environment is difficult, if not impossible, this approach considers how people interact with and, in the process, reflect or resist culturally valued ways of thinking and acting.

Sociocultural theories of learning and human development are not particularly new. Vygotsky, the foundational theorist of the sociocultural approach, was a contemporary of Piaget but had the misfortune to live and work in the Soviet Union, die very young from tuberculosis, and have his work largely remain behind the Iron Curtain for decades (i.e., not the best context for influencing the work of others). Yet the delayed sharing of his work—his most influential work, *Mind in Society*, was only published in English in 1978, more than 40 years after his death—has not prevented it from becoming influential with scholars and practitioners working in the social sciences—particularly in education, psychology, and anthropology (Brown, Metz, & Campione, 1996; Davydov, 1995; Jacob, 1997).

Vygotsky's philosophical framework treats individuals as deeply situated within a social-cultural milieu. He found little value in considering individual cognition if that consideration does not account for context. Vygotsky's emphasis on the culturally situated nature of cognition and learning runs counter to the individualistic principles undergirding most American educational systems. Traditional forms of teaching and assessment are designed to separate learners from their contexts, and to treat learning as ultimately an individual accomplishment that resides in individual minds (e.g., DeLay, 1996; Lorsbach & Tobin, 1992). When knowledge is decontextualized in this manner, it can be evaluated efficiently and effectively through traditional assessments, such as tests, quizzes, and projects in which individuals' discrete contributions can be identified and graded.

However, sociocultural theories position knowledge as located not only in individual heads but also across people, tools, and contexts (Lave & Wenger, 1991; Stetsenko & Arievitch, 2004; Wertsch, 1985). "Knowledge" is activity that stretches across people, cultural artifacts, and social structures. For example, consider what is required for a person to drive a car from their home to the supermarket. Certainly, the driver has at some point acquired (and, ideally, retained) the expertise necessary to operate an automobile safely. This knowledge includes mastery of the ignition, transmission, steering, gas pedal, and brake. The mechanisms that comprise an automobile, however, are themselves the products of the knowledge of a multitude of people who came before our hypothetical driver. Braking systems are designed to enable safe, consistent, and effective deceleration—and in order to create such a system, car designers must themselves draw on their knowledge of driving, an awareness of how various weather conditions impact deceleration, and an acceptance of a general consensus about what constitutes sufficient braking. Each aspect of a car, then, carries with it the accumulated societal knowledge about driving.

Additionally, "safe driving" is not accomplished by a single individual. Instead, it is the collective accomplishment of all drivers on a given road or within a given system of roads. This accomplishment requires coordination across drivers, which is achieved through the use of signs (including stop signs, school zone signs, and speed limit signs) and signals (use of headlights, brake lights, and turn signals in ways that other drivers can understand and respond to). Safe driving is a category that is regulated by law enforcement and legal systems. Although any driver could theoretically identify unsafe driving practices, only police officers are imbued with the right to enforce driving laws.

Of course, any given category of knowledge can also be reviewed for its relationship to other categories of knowledge. For example, while police officers regulate obedience to traffic laws, they also enforce a range of other norms and values in the process. In America, drivers are not regulated uniformly; people of color, and particularly black men, are stopped and ticketed at a higher rate than are white drivers (Kalinowski, Ross, & Ross, 2019a, 2019b).

It follows, then, that safe driving could be defined as a collective accomplishment. The knowledge contained inside of individuals' head is meaningless unless those individuals participate effectively within the larger system of driving. Sociocultural theorists concern themselves with how individuals come to participate effectively within such systems. They may consider what values and norms are reflected within a given system and how those values and norms shape what counts as knowledgeable participation. They might also investigate the values and beliefs that are designed into individual cars, with one possible goal of identifying how these designs favor some people and limit the effective participation of others. And they certainly would examine how the design of roads, signage, and related physical conditions interact with individual drivers and cars to produce safe driving.

Talent development is likewise a complex system, with individual students and their unique abilities and potentials interacting with other students, teachers, family members, and other important people within their social circles. In addition, these interactions take place within important cultural and physical contexts (e.g., even if the classrooms were identical, the cultural context of a German and a Chinese classroom is clearly different, as would be classrooms within each of those countries that serve primarily native-born or immigrant children). All of these factors impact how talent emerges and develops, and successful talent development efforts should consider and address these interactions. Embrace of sociocultural theories, then, requires reconsideration not only of how we conceptualize and position knowledge, but also of how we teach and assess students.

Applying Sociocultural Principles to Talent Development

In this section, we offer a brief overview of some key tenets of sociocultural theory and offer educational applications derived from these tenets, which are adapted from Plucker, McWilliams, and Alanazi (2016) and Plucker, McWilliams, and Guo (2017).

Tenet 1: Knowledge = "Socially Valued Forms of Thinking, Valuing, and Acting" (or, It's Context All the Way Down)

From a sociocultural perspective, *knowledge* and *truth* are not universal concepts but are shaped by the values and norms held by communities and cultures. Literacy—a core element of knowledge—is itself defined and shaped by the valued forms of reading and writing that carry capital in a given culture. To understand this, we might trace what (Brandt, 2014) describes as "the rise of writing" (p. 1). For most people and most of human history, Brandt writes, writing literacy played a small role in workplace and private life. The rise of digitally networked technologies, however, has led to an increased emphasis on writing—as well as a shift in how the effectiveness of text-based communication is assessed.

We see this, for example, in the ways in which digital technologies are implicated in shifting literacy practices. Traditional forms of publication (i.e., publishing houses, print newspapers, and television shows) were for many centuries designed to filter information for audiences. Publishing was relatively expensive, so creative and critical work was published if it met criteria for quality and profit as determined by specific gatekeepers (Csikszentmihalyi, 1988).

Increasingly, digital technologies have led to what (Shirky, 2008) refers to as a "publish, then filter" (p. 81) mindset (i.e., vs. the traditional filter then publish approach). Creative production and publication tools are relatively inexpensive, and anybody with an internet connection can quickly and inexpensively create and circulate creative or critical work to a wide audience. This trend offers increased opportunities for people to create, collaborate, and share their own content.

On the other hand, this *publish, then filter* model calls for different approaches to reading and analyzing texts, and for a heightened sensitivity to false, misleading, or inaccurate information. That is why critical media literacy (CML) has become an increasingly valued set of reading and writing practices (Alvermann & Hagood, 2000; Kellner & Share, 2005, 2007). CML refers to the ability to critically analyze the relationship between media, audience, information, and power. No matter how impressive gifted children's abilities are, they still need guidance in identifying relevant and important information and resisting sociocultural manipulation. In that sense, As Kellner (2011) explains, the gaining of critical media literacy is an empowering resource for individuals and citizens, gifted or not, "in learning how to cope with a seductive cultural environment" (p. 7). In other words, learning facts is helpful, but an inability to use that knowledge to evaluate information in a digitally saturated, real-world environment makes the facts useless.

It is not just literacy that is contextually bound. Computation and deduction skills are determined by the kinds of problems people encounter in the course of their everyday lives (Lave, Smith, & Butler, 1988). Talent, creativity, intelligence—and what is valued as exceptional behavior—rely on a culture that accepts them as such. The colloquialism that some inventor or composer or scientist was ahead of their time is not precisely true; it may be more accurate to say that a given person's abilities preceded a context in which their expertise or creative work was valued. For example, the Austrian abbot and scientist Gregor Mendel conducted many of the foundational experiments in heredity in the middle of the nineteenth century, but his work (which, contrary to legend, was published in prestigious scientific journals) was widely ignored until several scientists rediscovered his work and verified the results decades later.

In a similar vein, a student may not appear talented, intelligent, or creative in one setting—such as a fifth-grade math class—but may appear highly skilled when keeping the books for their family's business afterschool and on weekends (see Nunes, Schliemann, & Carraher, 1993, for related examples). Or consider the student who performs slightly above average on math tests but thrives in the competitive environment of the math team. A historical example is the baseball player Lou Gehrig, who received poor grades in German when studying at Columbia University. One could infer that Gehrig was not a great student, as he received poor grades for most of his courses. But our interpretation changes when we consider the context: he worked nearly a full-time job twice per day in the student cafeteria and played two varsity sports in addition to his coursework. In fact, he was fluent in German, which was the language spoken at his home (Bryson, 2013). Different contexts provide a range of opportunities for students' abilities to interact with diverse settings to produce talented behavior (or to not interact and not produce such behavior, as the case may often be).

School systems are contexts in which certain kinds of knowledge and creativity are not only valued but also identifiable, whereas other kinds are devalued or not visible. Numerous examples of this abound in educational scholarship. Many forms of social competency—for example, a flair for coordinating collaborative projects or an ability to collate, organize, and represent the ideas and work of peers—are crucial skills in many careers but are often devalued within formal school systems.

A sociocultural approach invites us to consider not only *what* constitutes exceptional behavior, but also *why* a given context labels some kinds of behavior as exceptional while overlooking or devaluing other kinds of behavior. It also invites educators to investigate how this serves to marginalize or undervalue certain learners or certain kinds of behavior. For example, formal school settings tend to be implicitly or even explicitly hostile to student creativity, and hypothesized reasons include negative teacher attitudes toward divergent ideas and behaviors, ineffective interventions, poor-quality curriculum and assessments for creative development, and lack of teacher training, among many other possible factors (see Beghetto & Plucker, in press; McLellan & Nicholl, 2013; Sternberg, 2015). Interventions could be designed to address these and other potential barriers, or we could examine how creativity emerges in real-world contexts and attempt to model those conditions within our schools. This approach is essentially what the Schoolwide Enrichment Model and higher education model of Plucker and Dow (2017) are designed to do, attempting to replicate contexts that tend to produce human creativity and innovation in out-of-school settings. A sociocultural approach examines all of the factors suggested above, but also how contextual variables such as incentives for helping students become more creativity can be infused into school settings, providing enhanced opportunities for all students (and teachers) within the school to develop their creative talents.

Reframe exceptional behavior. If a given learner looks *smart*, what is it about the context that enables that learner to succeed? Who else benefits from specific aspects of the context, and why? Conversely, which learners are at a disadvantage, and what might be shifted to enhance those students' learning experiences? There may be value in taking a holistic approach to education that considers other (non-academic) contexts in which learners may be considered "high achieving." Examples include club or team sports, podcasting or other creative communication forms, participation in an online forum for fans of the Broadway musical *Hamilton*, or something else entirely. What all of these examples have in common is the assumption of a community, with community-generated values that guide effective participation. A teacher might draw on learners' mastery of locally valued forms of knowledge and participation for two purposes: first, to reflect on how school-based norms might reveal or conceal important forms of giftedness that are emphasized in other areas of importance in students' lives; and second, to guide learners in investigating and articulating the norms that shape their classrooms or school. If contexts can make a learner look more or less talented, then it follows that the ability to identify and negotiate community norms is a crucial skill.

Tenet 2: Learning and knowledge are distributed across people, tools, and contexts

A key principle of sociocultural theories is that knowledge does not reside in individuals' minds. Rather, learning can be defined as culturally meaningful forms of action using the tools, people, and contexts that make up human life, as seen in the safe-driving example discussed earlier.

From a sociocultural perspective, knowledge is produced collaboratively. Collaborative knowledge production has become particularly visible and powerful, given the technologies that enable us to connect with thinkers and creators around the world. McWilliams and Plucker (2014) offered the example of digital artist Salvatore Iaconesi. After being diagnosed with brain cancer in 2012, he invited medical professionals, software designers, artists, and others who have experienced illness and disability to review his medical records and participate in developing a treatment plan. As a result of his attempt to "open source a cure," Iaconesi not only continues to live and work eight years later, but he has also extended his personal experiment into an organization he called La Cura, "a global art performance about the opportunity to transform our societies to become more active, aware, caring human beings by reclaiming information and knowledge, and by feeling the desire to be part of a society whose well-being truly depends on the well-being of all of its members" (Iaconesi, n.d., par. 2).

Iaconesi's experience also applies to sociocultural perspectives on giftedness and talent development. Certainly, there are people who meet an agreed-upon definition of giftedness—Iaconesi, an accomplished digital artist and technology designer, fits most people's definition of a highly talented person. However, giftedness is reliant on a combination of tools, people, and communities that make exceptional behavior possible (see also Neilsen, 2011, and his discussion of networked science). Talent is a collaborative endeavor, accomplished through effective coordination of resources and people. This is increasingly visible and prevalent because of the emergence of digitally networked technologies, and new dispositions and skills have become important factors in shaping giftedness and talent. For this reason, Plucker et al. (2004) emphasized tangible products as an important aspect of creativity: a tangible product provides evidence that the combination of individual potential and talent-supporting context has interacted to produce talented outcomes.

Talent identification and development should move beyond an emphasis on individuals' knowledge and capacity for learning to account for social skills that enable effective coordination of collaborative learning. Our culture and economy increasingly value and enable collaborative projects and collective problem-solving (Buckingham, 2003; Dede, Korte, Nelson, Valdez, & Ward, 2005; Jenkins et al., 2013; Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009). Collaborative activities and assessments that evaluate students' skills at and capacity for collaborative work will become increasingly important as students prepare to enter the workforce. Plucker et al. (2017) suggested a thought experiment in which one considers how education would be different if giftedness was a label given to groups of students instead of individuals, with special attention to structures enabling groups to complete projects and explore problems.

Tenet 3: Learning and development occur in the Zone of Proximal Development

From the Vygotskian perspective, all learning results from social interaction with culturally valued artifacts. A child learns from others how to hold a pencil, how to spell their first and last name, and how to engage with concepts such as language, naming conventions, family histories, and cultural or ethnic origins. All learning—whether focused on concrete skills, abstract concepts, or something in between—occurs within the Zone of Proximal Development, or ZPD (Chaiklin, 2003). A common definition of ZPD is that it is the distance between what a learner can independently achieve and what they can achieve only with support—that is, through interactions with and guidance from teachers, community leaders, or more advanced peers.

The notion of the ZPD has direct implications on how we assess and develop talent. Traditional approaches to talent identification tend to rely on individual assessments that measure learners' skills in a range of domains relative to their peers. Even in cases where multidimensional approaches to assessment are used, the assessment data may be used in inappropriate ways. For example, (Renzulli, 2014) noted that this approach can be a "multi-criteria smoke screen" (p. 87) because it gives the impression of examining a broader range of indicators of potential, but in most cases, high grades in regular schoolwork, teacher ratings, or other criteria only serve the purpose of earning students the opportunity to take an individually administered intelligence test.

Individual intelligence tests, and the factors that commonly lead a student to be identified for testing, rely primarily on what a learner has *achieved* and not what a learner *might achieve*. This leads to talent-identification situations in which the tests may produce few false positives but many false negatives, especially among disadvantaged students who have not lived and learned in contexts that allow them to develop their talents. The sociocultural perspective invites us to consider this in terms of the ZPD. Research suggests that giftedness might be described as more rapid progress in response to adult assistance (Kanevsky, 1992) or demonstrated learning in advanced-for-age ZPDs (Morelock, Brown, & Morrissey, 2003).

Talent identification must move beyond assessing knowledge acquisition and toward a consideration of what learners may accomplish when working in their zone of proximal development. At the very least, educators should consider whether students have had the necessary opportunities to develop the skills and behaviors that are the focus of chosen identification strategies.

Smart Contexts for Talent Development

In this section, we offer a more extended discussion of the kinds of shifts that might be considered in order to enact these principles in twenty-first-century classrooms. We attempt to show what an applied perspective for developing talent and achieving giftedness could look like, with attention to compromises that are necessary for this approach to succeed in our schools.

Identifying Talents

As noted above, standardized ability and achievement tests tend to assess abstract and usually decontextualized skills, without providing much insight into a learner's *capacity* for the kinds of collaborative, multidisciplinary, and complex concerns and challenges that gifted and creative learners will need to take on in order to successfully navigate the social and workplace dynamics of the coming decades. Multidimensional assessments have received a good deal of attention and interest (e.g., McBee, Shaunessy, & Matthews, 2012), but they are commonly implemented as nominate-then-test approaches that are not truly multidimensional and tend to be biased against students who have not learned in talent-friendly contexts (McBee, Peters, & Miller, 2016). Further, talent and giftedness are frequently viewed as abstract, universal categories and fail to take into account how context may reveal or obscure a learner's capacity for exceptional achievement. Asian American and White, middle-class students are overrepresented in talent identification and development programs, and this is not because talent disproportionately lands in the brains of these learners—rather, they are more likely to be placed in contexts that help them exhibit talented behaviors; conversely, many other minority and poor students do not have access to these contexts and therefore do not have sufficient opportunities to develop their gifts and talents (Callahan, 2005; Milner & Ford, 2007; Morris, 2001; National Research Council, 2002).

Some approaches to talent identification aim at countering these equity concerns. One such approach is to incorporate non-standardized tests when appropriate, such as nonverbal achievement tests and creativity assessments. Examples include the *Revolving Door Identification Model* (RDIM; Renzulli & Reis, 1994) and the *WICS model* (Wisdom, Intelligence, Creativity, and Synthesized; Sternberg, 2003). The RDIM is particularly appealing from a sociocultural perspective, as it emphasizes that students need not perform at high levels constantly to be considered talented. Empirical support for these approaches is mixed (Plucker & Peters, 2016), but researchers suggest creativity assessment may counter ethnic biases and increase diversity (Kaufman, 2010; Kaufman, Plucker, & Russell, 2012). Creativity assessments may work in favor of students from historically marginalized racial or ethnic communities, whose achievement in traditional academic domains may be undervalued by systems that privilege white, middle-class dispositions, and students (Luria, O'Brien, & Kaufman, 2016).

One approach receiving a great deal of attention with K-12 schools is the local-normative comparison strategy for education (Jordan, Bain, Mccallum, & Bell, 2012). This approach uses local norms rather than state or national norms to identify students who exhibit exceptional abilities in local environments, thus bringing benefits to schools where characteristics of students are significantly different from those of the nation/state-wide sample. Using local norms would increase the number of students being identified as talents in high-poverty and minority schools, which may help to close the excellence gap (Peters, Rambo-Hernandez, Makel, Matthews, & Plucker, 2019; Plucker & Peters, 2018). Local norms are consistent with a sociocultural approach to talent development, in which a student's proximal context is always the most appropriate context in which to evaluate talent and potential.

Another approach that aligns with sociocultural perspectives on learning is dynamic assessment. This approach is based on Vygotsky's work framing learning as rich and dynamic (Kanevsky & Geake, 2004), as well as Feuerstein's learning potential assessment (Feuerstein, Rand, Jensen, Kaniel, & Tzuriel, 1987). In this approach, students are provided with opportunities to interact with teachers or other adults. Only through this interaction can we assess how much teaching/support is needed for certain progress, or in the context of giftedness, how much progress students can make in response to certain support. For gifted students, this progress/zone is much larger than other average students so that they can reach higher levels of competency in their areas of strength.

The idea of dynamic assessment has been implemented by some educators, and it appears to work well in identifying gifted children. For example, Lidz and Macrine (2001) used a nonverbal test and followed the typical test-intervene-post-test procedure in their dynamic assessment strategy (see also Sternberg & Grigorenko, 2002). Although the entire procedure of identification involved several sources of information, including standardized tests and teacher/parent nominations, dynamic assessment was most effective in helping identify students across ethnicity, gender, and districts (Lidz, 2002). Although some gifted students may live in under-resourced conditions that prevent them from maximizing full competence, their learning potentials as measured by the learning gains in dynamic assessments are equal to those in better environments.

Instruction for Giftedness

Embracing an alternative approach to talent identification requires talent development and gifted education, too, to shift their focus. If we adopt a sociocultural perspective and aim to identify learners whose talent is undervalued or underestimated in current educational contexts, then our educational supports must change to accommodate those learners and help them achieve academic and workplace success. In addition, global concerns require a shift in pedagogy to prepare students for today's complex, multidisciplinary challenges. From pandemics to cybercrime, to climate change,[2] our schools were not designed to prepare students to engage collaboratively to identify, evaluate, and implement solutions (Apple, 2006; Dede et al., 2005).

Gifted and talent development programs are well-suited to implement sociocultural principles. These programs often emphasize problem-based learning (PBL) and its emphasis on engagement with real-world, ill-defined problems. PBL can be extended to engage students in the contexts they may encounter outside of formal school structures. For example, Barab and Duffy (2000), among many others, have suggested that, rather than have students design a pretend online business, they could design a real online business. Classroom instruction could then move beyond helping students *learn what* the correct answer is and place increased focus on helping students *learn how* to leverage knowledge networks and to apply expertise to complex problems. *Learning how* requires social skills including an ability to navigate communities, discern norms for interaction, build social capital among community members, and participate in the (spoken or tacit) goals of community members. Historically, these kinds of skills have been referred to as *soft skills*, which minimize the enormous role they play in supporting success (Sharma & Sharma, 2010; Symonds, Schwartz, & Ferguson, 2011).

Another, often de-emphasized area of importance is creating conditions in which students can present and defend their work and provide thoughtful critique of others' work, which can be described as "dialogue across difference/dialogue across ideas." Learners should adopt alternative perspectives, understand differing worldviews, and justify the value of their work to those who view it from a different standpoint than they do. Few areas of human activity have been as consistently neglected in education as has the ability to offer and use constructive criticism (see Plucker, 2016; Plucker & Barab, 2005).

Although dialogue across difference/dialogue across ideas has a clear value for those in creative fields, it is also increasingly important when learners engage in information within the internet's nearly limitless range of distributed communities (Clifton & Jordan, 2016; Kreikemeier & James, 2018). In previous generations, information and other creative work were filtered and shared by gatekeepers, such as marketing directors, newspaper and magazine editors, publicists, literary agents, and other gatekeepers. Today, learners frequently encounter information that has not been filtered at all. The internet has democratized distribution of creativity, in a way, but it also (very

[2] Essentially, what Ambrose and Sternberg (2016a, 2016b) refer to as *macroproblems*, and what many creativity researchers would call *Big C creativity* problems (2009).

predictably) has democratized distribution of false and uncreative material. This development is important from a sociocultural perspective because individuals and groups live within this information age phenomena, making it imperative that they can navigate exceptionally information-rich contexts successfully, which often means (1) having strong, multi-modal communication skills and (2) the ability to analyze and evaluate information for accuracy and to determine the authors' potential biases.

Interactions Between Instruction and Assessment

Throughout this chapter, we have asserted or implied that traditional approaches to assessment often fail to identify behaviors that enable exceptional achievement. Given the emphasis placed on context in the sociocultural perspective, the use of standardized tests—designed to eliminate contextual factors such as locally valued knowledge—may be particularly fraught. Fortunately for educators, a combination of dynamic assessment models and agency over formative and summative assessments offer opportunities to develop and value alternative measures. The participatory assessment model positions *knowledge acquisition* as secondary in relevance, when compared to *knowledgeable participation* in culturally valued practices (Hickey, Honeyford, Clinton, & McWilliams, 2010; Hickey, Ingram-Goble, & Jameson, 2009; Hickey & Rehak, 2013). For example, many American students may be hard-pressed to locate specific countries on a world map (Carr, 2008), but most students can successfully find, for instance, Wuhan, China, on a map if allowed to use a phone or tablet.

Of course, procedural knowledge should not be the sole goal of learning, and semantic knowledge is important. But sociocultural approaches to talent development emphasize that the talent is the result of the individual working successfully within their social and cultural context. From a sociocultural perspective, the question is not "Is semantic or procedural knowledge more important for talent development?" but rather "How can educational contexts be designed to allow students to exhibit talented behaviors as they work together to develop new semantic and procedural knowledge?" Participatory assessment models, and similar assessment approaches that take into account collaboration, resist the learner-as-unit-of-interest emphasis that characterizes the vast majority of educational assessment approaches (VanTassel-Baska, 1998). They assume that knowledgeable participation involves coordination of people, artifacts, and cultural expectations, and they extend the boundaries of assessment to consider the interaction of these factors.

Conclusion

Embracing sociocultural perspectives shifts how we think about talent identification and development to a framework that considers the individual in interaction with context, collaborating with tools, other people, and cultural expectations to create generative and socially valued products. This approach acknowledges that context is critically important both to understanding giftedness and to developing giftedness in young people.

Focusing on individual gifted students as the locus of talent without regard to context is an approach with many passionate adherents. This approach may lead to high test scores and impressive educational accomplishments, but it may not be the optimal path for life success for most talented people. First, many minority and poor students are not broadly successful within this approach, nor are women in certain STEM disciplines, representing over half of our K-12 students. With this in mind, the traditional, student-as-focus approach is really only successful for specific groups within our student body.

Second, perhaps individuals who are successful within the traditional approach also benefit from unnoticed contextual factors that lead to the development of their giftedness and talents (e.g., what many commentators describe as privilege or implicit advantages). Put more directly, perhaps the students thriving under a "find the gifted child" approach are thriving not because they have been identified as gifted, but rather because they have contextual advantages that other students do not have. The first author recalls a recent conversation with a private high school admissions officer. In response to a question about the quality of the school's academic offerings, the admissions officer replied that the academics were good, but that "what you're really getting is a private school network that stays with you the rest of your life." Expanding a more contextualized approach to talent development to most of our students could, in a way, spread implicit advantages or privilege more evenly across our diverse student population.

Third, we now have case studies of countries that focus on the individualistic learning approach, such as China (Pang, 2012). It produces very high test-scorers with lots of semantic knowledge, but the application of that knowledge in creative ways is often lacking (Dai & Steenbergen-Hu, 2015; Pang & Plucker, 2013). From a sociocultural perspective, the success of the individual-as-gifted approach is limited and perhaps even illusory, and a greater use of contextual approaches may produce many more instances of talent and giftedness.

The sociocultural approach invites educators to consider how they prepare learners to *participate* in culturally valued projects and to work on the transdisciplinary, ill-defined problems that increasingly characterize modern work and life. This approach also could expand educators' *perspectives* in understanding how talents come into being under various contexts, and it would change the emphasis on talent development within educator preparation programs from "find the talented child," which rankles many teacher educators, to "provide contexts that develop talent," which is more palatable. After all, it is cultural diversity and complexity that enriches humanity.

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18

Creative Productive Giftedness in Women: Their Paths to Eminence

Sally M. Reis

> If there is one thing women are going to have to answer to, it is why we did not make more use of the gifts that we have been given—the idea that I have done enough just seems silly to me. I want to keep on going. We all need to keep on going and I believe it took me less time than other women to come to this realization—G, one of the participants of this study.

My previous research on talented women who have achieved eminence in a variety of disciplines (Reis, 1987, 1995, 1996, 1998, 2002, 2005; Kirschenbaum & Reis, 1997) suggested that their collective experiences reflect the complexities of the personal and professional paths they chose to follow and decisions they made. This previous research also found that women's contributions reflect both personal and professional gendered choices and blocks. In the last two decades, little new research has investigated giftedness in women. This chapter summarizes new research on 15 eminent women who have contributed important and creative work across multiple disciplines. These scholars, scientists, artists, innovators, historians, and psychologists range in age from their mid-40s to their mid-60s. Each is regarded as being in the top-tier of creative work in her discipline and has received multiple awards, honors, and accolades. Some have earned patents for highly creative work, while others have obtained competitive academic grants and awards, discovered new species, written award-winning books, and given speeches across the

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globe. Each has been featured in multiple articles in the popular press. Their paths to eminence demonstrate that their success is due to a combination of abilities, interests, motivation, and focus, as well as their determination to excel in their work, and make a positive difference. All of these women exemplify the conception of creative productive giftedness introduced in this chapter.

Why study eminent women? And why investigate creative productive giftedness in women? Our work (Renzulli & Reis, 2014) and the work of Kaufman and Beghetto (2009) provide a framework for considering the creative contributions of the women described in this chapter. Joe Renzulli and I have defined creative productive giftedness as becoming a producer of original knowledge, materials, or products by employing creative processes that are inductive, integrated, and problem-focused and problem-oriented (Reis & Renzulli, 2010). Each of the women in this study fit these criteria. Kaufman and Beghetto's perspectives in their 4C Model of Creativity (2009) also offer insights on these highly creative women. They define Big C creativity as creative work that brings about significant change in a domain and for which history remembers the creator. Pro C describes creative acts of those who have mastered a field after decades of work and practice. Little c describes creative acts of those not particularly expert in a field, while mini-c relates to individuals' novel, personally meaningful interpretation of experiences, actions, and events, such as a child's finger painting or invention in school. The women profiled in this study all meet the criteria for Pro C, and some of them, arguably, may be on the cusp on Big C in their specific disciplines. What are their paths and blocks to the highest levels of creative productivity?

Too Few Talented Women Achieve Eminence

Women comprise almost 51% of the American population, and currently earn 60% of undergraduate degrees and 60% of all master's degrees, as well as 38% of MBAs, and 48% of specialized master's degrees (Warner and Corley 2017). Increasingly, they also complete more advanced degrees, earning 47% of law degrees and 48% of medical degrees. Women currently comprise 47% of the American labor force and 49% of the college-educated workforce (Sommeiller & Price, 2018). Yet women do not realize the same financial benefits for this work as men. White women earn just 81.8% of what men earned for the same work, but the story is even worse for culturally diverse women, as Black women earn 60 cents and Hispanic women 55 cents for every dollar paid to a white male (Hegewisch & Williams-Baron, 2018).

Women comprise 31% of full-time faculty in U.S. higher education, an increase of only 5% over the previous 75 years, during which time the number of women earning college degrees has tripled. According to the American Association of University Women, among tenured faculty at four-year institutions, just 27% were women, a small increase of only 5% over the previous 75 years.

In 2013, women represented only 6% of partners in venture capital firms—down from 10% in 1999. In 2014, only 20% of executives, senior officers, and management in U.S. high-tech industries were women. In the entertainment industry, women accounted for just 17% of all the directors, executive producers, producers, writers, cinematographers, and editors who worked on recent successful domestic films (Teare, 2016). And perhaps, the most glaring example of the "why so few" question occurred recently, when Forbes (2019) list of America's 100 Most Innovative Leaders included only one woman. This glaring oversight is representative of the broader phenomenon: a lack of women at the top of too many professions and domains continues to exist.

Interestingly, the last decade of the twentieth century has brought considerable progress in women's professional advancement in the United States, but that progress has been uneven and is currently slowing. Also, significant racial and ethnic differences exist in women's success in moving into the top-level jobs as women of color continue to fall far short of matching the success of their white counterparts in high-level positions. Women of color represented 38% of the nation's women population and 20% of the entire U.S. population in 2015. In 2015, they made up 35% of the female labor force, 16% of the total labor force, and 16.5% of workers in S&P 500 companies. Women of color are currently only 3.9% of executive or senior-level officials and managers and 0.4% of CEOs in those companies. For example, a recent examination found no African American women heading Fortune 500 companies, and more than two-thirds of Fortune 500 companies had no women of color as board directors (Warner & Corley, 2017).

The Global Gender Gap Report benchmarks 144 countries on their progress toward gender parity across four thematic dimensions: Economic Participation and Opportunity, Educational Attainment, Health and Survival, and Political Empowerment, the report predicted that it will take over 200 years to achieve gender parity in these areas (World Economic Forum, 2016). Although the United States ranks first in women's educational attainment on the World Economic Forum's Global Gender Gap Index out of 144 countries (2016), it also ranks 26th in women's economic participation and opportunity and 73rd in women's political empowerment. Women continue to have multiple setbacks in political leadership in the United States, as well.

Currently, women hold only 25% of seats in state legislatures and are only 10% of governors and only 20% of the mayors of the 100 largest American cities (Warner, 2014).

The talent gap widens even more when measured in terms of the highest level of creative achievement. Although women constitute over 50% of the world population, only 5% of all Nobel Prize winners have been women. Even in areas in which women are usually thought to excel, such as literature, men win more accolades and prizes. For example, of 114 recipients, only 14 women have won the Nobel Prize in literature. In the 103-year history of the Pulitzer Prize, only 30 women have won the prize for fiction.

It is undeniable that, by every indicator, women continue to lag substantially behind men in their creative and scholarly output, as well as in leadership positions. Simply stated, too few excel at the highest levels in their disciplines, and in particular, in their creative contributions. It is for this reason that this study investigated the talent development process and perceptions of women who have reached the highest levels of creative productivity in their disciplines. We need to understand their perceptions of blocks to further achievement, as well as what drives them in their paths to even higher levels of leadership, creative productivity, and scholarly output. As one of the participants explained when asked what drives her work, "Pleasure—I love my work—I get such a kick out of thinking about something that I have not thought of before."

Creative Productive Eminence in Women

This chapter introduces a new theory of female creative productive giftedness that integrates previous research (Reis, 1987, 1995, 1996, 2002, 2005) with the cumulative and contextual experiences of this new study of eminent women.

> Creative productive giftedness in women is developed when they apply their high intellectual, creative, artistic or leadership ability to an area of intense personal interest and make contributions they consider to be significant, consequential and meaningful to society. Their gifts develop over time, as do the personality characteristics that enable them to be successful (determination, love of discipline, focus, risk-taking). They seek environmental conditions that enable them to focus on their creative work (support from family and in their work environment). Highly creative productive women develop a strong belief in self, an intense desire to foster their intellectual, creative, artistic or leadership talents, and the focus to work diligently to contribute in areas they believe are

meaningful to society and to improve their disciplines by developing and implementing novel, original ideas.

The Current Study: Fifteen Creative, Eminent Women

To study the perspectives of eminent women contributing to this new conception of creative productive giftedness, 15 American women who achieved eminence in diverse fields were studied over two years. Institutional Review Board permission was granted and multiple qualitative case study methodology used, employing in-depth document review and interviews to probe participants' perceptions of work and lives (Miles & Huberman, 1994; Yin, 2009). Multiple case study methodology enables the comparison of cases to identify similarities, differences, and patterns. Primary source data, such as articles by and interviews about these women, as well as their scholarly work, biographies, and vitae, were also used to understand their perceptions about their broad and compelling accomplishments.

Demographic information was gathered about personal lives (age, marital or partner status, college or university attended, children), as well as information about their career and discipline. A protocol was developed and one to two interviews, usually lasting between one and three hours, were conducted, transcribed, and coded for major categories. All participants participated in subsequent briefer interviews, with follow-up questions asked over a period of two years.

Each eminent woman in the study was recognized as a major creative contributor in her field or domain. Each was nominated to participate by their deans, central administrators, and leaders in their discipline or university because of her accomplishments or fame. Each had stories or articles about her work in major publications such as *The New York Times*, weekly news magazines, or important academic journals or newsletters. Each has been honored by their professional associations and their peers. Additionally, several of the women were identified as among the most famous in their fields. Some, for example, were the first women to achieve specific milestones or make a specific important creative contribution. They were all recognized as being at the top of their discipline, such as being elected to prestigious societies, academies, and associations in diverse areas such as the arts, environmental sciences, physics, history, and other fields. Their selection for this study was based on their individual recognition as eminent in their discipline, as well as the level of their creative productivity, various articles written about them, and receipt of awards or special honors in their fields.

Most participants were faculty or administrators at a large public research institution, but few knew each other as they worked in different schools or colleges. Demographic information about the participants, their ages, disciplines, major contributions, and blocks to creative productive work are summarized in Table 18.1.

All participants were between the ages of 45 and 65. Eight were born in the United States, but seven were born in other countries, including Europe, the West Indies, and Algeria. All but two had spouses or partners at one time, but currently, ten are married or have partners. The majority, nine, have children, most often two or three. All live busy, fast-paced lives characterized by creative pursuits and a constant desire to be engaged in innovative, important, and exciting work.

Table 18.1 Eminent women

Name, age, discipline	Marital or partner status, children	Contribution	Obstacles
R, 50s, Genomics	Yes, 1	New genomes	Having to fight for opportunities with male counterparts
N, 40s, Business	Divorced, 2	New theories	Time to focus on my work
M, 50s, Engineering	Yes, 2	Patents, inventions	Gender issues at work
S, 50s, Psychology	Yes, 3	New theories	Time to do everything well
F, 40s, History	Divorced, 3	New theories	Time to excel and complete projects
G, 60s, English	Yes, None	New genre	I always want the next project to be better
A, 50s, Art	Yes, 3	New theories	Time and focus
B, 50s, Sociology	Yes, 1	New theories	Time and focus
C, 40s, Literature	Yes, None	New theories	Balancing the demands of your discipline with your creative work
J, 50s, Biology	Single, None	New species	Demands of service and other work
L, 50s, Science	Yes, None	New theories	So many creative opportunities and the need to focus
N, 60s, Physics	Yes, None	Pioneering experiments	Service responsibilities
A, 40s, Psychology	Yes, 3	New theories	Time
D, 60s, Pharmacological	No, None	Inventions	Focus on work, as opposed to other responsibilities
L, 50s, Management	Yes, 2	New theories	Too many choices, always seeking next challenge

Early Life

Many, but not all, of these eminent women were identified by their teachers as being academically advanced in elementary and secondary school. Most had supportive families, but not necessarily parents who provided intellectual stimulation or academic enrichment. Most grew up in middle-class families, but a few lived in lower middle class or very low socioeconomic circumstances. Almost all had siblings and most were not the oldest child in their family. Most are white but four are women of color. One had dyslexia that initially was an obstacle to her academic achievement in school, as her disability was not recognized by her teachers and the school system, a common issue confronting academically talented students (Reis, Neu, & McGuire, 1997). Her mother, who observed her daughter's academic struggles, spent hours working with her to help her learn to read, and although she is still a slow reader, she began to excel both in high school and in college. Two of the women in this study were grade-skipped, and many, but not all, had opportunities for enriched, accelerated opportunities and classes for advanced students. Most were identified for special honors and academic awards in high school or college, several but not all graduated near the top of their class, and won prestigious awards and college scholarships in high school. Three attended Ivy League Schools (Princeton, Harvard, and Dartmouth). Most had important ambitions about their future plans when they were young girls. All were determined, thoughtful, driven, and focused about their work in their paths to eminence. Some of their initial interest areas for future high-profile careers and important work changed, based on new and developing interests, often due to classes in which they enrolled, and the passion of professors or mentors who inspired them.

Current Lives

As they grew older, each developed an increasing understanding of their talents, opportunities, and interests. They all developed a strong belief in self over time, but almost all acknowledged stages of self-doubt in their ability to be successful during their journeys. Some still had frequent doubts. As R explained:

> My biggest hindrance is me—I am very insecure. I can sometimes be my own biggest block—I don't think I deserve to be considered highly creative or eminent. I brood and then I pull back and realize that I can't do this anymore—brooding blocks my creativity—but then my creativity brings me back—I have trained myself to get out of this senseless self-doubt.

With age and experience, and increasing levels of success, each gained knowledge about their abilities as well as their self-confidence over the decades, leading to enhanced self-perceptions as they developed their creativity, abilities, and interests and forged ahead with future plans. The creative productive talents of the eminent women evolved over decades and were constructed from a backdrop of their earlier varied and diverse life experiences that prepared them for their future accomplishments.

Several had or were currently pursuing leadership positions in their institutions, organizations, or societies. Five served or are currently serving as deans or associate deans, six were or are department heads or directors of institutes or centers, and almost all were elected to and held leadership positions in their professional organizations. These positions were mainly pursued, according to these women, to give back to one's professional community and make a positive difference for one's colleagues or in one's disciplines. Interestingly, several of these women considered these administrative and service obligations to be a block to achieving the highest levels of creative productivity, perhaps an impediment in their move from Pro C to Big C. All believed in their obligation to give back to others, sometimes by making their department, center, or school a better environment in which other women can work and produce.

Two brief case studies are included below to illustrate the breadth and depth of the creative accomplishments of these eminent women.

Brief Case Studies of Two Participants

Dr. B has been honored as one of the most eminent professors at her university for her cutting-edge scientific work. She is credited with redefining the science in her field, where she is noted as one of the most famous researchers and scholars in the world. She has won teaching, research, and service awards throughout her career from her university, her professional associations, and from international organizations. She has also been the recipient of international research awards for her hundreds of articles and books. She has been awarded tens of millions of dollars of research grants and has given over 300 research presentations, 200 invited lectures, and keynote addresses at major international scientific meetings. She has placed two dozen doctoral students in research institutions across the world. She is a fellow of her professional association, of which she was also president. She has been or is currently an editor of the leading journal of both the national and international journals in her field, and currently serves on the editorial boards of seven international journals. She has also been a member of an international advisory panel in her field and has delivered expert testimony before Congress for her innovative, inventive work.

Dr. G is the author of 10 books and editor of 16 other books. She has published hundreds of articles, columns, and has delivered invited keynotes all over the world. She has also discussed her books and creative work on numerous television and news shows, including 20/20, The Today Show, CNN, the BBC, NPR, and Oprah. G has also published articles in *The New York Times*, *The Philadelphia Inquirer*, *The Atlanta Journal-Constitution*, the *Chicago Tribune*, *Harvard Business Review*, *The Common Review*, and *The Chronicle of Higher Education*. Her books have been translated into several languages, including Chinese, German, Spanish, and Japanese. She is a sought-after public speaker who lectures nationally and internationally and has served as an advisor to the Library of Congress. Her writings are distributed internationally and she is credited with the creation of a new genre within her discipline. She has won numerous awards from many different organizations, as well as her university's highest award for scholarship and teaching.

What Drives These Eminent Women?

Fascinating responses were offered to the question of what motivates these eminent women to maintain their demanding workload. As noted, all are already famous, successful, and considered both creative producers and change agents in their disciplines. When questioned about their motivation, their responses were fascinating, demonstrating the variety of ways that these women remain motivated to make change, improve their disciplines, avoid boredom, and make a positive difference in the world.

N: I identify problems that people did not think could be solved. I do something that no one else thought I could do. I succeed where others have failed.

S: Lots of people do good work but not necessarily creative work. Lots of people stay on the path but don't create new paths or bring new ideas into a field. I create new work and implement new ideas that make a difference.

G: To go back in time, I think I hesitate more than I used to because I always want the next thing to be better. I always want to be and do better. It is not about impressing people. I want something to be better and to be smarter. I don't want to do the same thing again. I have a much broader expanse. I understand that not everything makes a difference—I want to do something new and bold. Getting older has made me want to do even better all the time.

C: I think what drives me is it is that I don't do this work for anyone else. It is such a privilege to be in the places we are in—it is a privilege to be in a place where I can write things that other people will read. It is not about getting the next position or the next award. I love learning and creating new work and making a difference.

L: The fear of boredom—a little boredom is good but a lot is bad. I love what I do—I loved building my research identity. Now the question is: do I want to build something else—do I also want to be a dean? I am restless about my talents and I also get angry at women who quit and who don't use their gifts. I see too many of them.

A: Ultimately, I love what I do. I study a really important public health problem and I want to make a difference. Even in my administrator role, I want to make a difference. I get a lot of satisfaction in helping other people succeed. I am super invested in what I do because I am so passionately interested in what I do. I structure my work so that I have a lot of variety and that variety is what makes me creative. I have a constant series of challenges and I am always striving to learn what works and what does not. If something does not work, I design a new intervention.

D: I don't know what drives me but I think my work ethic is built into my genes—If I am not working, I don't feel right. I see things that need to be done, and I do them. It is not to show off or to tell others what I have achieved. Most people know that I bring in most of the funding in my school and have created real change in my discipline. I am modest about my accomplishments but I am driven to make positive change in my field and to improve what has been done in the past.

Barriers or Blocks That Impede the Development of Women's Creative Productivity

Earlier work on talented women focused on internal and external barriers that hindered the completion of high-level work (Arnold, Noble, & Subotnik, 1996; Hollinger & Fleming, 1988; Kerr, 1985; Ochse, 1991; Piirto, 1991; Reis, 1987, 1998). External barriers included the way women were raised as children and the cultural messages they encountered in life. These external barriers contributed to and interacted with internal barriers, which were often deeply personal and unique. In this study, the most frequent and important block to creative productivity was external, that is, having enough time to focus on work. Few of the women mentioned internal blocks when asked about their greatest block to creative work. The participant who did discuss self-doubt as her biggest block described that frequent and well-known visitor that emerges in many gifted women's early professional lives (Reis, 1998) and was mentioned by some of the participants in this study. This study found that as gifted women age and achieve higher levels of success, some internal obstacles lessened. Time was the most important block identified by most of the women but reasons for this block varied by their age and marital status. All of the younger women children mentioned time to focus on their family while passionately wanting to pursue their work as their major block to creative work. As V explained,

> The most important challenge I have had as a creative woman is work life balance. My creative work does not come at a convenient time. The exciting content comes randomly at odd moments. I text myself ideas all the time but I also have to reel these in all the time If I am with my children, and I want to work or get a creative idea, I am called workaholic and selfish all the time, because I just want to do my work.

The older, eminent women mentioned their greatest external block as time constraints due to work-related service and administrative demands on their schedule. Many women pursued leadership opportunities or had too many service demands, and they discussed how this use of time reduced their ability to pursue their disciplinary work. They regretted the time lost but also acknowledged the need to give back and the responsibility to pursue these leadership and service obligations. One participant's explanation was representative of some of the feelings of this group when she explained that "some of the service demands in academe kill creativity."

Perhaps the most controversial issue related to women and their work process is the claim that there may be a potential mismatch between the single-minded devotion necessary for creative accomplishment and either their personalities or their need and desire to balance family and career (Arnold et al., 1996; Piirto, 1991). In fact, in this current study, all participants displayed single-minded devotion to work but they choose to diversify their efforts, spending time on service or leadership as administrators, leaders, directors, and deans. In this way, they diversified their creative energies and efforts (Reis, 2002), perhaps ultimately taking crucial energy and time away from their discipline to focus on other interesting opportunities for self-growth and the opportunity to lead or give back to their professions and colleagues.

Summary of Findings

Each eminent creative producer in this study acknowledged their high levels of creative productivity, and none disputed the label of giftedness as applied to them as a participant in this study or disagreed with the assessment of their high levels of accomplishment and creativity. Each discussed the process of talent development of their gifts and talents, describing their path to achieving at high levels, working steadily and carefully, while acknowledging and sometimes even celebrating the detours that occurred in their lives. These detours were not always unwanted, but they definitely took time away from disciplinary work, and included relationships, raising children, caring for elderly or sick parents, and helping others, as well as their leadership or service obligations for the betterment of their discipline, others, or the community. All of these women understood the intensity of their lives, characterized by both a need and obligation to purposely develop their talents.

Comparing This Conception of Women's Creative Productive Giftedness with Others

Some advantages emerge when comparing this conception of giftedness with others. This research brings new depth and rigor to a conception of giftedness in women. First, this conception draws upon current and previous data-based research spanning two decades of work on the cumulative and contextual experiences of eminent women. This data-based theory has continued to be refined over decades (Reis, 1987, 1996, 1998, 2002, 2005), suggesting that the findings outlined in this chapter are not outliers but rather indicative of general patterns, traits, and behaviors of eminent women. Other conceptions of giftedness are not based on data collected over time on similarly gifted individuals.

Similarities and differences exist with other conceptions of giftedness. Creative productivity in these eminent women was constructed in an individual and personal manner, supporting the Moon's theories on personal talent development (2003). Moon defines personal talent as having the exceptional ability to select and attain difficult life goals that match one's interests, abilities, values, and contexts. This theory also has similarities and differences to another model of talent development in women conceived by Arnold et al. (1996). In this model, the outcome component focuses on the fulfillment of potential in gifted women across many domains or spheres, such as fulfilling personal and family relationships, community relationships, and the self-actualization of potential. In the public sphere of the Arnold et al. model, opportunities are provided for women to achieve high levels of accomplishment and leadership in professional areas, as well, similar to some of the findings in this research.

The model for female creative productive giftedness proposed in this chapter differs in ways when compared with other models of giftedness that consider giftedness as superior general intellect and indicate that strong support for the development of gifts is consistently needed for talent development over a lifetime. Not all of the women in this study reported consistently superior intellect and achievement while in school, and some grew up or lived as adults in less than supportive environments. Most experienced self-doubt at various periods during their lives, but over time, their belief in self defeated their self-doubt, as they slayed this negative self-perception, mastered their discipline, and achieve at higher and higher levels.

Similarities also exist to earlier and current theories of giftedness. This conception supports the work of Renzulli (1978, 1986, 2005) relating to the three-ring conception, as all had above-average abilities, and developed task commitment and creativity. It also supports the work of Sternberg (1999) and Sternberg and Gregorenko (2002) regarding the development of successful intelligence, as these eminent women succeeded in life by developing their strengths, compensating for their weaknesses, and shaping their home and work environment to develop their unique gifts. This theory supports the houndstooth research of Renzulli (2002) who identified optimism, courage, romance with a discipline, sensitivity to human concerns, vision and sense of destiny, physical, and mental energy, as essential background components of what makes giftedness. It also supports the WICs model of leadership developed by Sternberg (2013), as many of these women pursued leadership opportunities and used their creativity, intelligence, and wisdom to develop new ideas and convince others of the usefulness of their work, in the service of the common good.

Identifying Gifted and Talented Children, Based on This Conception

While I do not wish to appear self-serving, a key finding in this research is that several of these women were not excellent students in elementary or high school. Some excelled at various points and then became distracted from being good students because they became fascinated with one topic. Some had learning and attention challenges. Still others were strong students in high school but not when they were younger. Only a few excelled in all grades and these were students who grew up in India, China, and Canada. The ideal identification system for these students would have been the use of a broader Talent Pool as Joe Renzulli and I suggest in the Schoolwide Enrichment Model (1985, 1997, 2014). The Talent Pool is formed by including students who have been identified by both test and non-test criteria, so it includes students who earn high scores on traditional measures, and also leaves room for students who show their potential after participating in other kinds of opportunities, such as extra-curricular or performance-based activities. This more flexible and open approach enables educators to identify students for special programming who are curious and open to new ideas and those who are highly creative and in need of special opportunities, resources, and encouragement.

An Ideal Gifted Education Model Choice for These Eminent Women

Several of the participants spoke passionately about what worked and did not work for them in school. Those that enjoyed school sought the opportunity for enrichment and special projects. Those who did not spoke with regret about the rigidity of their school systems and how much they sought and desired creative outlets. Our Schoolwide Enrichment Model (SEM; Renzulli & Reis, 1997, 1985, 2014) would have been particularly appropriate for providing a strength-based, talent-focused approach for these creative gifted women. A talent development approach provides enriched learning experiences and self-selected opportunities, with a focus on a broad range of enrichment experiences to expose students to new ideas and skills and follow-up advanced learning for academically talented students interested in further investigation. The SEM identifies and enhances interests and strengths by providing exposure to areas of interest, giving instruction in higher-order problem-solving, creative and critical thinking, and information processing, and providing opportunities to produce original work and services in areas of interest and strengths. As one participant explained,

> I moved to a high poverty school district when I was 13 and drove past Princeton and told my teachers I am going there. I know that the teachers in Trenton noticed me because I did not have to push—my guidance counselors and teachers put me in the gifted and talented program that gave me exposure to many

new topics and ideas. I was so motivated there. My stepfather was a janitor and my mother was a maid but there was no question about whether we were going to college, I have two older sisters and one is a teacher and one is a nurse. Setting high expectations was a big issue for me and our family. I had that internal motivation—I knew I wanted to go to Princeton because it looked like a castle. When I started reading about college, my teachers and counselors pushed me toward Rutgers—most kids from Trenton went there and I wanted to go different but I wanted it all. We started out with a class of 1200 and only 400 graduated from high school. They told me what I needed at Princeton and I thought, I could do all that—with the gifted education program and my advanced math classes and STEM, I was ready. That education had prepared me for Princeton.

Conclusion

Each participant made individual decisions about her talent development that included cumulative life experiences that prepared her for future accomplishments. Another interesting finding was the self-knowledge the women gained about their paths to eminence, and the personal and professional sacrifices necessary, but also their sense of gratitude for being able to complete their creative work. Each was proud of their accomplishments, and none indicated or harbored regrets about the directions taken and or personal choices made in their lives.

The personality characteristics of these eminent women include determination, motivation, creativity, leadership, love of discipline, and the ability to take, and in some cases, thrive on risks. Each woman exhibited a focused ability to strive for success and continue to persevere, sometimes under adverse conditions. Each displayed creativity rooted in the love for their work, and their intense interest in their discipline. Their sheer volume of work and persistent evolution into higher talent forms interacted with their "learned creativity." And each woman displayed a careful patience about the development of her talent. In addition, each displayed a willingness to take risks and tackle new, challenging, and important work.

These women made active choices to pursue their talents because they had a sense of destiny about the importance of their work. They overcame and successfully negotiated various obstacles, resulting in increased motivation and determination to succeed. The development of a creatively productive life and the attainment of eminence is complex and decidedly personal. All of the eminent women in this study combined a meaningful personal life with passion for their work, as they purposely shaped their extraordinary journeys.

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19

The Three Ring Conception of Giftedness: A Change in Direction from Being Gifted to the Development of Gifted Behaviors

Joseph S. Renzulli and Sally M. Reis

Not everything that can be counted counts. And not everything that counts can be counted.
—Albert Einstein

The Meaning of the Word "Gifted"

Any attempt to develop a conception of giftedness must first deal with how one chooses to use the term, "gifted." When used for practical purposes, such as identifying students for special services, a direct relationship should exist between the definition of giftedness, the identification system, and the types of services offered in the program. If, for example, the program is designed to provide advanced level curriculum in math, then it is logical and appropriate to examine math scores and achievement levels in this discipline to make identification and selection decisions. If, on the other hand, a program is developed to respond to individual student interests, promote investigative skills and mindsets, and encourage creative productivity in students' strength areas, then a logical identification system that assesses these areas should be considered. In other words, the identification system should *follow* rather than precede the development of program practices.

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Approaching a practical understanding of the meaning of the term "gifted" raises the question of what heuristic purpose the term serves once it is deprived of the aura that surrounds its use in many professional education groups and lay communities. A heuristic technique is an approach to problem solving, learning, or discovery employing a practical systematic method. Although a heuristic technique is not necessarily optimal or perfect, it should be sufficient to pursue an immediate goal; in this case, to plan special programs and the processes that determine which young people are eligible to participate.

When considering the heuristic meaning of the word, "gifted," one must first examine the parts of speech assigned to the g-word in the dictionary (Merriam-Webster, 2016). It is categorized as both a noun (giftedness) and an adjective (gifted). When used as a noun, the word refers to an *entity* or state of being. For example, "He or she is gifted." Synonyms for the word as a noun are almost non-existent but "blessed" or "preordained" might come close. The noun "giftedness" often takes an adjective (such as scientific or academic) to specify the area in which a person has achieved superior accomplishment.

When used as an adjective, it refers to high potential in a particular area of human performance and usually has reference to a criterion or comparison group (e.g., "She is a gifted writer for her age"). Synonyms frequently found when the word "gifted" is used as an adjective are also adjectives that usually take an object (e.g., superior mathematician, advanced reader, innovative designer, exceptional artist, persuasive speaker, compelling writer); all words that helpfully provide direction when talking about the types of services advocated when developing special programs, services, and opportunities. Indeed, the word is even used as an adjective when the field is referred to as "Gifted Education," reminiscent of the root word, that a gift is something to be given rather than a state of being. The student receives the gift when the school provides opportunities, resources, and encouragement to transform his or her potential into gifted behaviors.

Persons advocating the entity perspective argue that someone must first officially label students as "gifted" before they can receive any special services. One may contrast this with a *responsive* orientation, where students react to presented opportunities and teachers respond to students' demonstrated talent potentials at various times and ways. Those with an entity perspective may assert that they are using a "multiple criteria" approach; but oftentimes, the label will not be bestowed unless the student achieves a predetermined cut-off score on an IQ or other cognitive ability test. In such cases, the preliminary nomination and screening serve as a ticket to take a test, and the strengths and evidence of talent potential that led to the nomination and/or screening are disregarded unless one hits the cut-off score. Thus, claims about a multiple-criteria approach end up being a smokescreen for the same old test-based, entity-oriented approach.

A case in point is an article that discusses the impact of the nomination stage on identifying under-represented students (McBee, Peters, & Miller, 2016). Although an excellent analysis is made of issues related to nominations for gifted programs, referral to the "actually gifted" and the "not-actually gifted" clearly indicates an entity orientation, even at the very early nomination stage of identification. Use of terminology such as "truly" and "actually" gifted in scholarly publications, with or without whatever disclaimers may be noted, could easily lead the casual observer to believe that there are people who do indeed have a "gifted chromosome."

As a heuristic, "gifted education" conveys a process that *may* lead to the enhancement of abilities and skills. As a less than perfect heuristic, "gifted assessment" for identification *may* identify students who can benefit from enhanced programming, but it may also miss many who would benefit. Recent studies (Grissom & Redding, 2016; Lu & Weinberg, 2016; McCoach et al., 2016) provided evidence that students from historically under-represented groups continue to be less likely to be identified as "gifted." Grissom and Redding (2016) found that Black students are half as likely as other students with equal achievement to be assigned to a gifted program and that Black students are three times as likely to be nominated for a gifted program if taught by a Black teacher. Likewise, in a study that controlled for school characteristics, McCoach et al. (2016) found that students who are Black, Hispanic, from low-SES (Socio-economic status) families, or English learners whose achievement scores were just as high as students who were White, non-ELL (English Language Learners), and not from low-SES families were significantly less likely to be identified as "gifted."

The traditional entity usage and primary reliance on teacher nominations and ability-test scores have resulted in remarkable restrictions of high-potential students from historically under-represented groups in the United States (Erwin & Worrell, 2012; Ford, 2014; Ford & Whiting, 2016; Lakin, 2016; U.S. Department of Education, Office of Civil Rights, 2016; see also National Research Council, 2002). This approach also eliminates students of all backgrounds who are highly creative, those who think and pursue tasks with a different approach to learning, and those who have highly specialized talents, interests, creativity, or motivation. Examples abound of these nontraditional thinkers who go on to become world-changers. Joni Mitchell, winner of nine Grammy Awards and a member of the Rock and Roll Hall of Fame, reflected:

> I was a bad student. I finally flunked out in the twelfth grade. […] The way I saw the educational system from an early age was that it taught you what to think, not how to think. *There was no liberty, really, for free thinking*. You were being trained to fit into a society where free thinking was a nuisance. (Crowe, 1979, emphasis added)

Other examples also support our premise. Sir Richard Branson, the founder and CEO of Virgin Group, is dyslexic and did poorly in school. He dropped out of school at 16 to produce the magazine *Student,* which led to the creation of Virgin Records. On his last day, the headmaster told him he would "either end up in prison or become a millionaire" (Branson, 1998). Maya Angelou's turbulent childhood led to a period of selective mutism, and she has explained that people considered her "an idiot, a moron" because she didn't talk (Moore, 2003, para. 23). Steven Spielberg is another case in point. He had dyslexia, hated school, dropped out of college, and his grades were too low to get into the University of California's film school. His mother, a free spirit with artistic talent, gave him free rein. She was tolerant of her son's lack of interest in school and often let him stay home, feigning illness, so he could work on his movies (McBride, 2011).

Another dramatic example of a creative young scientist whose teacher overlooked his strengths follows in the teacher's comments about John Gurdon, winner of the 2013 Nobel Prize for medicine:

> His work has been far from satisfactory. His prepared stuff has been badly learnt and several of his test pieces have been torn over: one such piece of prepared work scored 2 marks out of a possible 50. His other work has been equally bad, and several times he has been in trouble, *because he will not listen, but will insist on doing his work in his own way*. I believe he has ideas about becoming a scientist: on his present showing this is quite ridiculous. (Collins, 2012, October 8, emphasis added)

Two Kinds of Assessment

Another consideration that guided the development of the Three Ring Conception of Giftedness is the set of differences between two kinds of assessment. Most identifications system have been based on assessments *of* learning—what students already know based on cognitive and achievement test scores. While this information is obviously valuable in making decisions about students' potential, the Three Ring Conception also takes into consideration factors related to assessment *for* learning. Sensitivity to traits such as curiosity, interests, learning styles, expression styles, enjoyment of learning, collaboration, cooperation, planning, and self-regulation are not as easily measured or consistently present as traits measured by cognitive assessments. These traits are, however, developmental and are highly influential in the advancement of creative productive giftedness. In recent years psychologists have paid much more attention to performance-based assessment (Darling-Hammond, 1994; Wiggins, 1998) and therefore the traits listed above should be reflected in practical applications of theories designed to identify potentials for gifted behaviors.

The theory developed in this chapter focuses on creative-productive rather than lesson-learning giftedness and proposes that young people showing creative potential and an investigative mindset should also have access to special opportunities, resources, and encouragement. The quotation above and the following quotation attributed to Albert Einstein, the personification of scientific (adj.) "giftedness," point out that "Not everything that can be counted counts, and not everything that counts can be counted." If decision-makers only base student placement on things that can be easily counted, how many John Gurdons, Joni Mitchells, Richard Bransons, and Maya Angelous will society lose by failing to heed Campbell's and Einstein's advice?

The Three Ring Conception of Giftedness

As its name implies, the Three Ring Conception of Giftedness is based on three interacting clusters of traits consisting of above average (not necessarily superior) ability, task commitment, and creativity (see Fig. 19.1). Although no single criterion can be used to determine giftedness, persons who have achieved recognition because of their unique accomplishments and creative contributions possess a relatively well-defined set of these three interlocking clusters of traits (Renzulli, 1978, 1986, 1988, 1999, 2002, 2005). No single cluster "makes giftedness," but rather, it is the *interaction* between and among the clusters that create gifted behaviors, which are the necessary ingredients for creative/productivity.

It is essential to understand that each cluster plays an important role in contributing to the display of gifted behaviors. The theory was developed to guide identification practices for both academic/high achieving giftedness and creative-productive giftedness. Both types of giftedness are important, they often interact, and both should be developed in programs that serve high-potential youth. Although the theory is widely used in programs based on our Schoolwide Enrichment Model (Reis & Renzulli, 2003; Renzulli & Reis,

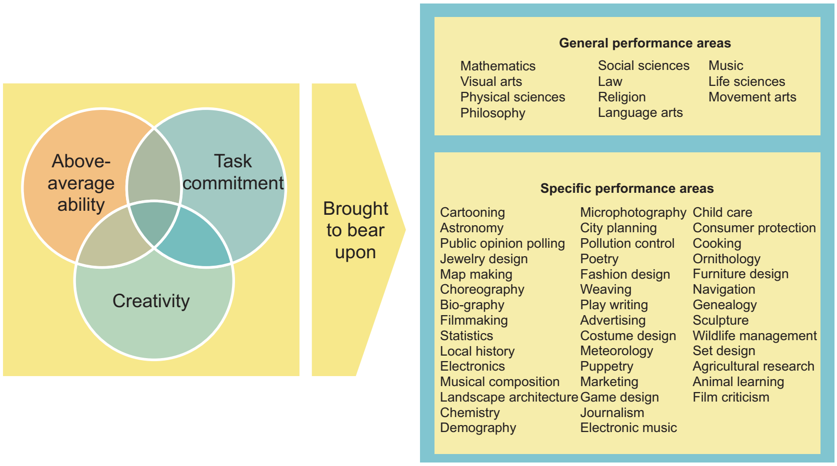

Fig. 19.1 Three Ring Conception of Giftedness

2014), the articles and chapters referenced above based on this theory are among the most widely cited in the field of research on gifted education and talent development. The Schoolwide Enrichment Model (SEM) combines the Enrichment Triad Model (Renzulli, 1977) with a more flexible approach to identifying high-potential students based on the Three Ring Conception of Giftedness, and it has been implemented in thousands of school districts worldwide. Extensive evaluations and research studies indicate the effectiveness of the model, resulting in independent researchers Van Tassel-Baska and Brown (2007) labeling it one of the mega-models in the field. This research suggests that the model is effective at serving high-ability students in a variety of educational settings and works well in schools that serve diverse ethnic and socioeconomic populations (Reis & Renzulli, 2003; Renzulli & Reis, 1994).

The curriculum/instructional focus in the SEM for all learning activities is the Enrichment Triad Model (Renzulli, 1977). Research on the use of SEM has consistently shown the positive outcomes of the use of this approach with students, finding that the enriched and accelerated content can reverse underachievement and increase achievement (Reis & Renzulli, 2003). The Enrichment Triad Model is designed to encourage creative productivity on the part of students 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. In order for enrichment learning and teaching to 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 is widely used for this purpose.

Comprehensive reviews of research literature cited earlier on the Three Ring Conception of Giftedness have, over time, provided updated pertinent research supporting this definition. Each of the three clusters is described in detail in the sections that follow.

Above-Average Ability

Above-average ability includes both general and specific ability. General Ability is defined as the capacity to process information, integrate experiences that result in appropriate and adaptive responses in new situations, and engage in abstract thinking in areas such as verbal and numerical reasoning, spatial relations, memory, and word fluency. General abilities are broadly applicable to a variety of traditional learning situations and are most often measured by tests of general aptitude or intelligence. They are broadly applicable to a variety of traditional learning situations. Research support for the concept of the Above Average Ability cluster has been discussed in previous research syntheses (Renzulli, 1978, 1986, 1988, 1992, 1999, 2005) but can also be found in Sternberg's voluminous work on the Triarchic Theory of Intelligence (1985, 1988, 1996).

It is important to point out that we need to consider above average ability more broadly than just in terms of traditional academic learning. People in areas such as the arts, leadership, politics, human relations, executive function skills, business and entrepreneurship, and social conscientiousness are all real-world domains of expression where above average behaviors can be observed. These areas represent fields of knowledge where an individual's ability can be applied to address the types of problems one encounters in daily life by selecting, adapting to, and shaping one's environment. Sternberg (1996) has asserted that his concept of practical intelligence is a better predictor of successful academic and occupational outcomes than standard IQ tests and other cognitive ability measures.

Specific ability is the capacity to acquire knowledge and skill or the ability to perform at high levels in one or more specific areas of human performance. Examples of these areas are listed in the lower right section of Fig. 19.1. A few of the specific abilities can be measured by achievement tests or tests of specific aptitudes, but others (e.g., photography, cartooning, film making, leadership, fashion design) can only be determined by performance-based assessment. Assessment of these types of specific abilities usually can only be determined by highly skilled observers in specialized fields using criteria based on their experience in specific areas of performance.

Task Commitment

Although this second cluster of traits is not as easily and objectively identifiable as general cognitive abilities, task commitment is a major contributor to the development of gifted behaviors. These traits, which are consistently exhibited by creative-productive persons, are a refined or focused form of motivation. Renzulli (1978) formulated the term "task commitment" over four decades ago and in recent years the concept has gained increased attention in Duckworth's theory of "grit" (Duckworth, Peterson, Matthews, & Kelly, 2007). Whereas motivation is usually defined in terms of a general energizing process that triggers responses, task commitment represents focused motivation that is brought to bear upon a particular problem (task) or specific performance area. The terms that are most frequently used to describe task commitment are perseverance, endurance, hard work, dedicated practice, self-confidence, and a belief in one's ability to carry out important work. In addition to perceptiveness and a better capacity to identify significant problems, research and biographical information on persons of high levels of accomplishment have consistently shown that a special fascination for and involvement with content that is of high interest is of critical importance in the talent development process. The young people studied by Bloom and Sosniak (1981), one of the most well-regarded studies of sustained talent development, for example, displayed early evidence of task commitment.

Research support for including task commitment in a definition of giftedness has increased in recent years. From popular maxims and autobiographical accounts to research about the role of effort and sustained interest (Duckworth et al., 2007; Dweck, 2006; Tough, 2013), task commitment as well as focus and effort have emerged as necessary traits employed by successful individuals who can immerse themselves totally in a specific problem or area for an extended period of time. Indeed, grit is defined as the tendency to sustain interest in and effort toward very long-term goals (Duckworth et al., 2007).

Creativity

The third cluster of traits necessary for the development of skills leading to creative productivity includes factors usually characterized under the general heading of "creativity." Kaufman and Beghetto (2009) estimated that there have been more than 10,000 papers written across diverse areas of psychology about creativity in the last decade. Summarizing research on this increasingly complex area is challenging. Several researchers, including Kaufman and Beghetto (2009), suggest that current creativity research follows one of two trends. The first trend focuses on eminence and creative genius, usually labeled as *Big-C* creativity. The second trend focuses on everyday creativity (Richards, 1990) and includes the creative work or activities of students or children, often called *Little-c* creativity. Longitudinal research related to the Three Ring Conception of Giftedness suggests that the "Little-c" opportunities that are core parts of the Schoolwide Enrichment Model (i.e., Type II and Type III experiences) can develop a mindset that can inspire students to pursue the Big-C creativity that may emerge in the years that follow. Hébert (1993) found that the creative projects of school-aged students had an impact on their post-secondary decisions and plans. He also found that the high creative opportunities in elementary and middle school programs encouraged students to seek creative outlets in high school. Students who experienced high levels of creative productivity, especially those who completed sustained creative projects based on their interests, maintained these interests and aspirations during college. One student Hébert (1993) interviewed, for example, who had graduated from college as an aspiring writer, explained that the high levels of creative enjoyment and engagement that she experienced in the enrichment program at her school led her to seek similar opportunities in her college and future work. In another longitudinal study of participants in Schoolwide Enrichment Model (SEM) based programs, Delcourt (1993) learned that high school creative productivity, as manifested in performances and product development, was predicted by earlier high levels of creative/productive behaviors in elementary and middle school. In another longitudinal study, students who participated in Schoolwide Enrichment Model programs based on our work (Renzulli & Reis, 1985, 1997, 2014) maintained strong interests over time and were still involved in creative-productive work both during and after graduation from college (Westberg, 2010).

Traits associated with creativity in the Three Ring Conception of Giftedness include novelty, curiosity, originality, ingenuity, flow (Beghetto & Kaufman, 2007; Csikszentmihalyi, 1996), and a willingness to challenge convention and tradition. The belief that creativity is developmental is inherent in the Three Ring Conception of Giftedness and is shared by other creativity researchers, including Runco (2004) and Sternberg and Lubart (1995). Another theory that is compatible with the creativity cluster in the Three Ring

Conception is Amabile's (1996) componential model of creativity. She argued that three variables were needed for creativity to occur: domain-relevant skills, creativity-relevant skills, and task motivation, similar to the interaction of the clusters in the Three Ring Conception.

Creativity is an essential component of the highest levels of creative productive giftedness. Many bright, capable, productive scientists have contributed to humanity's pool of knowledge, but the scientists whose work we revere, whose names have remained recognizable in scholarly communities and among the general public—the ones we think of as *gifted* or *Big-C* scientists—are those scientists who used their creativity to envision, analyze, and help to resolve scientific questions in new, original ways. Teachers, parents, coaches, and mentors can stimulate and develop young people's creativity in school and in this way prevent and alleviate the boredom and underachievement that too often affect high-potential students (Reis & McCoach, 2000). And because the occurrence of Big-C is rare, we remain fascinated by whether we can increase the likelihood that it can occur more often in students who participate in consistently planned enrichment opportunities.

It is difficult to measure creativity, and challenges exist in establishing relationships between creativity assessments and later creative lifetime accomplishments. Some research exists about school-based experiences that have increased creativity and had an impact on later creative productivity (Delcourt, 1993; Hébert, 1993; Westberg, 2010). Milgram and Hong (1993) found that engagement in childhood creative activities predicted adult vocational and avocational activities and Plucker (1999) found that students who were identified as creative thinkers at early ages by the Torrance Test of Creative thinking were more likely to engage in creative activities as adults. Although case studies do not represent the type of hard data that is the contemporary vogue in research and evaluation, when examining a different "brand" of learning, we must be open to equally different brands of evaluation.

Defining Gifted Behaviors

Although no single statement can effectively integrate the many ramifications of the research studies that underlie the Three Ring Conception of Giftedness, this definition of gifted behaviors attempts to summarize the major conclusions and generalizations resulting from earlier extensive reviews of research (Renzulli, 1978, 1986, 2005).

Gifted behavior consists of behaviors that reflect an interaction between and among three basic clusters of human traits—above-average ability, high levels of task commitment, and high levels of creativity. Gifted behaviors also include noncognitive traits related to various personal and executive function traits. Individuals capable of developing gifted behavior are those possessing or capable of developing this composite set of traits and applying them to any potentially valuable area of human performance. Persons who manifest or are capable of developing an interaction among the three clusters require a wide variety of educational opportunities and services that are not ordinarily provided through regular instructional programs.

The Three Ring Conception: Frequent and Recurring Questions

In the decades since the original publication of the Three Ring Conception of Giftedness (Renzulli, 1978), questions are often asked about the interrelationships between and among the three rings. The most frequently asked questions are below.

Do Additional Clusters Exist Beyond the Original Three?

A frequent reaction to our work has been the suggestion that the three clusters of traits portrayed in the model do not adequately explain the development of gifted behaviors. Based on our experiences and research about the Three Ring Conception of Giftedness (Renzulli, 1978, 1986, 2005), we believe that the interaction among the three rings is still the most important feature leading to the manifestation of gifted behaviors. Other factors contribute to the reasons that some persons display gifted behaviors at certain times and under certain circumstances. These factors, discussed below, can be grouped into the two traditional dimensions of personality and environment that influence the manifestation of gifted behaviors. Certain aspects of the original three clusters also relate to chance factors, for it may be chance that enables a student to interact with a teacher that peaks and supports his or her creativity. Our research, however, has demonstrated that creativity and task commitment and the two factors discussed below are in fact modifiable and can be influenced in a highly positive fashion by purposeful kinds of educational experiences (Baum, Hébert, & Renzulli, 1999) and by enriched and purposely planned enrichment and acceleration experiences.

Are the Three Rings Constant?

Most educators and psychologists would agree that the above average ability ring represents a generally stable set of characteristics, at least when interpreted in terms of traditionally measured school achievement. In view of the types of assessment procedures that are most readily available and economically viable, it is easy to see why aptitude or achievement tests have been so often used to make decisions about entrance into gifted programs.

The task commitment and creativity clusters are different, as these traits are not always present or absent in the same manner as students who are generally more stable in content area achievement. We can't use a percentile to value a creative idea nor can we assign a standardized score to the amount of effort and energy that a student might be willing to devote to a highly demanding task. Creativity and task commitment are present or absent as a function of the various types of situations in which individuals become involved, and these clusters are variable rather than permanent. Although there may be a tendency for some individuals to develop more creative ideas than others and have greater reservoirs of energy that promote more frequent and intensive involvement in situations requiring high levels of creativity. Task commitment and creativity can be developed through appropriate stimulation and training. Variations in interests do, of course, occur, as some people are more influenced by certain situations than others, but educators cannot predetermine which individuals will respond most favorably to a particular type of stimulation. This is why in the Schoolwide Enrichment Model we recommend general enrichment experiences for all students.

The creativity and task commitment clusters almost always stimulate one another. When a person gets a creative idea, the idea is encouraged and reinforced by one's actions or the actions of others. An individual decides to "do something" with the idea and, as a result, his or her commitment to the task begins to emerge. Similarly, a commitment to solving a particular problem will frequently begin the process of creativity as applied to problem solving.

Are the Rings of Equal Size?

In the original publication of the three ring conception of giftedness, Renzulli (1978) noted that the clusters must be viewed as "equal partners" in contributing to the display of gifted behaviors, but over time we have found that the higher the traditionally measured cognitive ability, the more able the person is to achieve in most traditional learning situations. The above average ability cluster is a predominant influence in lesson-learning giftedness. When it comes to creative/productive giftedness, however, an interaction among all three clusters is necessary for high-level performance. Not all clusters must be of equal size nor the size of the clusters must remain constant throughout the pursuit of creative/productive endeavors. For example, task commitment may be minimal or even absent at the beginning of a robust creative idea; the energy and enthusiasm for pursuing the idea may never be as large as the idea itself. Similarly, there are cases in which an extremely creative idea and strong task commitment will overcome somewhat lesser amounts of traditionally measured ability. Such a combination may even enable a person to increase her or his ability by gaining the proficiency needed to complete a robust project or study. Our research and case studies clearly indicate that larger clusters do in fact compensate for somewhat decreased size on one or both of the other two areas, but all three rings must be present and interacting in order for high levels of creative productivity to emerge (Renzulli, Koehler, & Fogarty, 2006; Renzulli, Sands, & Heilbronnor, 2011).

Co-Cognitive Additions to the Three Ring Conceptions of Giftedness

In addition to cognitive contributors to the development of high performance, a number of other factors referred to by Renzulli (2005) as "intelligences outside the normal curve" have been found to play a role in the accomplishments of highly effective young people and adults. New additions to our conception of giftedness focus on two clusters of co-cognitive traits that deal with characteristics related to using one's talents to create social capital by doing good works and applying executive function skills to the development of action-oriented products. Although these traits are not as easily measured as cognitive abilities, we believe they are important contributors to high levels of creative productivity and that can and should be developed in high-potential young people. Motivation for this work came mainly from an examination of the literature on positive psychology (Seligman, 1990). This movement focuses psychology on enhancing what is good in addition to fixing maladaptive behaviors. The goal of positive psychology is to create a science of human strengths that will help us understand and learn how to foster socially constructive virtues in young people. Financial and intellectual capital are the well-known forces that drive the economy and result in generating highly valued material assets, wealth production, and professional advancement—all important goals in a capitalistic economic system. Social capital, on the other hand, is a set of intangible assets that address the collective needs and problems of other individuals and our communities at large. Also important in pursuing this work was our own observations and teaching experiences with young people.

The original graphic for the Three Ring Conception was embedded in a houndstooth background because people frequently asked where the three rings came from. The black and white houndstooth graphic was intended to convey the *interaction* between personality traits and environmental conditions that contribute to creative productivity. If we truly believe that many high-potential young people will eventually assume leadership positions in their chosen career areas, we should be encouraging them to use their talents to make the world a better place. The literature review and school experiences initiated a confirmatory factor analysis (Renzulli, 2002, 2008; Renzulli, Sytsma, & Berman, 2002) that resulted in the identification of the following six factors related to the production of social capital:

- Optimism (hope, positive feelings from hard work)
- Courage (psychological and intellectual independence, moral courage)
- Romance with a topic or discipline (absorption, passion)
- Sensitivity to human concerns (insight, empathy)
- Physical and mental energy (charisma, curiosity)
- Vision and sense of destiny (sense of power to change things, sense of direction, and pursuit of goals)

Subsequent research concluded that Houndstooth-oriented activities led to the constructive development of gifted behaviors, and the internalization of co-cognitive factors. It also showed that students became creative producers at the higher levels of internalization than merely doing work for grades or other forms of external rewards (Renzulli et al., 2006, 2011). This work helped us to better understand why some people mobilize their interpersonal, political, ethical, and moral realms of being in such ways that they place human concerns and the common good above materialism, ego enhancement, and self-indulgence.

The work on executive functions is a spin-off from the work done on Operation Houndstooth and it also relates to the task commitment concept in the Three Ring Conception of Giftedness. Executive functions are generally defined as a set of processes dealing with managing one's mental control, self-regulation, and resources in order to achieve a goal (Kaufman, 2010). Our concern was to better understand and explain the motivation and skills that were observed in students' work on high-quality creative and investigative projects.

A comprehensive review of both the psychological and business leadership literatures led to countless articles on executive functions. Again, an instrument development project was initiated (Renzulli & Mitchell, 2011), and a confirmatory factor analysis resulted in the development of an instrument that identified the following five factors:

- Action orientation (decision making, goal setting, time management)
- Social interactions (listening, communication, collaboration)
- Altruistic leadership (team work, positive reinforcement, delegation)
- Realistic self-awareness (self-confidence, self-efficacy, humility)
- Awareness of the needs of others (e.g., empathy, tolerance, kindness)

An ongoing search was and continues to be pursued for materials and teaching strategies to develop these five co-cognitive factors in young people. We believe that both scientific examinations and practical examples of these background components are necessary for us to understand more fully the "big picture" of creative/productive gifted behaviors; and more importantly, the ways in which people transform their gifted assets into constructively positive social action. Although these factors are frequently called the "soft skills," we believe that the mission of gifted education should be expanded to include these co-cognitive skills because they are becoming more important in the top-level employment market. A major assumption underlying our work in these co-cognitive areas is that personality and environment are subject to modification. Factors such as courage, optimism, and a sense of power to change things are the traits that we respect in leaders and innovators such as Rachel Carson, Marie Curie, Nelson Mandela, and Martin Luther King (Renzulli, 2005). Combined with other co-cognitive executive function skills such as collaboration, leadership, and self-efficacy, what emerges in our enhancements of the Three Ring Conception of Giftedness Theory extends far beyond the "golden chromosome" theory that previously led many educators and psychologists to believe that some people are pre-ordained to be gifted.

In the years ahead, we hope to examine additional environmental and school-related interventions that promote the types of behavior associated with each of the clusters in the Three Ring Conception and what we describe as intelligences outside the normal curve (Renzulli et al., 2006). These interventions draw upon existing and newly developed techniques that can be used within various schools and in extracurricular contexts. Definitive answers to questions about promoting the development of these components will take time but it is our hope that educators and psychologists will understand the importance of this challenge and initiate additional research to contribute to our understanding of these human behaviors. We also hope that educators will promote planned enrichment activities and the infusion of more enrichment into the regular curriculum to stimulate these behaviors (Renzulli & Waicunas, 2016).

Fundamental to our conception of giftedness is the difference between those who master information, even at very advanced levels, and those who create and produce new and important contributions to knowledge. Given the increased access to knowledge and the ease with which technology enables the acquisition of just-in-time information, our conception of giftedness focuses on how our most able students access and apply information rather than merely how they accumulate, store, and retrieve it. Also fundamental to our conception of giftedness is our belief that it is less important to label children as "gifted" and more important to develop the types of educational experiences that are necessary for the emergence of creativity, task commitment, and an investigative way of looking at the world, in order to encourage students to display gifted behaviors. Using the Three Ring Conception as one's definition of giftedness also means that "gifted programming" should include the various types of educational services and gifted education pedagogy that we advocate. Our goal is to promote enjoyment, engagement, and enthusiasm for learning in all students and to develop high achievement and the intellectual, motivational, and creative assets that contribute to both high achievement and creative productivity. The educational services described in the pedagogical and program organization model, the Schoolwide Enrichment Model, with which the Three Ring Conception of Giftedness was developed (Renzulli, 1977; Renzulli & Reis, 2014) increase the likelihood that more students will pursue creative work in school and life.

Conclusion

We believe that the justification for gifted education is to increase the world's reservoir of creative and productive young people who will contribute to the scientific, economic, social, and cultural development of mankind and to preserve the earth's resources for future generations. Persons identified using strategies based on the Three Ring Conception of Giftedness and the co-cognitive factors discussed above are a diverse group. They exhibit a wide range of characteristics in ability and achievement, temperament, and effort invested in realizing academic and creative accomplishments. Our four decades of research on this conception of giftedness has convinced us that their talents and abilities, task commitment, and creativity, as applied to areas of interest or passion, can be developed over time. The development of these abilities is accomplished when individuals begin the process of identifying and nurturing their academic abilities and interests inside and outside of school. The development of task commitment and creativity occurs when students find an area in which they desire to pursue with a passion, usually when their interests are activated. When children experience and enjoy creative and productivity experiences, such as interest-based projects and academic work, they are more likely to seek additional creative and productive experiences later in their education and professional lives. If we promote and develop these creative experiences in elementary or secondary school, students are more likely to pursue creative opportunities in their adult lives, leading to more creative and productive personal and work lives. When this happens, more talents in a broader pool of persons with academic and creative potential will be realized and developed.

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20

Relationships Between Talent, Training, Polymathy, and Creativity

Robert Root-Bernstein and Michele Root-Bernstein

Introduction: The Problematic Relationship of Giftedness and Creativity

One of the ongoing challenges for gifted and talented education is that the measures used to select students for advanced educational opportunities rarely identify those most likely to make creative contributions later in life. The smartest students are rarely the most inventive. Conversely, extremely creative people are often overlooked as average or without obvious potential during their educational years. A need exists to understand what factors mediate the relationship of talent to creative potential so that better ways of fostering creative talent early can be devised.

Previous Attempts to Predict Creative Potential

Various measures of giftedness or talent have been tested as predictors for creativity without much success. These include IQ, grade point average, and SAT scores. Terman's longitudinal studies of high-IQ individuals found that they did not achieve greater career success or more creative attainments than average IQ individuals of similar ethnic and socioeconomic backgrounds

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(Terman, 1925; Terman & Odin, 1947; Sorokin, 1956). Even the super-geniuses in Terman's study, those with IQs averaging 190, were no more successful in any measure of creative achievement (Feldman, 1984). Conversely, high-achieving groups such as scientists employed at Cambridge University (Gibson & Light, 1967), professional mathematicians (Helson & Crutchfield, 1970; Helson, 1971), and successful musicians (Moore, 1966) displayed no higher IQs than average college graduates. Above-average IQ confers no significant advantages in terms of creativity or inventivity (e.g., Karwowski & Gralewski, 2013; Batey & Furnham, 2006).

Grades are also poor predictors of creative potential, in part because grade point average correlates highly with IQ (Gralewski, 2012; Roth et al., 2015). Harmon (1963) found no correlation between college grades and career-achievement measures; Burton and Wang (2005), too, found that undergraduate grades were a very poor predictor of professional productivity across many disciplines. Additionally, grades correlate poorly with creativity test scores (Badaruddin, DeMiranda, & Siller, 2016; Gralewski, 2012; Mayhew et al., 2012).

Studies of the Graduate Record Examination (GRE), SAT, and ACT as predictors of creativity also demonstrate poor or inverse associations (Burton & Wang, 2005; Glanz, 1996; Schrader, 1978; Dollinger, 2011; Blake, McCarthy, & Krause, 2014), again because such test scores correlate significantly with both IQ ($r = 0.86$) (Frey & Detterman, 2004) and grades (Marini et al., 2013). In a follow-up of mathematically precocious youth with SAT scores over 700 by age 13, 15% had produced patents and 3% had published books thirty to forty years on (Wai, Lubinski, & Benbow, 2005; Lubinski, Benbow, & Kell, 2014). They did well in comparison to the U.S. national average of 1% producing patents and less than 1% publishing books, but the mathematically precocious cohort palls in comparison to a surveyed sample of mid-career scientists and engineers, in which 49% of men and 20% of women held patents and 51% of men and 29% of women published books (Root-Bernstein, Van Dyke, et al., 2019). About all that high IQ, GPA, and scholastic test scores reliably predict is each other and higher incomes, which may be nothing more than a self-fulfilling prophecy since such scores also correlate with better educational opportunities (Wallach, 1976).

Creativity Tests Do Not Predict Creative Potential

Are creativity tests better at predicting creative potential than IQ, grades, and standardized tests? Unfortunately, not. Few creativity tests have been validated in longitudinal studies to see whether school-age scores predict professional creative attainments. Of these few, none have thus far proved useful (Mansfield & Busse, 1981; Runco et al., 2010; Said-Metwaly, Van den Noortgate, & Kyndt, 2017). Is there, then, some other way to identify creative potential? A significant number of scholars studying creativity have suggested that the best measure of creative potential is self-motivated extracurricular or extra-workplace creative activity (Burks, Jensen, & Terman, 1930; Richards, Holland, & Lutz, 1967; Munday & Davis, 1974; Albert, 1975; Baldwin, 1985; Hocevar & Bachelor, 1989; Milgram & Hong, 1993; Milgram et al., 1997).

A reliable measure of creative potential is self-actualized creative endeavor. An individual who can demonstrably navigate the creative process as applied to one or more specific challenges has demonstrated self-motivation, ideational fluency, persistence, and other psychological traits associated with successful individuals. Our research has therefore focused on self-motivated creative tasks as predictors of discipline-generated creative excellence.

Avocations as Predictors of Creativity

As self-motivated activity par excellence, avocations range from the casual engagements of hobbyists to the more extended commitments of serious amateurs functioning at a near-professional level. When such activities depend upon substantial skill, knowledge, and/or experience, they promote creative readiness (M. Root-Bernstein, 2020) and/or offer "significant opportunity for creative or innovative work" (Stebbins, 2004, p. 9) characterized by deliberate transfer of skills, techniques, and content within avocation/vocation dyads.

The best documentation to date of avocation-vocation transfer concerns the predilection among scientists for generative hobbies in the arts and crafts. In a longitudinal study spanning three decades, Eiduson (1962) tracked forty male scientists whose careers ranged from the mediocre to the heights of excellence. The most successful of these scientists were all avocational artists, musicians, sculptors, and poets; the least successful were rarely so (R. Root-Bernstein, Bernstein, & Garnier, 1995). Similarly, Helson and Crutchfield (1970) found that creative mathematicians were significantly more artistic than their average peers. In a study of larger groups of scientists, Nobel laureates in chemistry, physics, and physiology/medicine displayed significantly more avocations than members of the U.S. National Academy of Science and U.K. Royal Society, who in turn displayed more than members of Sigma Xi (open to all scientists) or the general population. The differences were modest for photography and music, but particularly large (fifteen to twenty-five times) for visual arts, handicrafts, performing arts, and creative writing (R. Root-Bernstein et al., 2008).

Studies of a convenience sample of science, technology, engineering, mathematics, and medicine (STEMM) professionals produced similar results: arts and crafts avocations correlated significantly with publications, books, patent output, and the founding of high-tech companies (R. Root-Bernstein et al., 2013). The effect was enhanced when the avocation was sustained, that is, introduced in childhood or youth and maintained in adulthood (ibid.). Self-reports confirmed that successful STEMM professionals knowingly integrated their avocations with their vocations to form what Gruber (1988) called "networks of enterprise" that benefited their professional creativity. A recent study of artistic scientists verified the interconnectedness of their activities (Frenz, Bucher, & Hermann-Franhaenal, 2019).

Polymathic Ability and Creativity

Integrating avocational with vocational interests signals the acquisition of an unusual range of learning often referred to as polymathy (R. Root-Bernstein & Root-Bernstein, 2020a). Not surprisingly, then, polymathy has a long history of being associated with creatively successful people. Cox found that the more creative a historical figure was, the more varied and intense their interests (1926, Table 41). Analyzing a similar pool of historical geniuses, R. K. White (1931) found that "the typical genius surpasses the typical college graduate in range of interests and… he surpasses him in range of ability" (p. 482). Terman, too, concluded that "[t]here are few persons who achieved great eminence in one field without displaying more than average ability in one or more other fields" (cited in Seagoe, 1975, p. 221). Cranefield (1966) reported a striking correlation between the number of adult avocations pursued by a group of nineteenth-century scientists who founded the discipline of biophysics and the number of major discoveries made by each.

Cranefield's work, as well as Gruber's study (1981, 1988) of Darwin, suggests that creativity as a process may be fundamentally **combinatorial**, an argument first proposed by Nobel laureate Wilhelm Ostwald (see Hapke, 2012): the wider the range of skills, methods, ideas, and problems that an individual integrates within his or her network of interests, the greater the potential for novel and effective problem-solving. It follows that highly creative people are invariably polymathic, either within or across domains. Building on previous study of art-science polymathy among Nobel laureates in the sciences, Root-Bernstein and Root-Bernstein (2020b) found that Nobel Prize winners in literature, peace, and economics are, as groups, equally polymathic. Tracking interests in arts, crafts, writing, humanities and social sciences, sciences, nature, and sports, the extended study determined that each laureate group displayed significantly greater activity in fields beyond their prize-winning disciplines than diverse control populations around the world (Root-Bernstein & Root-Bernstein, 2020b, Table 2). While all literature Nobels displayed interest in writing, as expected, 44% demonstrated ongoing and active engagement in the arts, 24% in the sciences. Nobel laureates in economics were almost as likely as science laureates to have training and interest in science and mathematics, but many times as likely to engage actively in humanities. Peace laureates displayed similarly diverse yet different patterns of active engagement in non-disciplinary domains (Root-Bernstein & Root-Bernstein, 2020b, Fig. 1).

Furthermore, Nobel laureates with trans- or across domain interests outnumbered those with single (home) domain interest anywhere from 2:1 among physiology/medicine and physics laureates to 19:1 among economics laureates. Many of these same laureates, from 58% of peace laureates to 84% of medicine/physiology laureates, also displayed multiple intra- or within (home) domain interests. Fifty-two percent of all laureates in the sciences displayed both trans- and intra-domain polymathy, which is to say, combined two or more developed interests within their home domain with interest in at least one additional domain. Sixty-eight percent of all laureates in literature, economics, and peace did the same (Root-Bernstein & Root-Bernstein, 2020b, Table 12). While this degree of polymathic training and production has not been documented in any other group of individuals, Niemi (2015) found a significant correlation with arts training among U.S. citizens holding patents.

Given the links thus demonstrated between creative productivity, avocations, and polymathy, we argue that one way to foster creative potential is to encourage talented individuals to master more than one discipline and to explore ways to connect their developing interests.

Tools for Thinking as Creative Connectors

How are such connections between diverse and perhaps divergent disciplines or domains to be made? Root-Bernstein (1989) and Root-Bernstein et al. (1995) observed in very successful scientists an association between creative know-how and an explicit use of non-verbal, non-mathematical, embodied forms of thinking that were not employed by their less-successful colleagues. Among Eiduson's pool of scientists, creative success—measured by publication citations, impact ratio, or extraordinary honors—correlated significantly with the use of visual and kinesthetic forms of sensory-based thinking during scientific problem-solving, a phenomenon also noted by Roe (1951) in her study of members of the National Academy of Sciences. Moreover, Root-Bernstein et al. (1995) documented that arts avocations among the Eiduson cohort developed imaginative skills germane to vocational endeavor when integrated within a scientist's network of interests.

The integration of embodied thinking within vocational creative work was subsequently documented by Root-Bernstein and Root-Bernstein (1999) among creative individuals working not just in the sciences, but also across the arts, humanities, and public interest professions. These common creative "thinking tools" included o**bserving** with all the senses, **imaging** percepts in the mind, **abstracting** or drawing out the essential elements of things and processes, **patterning** those elements, **analogizing** functional similarities between unlike things, **empathizing** with objects of study, **body thinking** with muscular feelings and emotions, **playing** physically and mentally with possibilities, and **modeling** phenomenal processes. Tools for thinking characterized creative thought among highly creative people across all domains and largely preceded the translation of their insights into symbolic forms such as words, numbers, images, sounds, or movement. Most importantly for what follows, creative practitioners considered these "tools for thinking" to be trainable.

Mental tool use in relation to creative output has been characterized quantitatively, for the most part among scientists. Among mid-career Michigan State University Honors STEMM graduates, the vast majority reported use of "exploratory play," "analogies," "intuition," and "imagination" as well as "logic" (LaMore et al., 2013). A survey of engineers and awardees of a Michigan bio-tech grant program revealed that all study participants used at least some thinking tools in their creative thinking. Ninety to one hundred percent of scientists and engineers in the survey group reported use of pattern recognition and visual observing and imaging. Fifty to seventy-five percent used abstracting, mental modeling, analogizing, thought experiments (imaging), or imaginary world invention (a complex form of exploratory playing, see below). Professional artists surveyed at the same time were more likely than the scientists and engineers to use body thinking, modeling, abstracting and play as creative strategies (Root-Bernstein, Van Dyke, et al., 2019).

Thinking tool use among these STEMM professionals also correlated with professional achievement, measured variously as patents filed or licensed and companies founded. Visual imaging and mental modeling correlated significantly with founding companies. Visual imaging, physical modeling, and playing each correlated with patent production. Indeed, those individuals reporting use of visual and tactile imagery, as well as the use of imagination more generally, were significantly more likely to have patents than those who did not. Open-ended responses by study participants further suggested that conscious exercise of sensory-based cognitive skills bridged avocational and vocational interests and developed and promoted combinatorial thinking.

Visual thinking as a case in point. Of all the thinking tools, visual thinking stands out both for its trainability and for its consistent association with many measures of STEMM success. In a 35-year follow-up of 563 students who scored above 700 on the math SAT by age 13, Kell et al. (2013) found that SAT scores accounted for 10.5% of the variance in the production of patents and peer-reviewed publications, while a test of visual thinking ability accounted for an additional 7.5% of the variance. As Uttal and Cohen (2012) have documented, these types of results have been found by dozens of other studies as well: people who score well on visuospatial tests tend to do significantly better than those who score poorly (see also Root-Bernstein, Peruski, et al., 2019; Root-Bernstein, Pathak, & Root-Bernstein, 2017/2019). More importantly, Uttal and Cohen review the extensive literature documenting the fact that visuospatial ability is not an inherent trait but is trainable. Visuospatial training interventions such as drawing, painting, sculpting, jewelry-making, computer-aided design, and so on not only produce improved scores on visuospatial skill tests but also on various measures of STEMM learning, especially among women and minorities (Uttal & Cohen, 2012).

Other thinking tools are also trainable. A recent review of well-controlled, statistically validated pedagogical studies demonstrated that the purposeful development of STEMM learning can be improved through observing, imaging, and modeling lessons grounded in arts practices. Less extensive data exists for the trainability of abstracting, patterning, analogizing, body thinking, empathizing, and playing, though this is not for lack of such pedagogies but, rather, a paucity of well-controlled, randomized statistical studies to validate them (Root-Bernstein et al., 2017/2019; Root-Bernstein, Van Dyke, et al., 2019). Given that each of these tools for thinking correlates with creative activity and with measures of creative success, it follows that training gifted and talented individuals in their use should improve their creative potential.

Childhood Worldplay and the Early Recognition of Polymathic Tendencies

Thus far, we have argued for avocational polymathy as an indicator/generator of creative cognition and practice among adults. We can do the same for the young. In the absence of good tests for predicting creative potential in children, we can turn to self-choice activities in the school-age set, especially those relevant to childhood itself. Among these, the invention of imaginary worlds, otherwise known as worldplay, "may chiefly represent the vast creative potential of inherently talented people" (Singer & Singer, 1990, p. 116).

Worldplay refers to the consistently repeated evocation of a fully realized paracosm or imaginary place, often involving the generation of maps, drawings, stories, histories, and other material artifacts. Creative play of this sort typically peaks around the age of nine, continues for some months or years, and then fades away in adolescence or early adulthood. Often recognized in the childhood play of prodigies and geniuses, worldplay is now known to flourish among a larger range of children: recent estimates place rates among general populations of children in the 12–17% range (M. Root-Bernstein & Root-Bernstein, 2006; Taylor et al., 2020). A strong correlation exists between childhood worldplay and adult creative achievement in the arts, sciences, and humanities. Rates of world invention among MacArthur Fellows appointed for creative achievement between 1981 and 2001 reach 25.5%, suggesting that paracosm play may indeed serve as an early indicator of creative potential (M. Root-Bernstein & Root-Bernstein, 2006; M. Root-Bernstein, 2009).

Recent laboratory testing finds that world-playing children score significantly higher than others in creative measures of narrative construction (Taylor et al., 2020). Likewise, recent testing of classroom-based imaginary world construction suggests that it improves learning comprehension in the sciences, in one study leading "to significant gains in mathematical and computational thinking" (Black, Segal & Vitale, et al., 2012, p. 213) in middle school classrooms. Qualitative study of natural, spontaneous worldplay suggests a reason for these classroom outcomes in creative readiness and learning. The invention of imaginary worlds nurtures facility with many tools for thinking, especially imaging, patterning, empathizing, playing, and mental as well as material modeling. It provides early exposure to disparate forms of knowledge and their expressive forms. Indeed, across domain exploration of what-if concerns distinguishes worldplay from precocious expertise. The invention of imaginary worlds functions as a playful “network of enterprise” that promotes a polymathic giftedness as readily recognizable as intellectual precocity or singular artistic talent—and potentially more prescient of adult creative capacity (M. Root-Bernstein, 2009, 2014).

Double Majors and Creativity

Considering the fundamentally combinatorial nature of creativity, the benefits of avocational breadth, polymathic tendencies, and worldplay make intrinsic sense. From roots in Koestler’s (1964) and Rothenberg’s (1979) work on “bisociation” and “Janusian thinking,” the literature on creativity has recognized that creative insights often, if not always, involve the fruitful integration of two or more apparently unrelated sets of problems, ideas, concepts, methods, or materials. It follows that people with unusual sets of interests cognitively integrated within a network of enterprises will be more likely to recognize novel problems and have the requisite skills and knowledge to address these problems fruitfully. Our data on the active within and across domain polymathy of Nobel laureates certainly supports this proposition.

One stimulus to developing creativity might, therefore, be to encourage gifted and talented individuals to undertake dual or multiple majors or to acquire successive degrees in multiple disciplines (Vulperhorst et al., 2018). Indeed, Del Rossi and Hersch (2016) found that college students who double majored had an increased probability of ending up in research and development careers than single majors in the same disciplines, while Selznick and Mayhew (2018) found that double majors were more likely to become entrepreneurs. Pitt and Tepper (2012) similarly reported increases in a variety of creative behaviors and outcomes for double majors as compared with single majors. “Many students report that their double major combination helps them think differently, solve intellectual puzzles, and approach assignments more creatively. These gains are greatest when students major in two disparate domains of knowledge, especially combining science with art and humanities” (Pitt & Tepper, 2012, p. 12).

In sum, if talented student have a desire to innovate, there is clear evidence that studying more than one discipline will increase their creative capacity to find and exploit connections among their diverse studies and interests.

Shifting the Emphasis from Testing to Training

In conclusion, our research suggests that the set of individuals who are identified through standard measures of talent and giftedness overlaps, but is distinct from, the set of individuals who actually contribute creatively to adult fields of endeavor. Creative potential is best identified by self-motivated, often avocational, activities involving the production of novel products, as well as by the ability to integrate unusual combinations of skill and knowledge from across diverse disciplines. Moreover, creative potential may actively be nurtured and trained: the acquisition of "tools for thinking" and their integration in synthetic activities such as early worldplay or the lifelong pursuit of productive avocations all develop creative readiness and know-how. Those who desire to optimize their creative potential should consider majoring in multiple subjects, developing intensive avocations, and mining the links between their diverse interests and skills.

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21

The Fuzzy Conception of Giftedness

Ugur Sak

Introduction

The Fuzzy Conception of Giftedness posits that most conceptions and practices concerning giftedness (e.g., propositions and identification practices) are vague. The Fuzzy Conception of Giftedness itself is vague as well. The two editions of the landmark book *Conceptions of Giftedness* (Sternberg & Davidson, 1986, 2005) cover over 20 different conceptions of giftedness. Each conception has its own unique vagueness. In this chapter, first, I discuss the vagueness of the concept "giftedness," with an emphasis on problems related to vagueness in conceptions of giftedness. Then, I propose the Fuzzy Conception of Giftedness and suggest identification and education practices based on this conception.

An Analysis of Vagueness in Conceptions of Giftedness

The explication of giftedness is a conceptual puzzle because science does not have a definitive answer as to whether there is such a property as giftedness or intelligence. They, indeed, are cultural constructions (Sak, 2007, 2011b;

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Sternberg, 2004). Scientists assume the existence of these constructs based on their knowledge of culture created by mental activities of societies. Understood from a cultural point of view, giftedness concept is rooted in socifacts (e.g., organizations), artifacts (e.g., material objects), and mentifacts (e.g., mental constructions). The concept *mentifact*, coined by Huxley (1955), is used to describe the mental component of a culture as mental constructions of a society (e.g., creation, intelligence, giftedness) that transform over generations, and thus, become transposed into new constructions.

Conceptions of giftedness cannot be isolated from mentifacts as these conceptions are mental constructions engrained in cultural experience. That is, *giftedness is not a biological fact, but rather a mentifact*. Once this proposition is accepted, the conclusion would be inevitable that the most important characteristic of giftedness is its mentifact system, a term suggested by Huxley (1955) as the sum and organizations of mentifacts of a culture. In the case of constructing the giftedness concept, it is the sum of mentifacts of giftedness and the way they are organized. For example, the Three-Ring Conception of Giftedness (Renzulli, 1978) and the Differentiated Model of Giftedness and Talent (Gagne, 1985) differ from each other not only in the number of factors that make up giftedness but also in how these factors come together in the overall process of talent development. Here, it is important to underline that most mentifact systems look backward, and as a result, are based on traditional authorities (Huxley, 1955). Thus, they are largely resistant to change. The conception of giftedness as a mentifact system experienced this tradition in the twentieth century. Even though a trend of pluralism and flexibility emerged in gifted education in this century (Lo & Porath, 2017), practices, such as faith-based practices (Ambrose, VanTassel-Baska, Coleman, & Cross, 2010), have resisted change.

A critical review of theories of giftedness (Sternberg & Davidson, 1986, 2005) apparently shows that, in line with mentifact systems, most theories of giftedness based on personal beliefs and convictions. These theories differ considerably from each other, as much as they resemble one another, showing enigmatic subjectivity and vagueness, which brings about more complexity to the explication of giftedness. Because of this subjectivity and vagueness, scholars have attempted to resolve five omnipresent problems of the field of giftedness: (1) threshold problem, (2) composition problem, (3) conditionality problem, (4) typology problem, and (5) interaction problem. However, these problems are not independent, rather, they interact with each other in creating themselves.

Threshold Problem: The Sorites Paradox

The sorites paradox refers to vague concepts, such as *bald* and *old*, with a borderline range of application (Williamson, 1994). The threshold of giftedness is a prime example of the sorites paradox. A threshold IQ or top 3–5% of a normal distribution is used as the borderline in some conceptions of giftedness. Although this belief is accepted as a myth by researchers in the giftedness field (e.g., Borland, 2009), alternative ideas propose only more liberal thresholds, such as the top 10% (Gagne, 2009) or the top 15–20% (Renzulli, 2002). The sorites paradox equally applies to the top 3%, 10%, or 15% on a scale with incrementally equal units. If a child with a 130 IQ is gifted, then what is a child with a 129 IQ? If that child is still gifted, then how about a 128 IQ, and so on?

Needless to say, such reasoning leads to absurdities. Lowering or increasing the threshold does not resolve the problem, and indeed may lead to new problems. For example, McBee and Makel (2019) explored how dramatically the rate of giftedness changes as a result of using different cutoffs, more than one domain, and different combination rules ("and" and "or"). For example, according to the Three-Ring Conception of Giftedness (Renzulli, 2002), the rate of giftedness ranges from 9.4% to 25.2%, depending on the number of domains and the magnitude of correlations between domains. According to the NAGC definition of giftedness, the rate of giftedness approaches 87%, with 20 domains under the "or" combination rule. These analyses imply that a child identified as gifted according to the definition of the National Association for Gifted Children (NAGC) is not necessarily gifted according to the Three-Ring Conception.

Composition Problem

The composition problem deals with ingredients of giftedness. Problems concerning composition theories of giftedness are of at least three types. First, although the theories propose a limited number of components that make up giftedness (e.g., Renzulli, 1978; Tannenbaum, 1983), a critical review of these theories shows that an infinite number of subcomponents of these components may be identified. Second, theories of giftedness markedly differ from each other as to which components make giftedness (e.g., Renzulli, 1978; Runco, 2005; Sternberg, 1986, 2001, 2005; Sternberg & Lubart, 1993). Third, the hierarchy of components on which giftedness is constructed differs across different giftedness theories (e.g., Cohn, 1981; Gagne, 1985). That is, an evaluation of giftedness theories depicts a vague concept in terms of its construction.

Conditionality Problem

Most theories of giftedness propose necessary conditions for giftedness. At first glance, a necessary condition for giftedness seems simply solvable. Yet, the solution is much more complex in cases of contingent conditions (Bradley & Swartz, 1988) and of a plurality of causes, as suggested by John Stuart Mill (Mackie, 1980; Robson & Stillinger, 1980). First, initially an unnecessary condition for giftedness becomes a necessary condition due to a contingent choice. That is, conditions of giftedness entail sub-conditions and sub-conditions necessitate sub-sub-conditions, and so on. Our ingenuity can generate endless subcategories. Hypothetically, the absence of a single disposition from a sub-sub-condition can veto the sub-condition, and thus the manifestation of giftedness. For the argument to make more sense, let's take the disposition "non-conformity" as an example. Almost no theories of giftedness propose non-conformity as a necessary component of giftedness. However, it indirectly becomes a necessary condition (sub-sub-condition) if a theory includes creativity (sub-condition) as a necessary condition of giftedness because creativity is presumed to entail non-conformity (Sternberg & Lubart, 1995). That is, conformist people cannot be gifted according to theories that include creativity as a necessary component of giftedness.

Second, contingent choices in conceptions of giftedness further complicate the conditionality problem because contingent propositions are possibly true in some worlds and possibly false in other worlds (Bradley & Swartz, 1988). Let's look at the "non-conformity" example again. It indirectly becomes a necessary component of giftedness due to a contingent choice of creativity as a necessary component of giftedness. Then, the problem arises of how we define non-conformity as a component of giftedness in strictly conservative and undemocratic countries where Western-style non-conformity is a life-threatening condition?

Third, the cause of an effect may not be singular and asymmetrical. More complicated is the organization of antecedents (Mackie, 1980). For example, a high level of intelligence, motivation, and supporting environment may jointly cause the development of giftedness. In turn, giftedness itself also causes an increase in intelligence, in motivation, and in the quality of environment. However, a completely different set of variables such as interest, curiosity, and creativity may also jointly cause the manifestation of giftedness.

Meta-theories of giftedness attempt to resolve the conditionality problem, inherent in the construct of giftedness (e.g., Sternberg & Zhang, 1995; Ziegler & Heller, 2000). For example, according to the Pentagonal Implicit Theory of Giftedness (Sternberg & Zhang, 1995), five meta-theoretical conditions (excellence, rarity, demonstrability, productivity, and value) are accepted to be individually necessary and jointly sufficient for labeling someone as gifted. It proposes that giftedness is the manifestation of excellence at a level rarely seen in domains requiring productivity that has a value to humans.

Typology Problem

The typology problem refers to vagueness in relation to types and domains of giftedness and boundaries between these types and domains. All the type theories are mere classifications of gifts and talents under some theoretically robust criteria. Some theories are hierarchical whereas others are not. A primary example of the theories differentiating both the hierarchy and domains of giftedness is Cohn's Multidimensional Model of Giftedness (Cohn, 1981). Giftedness is a broad ability (on top of everything), becoming manifest in three major talent domains: intellectual, social, and artistic domains. The Differentiated Model of Giftedness and Talent (Gagne, 2009) views giftedness in four domains: intellectual, creative, socio-emotional, and sensorimotor; these domains transform into diverse talents across the lifespan. Departing from the domain-focused approach, Sternberg (2000) offered a process-based conception of giftedness and distinguished seven patterns of giftedness: analyst, creator, practitioner, analytic creator, analytic practitioner, creative practitioner, and consummate balancer. In short, we can generate numerous types of giftedness according to where we look for and how we look at giftedness.

Interaction Problem

Not surprisingly, most models of giftedness put an emphasis on the role of environment and the interaction between person and environment (e.g., Gagne, 2009; Renzulli, 2012; Sternberg & Lubart, 1993; Tannenbaum, 1983; Ziegler, 2005). However, with the exception of a few conceptions, the interaction is conceptualized to be singular and unidirectional between person and environment. Contrary to models that view the interaction as unidirectional and singular, the Actiotope Model of Giftedness (Ziegler, 2005) and the model of giftedness as developing expertise (Sternberg, 2001) consider the interaction as a reciprocal causation in multiple forms. According to both models, changes in one of the components always bring about changes in other components, resulting in a coevolution.

In short, by dealing with the five problems, I tried to demonstrate how scholars of the giftedness field have created giftedness concepts. In the following sections, I discussed the Fuzzy Conception of Giftedness, which still is in the emergent stage.

A Developing Conception of Giftedness: The Fuzzy Conception of Giftedness

According to the Fuzzy Conception of Giftedness (FCG), giftedness is defined as *"a set of developing dispositions interacting efficiently with stimulus conditions."* Three terms in this definition are of importance and of the components of the FCG: disposition, interaction, and stimulus condition (see Fig. 21.1). According to the FCG, giftedness is *necessarily dependent* not only on (1) interactions between person and environment but also on (2) interactions among personal dispositions. What follow are a specification analysis of each component and an interpretation of their interactions in the construction of giftedness.

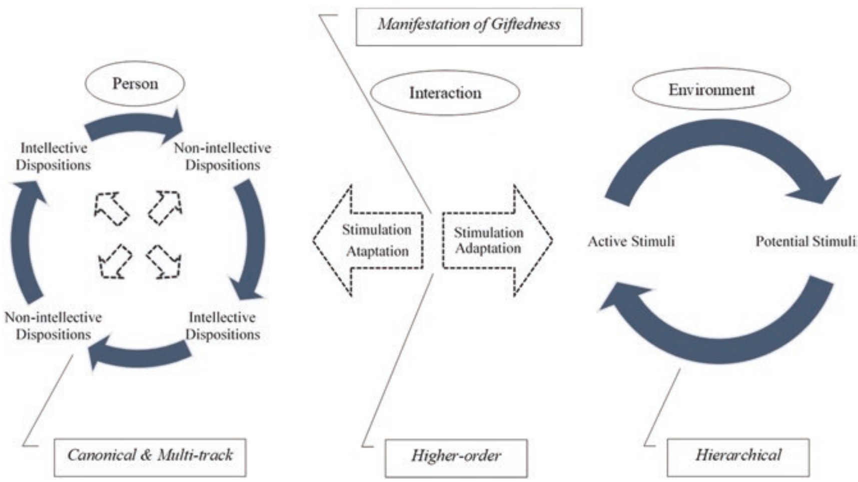

Fig. 21.1 The Fuzzy Conception of Giftedness

Specification of Dispositions

Personal dispositions are of two types: intellective, such as reasoning and working memory; and non-intellective, such as self-concept and motivation. Both types are internal characteristics of a person. The number of dispositions in each type, as discussed later, as involved in the construction of giftedness, is unknown, or otherwise infinite. The following six propositions specify the nature and role of dispositions according to the FCG.

Dispositional properties of giftedness are ascriptions. All dispositional properties are what John Locke called "secondary properties," not "primary," such as shape, number, and size of an object (Swartz, 2001). Primary properties are what we see, whereas secondary properties are the perceptions primary properties cause in us. For instance, the height of a red wall is a primary property while its color is not because when the light is switched off, the color disappears though the wall is still out there. Color is what objects cause in us when they interact with light. Thus, color is not a property of objects but a property of our minds. The wall has the potency to cause us to see it as red under certain conditions. Applied in giftedness construct, giftedness is not a property of a person. Rather, it is our reaction to manifest dispositions (behaviors). These behaviors cause us to ascribe them as gifted.

Dispositions have causal relevance to their manifestations (McKitrick, 2005). Giftedness can be explained in terms of manifest properties. A number of terms are used to describe dispositions in gifted education, such as *gifted, able, capable,* and the *like*. However, being conventional, these dispositions make no explicit reference to stimulus conditions and manifestations for the properties they state. In an effort to explicate dispositions, the FCG differs from other theories in terms of what dispositions signify in defining giftedness. Personal dispositions of the FCG are the sort of *canonical dispositions* formulated by Choi (2008, p. 468) as follows: *if "x" were to be situated in "c" at "t," it would exhibit "m."* More plainly, canonical dispositions exhibit their typical manifestations in response to being situated in corresponding stimulus conditions. We can tell whether a person has the disposition for giftedness only if this person exhibits manifest properties of giftedness (e.g., exceptional achievement, creativity) when interacting with corresponding stimulus conditions. Thus, it makes sense that such and such dispositions interacted with stimulus conditions for some time and became manifest as, for example, a creative output. For example, when we say "x" is potentially gifted, the stimulus condition for giftedness can be a challenging task about creating a unique style in the arts, with both inspirations and obstacles, for a beginning arts student in a prestigious arts school filled with artists. The manifestation would be not only the creation of a new style but also the increasing level of dispositions and interactions, namely, progressive adaptations seen through overt behaviors. Thus, giftedness becomes observable while a person interacts with stimulus conditions. From this point of view, there exists no such thing as a "hidden gift" in a corresponding stimulus condition as this condition is assumed to be sufficient for initiating an efficient interaction with personal dispositions.

The number of dispositions necessary for the manifestation of giftedness is indeterminable. According to the FCG, the personal component of giftedness is formed by an indeterminate set of dispositions typified as intellective and non-intellective dispositions. Both types are necessary, though not sufficient, in the construction of giftedness. Intellective dispositions include, but are not limited to, general ability, fluid reasoning, working memory, imagination, perception, attention, retrieval fluency, and the like. Non-intellective dispositions consist of self-concept, achievement motivation, coping skills (Heller, Perleth, & Lim, 2005), ego, intellectual impulse, mental health (Tannenbaum, 1983), perseverance, determination (Renzulli 2012), interest, volition, physical characteristics (Gagne, 2009), curiosity, openness (Piirto, 1999), personality type (Sak, 2004), and self-regulation both as intellective and non-intellective (Shapiro & Schwartz, 2005), and so on. There exists no exhaustive list of these dispositions and their interactive sets. Each disposition also may have sub-dispositions. Indeed, it is implausible to identify all the personal dispositions necessary for the manifestation of giftedness. There may be a disposition we are not aware of that enters into an interaction at a point in time that leads to the efficient within- and between-group interactions of a set of dispositions sufficient for the manifestation of giftedness.

Intellective and non-intellective dispositions are equally necessary in the construction of giftedness. If the manifestation of condition A (giftedness) entails the existence of condition B (e.g., intelligence) and C (e.g., task commitment), then conditions B and C are equally necessary for the manifestation of A. Their interactions with other dispositions and stimulus conditions may be equally important. Contrary to other theories, the FCG proposes that *non-intellective dispositions are not mediators or catalysts*; rather, they are as necessary as intellective dispositions for the manifestation of giftedness. They enter into dynamic interactions with environmental conditions as well as with intellective and other non-intellective dispositions in multiple tracks (see Fig. 21.1), thereby, they constantly adapt to changing stimulus conditions and other dispositions. For example, motivation (Sternberg, 2001) or task commitment (Renzulli, 1978) is as necessary as natural abilities (Gagne,

Picture 21.1 Art by Esref Armagan. (Used by permission of the artist)

2009) for the manifestation of exceptional achievement, depending on the state of corresponding stimulus conditions.

Magnitudes of dispositions in the manifestation of giftedness cannot be precisely estimated though they come in degrees. Manifestations of giftedness result from efficient interactions to which each personal disposition can contribute differentially, but there is always a compensation mechanism for absent or weak dispositional contributions. Dispositions can have veto and compensation qualities. A weak or absent disposition in a person's disposition repertoire required for a specific talent may have a veto power on talent development (Simonton, 2005). Alternatively, depending on domains of giftedness, it can be compensated by a well-developed disposition(s) under an adaptable interaction model. There is a real case supporting this proposition. Esref Armagan, a Turkish artist, was born totally blind. He never saw the world once in his life. However, he still could draw and paint by his fingers using color, three dimensions, perspective, and shadow (see Picture 21.1) based on his touching experience and others' descriptions of environment (E. Armagan, personal communication, March 24, 2009). He developed a unique talent in visual arts though one of the dispositions (seeing) is completely missing from his disposition repertoire. Unquestionably, one cannot refute that seeing is the most essential disposition for talent development in visual arts.

A disposition for giftedness can be stimulated by a multiplicity of quantitatively and qualitatively diverse stimulus conditions. Dispositions of giftedness can be characterized as infinitely multi-track (Fig. 21.1). Multi-track dispositions correspond to more than one pair of stimulus condition and manifestation as opposed to single-track dispositions that correspond to a unique pair of stimulus condition and manifestation (Vetter, 2013). A single disposition for giftedness can be stimulated by an endless number of conditions. For example, a child's interest in sciences may be stimulated by his curiosity about dinosaurs, reptiles, or black holes or being exposed to natural habitats, science books, or a science course, and so forth. Interactions with all these stimulus conditions are multi-track with multiple possibilities for manifestations of giftedness.

Specification of Stimulus-Stimulation Conditions

Environment is a higher-order organization of stimulus conditions, from objects to living organisms, from home to society, from behaviors to opinions, and so on. According to Skinner (1938), a stimulus is simply a part of an environment. Thus, a physical, psychological, social, or economic aspect of an environment having potential to arouse stimulation can be thought as a *potential stimulus*. Nevertheless, an infinite number of stimuli exist in the environment, of which not all have the potential to awake similar stimulations for personal dispositions because a stimulation is rather unique and personal. A stimulating condition for a person may not be an active stimulus for another person. For example, a room full of children's books does not necessarily stimulate reading dispositions of all children or may stimulate curiosity but not reading dispositions. Here, the stimulus loses its supremacy in talent development and "stimulation" becomes a major mechanism in talent development. Then, we should not ask the question "what kind of environment is conducive for giftedness or talent development" but rather ask the question of "how this child is stimulated to engage in talent development." The FCG is concerned with the latter question and offers three propositions regarding stimulations and stimulus conditions.

A stimulation is a personal experience. An active stimulus exists in a stimulation, not in the environment. An environment provides an infinite number of *potential stimuli* (Gibson, 1960), *not yet gained a status for being an active stimulus.* From a talent-development point of view, an object or event in a stimulus condition becomes an active stimulus only if it stimulates at least a disposition of a person. A potential stimulus has the potency to be activated both by active stimuli and by personal dispositions. Nonetheless, a potential stimulus (e.g., books) for a person can become an active stimulus for another person. Then, it is safe to say that a set of stimulus conditions unnecessary but sufficient for a person to initiate the talent-development process may be insufficient but necessary for another person. In line with this view, a search for the richest environment or the richest stimulus conditions makes no sense for talent development; rather, the personal mechanism that instigates stimulations for a person should be explored, or otherwise be constructed.

A stimulus condition is a temporary antecedent of but not causally relevant to the manifestation of giftedness. Stimulus conditions are necessary for the manifestation of giftedness because giftedness becomes manifest in the interaction between person and stimulus conditions. However, there is not a particular set of stimulus conditions causally relevant to giftedness. The same stimulation, not necessarily the same level, can be aroused by a completely different infinite number of stimulus conditions. For example, interest toward basketball can be aroused by watching a live game, by peers, or by just a ball.

Hierarchically organized stimulus conditions have the potency to reinforce talent development. A hierarchy within which stimulus conditions are organized is a kind of a reinforcer that increases the probability that the interaction between personal dispositions and stimulus conditions becomes constant. The same stimulus, not hierarchical, may cause boredom and discontinuity of a particular behavior, such as learning motivation, as in the case of bored gifted students (Gallagher, Harradine, & Coleman, 1997). As a simple example, a child who is satisfied with reading storybooks should begin novels to experience new and more challenging stimulations. However, hierarchical stimulus conditions also may cause boredom if not individually tailored because a hierarchy is also personal. For example, research on cognitive load theories (e.g., see Kalyuga, 2007) has shown substantial interactions between levels of students' task-specific expertise and different instructional methods.

In short, there is a multiplicity of both qualitatively and quantitatively heterogeneous stimulus conditions (Vetter, 2013). A stimulus condition is potent to activate multiple dispositions for the manifestation of giftedness in a successive order, from curiosity to interest and to creativity, and so on. In addition, the relevancy of stimuli to a particular talent will increase the probability of the manifestation of giftedness.

Specification of Interaction

From an interactionist point of view, intelligence exists in the person-situation interaction; they become tuned to one another (Snow, 1994). Giftedness should be sought in the same way in situations. The efficient interaction pointed out in the FCG definition refers to progressive adaptations (Ziegler, 2005) of interactions, as well as dispositions and environment. Efficient interaction may grow into a sufficient condition over time if it brings about a *sustainable reciprocal causation* between person and environment and among personal dispositions, gradually improving existing interactions and environment through self-reproductions of new interactions and environment. The progressive interaction may be achieved if a child (1) selects, (2) shapes, and (3) evokes environment, an organism-environment correlation model proposed by Stanovich (1986) to explain multiplier effects of talent development. If the interaction is not (1) *progressively reproduced* and (2) *adaptively maintained* throughout life, the development of giftedness would decelerate; even trivial circumstances would seriously interfere with person-environment interaction. Consequently, talent never reaches the peak of excellence. The following four propositions characterize the interaction model of the FCG.

Manifestations of giftedness entail higher-order interactions. Giftedness requires interactions (1) between personal dispositions and environmental variables, (2) within personal dispositions, and (3) within environmental variables (Fig. 21.1). Therefore, giftedness is necessarily dependent upon the joint interaction of multiple variables. In a typical higher-order interaction, one or more variables affect the interaction between two or more variables (Abrams, 1983). In some cases, (e.g., giftedness), a joint effect of multiple variables is much greater than the sum of its parts. Viewed from this perspective, environment and intelligence as single variables lose their supremacy in the construction of giftedness because the contribution of these variables to the development of exceptional talents is not additive. Indeed, their interaction effect is also contingent upon the effect of non-intellective dispositions. We all accept that a child with the highest intelligence in the richest environment will not necessarily become a talented adult unless she efficiently interacts with environment to create a multiplicative effect. A multiplicative effect is evident in giftedness research (e.g., Bain & Mee Bell, 2004). What has significance in the construction of giftedness is the mechanism that initiates, maintains, and multiplies interactions between personal dispositions and environmental variables that enter into a tuning process for each other.

Interaction is initiated by non-intellective dispositions (e.g., interest, curiosity, learning motivation) whereas it is mediated and maintained by both intellective and non-intellective dispositions as well as environmental conditions. For example, personal actions are governed by several goals of which enjoyment is the first and then skills necessary for attaining the goal can be developed (Ziegler, 2005). Applied in talent development, a child's curiosity toward speaking initiates a feedback loop between the child and parents, who become responsive upon the child's curiosity for speaking. If the child learns a few words and, upon this learning, shows more enjoyment and interest for speaking, parents would provide more responses, resulting in a feedback loop. In turn, the child will learn more words and sentences and gradually develops better language skills. That is, the child's speaking action is initiated by the child's curiosity and then mediated and maintained by language ability, deeper interest, enjoyment, and parents' actions. Nevertheless, in some cases, an intellectual disposition may activate non-intellectual dispositions to initiate an interaction but we can only speculate on this because we are not able to objectively prove this activation. For example, memory is capable of activating non-intellective dispositions when a toddler sees her caregiver.

The interaction between person and environment requires evolutionary changes for talent development. The efficient interaction requires two types of changes: (1) *focused-diversification* and (2) *advancement* both *in person* and *in environment* just as how the evolution of species involves diversification and advance (Huxley, 1955). Focused-diversification and advancement together through an adaptable interaction with environment have the potential to create "multiplier effects" (Ceci, Barnett, & Kanaya, 2003) in talent development. At the individual level, focused-diversification refers to the increase in learning the number of specialized skills and knowledge necessary for excellence in a domain whereas advancement implies a growth in the upper level of each skill and knowledge. Advancement entails the efficient exploitation of environmental resources and the finest interaction with environment. At the environmental level, focused-diversification involves an increase in the variety of opportunities and resources (mentors, labs, networks, teams, competitions, etc.) in a specific domain in which the person has a focused interest and a special talent. Advancement on the environment refers to the increase in the quality of opportunities and resources. One cannot attain exceptional achievement unless he gradually improves the quality of environment. For example, in order to be a good mathematician, a child may work individually with a math teacher throughout K-12 years, with a mathematician in the university, and with a team of mathematicians during his graduate and postgraduate studies.

The magnitude of interactions in the construction of giftedness cannot be precisely estimated. Each disposition and environmental variable enter into manifold interactions both within- and between-groups. We are not able to identify all the dispositions and environmental variables interacting in the construction of giftedness. There is, probabilistically speaking, an infinite number of interactions within personal dispositions and between environmental variables and personal dispositions. Multiplicity of interactions makes it impossible that the unique contribution of each disposition and of environmental variable to the construction of giftedness cannot be precisely estimated. Thus, one cannot claim that an intellectual disposition, such as intelligence, is more important than other dispositions (e.g., motivation) or than a set of interactions (e.g., deliberate practice, Ericsson & Harwell, 2019) in the construction of giftedness.

Identification Based on FCG

As the FCG situates giftedness in the interaction between personal dispositions and environmental conditions, there exists no necessity for a gift to be identified. In other words, no personal dispositions or any combinations of them have the merit to be recognized as a gift. Thus, the FCG suggests no identification, but selection of those who can develop efficient interactions with environmental conditions. That is, a norm is not the method of identification to be suggested under the FCG model. Rather, the capacity of an education program for gifted students determines the rate of students who will be admitted to a gifted education program. According to the FCG model, the selection of gifted students should be a two-phase process: (1) self-selection and (2) adaptive retention (Sak, 2011a, 2013).

Self-Selection

This phase can be explained by self-selection of environments by students (Scarr, 1997). Students expose themselves differentially to learning environments that fit their individual characteristics, needs, and goals. For example, students who like to play soccer and are good at it prefer to join soccer clubs whereas those who have high ability and learning motivation in mathematics search for the best environment that could nurture their ability and satisfy their learning needs in this subject. This type of preference may be called "self-selection." Because students are aware that an education program for highly able students has rigorous curriculum, mostly those who have learning motivation and keen interest and believe that they have high ability apply for selection. Self-selection plays an important role in the process of selecting students who are disposed to exceptional achievement by (1) allowing any students who have keen interest and learning motivation to apply for gifted education programs, (2) reducing the number of applicants by self-selection, and (3) providing a fit between dispositions and environment (Sak, 2011a, 2013). Being a static phase, selection should be characterized as a *sample-based selection* on measures of *domain-specific abilities*. The formula is very simple: *Select students who are the best among applicants on domain-specific measures*. Yet, the static identification possibly selects the most intelligent, but fails to find the fittest, which is compensated by adaptive retention in the FCG model.

Adaptive Retention

There can always be a misfit between organisms and environment they select. Related to this hypothesis, organisms usually cannot modify themselves as rapidly as environment does; hence, they will fall behind environmental changes (Brooks, 1998). Adaptive retention is capable of correcting this misfit. Some students could select inappropriate learning environments for themselves. These students are likely to experience misfit because their intellectual, motivational, or interest profiles do not fit the learning environment they select. It is highly likely that students who experience a maladaptation in a program leave this environment because they will not survive there. Otherwise, the environment itself excludes these students. Applied in gifted education, if some students previously selected as potentially gifted (disposition principle) do not demonstrate sufficient success, interest, and learning motivation in the program (interaction principle), they eventually drop out of the program or should be advised to do so and be guided to find a better match for themselves (environment principle). This whole process may be called "adaptive retention" in the selection of gifted students. Adaptive retention relies on the manifestation of efficient interactions between person and environment. Compared to conventional identification approaches, selection has several advantages from the FCG point of view.

1. Identification is a diagnosis while selection is a search process of finding the right match. Diagnosis technically has to be free of mistakes so that no error is made in prescription. However, we know that any types of identification in gifted education are far from being perfect due to methodologi-

cal drawbacks (Heller & Schofield, 2008; Lohman & Nicpon, 2012) and vague definitions of the giftedness concept (McBee & Makel, 2019).
2. Identification suffers from the sorites paradox whereas selection is an approximation operating on probability. Thus, identification's scientific validity is yet to be proven.
3. Identification leads to labeling because it produces an absolute truth, existence or non-existence of giftedness. Conversely, selection avoids labeling as it operates on probability of partial existence.
4. Identification as widely used in gifted education overemphasizes on itself, generating like-minded people, like selfish genes (Dawkins, 1976) being worried about its own replications. Selection, in contrast, is selfless being concerned with the diversification of talents.

The FCG is not concerned with a threshold of ability for use in the identification of gifted students. Though it has a practical use, it is of minimal theoretical significance. Rather, person-environment interactions have a great significance for talent development. Additionally, the FCG has no concern with the identification of the smartest, but with the selection of the fittest from a big pool of potentially gifted students. The fittest students demonstrate high levels of intellectual and non-intellectual dispositions and efficiently interact with school learning whereas the smartest students who are not the fittest only demonstrate high levels of intellectual dispositions. Research on underachievement shows that one of the major causes of underachievement among gifted students is their failure to adequately adapt to the learning environment (e.g., Rimm, 2008).

Education Based on FCG

Person-environment interactions for talent development are rather unique and personal; therefore, trait-treatment interaction and expertise-reversal-effect models are ideal educational adaptations for talent development according to the FCG. Nevertheless, gifted education programs that apply a unilateral view of giftedness in educational practices provide the same education for all gifted students, with a purpose to raise academically advanced students. This approach contradicts the commonly accepted opinion in gifted education: one size does not fit all (Borland, 2003). According to the FCG, the major goal of gifted education should be talent development through (1) initiating interactions between person and learning environment and (2) progressively adapting learning environment in accordance with progressive adaptations in personal dispositions.

First, a fit should be built between personal dispositions and learning environment to initiate an effective interaction. The fit can be built based not only on dispositions but also on self-choices for learning. The match between person and stimulus conditions is potent to trigger stimulations for interacting with new stimuli. Trait-treatment interaction models (Berliner & Cahen, 1973) have the potency to initiate effective interactions for talent development because these models take into account not only intelligence but also non-intellective dispositions in adapting education for students.

Second, an adaptation of environment (e.g., instructions) should be progressive so that stimulus conditions become constantly stimulating for efficient interactions between personal dispositions and stimulus conditions. Progressive adaptations can be achieved using expertise-reversal-effect models (Kalyuga, 2007) through applying two curriculum differentiation approaches in gifted education: (1) acceleration (Colangelo, Assouline, & Marron, 2013; Rogers, 2019) and (2) content enrichment (Maker & Schiever, 2010). Two principles apply in the operation of progressive adaptations of stimulus conditions: (1) precedence of adaptations and (2) level of adaptations.

The first principle to consider is that progressive adaptations of environment should be synchronized with adaptations in personal dispositions in that environmental adaptations should precede corresponding adaptations of dispositions. The reverse inhibits adaptations of dispositions. The second principle is that environmental adaptations following adaptations in dispositions should be advanced enough to cultivate the interaction. As a simple example, as soon as a child learns addition with two digits, addition with three digits should be started, a content acceleration approach as an in-time progressive adaptation of stimulus conditions. Otherwise, in the case of a "delayed adaptation," the curious child possibly will lose her interest toward learning mathematics due to replications of the same simple stimulus conditions, similar to producing *replicators* from an evolutionary point of view (Dawkins, 1982), that lack diversity, which may cause the loss of curiosity; thereby the interaction between curiosity and interest gets inhibited. The inhibition can be wiped off and the interaction can be reinitiated by changing stimulus conditions, similar to *interactors* as causers of evolutionary change (Hull, 1980), through an individually adapted content enrichment at different units and levels of selection, whereby the child rebuilds interest and reinitiates the interaction with environment.

Conclusions

Giftedness is like a diffuse nebula having no well-defined boundaries. No theories, without limits, can exhaustively explicate such a nebulous concept. In line with this limitation, the FCG is valid under certain boundary conditions. As long as the interaction between person and environment is adaptively and progressively reproduced throughout life, one will attain giftedness or maintain the current status of or optimize giftedness. One cannot estimate the level or quality of interaction required for the continuation or optimization of giftedness. More importantly, it is difficult to precisely estimate the magnitude of dispositions, stimulus conditions, interactions, and their manifestations though they all are ordered on a continuous scale of degree in space. A child with greater intelligence in the richest environment cannot be predicted to develop a great talent as long as an efficient interaction between this child and her environment comes into play. Nevertheless, the level of efficiency of the interaction required for exceptional achievement is vague. It can only be assumed that the interaction is efficient when a person attains exceptional achievement. At the moment, we can only make a fuzzy speculation that the optimum interaction leads to optimum talent development, even in poor but stimulating environments. (It is no coincidence that Brazil produces more football talents than any other countries.) Optimum interaction is maintained through reproductions of progressively adaptive interactions. Therefore, according to the FCG, identification and education for talent development should be strictly based on interaction models.

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22

Giftedness, Talent, and Genius: Untangling Conceptual Confusions

Dean Keith Simonton

Strictly speaking, the bulk of my research over the past 40-plus years has been devoted to understanding historic genius in its two main forms, outstanding creativity and exceptional leadership. That interest has inadvertently caused me to encroach on the two concepts that are the subject of this volume: giftedness and talent. One conclusion became clear, namely, that conceptions of giftedness, talent, and genius often overlap, an overlap that sometimes renders the terms virtually interchangeable.

This convergence is certainly apparent in dictionary definitions. Take the online *American Heritage Dictionary* for some illustrations (ahdictionary.com). A search for the noun "giftedness" is redirected toward the adjective "gifted," which means "endowed with great natural ability, intelligence, or talent" or "revealing special talent." Searching for "talent" immediately yields "a marked innate ability, as for artistic accomplishment" and "natural endowment or ability of a superior quality." Finally, a "genius" search leads us to "extraordinary intellectual and creative power," "a person of extraordinary intellect and talent," "a person who has an exceptionally high intelligence quotient, typically above 140," and, lastly, "a strong natural talent, aptitude, or inclination." All three concepts entail "intellect" in some way, with no mention of personality or motivation. All suggest as well that this cognitive

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capacity or ability be "endowed," "innate," or "natural." Moreover, all three stipulate that these attributes be "extraordinary," "exceptional," "superior," or "great."

Scientists who have made a name for themselves by investigating giftedness, talent, and/or genius display a similar tendency to treat the three terms as near synonyms. Francis Galton's (1869) book is well-known as the first scientific monograph specifically devoted to "genius," yet this classic contribution was preceded by an article with the title that substituted "hereditary talent" for "hereditary genius" (Galton, 1865). The 1869 volume also includes domains of achievement that many today might consider forms of talent rather than genius per se, such as the competitive sports of wrestling and rowing. Much later, Lewis M. Terman launched an epochal longitudinal investigation whose five volumes were published under the series title *Genetic Studies of Genius* (Terman, 1925–1959). Even so, four out of those five volumes use the term "gifted" rather than "genius" in their titles, and the one exception involved a retrospective study of 301 actual geniuses (Cox, 1926). I don't want to imply that nobody ever tries to make distinctions among the three concepts. It's just evident that any such distinctions are very fluid and not universally accepted. And, in any case, the three concepts are still confused today.

Hence, my primary goal in this chapter is to disentangle these concepts. Once I do so, the next task is to consider the practical implications of the proposed conceptions.

Three Separate Concepts

My definitional endeavors begin with the concepts placed in the same order as this chapter's title: giftedness, talent, and genius. As will eventually become apparent, this order is by no means arbitrary.

Giftedness

To put myself on the firmest ground possible, I am going to begin by adopting unaltered the definition put forward on the official website of the National Association for Gifted Children (NAGC). I'm operating under the assumption that these professionals certainly know what they're talking about. Fortunately, the NAGC assigns a whole webpage to the question "What is giftedness?" (http://www.nagc.org/resources-publications/resources/what-giftedness).

They start by saying, "children are gifted when their ability is significantly above the norm for their age," to which they add "giftedness may manifest in one or more domains such as; intellectual, creative, artistic, leadership, or in a specific academic field such as language arts, mathematics or science." Hence, gifted involves an ability that's well above average with respect to a specific domain of achievement, academic or otherwise. Naturally, this raises the issue of how far above the norm a child's ability has to be to count as gifted. To answer, the site says, "Many consider children who are in the top 10 percent in relation to a national and/or local norm to be a good guide for identification and services." Needless to say, the 10% demarcation is somewhat arbitrary. Others may select another cutoff. Terman (1925–1956), for instance, defined his intellectually gifted children as scoring in the top 1% on the Stanford-Binet IQ scale—a point that we'll return to when we discuss genius.

Note that giftedness is an attribute that is assigned to children, which is usually broadly interpreted as encompassing adolescents (aka "minors"). However, it apparently makes somewhat less sense to call an adult "gifted." Once Terman's (1925–1956) children grew up, for instance, he referred to them as the "gifted group" rather than gifted adults. Hence, this age restriction will be continued here. Part of the reason for this decision is simply that it's often more difficult to determine the "norms" in the case of adults. Another critical stipulation is that giftedness entails a domain-specific ability rather than an interest or a value. A child is not viewed as gifted if they exhibit an intense interest in music but that interest does not translate into a corresponding exceptional skill in performance or composition. Similarly, a child may highly value a domain without displaying a gift. An example would be a youth who agrees that math is important for becoming a theoretical physicist, but just lacks either the ability or the interest to do the requisite problem sets for superior performance on exams.

Observe that the NAGC definition contains an implicit assumption that will also prove tacit in the other two conceptions: The gifted child is well above some norm in a domain that is culturally valued, like art, science, leadership, or sports. Thus, shoplifting or bullying is not considered a form of giftedness. Admittedly, it's sometimes difficult to draw the line between what is and what is not valued in a given culture or subculture. Many legitimate domains of achievement today were not considered so when they first emerged, such as rap music or video gaming. In addition, more recent additions to the list of valued domains will often pass through a transition phase before standards are sufficiently well developed that giftedness can even be consensually assessed. That standardization frequently takes the form of explicit scoring procedures, such as when a novel domain like snowboarding became an Olympic sport.

One final observation must be made because it imposes a qualification on NAGC's definition: giftedness is a matter of degree rather than kind. Instead of specifying a cutoff, like the top 10%, we can just as well just state a child's percentile placement on the domain standards. At the extreme upper level are the prodigies who are already performing at professional levels while still children. Yet even if musical prodigies seldom attain the status of adult virtuosi, children's norms no longer apply. For instance, Mozart's keyboard virtuosity at eight years old objectively surpassed that of his father, a professional musician who had originally taught his son to play (Barrington, 1770). This idea will also be returned to when we get to genius.

Talent

The NAGC conception of giftedness completely omits a consideration that seems so crucial in the dictionary definition: the gift does not have to be "endowed," "innate," or "natural." The exceptional domain-specific ability can apparently come from any source. Accordingly, the anonymous authors make no commitment to the notorious "nature-nurture" issue that Galton (1874) first introduced into the study of genius and eminence. Giftedness can be born or made, or some combination of the two—most likely the combination. This omission is critical because giftedness is associated with many environmental factors that cannot easily have some genetic basis. Indeed, despite Galton's (1869) strong preference for genetic explanations, he was the first investigator to examine birth order, a patently non-genetic influence. Firstborns are not conceived with superior genes relative to their later-born siblings, yet they still tend to be over-represented in certain achievement domains, such as the sciences (Simonton, 2002). Those born first must simply experience different home environments than those born later in the same family.

Given that giftedness is thus a function of both nature and nurture, we need another concept to focus on nature—those influences that are already present at the time of birth. I will recruit *talent* to have that exclusive function. Although nature can encompass more than one factor—such as prenatal intrauterine conditions—I will here simplify matters by concentrating on genetic inheritance, that is, on the genes received from both parents in some combination at conception. Granting that emphasis, I now must define what I mean by "talent." To do that, it's first necessary to delve into a developmental factor that entails nurture rather than nature. That factor is domain-specific expertise (cf. Olszewski-Kubilius, Subotnik, & Worrell, 2017).

It is difficult, if not impossible, to imagine a culturally valued domain of achievement that doesn't require the acquisition of a considerable body of corresponding knowledge and skills (Hambrick, Campitelli, & Macnamara, 2018). That requirement certainly applies to the various arts, sciences, sports, and games, such as chess. Not surprisingly, the mastery of this domain-specific expertise cannot be attained overnight, but it rather demands a long period of learning and practice. The length of this period is often described by the "10-year rule" (Ericsson & Pool, 2016) or, alternatively, the "10,000 hours rule" (Gladwell, 2008). Yet the term "rule" is a misnomer. The numbers actually only represent very rough averages. Some youths need much more time, and others need much less, before they reach the level of world-class domain-specific expertise. Accelerated acquisition has been called the "better faster" effect (Simonton, 2014, 2017). Furthermore, another qualification must be imposed, namely, what has been called the "more bang for the buck" effect (Simonton, 2014, 2017). Given two persons who seem to have acquired the same level of domain-specific expertise, one can still perform at much higher levels than the other. This difference can happen because there's more to high achievement than expertise alone (Macnamara, Hambrick, & Oswald, 2014). Depending on the particular achievement domain, these additional factors can include various cognitive abilities, personality traits, interests, and even values. For example, the openness to experience factor of the Big Five Personality Model is a strong predictor of performance in creative domains (McCrae & Greenberg, 2014).

At this point, it becomes essential to recognize that almost all variables on which people can vary, whether cognitive or dispositional, feature a conspicuous genetic contribution (Plomin, DeFries, Knopik, & Neiderhiser, 2016). For instance, the heritability of openness to experience exceeds 50% (McCrae & Greenberg, 2014). That automatically implies that a portion of the "better faster" and "more bang for the buck" effects may be ascribed to genetic endowment (Simonton, 2014, 2017). This portion then defines an individual's *talent* for a given domain. Again, depending on the particular domain of achievement, these genetic influences may account for a significant proportion of the variation in acquisition and performance (e.g., Simonton, 2008). Because these genetic contributions are very numerous and because the particular set of contributions vary from person to person even within the same domain, we cannot legitimately claim that two talents are talented in the same way (Simonton, 1999). For example, one individual's talent may lean more heavily on openness to experience, whereas another's might rely more strongly on conscientiousness, another Big Five factor with an appreciable genetic contribution (nearly 50%; Bouchard, 2004). In fact, the contributions of various genetic effects may shift over time (Simonton, 1999). Thus, in creative domains, conscientiousness can prove more important during acquisition of expertise, whereas openness can become more critical during actual performance. In physics, you have to do your problem sets before you get to the point that you can come up with creative ideas that cannot be found in your old, dusty textbooks.

The net result is that *talent* becomes a highly individualized and dynamic phenomenon that provides the "nature" side of giftedness. "Nurture" then provides the rest.

Genius

Earlier I noted that one dictionary definition of genius stipulated a high IQ score, and even specified an IQ of 140 or higher. Where did that seemingly arbitrary number come from? Actually, that happens to have been the score obtained by those children who scored approximately in the top 1% on an early version of the Stanford-Binet Intelligence Scale. That was the criterion that Terman (1925–1959) used to determine whether a boy or girl could be considered intellectually gifted, and even score high enough to count as a bona fide genius. Not too often does a psychologist exert an impact on a standard dictionary of the English language! That granted, that impact was simply unjustified by the scientific evidence. The problem was twofold.

On the one hand, very few if any of his intellectually gifted children grew up to become world-recognized geniuses by criteria other than a score on his IQ test (Duggan & Friedman, 2014). Instead, the best of them grew up to become highly successful professionals, like doctors, lawyers, and professors. Even worse, some of the children who did not score high enough to enter Terman's longitudinal sample ended up achieving higher acclaim than those who did. For example, two such IQ rejects ended up receiving Nobel Prizes for Physics. Yet, nobody in his gifted group received a Nobel Prize in any category, physics or otherwise (Simonton, 2016). Wouldn't the laureates enjoy a stronger claim to have exhibited genius?

On the other hand, the second volume of *Genetic Studies of Genius*—the one that retrospectively estimated IQ scores for 301 highly eminent creators and leaders—did not always find that such geniuses featured superlative IQ scores (Cox, 1926). To offer some striking examples, the following did not claim childhood IQs sufficient to satisfy Terman's criterion: Isaac Newton, Charles Darwin, Antoine Laurent Lavoisier, Jean Jacques Rousseau, Miguel de Cervantes, Rembrandt van Rijn, Ludwig van Beethoven, Napoleon Bonaparte, Abraham Lincoln, and Alexander Hamilton, just to name a handful. Worse yet, the correlation between the estimated childhood IQ and adulthood achieved eminence, while positive, was far too small for the two concepts to be considered conceptually equivalent (Cox, 1926; see also Simonton, 1976; Simonton & Song, 2009). Too many exceptions occurred either way.

Consequently, it's really necessary to define genius independently of an IQ score. For instance, Galton (1869) long ago argued that the concept must be defined by "the opinion of contemporaries, revised by posterity" that establishes the widespread reputation "of a leader of opinion, of an originator, of a man to whom the world deliberately acknowledges itself largely indebted" (p. 37). Put differently, geniuses achieve eminence in a culturally valued domain, especially a domain requiring either creativity or leadership.

Interestingly, an earlier version of the *American Heritage Dictionary* included a definition of genius that, for some unknown reason, didn't make it into the online edition: "Native intellectual power of an exalted type, such as is attributed to those who are esteemed greatest in any department of art, speculation, or practice; instinctive and extraordinary capacity for imaginative creation, original thought, invention, or discovery" (*American Heritage electronic dictionary*, 1992). Notice that the initial phrase appears to incorporate talent as part of the definition, perhaps even implying a "more bang for the buck" effect. Even so, that part of the genius definition is only a subjective attribution rather than an objectively assessed attribute. As a result, the deletion of that phrase would allow us to more clearly separate "genius" from "talent." After all, some historic geniuses might be more made than born. Notice as well that "genius" is implicitly distinguishable from "giftedness" because the definition of the former assumes that Galton's (1869) definition applies. Genius entails adulthood achieved eminence rather than childhood elevated performance with respect to some established norms in a culturally valued domain. Indeed, the notion that geniuses exhibit originality suggests that they are very much *sui generis*. The greatest creators and leaders make their own standards to be judged by. To modify slightly a famous quotation from Arthur Schopenhauer, "[Giftedness] hits a target no one else can hit; Genius hits a target no one else can see."

Practical Implications

The three definitions presented above have some useful repercussions. These are concisely summarized in Table 22.1. Let me now walk my readers through the rows.

High IQ Required?

Performance on an IQ test, or even a retrospective IQ estimate, has a variable connection with the three concepts. In the case of giftedness, a high IQ would prove most relevant when giftedness is defined as a score at some high percentile, such as the 1% criterion used by Terman (1925–1959). Yet in light of the research conducted since then, performance on an IQ test need not provide the only criterion. A case in point is those attempts to define other intelligences that are not very compatible with the analytical abilities emphasized on such tests (e.g., Gardner, 1983; Sternberg, 2004). Indeed, giftedness can be assessed without using any psychometric instrument whatsoever, as is the case in artistic and athletic giftedness. Often competitions provide the basis for picking out the most gifted.

With respect to talent, the role of high IQ, or rather a high level of general intelligence, would have the most relevance for those domains where it would either accelerate expertise acquisition ("better faster") or enhance eventual performance ("more bang for the buck"). That relevance ensues from the high heritability of general intelligence (Bouchard, 2004). Thus, scientific talent probably incorporates general intelligence in its profile of genetic contributions (Simonton, 2008).

By the same token, it is evident that the role of IQ in genius will depend on the domain. This implication was clear from the retrospective inquiry into

Table 22.1 Contrasts among the three concepts on five criteria

Criterion	Giftedness	Talent	Genius
High IQ required?	Only if intellectual	Depends on domain	Depends on domain
Nature or nurture?	Implicitly both	Explicitly nature	Implicitly both
Place in life span?	Childhood/ adolescence	Entire life span	Adulthood
Identification?	If standardized norms	Rather difficult today	Best if posthumously
Intervention?	Education and training	Impractical/ unethical	Very difficult

301 geniuses (Cox, 1926). Not only did eminent creators exhibit higher estimated IQs than eminent leaders (Simonton, 1976), but also creators in more scientific and philosophical domains exhibited higher estimated IQs than those in more artistic domains (Simonton & Song, 2009). General intelligence likely has variable relevance across domains.

Nature or Nurture?

As already noted, the NAGC definition makes no explicit connection between giftedness and either nature or nurture. Implicitly, that might indicate that both developmental factors are involved. In stark contrast, the concept of talent quite explicitly places emphasis on nature. Any involvement of nurture then becomes part of giftedness, which already allows for both influences. The concept of genius operates in much the same way as giftedness, albeit sometimes people like to associate genius with nature—with genius being born rather than made. That was Galton's (1869) original position, but it would be hard to find a credible advocate today. Indeed, given all of the political, economic, cultural, and societal factors that affect the emergence and manifestations of historic creators and leaders, it's reasonable to assume that the environment plays an even bigger part (Simonton, 2019). The forces that produced the Golden Age of Greece or the Italian Renaissance were surely more potent than even the most effective gifted education program. These forces included liberation from foreign oppression, fragmentation into city-states, increased wealth, population growth, and urbanization, plus the active patronage of major political figures.

Place in Life Span?

The three concepts certainly apply to different phases of a person's life span. Giftedness, as said earlier, is confined to childhood and adolescence. By comparison, genius belongs to adulthood, albeit for some highly precocious youths adulthood might be said to start early. Becoming an adult is a matter of maturity rather than chronological age. Even so, even a modified version of the ten-year rule mentioned earlier would usually prevent adolescence from encroaching too deeply on adulthood.

The most interesting concept respecting this criterion is talent. Essentially, talent can operate throughout the life span. That possibility arises because genetic contributions function from birth until death. In fact, the heritability of some abilities, such as general intelligence, actually increases with age (Plomin et al., 2016). The only complication here is that the specifics of the genetic influences can shift during successive developmental periods (Simonton, 1999). Previously, I gave the example of conscientiousness proving more important during expertise acquisition but openness becoming more significant during creative performance.

Identification?

How are giftedness, talent, and genius identified in the first place? I think the NAGC people did an adequate job of addressing that question on their website. If norms have already been standardized for a particular type of giftedness, then it's already straightforward. It's only when standards are vague or even nonexistent that identification becomes a problem. But in that case, there's nothing wrong with admitting that giftedness is hard to identify in that given area. To illustrate, anyone want to try to set the norms for determining "spiritual" giftedness without risking the introduction of any religious bias? Norms that treat, say, Hindu, Buddhist, and the three main Abrahamic religions in just proportion? Good luck!

The identification of talent is far more difficult according to our current knowledge. Although behavior geneticists have made major advances in understanding the bases for various human traits, they are nowhere close to being able to conducting a DNA analysis to detect where a person's talents might lie, if any talents exist at all. Even identifying the genetic basis of general intelligence is not an easy task (e.g., Plomin & Spinath, 2004). It doesn't help matters that the genetics underlying talent is much more complex than most people realize (Johnson & Bouchard, 2014; Simonton, 1999). Even then, the best that we might expect is the estimation of probabilities that provide tentative identification of those domains that might hold the most promise.

Identifying genius is perhaps the easiest. I say that because people have been identifying geniuses for centuries, even millennia. For example, the historians of ancient Rome were quite willing to pick out those figures of the Athenian Golden Age who could fall into this category—such as the great philosophers, dramatists, and artists who we still admire today.

Intervention?

Admittedly, the earlier implications vary greatly in "practicality." That said, no implication is more practical than what concerns intervention. What can we do to augment the amount of giftedness, talent, and genius—assuming these are all considered personal and social goods? The response is the most direct with respect to giftedness because we already have lots of research and applications devoted to this very issue (Wallace, Sisk, & Senior, 2019). I will not even attempt to review that vast literature here.

Talent presents a deeper problem. Galton (1869) believed that this was an easy nut to crack, for he had no qualms about advocating eugenics, a term for a program that he actually coined. We do not have to narrate all of the unethical, even tragic, applications of that idea. It has deservedly become a bad word. But worse than that, if possible, is the fact that it's not even practical. Besides not knowing enough about the behavior genetics of talent, as already stated, the magnitude of intervention required is out of step with the feasible. One especially provocative illustration comes from the "Nobel prize sperm kids" (Plotz, 2005). Allowing bright women to impregnate themselves with the genes of Nobel laureates was a colossal failure: not a single genius emerged from the artificial couplings. Even if scaled up by many orders of magnitude, the practical consequence would have been minimal. Human inheritance is just too complicated for talent to be bred like cows.

Last, we get to the question of intervening to produce more geniuses. Given what was said earlier about how such geniuses are contingent on a host of sociocultural forces—a propitious Zeitgeist, to use the German word for "spirit of the times"—it would seem a hopeless task. The required resources and power would just be too great. Nevertheless, from time to time, some great leaders manage to become active patrons of a florescence. Historic examples include Pericles in the Golden Age of Athens, the Caliph Harun al-Rashid in the Islamic Golden Age, and the Medici banking family in Renaissance Florence.

Conclusion

I've made the three concepts of giftedness, talent, and genius as distinct as possible, while at the same time trying to make them collectively incorporate all of the phenomena that they purport to cover. Yet I should point out that not all researchers would slice the semantic pie how I did. For instance, Gagné

(2005) defines giftedness and talent almost the exact opposite the way done here. For him, gifts are genetic and then environmental factors combined with that endowment generate talent. Nonetheless, the conceptions advanced in this chapter feature two assets. First, the conception of talent follows a long tradition of scientific inquiry extending all the way back to Galton (1865), a tradition elaborated by the current author for the past two decades (e.g., Simonton, 1999, 2008, 2014). Second, the conception of giftedness agrees with that expressed by NAGC and thereby doesn't require workers in this field to undergo any conceptual retooling.

Whether my endeavor to untangle these concepts succeeds depends on future developments in research and practice. It's now out of my hands, but I have hopes.

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23

A New Model of Giftedness Emphasizing Active Concerned Citizenship and Ethical Leadership That Can Make a Positive, Meaningful, and Potentially Enduring Difference to the World

Robert J. Sternberg

When we moved to Boston, my wife and I—we did not yet have our triplets—decided we should get the best medical care possible. So, we enrolled for our medical care at one of the most prestigious hospitals in Boston, and maybe in the world. Most of our visits were routine and it probably would not have made much difference where we went. Then, one day, something strange happened. While sitting in my office, I became dizzy. I reached a point where I could no longer stay sitting on my chair. I lay down.

The dizziness lasted for several days. I went to the prestigious hospital and had a series of tests. The tests were inconclusive. The doctors were unable to figure out what was wrong and prescribed some anti-dizziness medication which, however, made me so sleepy that I could not use it during the day. I went to a second prestigious hospital in the Boston area, which also was unable to diagnose the problem. In about a week, the dizziness vanished, but it was left undiagnosed.

Years later, I was in my office in Ithaca, New York, when I had a recurrence. It was not as bad as the first time, but it definitely seemed like a recurrence. I

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made an appointment at a hospital in Rochester, a very good one, but certainly one that was not nearly as famous as the two in Boston. I went into the doctor's office. The doctor told me within a few minutes what was wrong and what to do about it. Basically, I was having a recurrence of chickenpox virus that was attacking my inner ear and thus my balance. He told me to get the new shingles shot and take a particular anti-viral medication if the problem recurred. I also started taking ginger, which has some effect against dizziness. Since then, I have had no recurrences.

The doctors in Boston, with the most prestigious medical degrees possible and with affiliations at the most world-renowned hospitals imaginable, certainly were good, indeed excellent, at many things. One of those things was not diagnosing my condition. We went back to the same Boston hospitals multiple times, with similar results. Eventually, we switched to a less prestigious hospital with more patient-oriented doctors—these Boston doctors in the prestigious hospitals, whatever their skills, were not high in *practical giftedness,* or in particular, patient-oriented giftedness, and so I waited a number of years before I was properly treated.

One might think that anecdotal information such as this provides little data. But if one examines the work of academics in a variety of fields, the result is not much different. Milton Friedman of the University of Chicago won the Nobel Prize in Economics. How has his free-market-oriented economics worked out for the United States and other countries, where the distribution of wealth today is the most uneven it has been since the Gilded Age (Sommeiler & Price, 2018)? The mean net worth of the top 1% in the United States in 2013 was $18,623,400; the mean net worth of the bottom 40% was –$10,800 (Domhoff, 2017). The difference has only grown greatly under the economic policies of the Trump administration.

My goal here is not to tick off case after case in which academics or other distinguished individuals have won plaudits and awards for bad ideas (did I mention that Antonio Egas Moniz won the Nobel Prize for his development of prefrontal lobotomies, used on supposedly "insane" people and thereby rendering them severely mentally crippled for life?). Rather, it is merely to point out that our notions of giftedness have been unfortunately, and ridiculously, skewed toward rewarding individuals who are academically gifted, in one way or another, but whose ideas do not translate, or else translate badly, into everyday practice.

Motivation for a New Conception of Giftedness

At some point, society needs to take some responsibility for identifying children (or adults) as gifted for skills that, in whatever way they may be meritorious, are, at best, indifferent with respect to their societal outcomes, and at worst, harmful (Sternberg, 2017a, 2018). Is there some kind of urgency today as opposed to, say, 10, 20, or 30 years ago, or at the time of the Terman et al. (1947) studies of giftedness? I believe there is a new urgency today.

What has changed is that humans have placed the world at a level of peril that threatens to wipe out not only the more than one million species that are at risk or that humans already have wiped out (Resnick, 2019). It is that the million-and-first species may well be humans themselves. At the time I am writing this article, a hurricane, Dorian, is pounding the Bahamas and moving toward the United States. It is the hardest storm, a Category 5, ever to hit land in the Atlantic region (LePage, 2019b). Weather-related records have become a regular occurrence, and unfortunately, the records are all bad. They include powerful hurricanes, unprecedented wildfires, tornadoes, typhoons, and simple global warming, making temperatures in some localities unbearably warm. Fires are destroying major parts of California and Oregon. Meanwhile, ocean ice is melting at rates that are unprecedented, at least in the modern era, leading to historic flooding. More and more coastal regions are becoming flooded and with little hope of full and permanent recovery (Union of Concerned Scientists, n.d.).

If one looks at world problems, they seem to defy solution by the kinds of limited skills that are measured by traditional measures used to identify the gifted. The world problems are not multiple-choice, but they rather are based largely on life experience rather than academic knowledge; they are emotionally fraught rather than emotionally sterile, and the consequences of errors are very substantial. Consider just ten of these problems and how “gifted” or near-gifted individuals have contributed to them. Due to space limitations, I provide very brief descriptions of the problems and address only one or two of the causes and consequences of each instead of exploring them in depth and detail.

- *Global climate change.* Global climate change results, in part, from human-created machinery that generates hydrocarbons—industrial machinery, automotive vehicles, increasing use of fossil fuels (World Meteorological Organization, 2019). It took great innovativeness to create all this machinery, but that same machinery is creating climate change that threatens the kind of lives our children and grandchildren will be able to live. Gifted individuals in positions of power either have done nothing to improve things or, as in the United States under the current administration, are actively and self-consciously making them worse, sacrificing the long-term future of civilization for short-term gains for limited numbers of people already benefiting from the existing system.

- *Air pollution.* Air pollution benefits no one. But it is expensive to control pollutants emitted by factories, automobiles, buses, and other sources. The machinery is of brilliant design; the pollution it emits, less so. The current government in the United States is actively loosening regulations, again to profit those who already have profited extremely well from the system. Many executives, lobbyists, politicians, and others are cleverly seeking to loosen regulations that, in the long run, are all that protect us. Meanwhile, millions of people become sick or die from pollutants in the air (LePage, 2019a).
- *Water pollution.* Water pollution has become extremely serious, partly because of industrial run-off, but also because of various forms of plastics that end up in the sea and then take an extremely long time to decompose (Denchak, 2018). The plastics were an ingenious invention, but they have turned on us.
- *Bacterial resistance to antibiotic drugs.* Antibiotics were also ingenious inventions of highly educated, gifted scientists. But then there are those in the medical profession who have overprescribed them to humans, those in agricultural industry who have carelessly prescribed them in large quantities to nonhuman animals, and those who have taken them even when they knew they did not need them. The upshot is that the world is in danger of returning to the times where what once would have been a minor infection will be enough to seriously damage or even kill people (Ventola, 2015).
- *Rise of illiberal governments and the surveillance state.* Throughout the world, illiberal governments are replacing governments that provide freedom to all but at the same time protect the rights of minorities. Just a few of the countries that recently have elected potentially or actualized illiberal governments are Hungary, Brazil, China, Poland, Turkey, possibly the UK, and certainly the United States. With the election of such governments also have come staggering levels of corruption (Cole, 2019) and the rise of surveillance states, as in China, where the level of surveillance, especially in the Xinjiang territory, has reached an unprecedented level. It takes staggering levels of cleverness to develop more and more subtle means of infiltrating people's private lives. But the cost is that people's private lives, regardless of their wishes, are becoming more and more subject to public scrutiny.

Democracy today is in decline in many parts of the world (Mounck, 2018)—authoritarian leaders are successfully finding ways that encourage people to bypass critical thinking. At the same time, as Mounck points out, personal responsibility for decisions and their consequences seems to be falling as well.

- *Diminishing life spans caused, in part, by addiction and other poor health habits.* According to a governmental report, average lifespan decreased for the second time in a row in 2017, a startling reversal of a trend toward increasing lifespans (PBS, 2018). The main reason has been an increase in the use of addictive drugs, leading to overdoses, in many cases accidental and possibly, in some cases, purposeful. The development of opioid drugs was brilliant, in a sense; the aftermath has been anything but.
- *Resurgence of measles and other infectious diseases due to pseudo-scientific claims about the dangers of vaccines.* Measles was classified as eradicated in the United States in the year 2000. But, as of April 24, the Centers for Disease Control and Prevention reported for 2019 a total of 695 cases of measles in 22 states (CDC, 2019). Clearly, the disease is not "eradicated" and the United States may well be declassified, given such a resurgence. The resurgence is largely due to the "anti-vaxxer" movement, which feeds on misinformation, bad science, and hysteria. If people are willing to believe silly, groundless misinformation about vaccines, what other nonsense are they willing to believe? One would be inclined to believe anti-vaxxers are among the least educated and affluent in society and yet the opposite is true (Keneally, 2019).
- *Nuclear weapons.* Nuclear-weapons treaties, or at least some of them, are falling apart (Reif, 2018). Given the proliferation of nuclear weapons not only among the so-called superpowers (e.g., the United States, Russia, China), but also among not so superpowers (e.g., Israel, India, Pakistan), the danger to civilization is enormous, to the point that the Union of Concerned Scientists has pointed its clock at two minutes to midnight. These weapons were developed and have been improved upon by "gifted" scientists and technical experts who need very extensive knowledge about nuclear explosives. Indeed, J. Robert Oppenheimer was a brilliant scientist. He invented the first atomic bomb. He later called for controls, but by then, it was too late (Little, 2018).
- *Terrorism resulting from extremism.* Terror attacks occur with varying frequencies in different parts of the world but they are a threat almost everywhere in the United States (CNN, 2019) and elsewhere.
- *Poverty and income disparity.* Getting into a top college or university requires, for most students, a high level of academic brilliance. And receiv-

> ing a degree from a top college or university is worth a lot of money. According to one report, the private universities whose degrees later translate into the most cash comprise a hardly surprising list. The top five are Stanford, Princeton, University of Chicago, California Institute of Technology, and Harvard (Hess, 2019). But the result, as mentioned above, is startling and historic levels of income inequality, resulting in huge gaps in income between the well-off and the poor. There are many causes of these gaps, including lack of financial and other kinds of regulations. The risk is that such wealth gaps, eventually, lead to social unrest and worse (Archer, 2013).

We typically assess giftedness, or at least, intellectual giftedness, by measures of IQ and proxies for IQ tests, such as ACTs, SATs, SSATs, LSATs, and the like. These tests all measure roughly the same set of skills, sometimes referred to as comprising "general intelligence" (Sackett, Shewach, & Dahlke, 2020). The problem is that, for all the good things high IQ has brought us, such as ubiquitous cellphones, it also has brought us a host of problems, such as the teen unhappiness, depression, and suicide resulting from cell-phone use (Twenge, 2017).

The traditional definition of giftedness emphasizes general-intellectual potential. But intellectual potential can be put to good or bad uses, and in the world today, there are just too many examples of bad uses. Another option for society is to assess giftedness in terms of an individual's potential to make a positive, meaningful, and enduring difference to the world, at some level (Sternberg, 2017a). IQ may assess a person's potential to make a difference—to their own life. But at this point, the world needs something more—actually, much more.

The world needs not only general intelligence, but also *adaptive intelligence,* which is intelligence that promotes species adaptation to the environment (Sternberg, 2019, in press)). It is intelligence that is used for good ends, not only for oneself, but for all of humanity and even of other species as well.

The dinosaurs, as a species, lasted roughly 165 million years. What are the chances that *Homo sapiens* will last the 165 million years or even anything close to that? In contrast, *Homo sapiens* have been present for roughly 200,000 years. Their high IQs have been used for many positive purposes, but also to foul the environment and create species-harmful conditions such that it is truly questionable whether the world will remain fully habitable for the human species throughout the life spans of our children, grandchildren, and great-grandchildren.

Ironically, during the twentieth century, IQs increased roughly 30 IQ points (Flynn, 1984, 1987). Yet, today we are besieged by climate-change surprises—melting ice and rising sea levels; hurricanes, tornadoes and other severe storms; and unbearably high and life-threatening temperatures. We cannot say for sure what all the origins of any one storm are, but the preponderance of the evidence is that climate change has been exacerbated by human influence, and especially by those gifted people who created the innovations that later came back to exact their revenge. With humanity's future at stake, can we really go on mindlessly doing what so-called experts a century ago did when they thought that somehow, IQ tests would provide the best way to identify the gifted? We should have asked then, as we must ask now, "gifted for what"?

Proposed Conception of Giftedness

I have proposed that a set of skills is needed in order to make a positive, meaningful, and potentially enduring difference to the world. These skills include creative, analytical, practical, and wisdom-based thought and action (Sternberg, 2017a, 2019, 2020), and together, they potentially produce active, concerned citizens and ethical leaders (with the acronym, ACCEL) who can make a positive, meaningful, and potentially enduring difference to the world, at some level. Creative skills are involved in generating novel ideas that are potentially useful in some way. Analytical skills are involved in determining whether the ideas are good and viable ones. Practical skills are involved in putting the ideas into practice and then persuading other people of the value and utility of the ideas. And wisdom-based skills are involved when one seeks to use one's creative, analytical, and practical skills for the attainment of a common good, balancing one's own with others' and with larger interests, over the long- and short-terms, through the infusion of positive ethical values (Sternberg, 2003b). Consider each of analytical, creative, practical, and wisdom-based skills in turn.

Analytical Skills

Gifted students are selected primarily on the basis of their analytical skills. These are the skills tested by IQ tests and their proxies. And such skills are important for success in school and later in life (Deary, Whalley, & Starr, 2008). The problem is that such skills are only weakly related to other skills that matter for success in life (Sternberg, 2003b). Worse, someone could be gifted analytically—be identified as gifted and go to the best universities—and then make a total mess of things. For what it's worth, Boris Johnson, current Prime Minister of England, has his degree from Oxford University, as did his predecessor, Theresa May. Together—whether one believes in their policies or not—they have created utter havoc in the governance of the United Kingdom. On September 3, 2019, Parliament unprecedentedly took control of governance to prevent Johnson from unilaterally withdrawing the UK from the European Union. President Donald Trump has a degree from the University of Pennsylvania. He recently has spent time showing clumsily self-doctored photographs, supposedly from the National Hurricane Center, of Hurricane Dorian pushing toward Alabama. Both President Bushes had degrees from Yale. My point is not that academic talent and a prestigious university degree are in some sense bad, but rather, that in themselves, they seem radically incomplete in terms of producing skills that will lead to a better world.

Creative Skills

The world needs much more in terms of creativity from individuals identified as gifted. We sorely lack creative leaders. So many times, our leaders look for solutions that have not worked in the past, somehow, to work in the future, as though the fact that the solutions did not work in the past might mean that it is time for things magically to change and for these solutions somehow to succeed even though they have failed in the past. For example, the idea of a "border wall" to keep out illegal immigrants sounds appealing intuitively, but less so when one realizes that almost 40% of illegal immigrants, at least to the United States, come by air (Greenberg, 2015) and many others come by other legal means and simply remain when their visas expire. So, border walls have not been successful in keeping illegal immigrants out. There is no reason to believe that such walls will start being successful in the future. Certainly, more creative solutions are needed to immigration problems than border walls. The problem, of course, is not only in politics. In the business world, businesses can succeed only if they are flexible enough to change with the times. Those businesses that change—such as Microsoft—can stay on as major players. Those that cling to the past, such as Control Data Corporation, formerly a maker of mainframe computers, die. Although creativity generally serves a constructive purpose, it also has a dark side (Cropley, Cropley, Kaufman, & Runco, 2010; Sternberg, 2010b), meaning that it can be used for ill as well as for good. Nuclear weapons, out-of-control climate change, and terrorism that results in deaths all result from creativity gone awry.

Practical Skills

Practical intelligence is otherwise known as common sense. It is based on tacit knowledge, or what one needs to succeed in everyday life that is not explicitly taught in schools and that often is not even verbalized (Sternberg et al., 2000). It is unfortunate that common sense has somehow escaped our definitions and identification of giftedness because so many of our leaders, whatever their academic intelligence, seem to lack even a bare minimum of common sense. A popular stereotype is that gifted people lack common sense (Lilienfeld, Basterfield, Bowes, & Costello, 2020). This stereotype is wrong in implying a negative correlation between academic and practical intelligence, but our research suggests that the correlation is, indeed, close to 0, so that there will be many academically intelligent and intellectually gifted individuals who, basically, lack common sense (Sternberg et al., 2000). Most of us in academia know a number of them. This is seriously problematic in a society whose funnel for entrance into higher-level leadership positions so much depends on academic success. Inevitably, we will place into positions of responsible leadership individuals who excelled on IQ tests and their proxies but who are severely lacking in common sense. Indeed, a number of them are in such positions right now. And of course, they want to preserve not only their own power, but the power of the future generations they create. The system becomes self-perpetuating.

Wisdom-Based Skills

What seems sorely to be lacking in much of the world today is wisdom. One might be able rather easily to generate names of "smart" leaders or possibly even of "creative leaders." But thinking of the names of wise leaders is remarkably challenging. In discussions of wisdom, the same names keep coming up again and again, such as Abraham Lincoln, Martin Luther King, Mahatma Gandhi, Nelson Mandela, and perhaps a few others. But it is truly hard to think of current leaders who are wise; it is much easier to think of ones who are foolish. There are a few wise ones–Jacinda Ardern in New Zealand and perhaps Angela Merkel in Germany. Yet, many of the foolish leaders went to highly prestigious institutions of higher learning and were surely viewed as academically advanced, if not gifted, when they were in school, including the most prestigious universities in their respective nations.

Identifying the Gifted Who May Become Active Concerned Citizens and Ethical Leaders

A common complaint against theories that go beyond general intelligence is that we lack for augmented skills the sophisticated and construct-validated measures that we have for assessing general intelligence. Of course, this is true, because the monopolies that create standardized tests in the United States have invested so little in creating supplemental (or alternative) tests. It is easy to blame them but there is plenty of blame to go around. The problem is systemic, not of just one entity or another. If there were sufficient demand, companies creating assessments would have an incentive to develop more innovative assessments. But the demand is not there. I know. I have worked in university admissions for a number of years and the verbal expressions of despair over existing assessments have not been matched by actions. At best, colleges and universities have gone test-optional, but not enough have to make it worthwhile economically for testing companies to invest heavily in broader assessments. Meanwhile, many schools, or at least public schools, seem to be content to serve as test-prep factories, while parents understand the testing system and might well be loath to support a system that does not support objectively correct and incorrect answers to test problems. (Assessments beyond memory and analytical ones do not easily lend themselves to "objectively" correct answers.)

Nevertheless, what might assessments of some of these augmented skills look like? Some of these are described in more detail elsewhere (Chart, Grigorenko, & Sternberg, 2008; Grigorenko et al., 2009; Sternberg, 2016, 2017b; Sternberg et al., 2004). Here are some examples we have used:

Analytical Skills

In general, many of these items are the same as those in existing tests of intelligence and their proxies, because all of these tests measure basically the same mental construct, namely, general intelligence, or what I have been calling analytical skills (Sackett et al., 2020). Nevertheless, beyond the usual number series, analogies, matrix problems, mathematical-analysis problems, and reading-comprehension problems, I have listed below a few other kinds of problems. Note they require some knowledge base, as do all analytical problems, as one cannot think analytically without a knowledge base upon which to draw. Many psychologists used to believe that abstract-reasoning problems, such as figural matrix problems, were content-free, until it turned out that the problems they thought were most culturally "fair" were in fact the most susceptible to sociocultural influences and knowledge acquisition (Flynn, 1984, 1987). In all cases, our goal is to present analytical problems that have some relevance to people's lives, rather than ones that are abstracted from people's lives.

1. What is your favorite book? Why is it your favorite?
2. Some people today believe that democracy contains within it the seeds of its own eventual destruction. Why might they think that and how would you reply?
3. What is the biggest mistake you have made in your life (that you are willing to share)? How would you correct it in the future?
4. To our knowledge, no alien life has ever reached the planet Earth. (This is sometimes called the "Fermi paradox"—Howell, 2018.) Analyze some reasons why this might be so. Which do you think is most plausible, and why?
5. Why have personal incomes become more unequal during the past 10–20 years? Should anything be done to decrease the differences? If not, why not? If so, what might be done?

Answers to problems such as these are scored by rubrics. The rubric for analytical thinking includes how (a) analytically strong, (b) organized, (c) logical, and (d) balanced the response is.

Creative Skills

We have avoided the kinds of divergent-thinking problems that were favored by Guilford (1950) and Torrance (1966) that ask, say, for unusual uses of a paper clip or that ask test-takers to complete drawings. We believe that the divergent-thinking tests measure creativity in a way that is somewhat trivial, at least in comparison with the kinds of creative thinking people need to do in their daily lives, and that such creativity is not likely to generalize particularly well to creatively oriented situations that apply more to life problems. Examples of creativity problems we have used follow. As creativity is largely domain-specific (Baer, 2015; Sternberg, 2009), participants get a choice with regard to what activities they would like to do.

1. Suppose that the Nazis won World War II. What would the world be like today?
2. Draw a picture of the end of time.

3. Write a short story of two paragraphs in length with the title "Trapped!"
4. Design a scientific experiment to address a problem of interest to you.
5. Design a creative advertisement for a new brand of Brussels sprouts or a new bowtie.
6. Caption the cartoon below [a cartoon then follows].

Scoring of creativity problems is done by rubric. Typically, there are three main scores: novelty, quality/effectiveness, and task-appropriateness.

Practical Skills

We have measured practical skills in a variety of ways. One way of measuring practical skills is through essays:

1. How have you persuaded a friend of colleague of some idea you have had that the friend did not initially accept?
2. How do you resolve differences with friends when you disagree with them?

Most typically, we use scenarios and then ask respondents to resolve the problems in the scenarios. The scenarios are geared toward different domains. An example might be the following:

You have a new product you want to sell. You are convinced that the product will sell if only people find out (a) that it exists, (b) that it is of high quality, and (c) that it is very affordable. How might you go about trying to create a market for the product?

Scenario responses are judged on the basis of how practical they are with respect to time, place, human resources, and material resources, and with regard to how persuasive they are.

Wisdom-Based Skills

Wisdom-based skills also can be measured through essays or through responses to scenarios. Here are examples of each:

1. How would you take some interest you have in your life now and, when you are older, find a way to direct that interest toward improving the world in some way?

Here are two possible essays:

You and a friend have been discussing at various times entering an annual writing contest for which there is a cash prize for each of the top three winners. You just have discussed the contest and were relieved that you would have three months in which to write the essay. You just have learned, however, that the submission date has been changed for the current year and that the date is one month earlier than previously. You are pretty sure your friend does not know, as you just had the conversation about the later submission date in the past. You are trying to decide whether to say anything to your friend, and if so, what? What would you do?

Vora and Tamlin, two countries in the Far North, are having a serious clash. The Taron River flows in the direction from Vora to Tamlin. Tamlin claims that Vora is diverting more than its fair share of the water from the river. It is getting ready to go to war over this precious water resource. What should the two countries do?

The rubric for scoring wisdom items takes into account the extent to which a response seeks a common good; by balancing one's own, others', and larger interests; over the long- and short-terms, through the infusion of positive ethical values.

Teaching for Active Concerned Citizenship and Ethical Leadership

I have discussed at some length methods of teaching for creative, analytical, practical, and wisdom-based skills (e.g., Sternberg, 2003a; Sternberg & Grigorenko, 2007; Sternberg, Jarvin, & Grigorenko, 2009). Because of space limitations, I cannot go into detail here. The details are in the references just cited. But basically, when one teaches for analysis, one encourages students to analyze, evaluate, critique, compare and contrast, and judge. When one teaches for creativity, one encourages students to create, explore, wonder, imagine, invent, and design. When one teaches for practical thinking, one encourages students to apply, put into practice, use, implement, and persuade. And when one encourages wisdom-based thinking, one encourages students to use their ideas for a common good; by balancing their own interests with the interests of others; over the long- and short-terms; through the infusion of ethical values.

Conclusions

I have spent much of my career testing the ideas described above as they have evolved over time (see, e.g., Sternberg, 1985, 1997, 2003b, 2010a, 2016, 2020, in press; Sternberg et al., 2000). If I were briefly to summarize what I see as the key findings and conclusions of the research, I would say that they are these:

1. There is good construct validation, on the whole, for what I have called an "augmented theory of successful intelligence" (Sternberg, 2020), which comprises creative, analytical, practical, and wisdom-based skills.
2. Creative, analytical, practical, and wisdom-based skills are interrelated, in that they are based on highly overlapping components of information processing. But because they are applied to different content domains in different situational contexts, they are only weakly correlated with each other.
3. High scores on analytical tests as typically used for identification of the gifted tell us very little about creative, practical, and wisdom-based skills.
4. Whereas measures of general intelligence tend to be relatively domain-general, measures of creative, practical, and wisdom-based skills, and even analytical skills applied in actual contexts (e.g., Sternberg, Wong, & Sternberg, 2019), tend to be more domain-specific, although sometimes they are correlated across domains.
5. All of creative, analytical, practical, and wisdom-based skills can be measured, but the measures are in need of further development and have not reached the levels of validity and reliability of conventional measures of general intelligence, in part because the constructs are harder to measure and the tests are harder to score, and in part because commercial entities have stuck to the kinds of tests they have made for over a century.
6. All of creative, analytical, practical, and wisdom-based skills can be developed, although expectations have to be reasonable; claims of fantastic results typically are, indeed, fantastical. Schools could teach for these skills but are held back by lack of teacher training and obsession with standardized tests, which measure just a narrow range of knowledge and skills.
7. Societies create self-fulfilling prophecies in their identification of the gifted. They provide opportunities largely or exclusively for those selected by sometimes arbitrary criteria, and then interpret the correlation they created between their identification criteria and societal success as natural rather than as artificially created by the societal system of advancement they created.

8. Without wisdom, the other skills can and are used in species-destructive ways that will severely compromise the quality of life for subsequent generations and that may destroy the possibility of any human life in the not-too-distant future.
9. Gifted programs that focus only on academic skills without also taking into account identification of creative, practical, and wisdom-based skills have done a disservice to their societies, putting leaders into place who are ill-equipped to lead. Many of these individuals are in positions of leadership today.
10. It is not too late for societies to broaden their conceptions of giftedness, but with the threats of various kinds of pollution, climate change, nuclear weapons, terrorism, mindless populism, and extremism, the time frame may not be all too long.

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The Talent Development Megamodel: A Domain-Specific Conceptual Framework Based on the Psychology of High Performance

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What if you had the chance to create a model that melded the very best from a number of other theories into a new view of giftedness? The authors took on this challenge in response to an invitation by the editorial board of *Psychological Science in the Public Interest* to review the scientific literature on giftedness, talent, high performance, expertise, eminence, creative productivity, and domains of human endeavor. The review led to the talent development megamodel (TDMM; Subotnik, Olszewski-Kubilius, & Worrell, 2011, 2018; Worrell, Subotnik, & Olszewski-Kubilius, 2018), which was named (a) to acknowledge the contributions of many researchers to our understanding of

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how potential is transformed into exceptional contributions in a domain and (b) to indicate that the model is intended to be applicable not just to academic areas (Olszewski-Kubilius, Subotnik, & Worrell, 2018), but to all domains. The TDMM also reflects early claims (e.g., Taylor, Albo, Holland, & Brandt, 1985) that talent development in performance domains was more advanced and documented than in academic domains, particularly in emphasizing the contributing role of psychosocial skills. In this chapter, we review some of the more influential models on the TDMM, describe the major tenets of and supporting evidence for the TDMM, and provide implications for identification and programming from the TDMM framework.

Sources of Influence on the TDMM

As noted in the previous paragraph, the TDMM is based on an integration of models in the extant literature (Worrell, Subotnik, Olszewski-Kubilius, & Dixson, 2019), a few of which are highlighted here. In *Developing Talent in Young People*, Bloom (1985) collected retrospective studies of world-class American-born talent in artistic, athletic, and academic domains. Bloom's concept of developing talent speaks to the notions that (a) giftedness is manifested in domains and (b) giftedness in a domain must be enhanced through appropriate opportunities. Additionally, opportunity factors that contribute to the path toward creative contributions, such as programs, teaching, or mentoring, vary in their structure over time, but are consistently important across domains. In addition to privileging domain-specific talent over general intelligence and recognizing that the value of contributing factors to talent development changes in configuration over time, Bloom's work also signaled for the TDMM that opportunities for *elite* talent development are provided outside of school for most talent areas (Bloom & Sosniak, 1981).

Sternberg's (1984, 1996, 1998) triarchic theory of giftedness, successful intelligence model, and work on developing expertise also informed the TDMM. In triarchic theory, Sternberg (2005) noted that talent development in a domain is not dependent on analytic abilities exclusively, but also requires creative production and practical intelligence, including tacit knowledge. Practical intelligence, according to Sternberg, is associated with problem-solving in everyday life by facilitating the adapting to, shaping of, or choosing new environments or approaches. Expertise, according to Sternberg (1998), is built upon potential and abilities, and developed into domain-specific competencies via the acquisition of knowledge and skills. This developmental approach reinforces the notion that potential may be innate, but the transformation of potential to expertise is shaped by experiences and opportunities. Practical intelligence or tacit knowledge, knowledge that is usually not explicitly taught as part of instruction in a domain, can, as argued in TDMM, be modeled, shared, or taught by more experienced and wise others.

Tannenbaum's (1983) work was another important touchstone for the TDMM. According to Tannenbaum, giftedness involves the transformation of domain-specific abilities into creative ideas or performances, including the promulgation of beauty, that contribute to physical and psychosocial well-being. In this view, the end product of gifted education is not entry into a prestigious high school or university, but rather a contribution to the world. The Tannenbaum model also tips its hat to the contributions of non-cognitive (i.e., psychosocial) factors, chance, and opportunity on the pathway from potential to eminence.

Another contributing influence was Renzulli's (1978, 1986); Renzulli and Reis (2018) three-ring model, in which he argued that talent development was dependent on the interaction among above-average ability, creativity, and task commitment (also see Haensly et al., 1986). The accompanying enrichment triad model (Reis & Renzulli, 2003; Renzulli, 1977) proposes providing enrichment for all students, providing more domain-specific opportunities for those motivated and inspired by the enrichment, and providing a chance to develop a project that brings together interests, passions, and abilities into a creative product for the most committed students.

More recently, Subotnik and Jarvin (2005) developed the Scholarly Productivity/Artistry model that influenced the TDMM in two ways. The first was based on the realization that talent in music is affected by physical maturation as well as long-standing tradition. For example, musical talent in string performance and in piano can be identified in the early years, with outstanding examples of solo performances on international stages at age 10 or 11. However, high level performance in other areas of music, such as wind instruments and voice, does not occur without more physical maturation of the lungs and vocal cords (see link from Juilliard Pre-College https://www.juilliard.edu/admissions#arm). This research led to the conclusion that different domains begin, peak, and end at different ages. The second component is based on Jarvin and Subotnik's (2010) research with 80 conservatory participants where they described a developmental framework for psychosocial skills associated with classical music talent. This work led to a recognition of the increasing importance of psychosocial skills as individuals move higher in the talent development space and the observation that psychosocial skills may vary in importance over time and by domain.

Giftedness and Talent as Conceptualized in the TDMM

The synthesis of the literature with a special focus on the aforementioned models and empirical studies in sport and music provide the foundation for the TDMM (Subotnik et al., 2011, 2018; see Fig. 24.1). The TDMM's main tenets are presented below, as well as the empirical evidence on which those tenets are based.

General abilities, including intelligence, contribute to success in many domains, but to differing degrees, and domain-specific abilities are more important contributors to moving beyond competencies to expertise and beyond. General abilities play a critical, early role in talent development by signaling to educators, families, and sponsors that a young person could benefit from increased opportunities and guidance. Abilities are malleable, especially with the provision of opportunity, and talent development starts with potential, moves to competence, expertise, and creative productivity in adulthood. Over the course of selection and time, most of those in the talent pipeline share strong abilities, and other dimensions, such as psychosocial skills, domain-specific creativity, and insider knowledge allow for continued recognition and advancement.

Evidence in support of the contributions of general and domain-specific abilities comes from a wide range of sources. The importance of general

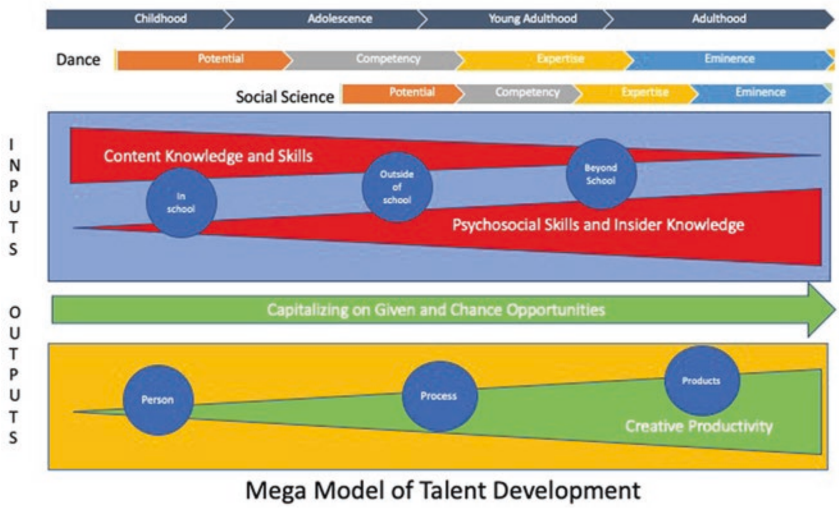

Fig. 24.1 The talent development megamodel

intellectual ability or IQ to academic domains is perhaps one of the most robust findings in the extant literature, beginning with Terman's (1922, 1954) longitudinal study. More recent work highlights the importance of intellectual ability in predicting expertise (e.g., Grabner, 2014), as well as outstanding performance across a wide variety of domains (Wai, 2013). There is also substantial evidence that although general intellectual ability may lead to expertise, it does not necessarily predict eminence (Subotnik & Arnold, 1994; Subotnik, Kassan, Summers, & Wasser, 1993; Terman & Oden, 1959). Although intellectual ability is not as strongly correlated with outstanding performance in non-academic domains, the ability to learn required skills quickly has been identified as important in many domains (Worrell, Olszewski-Kubilius, & Subotnik, 2019). Qinto, Ammirante, Connors, and Thompson (2016) noted that composers engage in problem-solving and assimilation and accommodation a la Piaget as they move from potential to expertise, and Vandervert (2016) highlighted the importance of working memory in musical prodigies. Decision-making skills are also critical in team sports (Fransen & Güllich, 2019) and in practically every field.

The extant literature also provides evidence for the importance of domain-specific skills. The importance of domain-specific abilities in traditional academic domains is evident in the research from the longitudinal Study for Mathematically Precocious Youth. Benbow, Lubinski, and colleagues have provided strong evidence of the importance of verbal, spatial, and mathematical ability in predicting differential outcomes in domains, occupations, and even creative productivity, such as patents versus novels (e.g., Lubinski, 2016; Lubinski & Benbow, 2006; Park, Lubinski, & Benbow, 2007; see Makel, Kell, Lubinski, Putallaz, & Benbow, 2016 for a replication of these findings in an independent sample). From *kitchen sense* in master chefs (Aron et al., 2019) to *mathematical cast of mind* in mathematicians (Krutetskii, 1968/1976; Leikin, 2019), *visual perception* in the visual arts (Kozbelt & Kantrowitz, 2019), and the different physical abilities required in dance and sport, outstanding performance in all domains is also dependent on domain-specific abilities (Worrell, Olszewski-Kubilius, & Subotnik, 2019).

There are several advantages to this conception of ability. Pointing out that ability is malleable, consistent with recent research indicating that the association between environmental factors and abilities is bidirectional (Nisbett et al., 2012), highlights the importance of the provision of opportunity. By moving away from conceptualizing giftedness as a trait leading to high performance across-the-board and noting that talent is domain-specific, TDMM recognizes the contributions of a wider range of abilities and sets the stage for recognizing more students and more pathways to excellence (Subotnik, Olszewski-Kubilius, & Worrell, 2019). Acknowledging the pathway from potential to competence to expertise and creative productivity in adulthood provides a clear direction for individuals interested in developing their talents and for individuals who work with youth in talent development. Additionally, knowing that outstanding achievement starts with potential opens the doorway for individuals who have potential to seek out and embrace opportunities that they may not have considered.

Domain trajectories vary as to when they begin, peak, and end. There are domains where training for elite performance begins much earlier than others, and there are some domains in which individuals contribute to the seventh decade of life and beyond. Opportunities vary based on physical maturation and tradition. As can be seen in Fig. 24.2, an elite gymnast and an

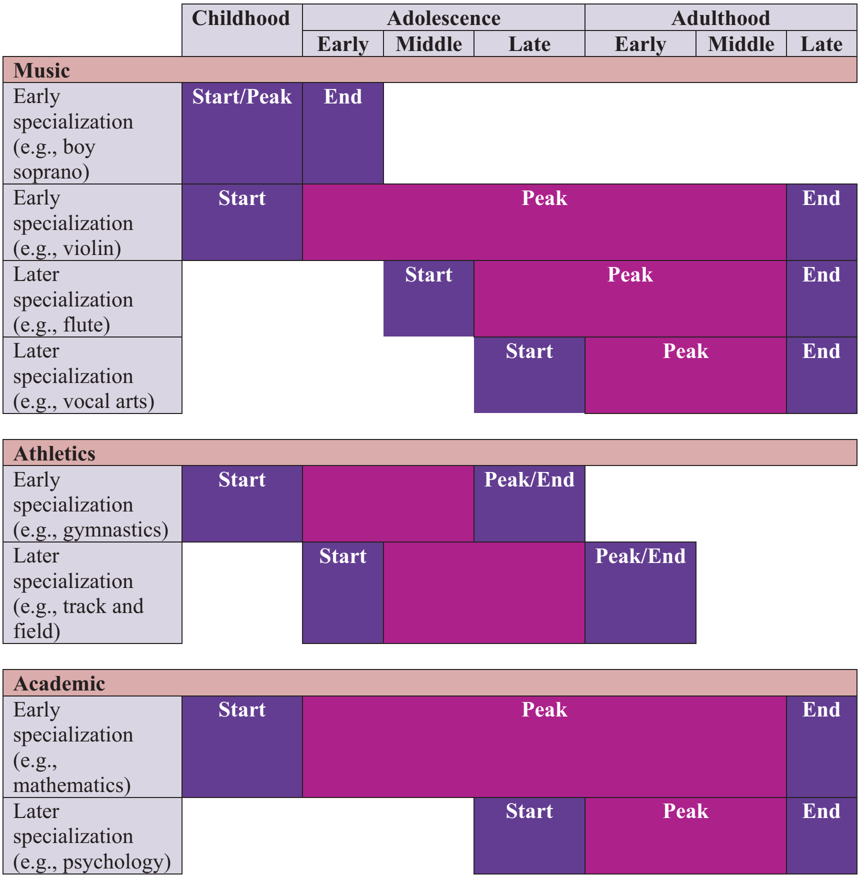

Fig. 24.2 Trajectories for different talent domains

elite mathematician may both show outstanding potential in childhood. The gymnast will peak in late adolescence to early adulthood and their career will be over in early adulthood, whereas the mathematician will peak in early to middle adulthood, but their career may continue well into the late adulthood. Thus, the developmental window for identifying potential in a domain is limited and does not necessarily match an individual's developmental stage (i.e., childhood, adolescence, adulthood). In some domains, children who have received appropriate training will already be experts in their field, and the types of opportunities that they require in their talent domain will differ from other individuals of the same age.

As noted above, physical maturation plays an important role in some domains. Consider athletics. The few early specialization sports, such as gymnastics and figure skating, are usually in the more aesthetic realm and are affected by female puberty. Elite gymnasts in their 20s are getting ready to retire, whereas elite footballers play into their 40s and elite swimmers fall somewhere in-between—Michael Phelps was 31 when he participated in the 2016 Olympic Games and gave some of the best performances of his career. There are also gender variations within domains. For example, female gymnasts begin around three to four years old whereas male gymnasts begin around eight to nine years old. The U.S. women's gymnastics team in the 2016 Olympics ranged in age from 16 to 22, whereas the male team ranged in age from 23 to 29. In music, the adult male voice does not develop until after puberty.

With regard to academics, a strong literature points to early recognition of number sense (Libertus, Feigenson, & Halberda, 2011), mathematical cast of mind (Krutetskii, 1968/1976), and quantitative reasoning (Lubinski, 2016). However, expertise in the social sciences and humanities tends to develop later, although it is not clear whether this is due to late exposure to the domain or whether the social sciences and humanities require insights into human behavior acquired through life experience in order to demonstrate giftedness. In addition to the career trajectories mentioned in the previous paragraphs, there is ample evidence of such differences in every domain.

The literature on prodigies provides examples in fields such as music, mathematics, and chess, where careers begin in childhood. However, in most fields, an earlier start does not necessarily increase one's chances of reaching elite levels. Although many parents enroll their children in sports at an early age in the hopes of developing a top athlete, individuals who enter a sport early are also more likely to exit early from that sport (Güllich & Cobley, 2017; Portenga, 2019). Similarly, many students who begin doctoral education programs never complete the degree (Yeager, 2008), signaling the importance of identifying domain-specific potential, providing appropriate supports and opportunities, and cultivating psychosocial skills.

TDMM acknowledges the importance of multiple spheres of opportunity, with particular emphasis on outside-of-school activities such as clubs, competitions, and special programs. This framing is in keeping with Bloom and Sosniak's (1981) contention that schools are not equipped to support elite talent development on their own. Best practices for gifted education require a wide array of opportunities matched to students' areas and level of developed talent, including enrichment and accelerative-type programs and opportunities to interact with talented peers and domain experts. Thus, talent development programs need to be sensitive to different stages of talent development (e.g., exposure early in the trajectory, acceleration and enrichment for achieving competencies, and mentorships and apprenticeships for achieving expertise and creative productivity). Wai et al. (2010, p. 861) showed that even in high-ability individuals, the probability of outstanding contributions increased with a greater "educational dose" of talent development opportunities, defined as "the density of advanced and enriching precollegiate learning opportunities beyond the norm."

Psychosocial skills play a greater role in talent development over time. The talent development pipeline tends to narrow over time, with only the most able, motivated, and prepared continuing on to elite levels. Potential and ability define giftedness in younger children, and outstanding achievement defines giftedness as individuals progress in skill development. As individuals increase in their achievement outcomes and move on to expertise, other factors make a difference in acquiring access to additional opportunities. The most important of these factors is presentation of strong psychosocial skills. Psychosocial skills incorporate those that are internal to the individual, (e.g., dealing successfully with performance anxiety whether on stage on in a testing setting) and those that focus on interactions with others, such as collegiality or tasteful self-promotion. Skills such as persistence in the face of failure, risk-taking, curiosity, and the "rage to master" are documented in the extant literature (Worrell, Olszewski-Kubilius, & Subotnik, 2019). These skills can be taught and are often done so in elite performance education in the arts and sport (Jarvin & Subotnik, 2010; Subotnik et al., 2011). Moreover, the psychosocial skills that are taught need to change with stages of developed talent and changes in the types of setbacks and opportunities that arise.

Talent development is a long-term project that requires multi-year thinking in its organization with the goal of cultivating domain-specific talents into creative production. Many performance domains have organized activities that change developmentally over time both in terms of selectivity (e.g., travel teams) and purpose (recreational teams). Many academic domains have replicated these arrangements in the form of clubs, academic fairs, and Olympiads. For those children and youth who maintain a commitment to pursuing a talent to higher stages, TDMM argues for having in place a set of opportunities that includes in-school and out-of-school components as well as guidance and adult mentoring designed specifically to assist students in moving to the next level of talent development—that is, to develop potential into competency, competency into expertise, and expertise into creative achievement in adulthood. Thus, one role for educators of children and youth with potential is to provide the opportunities resources that enable them to transition to the next stage of talent development.

Insider knowledge makes a difference. Judgment and decisions made at different points on the continuum of the talent development trajectory in a domain can have a large influence on what happens next. Should my child specialize in a subject or sport at age 8? Should I lobby to find a teacher with particular experience for my talented mathematics student? What clubs should they participate in? How should I prepare for an audition to a conservatory? These are all questions whose answers are more available to some individuals, families, and schools than others. Judgments that reflect the most likelihood of success are indicative of what we call "insider knowledge." Although tacit knowledge, a similar construct was initially considered to result from experience in a domain, more scholars are viewing tacit knowledge as teachable and worthy of collection and distribution (Hedlund, 2020). More equitable access to insider knowledge will better ensure that students from all demographic groups get the opportunities, services, and coaching they need to reach adult outcomes.

Summary

In sum, the TDMM is a general structure for talent development that is useful in educational settings and beyond. It synthesizes elements of many models of giftedness and talent into an integrated framework that transcends its origins. According to this perspective, the criterion for achieving the label gifted changes as one progresses in talent. Instead of focusing on the identification of *gifted individuals*, the TDMM is focused on identifying individuals with potential and setting the stage with opportunity, practice, and study, for these individuals to become gifted producers and performers in a domain. In the TDMM framework, giftedness at the level of competency and expertise involves "doing" rather than "being," with giftedness among the gifted earning the label, eminent.

Identifying and Serving Gifted Children Using the TDMM

Identifying and serving gifted students are the important processes in talent development. The TDMM's implications for identification and providing services are provided in Table 24.1. Two of the most important practice considerations emanating from the megamodel are (a) movement away from providing a one-size-fits-all approach, to providing an array of gifted services that meet the needs of students at different levels of talent development with talents in different domains and (b) turning the typical approach of "identify and then place in programs" to "provide services followed by assessment for additional services," critical for addressing students at the lower end of achievement and opportunity gaps. Currently, typical practice is to use indices of general ability or overall achievement to select students for gifted programs. This approach is appropriate for identifying children who begin school ready for advanced content and in need of acceleration, but will miss others who have potential but have not had significant early educational opportunities and exposure. These students will benefit from enriched early experiences before they are formally assessed for gifted identification.

As children progress through school and delve more deeply into specific subjects, identification for services should increasingly center on assessing abilities that are relevant to the subject area (e.g., mathematical reasoning ability for a math enrichment or accelerated math class) and put greater emphasis on actual achievement and demonstrated motivation over general ability. Regardless of domain, research-supported best practices (multiple indicators and pathways into programs, local norms) and program models (enrichment, acceleration, problem- and inquiry-based instruction, grouping strategies, etc.) should be employed.

As talent develops, the nature of programming also needs to change. In the first stages, exposure to domains and opportunities to dabble and explore are important, particularly for those who may not have these opportunities within their homes or communities. As individuals progress, talent development should focus on building foundational knowledge and skills, perhaps at an accelerated pace. With commitment to domains, talent development opportunities need to focus on exposure to domain experts who can inculcate domain values, help with insider knowledge about educational and career

Table 24.1 Key implications of the talent development framework for gifted identification, services, and programs

Talent development framework concept	Implications for gifted identification	
Giftedness is developmental. In early stages, potential is the key variable. In later stages, giftedness is defined by achievement. Adult giftedness is defined by creative productivity.	In early stages, focus on identifying broad general abilities while creating opportunities to sample a wide variety of interests. In higher stages, use indicators of domain-specific achievement. Include demonstrated motivation and engagement in the domain as criteria for services for later stages. Look to what students are doing outside-of-school as indicators of ability, interest, and motivation.	Programming needs to be matched to the stage of talent development. Opportunities that provide exposure and develop interest at the potential stage; programs that develop fundamental skills and knowledge at the competency stage; programs that expose students to adult professionals and authentic problems/work via apprenticeships and mentorships at the stage of expertise. Be alert to the fact that students may be at different stages of talent development, depending on the domain and previous opportunity.
Abilities matter and are malleable.	View identification as an ongoing process rather than a one-time event. Adjust criteria for services based on potential relative to previous opportunity to learn. For most academic fields, programming should be domain-specific by middle school.	Reverse the typical process of "identification, followed by programming" and offer opportunities for the development of abilities first, followed by assessment for placement. This sequencing is especially critical for students who have had fewer opportunities to learn (e.g., due to poverty or other circumstances).
Domains of talent have unique developmental trajectories across the lifespan.	Assess for relevant domain-specific abilities, such as number sense, mathematical cast of mind, or mathematical or verbal reasoning ability, no later than middle school. Coordinate talent mining with knowledge about trajectories and when domain-relevant abilities emerge and can be measured (e.g., early for math, later for science).	Talent development programming will need to start earlier for some domains (e.g., math, music) and later for other domains, such as science or leadership.

(*continued*)

Table 24.1 (continued)

Talent development framework concept	Implications for gifted identification	
Psychosocial variables are important contributors at every stage of talent development.	At earlier stages, assess development of relevant psychosocial skills for purposes of further development but not as criteria for services. Benchmark critical psychosocial skills at each stage for purposes of planning for further development. For later stages, consider using psychosocial skills such as teachability and motivation as criteria for services. Psychosocial skills should be cultivated within programs via appropriately challenging coursework combined with support.	Emphasize growth and improvement. Build support, motivation, and opportunities for benchmarking via contact with similarly interested/talented peers. Introduce constructive competition as appropriate and prepare with associated psychosocial skills. Provide opportunities for mentoring by professionals to help with career paths and domain-based identity development.
Opportunities and effort are important at every stage of talent development.	Adjust criteria for services depending on the stage of talent development (e.g., more liberal cutoffs for services for earlier stages or younger children). Adjust selection criteria depending upon type of program—for example, less flexibility for acceleration programs, but more flexibility for enrichment, portfolios for project-based work.	Multiple types of opportunities for students at different stages of developed talent need to be available at every level of schooling in major domains (e.g., enrichment for students with emergent talent and motivation, acceleration for students with well-developed ability and high motivation). Include children with high motivation and achievement in talent development/gifted education programs even if ability is somewhat lower.

(*continued*)

Table 24.1 (continued)

Talent development framework concept	Implications for gifted identification	
Creative productivity should be a potential outcome for talent development and gifted education programs, with individuals being encouraged to reach for the highest levels possible.	The criteria for identification for gifted services should match the stage of talent development—potential, competency, expertise, and beyond. Teachers, coaches, mentors need to be mindful of preparing students for the transition to the next stage of talent development. Opportunities to engage in creative production should be available to students at every level of talent development.	Cultivation of attitudes and mindsets (e.g., openness, risk-taking) conducive to being a creative producer needs to be deliberate and integral to programming at every stage of talent development. Emotional support for students choosing a path of creative productivity needs to be continuous. Educational programming needs to support ongoing talent development beyond K–12 years.

paths, provide opportunities to work on authentic domain problems with authentic methods, and generally build a domain-related identity. These latter types of services may require significant involvement and collaboration with outside experts and community partners.

Even for academic abilities, talent development will not take place completely within school. Some of the most motivating experiences, such as working on a research project in a university lab or shadowing a physician, can be organized but not provided by teachers and coordinators. Community organizations can be called upon to offer mentors, coaches, and programs. Lower-income students will still need to rely more upon schools to assist with accessing outside-of-school opportunities or providing them during the summer or school breaks.

A significant feature of the megamodel is the emphasis placed on psychosocial skills that support high achievement. Important skills such as positive attitudes toward challenge, resiliency, goal setting, self-directed learning, and growth mindsets can be actively developed by teachers, coaches, parents, and mentors. These skills can be fostered by providing the right level of challenge and appropriate goals for students within classrooms and programs, combined with emotional support for potential effects on self-concept and motivation. Individuals who work with talented youth can promote a mastery orientation by giving appropriate feedback focused on improvement and growth and by assisting students in benchmarking their talent development against other talented peers or professional standards. Mentors and professionals who have contact with talented youth can help to cultivate skills particularly important for their domain and their stages of talent development, such as teachability and openness to feedback for earlier stage students and risk-taking for more advanced students.

Conclusion

With the megamodel's emphasis on scholarly productivity or artistry as the ultimate goal of gifted education and talent development activities, it is important that teachers, coaches, and mentors are aware of the nature of talent trajectories in a youth's chosen domain. No one can predict perfectly who will attain the level of expert or become eminent in a field, and this prediction is not and should not be the goal of identification or programming. The goal of teachers and mentors should be to increase the probability of an upward talent development trajectory by preparing students with the skills, competencies, mindsets, and insider knowledge they need to transition effectively to the next higher stage of talent development. The TDMM aspires to delineate the structure of supports and critical experiences that foster appropriate attitudes, values, commitment, and motivation to move talented individuals forward on talent trajectory paths at any age, stage, or domain of development.

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25

A Conception of Giftedness as Domain-Specific Learning: A Dynamism Fueled by Persistence and Passion

Joyce VanTassel-Baska

Introduction

Itzhak Perlman, the great international violinist of our age, has remarked that "the more you have in your heart, the more you have to give", suggesting that the will to display extraordinary talent comes from an inner emotional resource. Recent biographical insights appear to take a similar view of giftedness that combines a natural aptitude orientation for learning with the passion in a specific area of interest aligned with the motivation to work hard for long periods of time to attain one's goal.

The Wright brothers, especially Wilbur, had an early vision of flying that consumed his thinking and his time. Wilbur Wright excelled in school but was given freedom at home for his passion to pursue his desired activities. Wright credited having the right parents as the blessing that allowed him and his brother to excel (Isaacson, 2018). He spent long periods in isolation to study flight even as he spent periods of time with his brother Orville, to whom he was perfectly attuned in the enterprise. Their success came because of passion for the task, diligence, and continuing in the face of adversity and even failure.

Chernow's (2004) biography of Alexander Hamilton presents a view of a man obsessed with being somebody as a counter to his wretched beginnings.

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His rise in American politics came as a combination of aptitude for the political enterprise alongside his ingenuity for innovative thinking and tireless advocacy for his ideas, including the national banking system and federal treasury. Finally, we see in the biography and biographer of Lyndon Baines Johnson (Caro, 2018) the traits of hard work, persistence, and a clear-eyed vision of what needs to be done as his defining characteristics. These characteristics animated him in his various roles as a political leader, from Congress to the White House, in bringing electricity for the first time to the hill country of rural Texas and passing historic civil rights legislation for the nation. In the arts, Agnes Varda, the 90-year-old French new wave filmmaker, showed persistence, resilience, and innovative capacity to continue to create film through her late 80s. She remarked in her filmed autobiography that "…film was a part of her", suggesting a fusion of domain and person.

All of these individuals had specific aptitudes that were converted to giftedness through passion, vision, and hard work in a specific area. The products they created sustain our sense of life today in the domain-specific spheres of aerodynamics, government, the arts, and a civil society.

Sources for Understanding Giftedness

Not just past and current biographies inform our understanding of giftedness, however. Current thinking, based on neuroscience, provides a physical map of areas of the brain that promote or impede thinking. Most of these studies are focused on the breakdowns of functioning (Kalbfiesch, 2008). Plomin's work (2018) has noted the role of our DNA, discussing the many multi-factorial ways genetics and environmental factors interact to enable intelligent functioning; yet neither he nor others have isolated a genetic pattern for high ability. As our popular conceptions of giftedness become more aligned with performance, research on expertise has suggested that ability may have little to do with high-level performance; rather it is dependent on targeted domain-specific interests on which an individual focuses over time (Ericsson & Pool, 2016; Ericcson et al., 2007) as has been demonstrated in the learning and mastery of chess. Learning research also has contributed to new understandings of higher-level functioning, translated into research on school-based subject areas of learning (National Research Council, 2000, 2005, 2012) that define what high-level performance looks like in the major school-based domains of learning.

Research into understanding what intelligence is and the processes by which it works has traditionally been the major source for our view of giftedness. Table 25.1 presents some of the theories of intelligence that have influenced the field of gifted education. These in turn have produced related definitions of giftedness. Several principles provide a framework for thinking about these theories of intelligence, the related definition of giftedness, and how each definition has been operationalized (Sternberg & Detterman, 1986).

1. Intelligence and giftedness are not the same thing. In order for a person to be viewed as gifted, she must demonstrate, through performance in the real world (not just on a test), the fruits of intelligence in contributions to "making the world a better place" (see Witty, 1962).
2. Giftedness requires using one's general intelligence or abilities to make a contribution in an existing domain of knowledge (e.g. science) or to develop or create new subdomains such as genetic engineering. Aptitudes and predispositions for learning will dictate the areas in which such contributions might be made (see Thurstone, 1938).
3. High-level general intelligence (top 10%) is often a necessary but insufficient characteristic to be gifted in adulthood, even in a given domain. Rather it requires developed knowledge and skills in that domain, the interest and motivation to learn deeply about the domain, and the energy to persist with real problems over time. The case studies of the Wright Brothers, Lyndon Johnson, Itzhak Perlman, and Agnes Varda, all demonstrate the dynamism of these criteria for performance working together to produce gifted individuals in very different domains.
4. Childhood giftedness may best be seen, not as a mirror of the multi-faceted definitions of adult giftedness, but rather as preliminary evidence of potential in one or more areas that may be identified through multiple approaches. These approaches may include the use of valid and reliable instruments that assess general and specific abilities. Programs for the gifted use such "preliminary evidence" as the basis for designing curriculum that would advance the learning of students who show advanced aptitudes, motivations, and interests in relevant domains that can be offered through the school. In cases where the school cannot provide specific programs that would benefit a student or small groups of students, then out-of-school opportunities should be designed or referred (e.g. chess clubs, Talent Search, Science Olympiads) for participation.

Table 25.1 A comparison of theories of intelligence and related definitions of giftedness

Theories of intelligence	Definitions of giftedness
Intelligence is g-factor based and discernible through tests that focus on abstract thinking and problem-solving (Spearman, 1904; Jensen, 1998).	Giftedness is general intellectual ability as demonstrated by IQ test thresholds above 130 IQ or two standard deviations above the norm (Terman, 1925).
Intelligence is the capacity to create in a domain (Simonton, 1994; Piirto, 2008).	"Giftedness is … performance that is clearly at the upper end of the distribution in a specific talent domain even relative to other high-functioning individuals in that domain. Further, giftedness can be viewed as developmental in that in the beginning stages, potential is the key variable; in later stages, achievement is the measure of giftedness; and in fully developed talents, eminence is the basis on which this label is granted" (Subotnik et al., 2018).
Intelligence is componential, comprised of analytical, synthetic, and practical abilities (Sternberg, Ferrari, Clinkenbeard, & Grigenko, 1996).	Giftedness is intelligence applied to real-world problems (Sternberg, 2005, 2011). Giftedness is above average ability, creativity, and task commitment (Renzulli, 1978).
Intelligence is the ability to solve problems or to fashion products that are valued in at least one culture or community. Intelligence is comprised of eight separate and distinct domains (Gardner, 1983).	Giftedness is the demonstration of extraordinary high-level functioning in any of the specific intelligences of linguistic, mathematical, visual-spatial, musical, bodily-kinesthetic, interpersonal, and intrapersonal (Gardner, 1993).
Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally, and to deal effectively with his environment (Wechsler, 1940).	Tests of intelligence that reflect verbal and performance abilities (e.g. WISC-R) at 2–3 standard deviations above the norm (Wechsler, 1940).

(*continued*)

Table 25.1 (continued)

Theories of intelligence	Definitions of giftedness
Intelligence may be defined as three strata: Stratum I includes dozens of "narrow" abilities, such as quantitative reasoning, verbal language comprehension, memory span, memory for sound patterns, perceptual speed, and simple reaction time. These abilities each correspond to one of eight broad areas that constitute Stratum II, including fluid intelligence, crystallized intelligence, general memory and learning, broad visual perception, broad auditory perception, broad retrieval ability, broad cognitive speediness, and processing speed. Stratum III is a general hierarchical factor similar to *g* (Carroll, 1993).	The use of multiple tests that assess both the g-factor and combinations of other strata (e.g. Cognitive Abilities Test, SAT). Giftedness is the ability to apply high-level aptitudes to domain-specific issues and problems through a focus on verbal, mathematical, and nonverbal test performance at levels significantly advanced compared to age peers (Stanley, 1991; Lakin & Lohman 2011).

Rationale for a Domain-Specific Conception of Giftedness

In my view, the world is organized in domain-specific areas that more easily allows intelligence to be bent in the specific directions that society has approved and supports. In turn, this allows for giftedness to become manifest through these domains and beyond in adulthood.

General intelligence requires an outlet in a specific domain in order to be productive and useful. As seen in the comparison of intelligence and giftedness, in order for giftedness to be activated, it requires an application of intelligence in a specific domain of learning. Thus, extraordinary performance in a domain is a cornerstone of giftedness (Subotnik, Olszewski-Kubilius, Worrell, 2018). A conception of specific-domain giftedness does not negate the importance of a floor of general ability as well that may vary by the domain under study (Jensen, 1998). For example, in fields such as genetics and mathematical modeling, the level of abstract thinking required to make a contribution may exceed three standard deviations above the norm in general ability while writing a novel may require only a more modest level. Even though some research has negated the threshold effect, other research suggests that levels of ability do matter in performance at high levels in domains (Lubinski & Benbow, 2006) in adulthood.

Although non-intellective qualities such as persistence and intense curiosity may often accompany general intelligence and specific knowledge and skills in order for giftedness to be displayed, it is the catalyst of the specific-domain problem(s) that is the activating force. Non-intellective qualities are perhaps best viewed as background conative traits or personality predispositions that either facilitate or impede an individual's capacity to produce and perform in a domain.

The strongest arguments for a domain-specific conception of giftedness are nested in the broader pragmatic view of existing organizational structures that support the talent development process.

1. The expression of giftedness in a creative product or performance is domain-specific (Piirto, 2008). Our ability to create requires deep knowledge in a domain, even to the point of playfulness. It is in the zone beyond proficiency where innovative and imaginative thinking coalesce. In fact, domain-specific knowledge may not make advances in the absence of the creative capacity to think and perform without restraint or censure as well as to employ creative thinking and problem-solving skills at will. Thus, the quality of mind required to exhibit giftedness must be attuned and open to creative impulses (Simonton, 1994, 2019).
2. Use of a domain-specific orientation to identification and programming may aid in finding and serving more low-income and minority students (VanTassel-Baska, Feng, & Evans, 2007a, b). While the United States has had difficulty in identifying students from some minority cultures, if more domain-specific tools such as those that focus on verbal, mathematical, and nonverbal reasoning were used for identification in lieu of general ability measures, more of these students might be identified and succeed in programs that match those areas of aptitude (VanTassel-Baska, Johnson, & Avery, 2002).
3. Schools at all levels K-20 are organized in domain-specific ways. Thus, learning is still acquired through domain-specific channels even as more interdisciplinary approaches are being advanced. Accelerative work in K-12, for example, is primarily accessed at the high school level through Advanced Placement, a series of 38 courses calibrated to university-level work. High-level performance in these courses and on their performance-based exam suggests that high-potential students will do well in college and beyond in the domains in which they have studied and demonstrated proficiency on advanced exams (Colangelo et al., 2004; Olszewski-Kubilius, 2015). A smaller group of high school students with potential have experienced the more interdisciplinary

learning provided by International Baccalaureate (see Shaunessy, Suldo, Hardesty, & Shaffer, 2006).

4. Evidence of adult giftedness emerges from domain-specific work. Even in Centers where collaboration of professionals across fields may be encouraged, the "breakthrough work" usually focuses on a subdomain problem, requiring expertise from multiple researchers whose perspective may be different but who have deep knowledge within a relevant domain. The discovery of the double helix is a case in point. Watson was a trained biologist while Crick was trained as a physicist who became interested in genetics. Rosalind Franklin was a geneticist working in another lab on crystallography. Her photograph of DNA was shown to Watson, resulting in the Watson and Crick team working out the double helix (Watson, 1980). Franklin died before receiving the Nobel Prize she deserved in addition to Watson, Crick, and her collaborator Wilkins for their contributions to showing what DNA was and how it worked to replicate life in all species. Deep knowledge in different science domains was necessary for the discovery to be made.
5. Our society is organized to recognize those who display giftedness in societally acceptable domains. We give Nobel prizes and other awards to individuals and groups whose contributions rightfully bring them the label "gifted" (Zuckerman, 1992). These same domains relate back to the core school-based subjects and non-core opportunities provided in which students may compete and excel. One exception might be the "Peace Prize", reserved for contributions to the general good of society, by individuals who demonstrate habits of mind and life's work that promote peace.

Giftedness, then, is the manifestation of extraordinary performance in any socially productive domain. This definition relies on an old concept, first described by Paul Witty (1962), that links giftedness to its expression in productive and valuable venues in a society. This conception of giftedness suggests that working on identification and intervention requires a specific focus on areas of aptitude that can be identified and developed.

When I became involved in the talent search movement of Julian Stanley's design in the mid-1970s, I realized how that identification and intervention model, applied in a systematic way, could be replicated and applied in various educational settings. I understood that by identifying on-grade achievement at the 95% or higher in specific areas, a pool of able students could be found that might be assessed on an off-level test in the same aptitude area of specific talent who were in need of advanced services. Later in my career, in the late 1980s, I realized that curriculum could be designed for use in schools that was responsive to the specific academic needs of potentially gifted learners. By "potentially gifted learners", I mean those who may be performing above average on traditional measures but have not been identified, yet who have shown promise in specific areas of either the core or the non-core curriculum. Many of these students are from low-income backgrounds, children of color, and twice-exceptional learners.

Evidence for Domain-Specific Giftedness

The conception of domain-specific giftedness has been a part of the literature of this field from the beginning, with Spearman's work (1904) on two factors of intelligence, ultimately leading to his recognition of the g-factor as primary. Thurstone's contribution of primary mental abilities (1938) was useful in recognizing the role of specific abilities in thinking about the nature of intelligence, an idea greatly expanded upon by later researchers such as Guilford (1956) who conceptualized 120 discrete types of intellectual functioning. Cattell (1963) studied the bifurcation of crystallized and fluid intelligence, providing for some educators a distinction between students who have had deep experiences with learning (crystallized) versus those who have not but function well in real-world environments (fluid). Carroll's (1993) re-analysis of all data from earlier factor-analytic studies supports a hierarchy of three strata that positions g-factor as the top stratum with more specific factors underlying it. Many researchers today would agree, as a practical matter, that intelligence is "the ability to think abstractly" and to apply that thinking "to real world situations for solving problems and adapting to an environment" (Perkins, 1995; Perkins et al. 2000). Yet others, however, suggest that no consensus around a single definition exists (Kaufman, 2009).

Recent reviews have continued to stress the practicality of using specific aptitude measures to identify and serve the gifted as they tend to find more low-income and minority students (Olszewski-Kubilius & Corwith, 2020; Lakin & Lohman, 2011; VanTassel-Baska, Zuo, Avery, & Little, 2002). They also tend to find areas of ability that would not be found through traditional IQ testing such as in the arts (see Piirto, 2008) where portfolios and auditions have been found to be superior ways to find specific artistic talent. Finally, they provide a better match to school-based interventions already in place (VanTassel-Baska & Baska, 2020). Sternberg's (2011) groundbreaking views of applied intelligence also provide support for specific interventions in the form of instructional models that match the capacities of particularly gifted students in domains. Ultimately, even a *g*-factor view of intelligence requires diagnostic assessment of student aptitude in specific areas such as verbal, non-verbal, and mathematical aptitudes for consideration of service provisions. It is important, for example, that a mathematically precocious child be provided with advanced mathematics according to the degree of her ability, not based on age factors alone.

The realm of curriculum studies, which examines the efficacy of curriculum with gifted learners, has continued to show that differentiation of domain-specific curriculum produces higher-level outcomes in content expertise as well as in critical thinking (Kim, VanTassel-Baska, Bracken, Feng, & Stambaugh, 2014; VanTassel-Baska & Stambaugh, 2006). Studies of math curriculum have shown significant and important growth in advanced mathematical concepts and problem-solving by using more hands-on, project-based curriculum that requires verbal interaction (see Gavin, Casa, Adelson, Carroll, & Sheffield, 2009). Science curriculum that uses a problem-based format with gifted learners has also shown significant and important learning in both the core area of science and value-added areas like real-world problem-solving (see Gallagher & Stepien, 1996; Robinson, Dailey, Hughes, & Cotabish, 2014; Cotabish, Dailey, Robinson, & Hughes, 2014). Social studies curriculum that has used a differentiated template for design and has focused on providing students multiple perspectives on history has produced students who perform at higher levels on critical-thinking measures than students using a more standard curriculum (Little, Feng, VanTassel-Baska, Rogers, & Avery, 2007). Writing samples that have been judged holistically show higher performance levels for gifted students pre-post, compared to more typical learners, through the use of advanced instructional models that promote elaboration and evidence of higher-level reasoning (see VanTassel-Baska, Bracken, Feng, & Brown, 2009). In virtually all areas of the core curriculum and beyond including the area of world languages (see VanTassel-Baska, 1987), the use of differentiated curriculum has produced both significant and important learning gains for students from elementary through secondary levels.

Studies also support the use of both Advanced Placement and International Baccalaureate curriculum models, again demonstrating the effectiveness of both programs in producing advanced learners who are performing at the level of college freshmen in specific subjects (Judson, Bowers, & Glassmeyer, 2019; VanTassel-Baska, 2001; Shaunessy et al., 2006; Tookey, 2000). Calibrated to first-year college courses, the IB and AP courses use a prescribed curriculum base and a performance-based assessment model that judges competency in specific domains.

Yet, most gifted students need such curriculum much earlier, often as soon as they enter school. Frequently, districts have been slow to respond to such needs, often waiting until second grade to formally identify gifted children and then leaving the intervention up to the teacher assigned to the gifted program. Only 18 states require that teachers have an endorsement in the field of gifted education, thus hampering the preparation of personnel who can work effectively with this population and provide differentiated services (NAGC, 2015). Beyond that, even fewer teachers have been trained in content pedagogy models of effectiveness. Untrained teachers of the gifted have been found to be ineffective in using differentiated materials, partially because they choose not to use them or implement them partially in favor of lessons they are familiar with (see VanTassel-Baska, Avery, Hughes, & Little, 2000; VanTassel-Baska, 2018). Thus, fidelity of implementation has become very difficult to achieve in scaling up projects.

Identification Models That Work

The Stanley (1974, 1991) model of talent search has been the best-documented off-level approach devised to find students who have abilities and aptitudes in the specific areas of mathematics and verbal aptitude. The model he proposed was based on Leta Hollingworth's idea, advanced in 1926, of using a more difficult test with younger students to see how advanced they were in an area of learning. While she did so with individualized measures, he experimented with a large-scale group test (the SAT), normed on college-bound seniors. From the beginning, the results were astounding; by locating the top 3–5% of seventh-grade students on a standardized on-grade achievement test, and then administering the SAT, one was able to see its effectiveness in finding students scoring in the range of students 5 years older, suggesting readiness for more challenging work in these two subject areas. This simple two-stage model of identification (high-level achievement linked to off-level aptitude) was cost-effective, as schools at that time all used standardized achievement tests so the data were all readily available on instruments like the Iowa Test of Basic Skills and the California Achievement Test. The most important contribution of this model at the time, and even now, was the knowledge that students were demonstrating advanced aptitude when the ceiling of the test was high enough to capture their true level, opening the door to understanding the precocity of the highly gifted and suggesting the need for advanced programming in selected areas of learning that would provide the optimal match to levels obtained through testing. While the dramatic differences came with discerning the top 20% of those tested as being ready for such work, all students tested demonstrated readiness for honors-level work as seen in their Stage I results.

Criticism of the talent search identification model has been leveled in several areas. Testing researchers, for example, have challenged the use of the SAT as a specific aptitude measure when research has found the test to be more indicative of g-factor intelligence (Frey & Detterman, 2004). The model has also been attacked by educators in respect to the ways in which it limits the areas for identification beyond verbal and math areas, and the score levels needed to receive services (typically at the average level of performance of students four years older), limiting services to the highly gifted only. Finally, concerns have been raised related to the underrepresentation of low-income and students of color qualifying for program services (Ford, 2013).

In-school approaches were suggested to acknowledge students identified through the talent search, accepting those students for program services who had scored in the top 20% of their age and ability group on the verbal or mathematical portion of the SAT. STEM and science program identification was recommended through a combined SAT score. Other tests, designed for pre-high school students but used with younger students, such as The Explore Test or the School College Ability Test (SCAT), also provided evidence of high-level functioning in verbal and math areas for schools to employ.

The talent search testing has also been used for decision-making on acceleration (see Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015). Students scoring at particular levels on any off-level test may reveal readiness for different forms of acceleration in schools in their areas of precocity. Even though the talent search model has over 300 studies supporting its efficiency and effectiveness for the identification of gifted learners (see Brody, 2004; McClarty, 2015), the model is still not widely used for in-school programming.

The most popular approaches to identification at the present time in schools involve the use of aptitude measures such as the Cognitive Abilities Test (CoGAT) which provides a comprehensive score and sub-scores on verbal, mathematical, and nonverbal areas of aptitude. Often, this measure is coupled with the use of the Naglieri Nonverbal Achievement Test, a test designed to find general ability in figural form. Both measures have studies that support their effectiveness in finding underrepresented populations (Lakin & Lohman, 2011; Naglieri, Brulles, & Lansdowne, 2009). These testing models are usually accompanied by other criteria, such as teacher recommendations, grades, and other performance indicators. Best practice suggests that these criteria be used in tandem with tests to judge which students might best benefit from particular program options provided. The use of an in-school committee also is recommended to provide greater voice to the process and advocacy for special-needs students who might be overlooked (Johnsen, 2009).

Unfortunately, identification approaches used in schools often are not deliberately matched to curriculum and instructional models that address the very needs identified. Exceptions to that situation often exist in respect to mathematical advancement at levels of learning from middle school on. Yet the clear connection to curriculum that matches talent search identification data does not often occur in school-based interventions.

The Optimal Match of Identification and Intervention

Regardless of the domain of learning, schools at all levels have focused on some aptitudes over others in respect to attention and importance and therefore testing for students who are advanced in those areas. Clearly, language arts and math have won the content wars for the use of time in school pacing guides as well as in more readily assessing for giftedness. For example, at the K-5 level, language arts comprises 60% of the instructional school day in some form while social studies has now been squeezed into that same time block, reduced from earlier allocations of 20 minutes twice a week. Math receives one hour a day while science instruction occurs three days a week. The arts may be included as non-core subjects, receiving one hour a week or less in the visual arts and music. Other art forms such as drama are typically elective and left to after school arenas. Other domains of potential learning like leadership or creativity are treated as electives at all levels of the school curriculum if they are offered at all. More commonly, they are integrated into existing curriculum. In order to connect a conception of giftedness with operational reality, however, educators must apply an "optimal match" approach between the tools of identification and intervention.

Domain-Specific Teaching and Learning

Specific-domain giftedness has gained contemporary interest as a way to think about how to find students for whom an optimal match might be made in the talent development process (Subotnik et al., 2018). Grounded in the work of Stanley from the 1970s (Keating et al., 1970), this contemporary view focuses on finding students with high aptitude in the core areas of learning—reading, math, history, and science—and then providing well-targeted interventions for them throughout their years of schooling and into university and professional careers beyond.

To enable a domain-specific view to have practical applications, it is necessary to apply a model of differentiated curriculum that aligns with our understanding of how curriculum might best meet the needs of the gifted. Figure 25.1 displays the Integrated Curriculum Model (ICM) (VanTassel-Baska, 1986; VanTassel-Baska, Bass, Ries, Poland, & Avery, 1998; VanTassel-Baska & Baska, 2020), a model used to design Javits units of study for gifted students over the past 25 years (Swanson, 2006). The model provides pathways for advanced learning in three dimensions that overlap and interact with different content at different developmental levels (see Fig. 25.1).

Curriculum was designed according to ICM criteria necessary to elevate thinking and problem-solving abilities to be the center of content-based learning rather than peripheral to it. Interventions were designed in language arts (ELA), math, science, and social studies. The materials were implemented in most states and used as a model for curriculum design in several countries, notably Singapore, which revamped its premiere Raffles high school curriculum using the Integrated Curriculum Model. Our studies on the use of the ICM units of study have shown that the nature of the intervention, its fidelity of implementation, and its longevity of use (VanTassel-Baska et al., 1998, 2000; Feng, VanTassel-Baska, Quek, O'Neil, & Bai, 2005) have all been factors in determining the extent and depth of student learning. Yet each study has also shown significant and important growth in the content area addressed and in critical thinking and concept development.

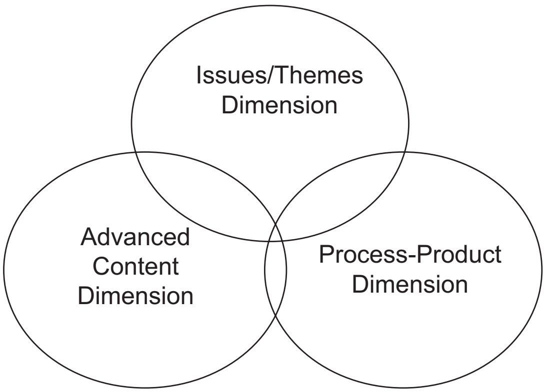

Fig. 25.1 Dimensions of the integrated curriculum model. (VanTassel-Baska, 1986; VanTassel-Baska et al., 1998)

Content Acceleration

Content acceleration is one basic component of the Integrated Curriculum Model. Longitudinal research has documented well the advantages to students of equal ability who have been accelerated versus those who were not. Students in the Study of Mathematically Precocious Youth longitudinal study, a 50-year study that has examined career patterns and outcomes of accelerated students who were identified at age 13 as either verbally or mathematically prodigious by four or more years, continue to outperform equally able students in major markers of adult achievement—patents, books, prestigious degrees, and eminent positions in society (Park, Lubinski, & Benbow, 2007; Park, Lubinski, & Benbow, 2008). These correlational findings suggest that early accelerative intervention and guidance impact decisions made at adult stages of life in positive ways for gifted learners (Lubinski & Benbow, 2006; Kell, Lubinski, & Benbow, 2013). Thus, a strong research-based curriculum for the gifted must include a component of accelerative learning in the domain of tested strength.

The ICM is a model of curriculum that emphasizes content acceleration first (in reading, in math, in science, in the social sciences). Thus, language-arts units, for example, from K-12, were organized based on advanced readings at least two grade levels beyond the placement of the unit of study. Topics in other units were deliberately selected to be used at multiple grade levels, partially for advancement purposes. Because the readings were advanced, so too were the vocabulary and linguistic connections, other areas addressed in the units. A discussion model was superimposed on each major reading, using pre-structured higher-level questions that explored critical thinking (Paul, 1992). A research project framed each unit as well, linked to the issues encountered in the readings. Interdisciplinary connections were made to art, music, and history with sample lesson plans provided.

Higher-Level Processes: Thinking and Problem-Solving

Best practices in instruction for gifted learners focus on the use of inquiry in multiple modalities, from problem-based learning to shared inquiry approaches in discussion (VanTassel-Baska & Brown, 2007). Moreover, general learning research supports the need for the use of higher-level thinking strategies, metacognition, teaching to conceptual understanding, and using concept maps as viable ways to elevate learning for all students (National Research Council, 2000). From an instructional perspective, the ICM provides teachers with learning scaffolds (i.e. concept maps, webs, graphic, and models) that elevate student thinking, problem-solving, and concept development. One example is the use of the literature web in language-arts units that allow students to analyze text simultaneously for vocabulary, feelings, symbols/images, theme(s), and structure through the use of a graphic organizer, used consistently across curriculum and grade levels, to promote automaticity in thinking at higher levels about the content of literature and nonfiction text.

Pedagogy developed for gifted education historically has been based on a set of desired outcomes for gifted learners—higher-level thinking, problem-solving, and conceptual development applied to oral discussion and writing (Reis, McCoach, Little, Muller, & Kaniskan, 2011). Yet, pedagogy also needs to be domain-specific, directly related to teaching a particular subject better in an advanced way (NRC, 2000). The ICM provides a content pedagogy that fulfills the desired outcomes of content learning and higher-level thinking.

Concept Learning

Providing an elevated understanding of content and how it fits together is of special interest to the gifted learner from an early stage of development. Moreover, concepts that make connections within the various domains of learning as well as across to other areas of learning have proven to be effective in enhancing gifted student learning (Kim et al., 2014) and to use as organizers for curriculum work. According to the world of science, major concepts for study might include *patterns, energy and matter, systems, stability and change, models, scale, cause and effect,* and *structure and function.* The three most frequently used concepts in units of study for the gifted have been systems, patterns, and change. All of these concepts are central to the new standards for science (NGSS, 2013) at all stages of development. Thus, employing them across the secondary years to enhance the depth of learning within and across subjects provides a connected way to enhance learning for gifted students. In the area of science, for example, using the concept of systems as the basis for student learning provides an important organizer for understanding the human body, plants, and animals in respect to all having elements, interactions, inputs and outputs, and boundaries. Students can analyze any system according to these components and draw generalizations that relate to all scientific systems such as "systems may be functional or dysfunctional, based on changes to inputs and/or interactions". If the human body ingests food that lacks in nutrition, then subsystems of the body may not function efficiently or effectively, a situation that may affect weight, body mass index, and energy which interact to cause physical problems of obesity, high blood pressure, and cholesterol levels. This change in inputs and interactions also may be seen in other systems, beyond the human body, which are impacted by similar changes. Studying the concept of change helps us understand the dynamism in all of life and how different types of changes impact differently. Predictable change as portrayed by a study of life or water cycles shows us that some changes are systematic while other types of change such as pandemics or tornados are less predictable and therefore wreak physical, social, and economic chaos when they occur. Thus, students can learn generalizations such as "Change may be predictable or random" even as they see that it is inevitable in all living things.

Assessments of Curriculum for Gifted Learners

Assessment tasks were designed that focused on advanced content, higher-level thinking and problem-solving, and on the concept under study. In language arts, that concept was "change", used at all grade levels and in each unit. Pre-assessments provided teachers a diagnostic as to where students were in their higher-level skill acquisition in areas like reading and writing, but also provided a set of data for inferencing instructional direction. Portfolio assessment was designed to document student metacognitive learning. Because pre-assessments were designed in the key areas of literary analysis, linguistic competency, and persuasive writing, we were able to judge how much growth had accrued in these language-arts areas. In several of the studies, a critical thinking measure, designed around the Richard Paul model of reasoning (1992), was used to assess pre-post growth in that dimension of learning (Bracken et al., 2003).

The specific outcomes assessed for gifted learners in the ICM curriculum studies may be seen in Table 25.2. In each case, the outcome is embedded in content but also linked to higher-level thinking and problem-solving.

Implications

How might a domain-specific conception of giftedness best be operationalized to promote talent development in our educational systems? The answer to this question is dependent on several variables being implemented flexibly

Table 25.2 Curriculum studies documenting desired outcomes for higher-level learning

Enhanced literary analysis skills (content)	VanTassel-Baska, Zuo, et al. (2002) and VanTassel-Baska et al. (1998)
Persuasive writing skills (content)	VanTassel-Baska, Zuo, et al. (2002) and VanTassel-Baska et al. (1998)
Enhanced critical thinking skills (higher-level process)	VanTassel-Baska (2018)
Enhanced scientific reasoning skills (content and higher-level process)	VanTassel-Baska et al. (1998) Kim et al. (2014) Cotabish et al. (2014) Robinson et al. (2014)
Enhanced higher-level concept development (i.e. systems and change)	Little et al. (2007) Kim et al. (2014)
Enhanced historical analysis skills (content and higher-level process)	Little et al. (2007)

and with fidelity, providing local school districts discretion over the logistical details but insisting on the elements that must be addressed simultaneously. School systems must take into account the very real issues of students who are underperforming in schools, especially those from low-income backgrounds and students of color, and apply talent development approaches with those students as well as those more easily found and served. A good start might be to adopt W. E. B. Dubois' idea of the talented tenth (1903), finding the top 10% of students from low-income backgrounds and those from low-performing cultural groups as a locus for talent development efforts.

A tapestry of connections needs to be woven that takes into account the problems of public schools that include serving students of color and from poverty as well as changing environments of schools to learning rather than testing. Yet this tapestry must also contain the major threads that promote talent development—the centrality of the individual differences of gifted and other learners, use of student-profile data for guiding opportunities that include acceleration as a primary alternative, enrichment programs and services that are equitable, personnel preparation, appropriate assessment of advanced student learning, flexible time frames and locations for learning, and mandated funding with personnel to coordinate and execute these processes (VanTassel-Baska, 2007, 2018). The continuum of services for the gifted would be planned on a K-16 model, accounting for articulated talent trajectories of advanced options. Figure 25.2 displays this tapestry.

Planning deliberately for the needs of the gifted, individually and collectively, is the central task in addressing the talent-development process.

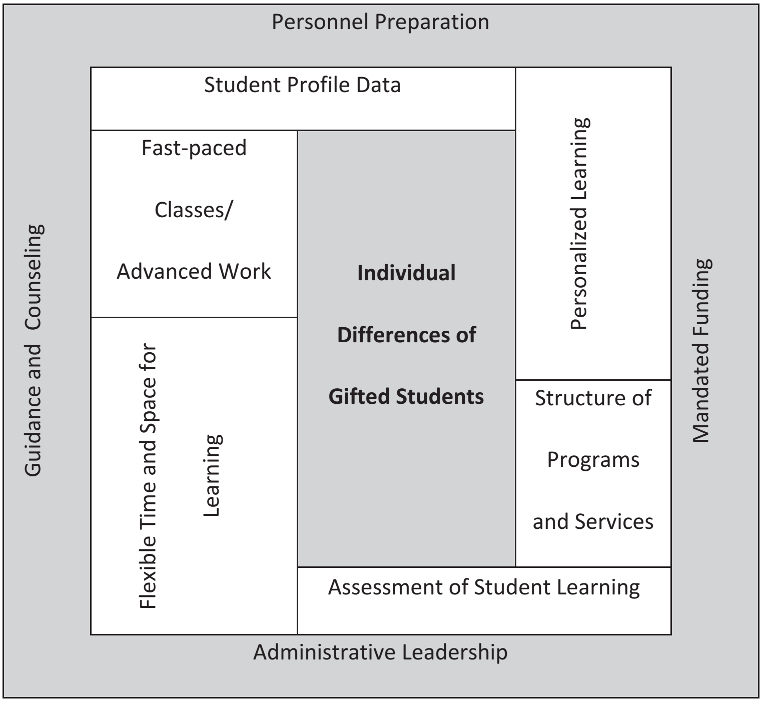

Fig. 25.2 A tapestry of talent development

Interventions are important to try, even in the absence of complete information about their effectiveness. Doing so is necessary to understand the dynamics of a phenomenon under study. Researchers need to try out innovations in schools and then test them for efficacy as well as replicate successful ones. In life, our pharmacological trials often have not been completed when a drug is released because of the drug's preliminary positive effects. Too many gifted students suffer from a lack of treatment in their areas of greatest need because we are too timid in the *doing* of proven educational practices and too lacking in the courage to experiment with others.

Conclusion

While most conceptions of giftedness are complex, psychometrically hierarchal, and educationally multi-faceted, it is critical that we convert such conceptions to the reality of schools. How can we address the needs of gifted children and young adults in the hours of schooling available? This chapter has argued for a domain-specific conception of giftedness, the evidence supporting that orientation, and provided both identification and teaching and learning approaches that address it. As such, the chapter encases a view of provisions for the identification of gifted students and responds to ideas for curriculum interventions that have proven effective in teaching to higher-level learning. It suggests that the field has models that can facilitate both the mechanism of talent search and broader provisions for talent-development services that might be applied systematically. In all endeavors, providing challenges is an important stimulation for the act of doing important work. Applying a conception of giftedness to the operational context of schools remains a challenge for the field, but not because of the lack of viable approaches, especially within the domain-specific realms of learning.

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26

Futures Studies and Future Thinking Literacy in Gifted Education: A Multidimensional Instructional-Based Conception

Hava E. Vidergor

This chapter argues that for curricula to stay relevant in the coming years, the gifted must actively prepare themselves for the future. It proposes a multidimensional developmental conception of giftedness based on talent development, synthesizing models offered by prominent scholars. It proposes a novel way of teaching in Gifted and Talented Education (GATE) programs in schools or ability grouping in heterogeneous classes. It links theory to practice and adds an innovative component defined as future thinking literacy. It illustrates how the Multidimensional Curriculum Model could be applied in elementary, middle, and high school in stages, to develop future thinking literacy, from interdisciplinary through multidisciplinary to the transdisciplinary level of an innovative school subject named "Future Studies."

Conception of Giftedness and Talent

The Developmental Model

This chapter proposes a developmental model of instructing gifted students based on talent development, synthesizing various models (Feldhusen, 1998, 2005; Gagné, 2005; Renzulli, 1978, 2012; Sternberg, 2005). These researchers

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place talent within a developmental context that includes variables external to the individual, such as the environment, and agree that giftedness must be explained via the talent development process**.**

Renzulli (1978) proposed a three-ring conception of giftedness comprised of above-average ability, creativity, and task commitment/motivation. His ideas evolved into a developmental model relating to the interaction between personality and environment (Renzulli, 2012). Feldhusen (2005) explained that nurturing gifts and talents calls for engaging all grade levels in higher-order thinking, such as planning, monitoring, evaluating, and problem-solving, and developing declarative and procedural knowledge. Coleman and Cross (2001) stressed that gifted preadolescents demonstrate general cognitive and creative ability, while adolescents demonstrate abstract thinking ability, produce creative works in some worthwhile area, and demonstrate involvement in activities of abstract thinking and creativity.

Gagné (2005) originally proposed a developmental model of natural abilities transformed into talents. The Developmental Model of Giftedness and Talent (DMGT) defines talent development as the transformation of outstanding natural abilities (gifts-G) into outstanding knowledge and skills (talents-T). Two types of catalysts, intrapersonal (I) and environmental (E), actively moderate the talent development process (D). This model was expanded by Gagné (2013) into the Expanded Model of Talent Development (EMTD), which begins with biological foundations and ends with high-level expertise.

The Wisdom Intelligence Creativity Synthesized developmental model (Sternberg, 2005, 2009) relates to creativity as finding direction and coping with change in the environment; analytical intelligence to ascertain whether creative ideas are good ones; practical intelligence to implement ideas and to persuade others of their value; and wisdom in order to ensure that the ideas will help achieve some ethically based common good (2009). Later, Sternberg (2018) argued that creativity is not enough for becoming successful leaders; leadership development also involves ethics, which often is the reason for leaders' failure.

School-Based Conception of Giftedness

The school-based conception presented in this chapter brings together the cognitive (thinking, creativity), personal characteristics (motivation, leadership, collaboration), and emotional (well-being, self-concept) under one roof for the benefit of gifted and talented learners.

Maker and Nielson (1995) suggested that curricula for the gifted follow four components principles: person (characteristics), process (e.g., problem-solving), product (artifacts representing learning), and learning environment (the place where learning occurs). Cross and Coleman (2005) explained that giftedness is an age-related phenomenon. In elementary school, gifted children should show high general cognitive ability, either through actions or through rapid learning in school-related domains. In secondary school, the gifted should demonstrate advanced development in a foundational domain or produce creative work in some valued area. If these attributes are not evident, the child is not considered gifted in terms of the school's curriculum.

Feldhusen (1998) explained the transition from genetically determined abilities to the display of specific talents in stages. In particular: In Stage 1, in preschool and elementary school, there are stimulating conditions that foster intellectual, physical, and emotional growth such as peers and teachers. Instruction causes rapid growth of knowledge and evidence of precocity. In Stage 2, in elementary school, precocious children may start displaying evidence of their special talent. In Stage 3, in middle school, learning of knowledge and skills is created by the encounter with excellent teachers, enabling learners to develop both cognitive skills and personality. In Stage 4, in high school, learners profit from able mentors and look for career opportunities leading to high-level and creative achievement.

The Schoolwide Enrichment Model (SEM) (Renzulli, 1977, 2012; Renzulli & Reis, 1985) was developed to encourage and promote creative productivity in young people based on the three-ring conception (Renzulli, 1978) evolving to the identification of talent named total talent portfolio (Renzulli, 2005) and resulting in the Enrichment Triad Model, with three types of activities, which was later expanded into Renzulli Learning (Renzulli & Reis, 2012), which uses a computer-generated profile of students' academic strengths, interests, learning styles, and preferred modes of expression.

According to VanTassel-Baska (2005), there are three major approaches to developing programs for gifted and talented learners, addressing their cognitive and affective characteristics: (1) *content-based instruction*; (2) *process skills* focusing on higher-order thinking skills; and (3) *concept- or theme-based curricula.*

The Multidimensional Instructional Conception

The conception presented in this chapter links theory to practice and puts together the developmental model and school-based conception. It acknowledges the developmental stages of cognition, the importance of creativity, and turning personal abilities into talents in interaction with the environment. It also combines content-concept-process programs mentioned earlier and adds the novel aspect of futures studies and future thinking literacy.

This has resulted in designing an innovative Multidimensional Curriculum Model (MdCM), which creates opportunities to engage in large transdisciplinary problems and develop cognitive and personal abilities and competencies. It is applied in an up-to-date learning environment equipped by the latest technology named the Learning In Future Thinking Societies (LIFTS) centers. Learners develop the currently essential future thinking literacy, which is not addressed in gifted programs in schools. This innovative multidimensional conception of instruction is addressed in the following section, followed by suggestions for its application in different grade levels.

Multidimensional Conception of Instruction

In order to understand the novel conception of instructing the gifted within the school system, we first need to address the concept of futures studies and futures studies education.

What Is Futures Studies? And What Is Futures Studies Education?

Dator (2009) explains that a futures thinking or visioning process includes appreciating the past, understanding the present, and forecasting the future, as well as experiencing alternative futures, envisioning the futures, and creating them. Masini (2011) pointed out that education in how to think about the future is of great importance for everyone. She added that it broadens our sense and teaches how to live in a complex society beset by increasing uncertainty. Sardar (2010) explained that predictions, forecasts, and future scenarios do not provide us with knowledge of the future but only suggest certain limited possibilities.

Lombardo (2010) relates to futures education as both multidisciplinary and interdisciplinary, as learners are asked to consider both the "big picture" and how various academic disciplines apply to life. They are given the opportunity to exercise and develop their imagination and deep learning regarding the disciplines studied. She further explains that the global, personal, and hypothetical are connected in developing hypothetical future scenarios, in which learners consider how these changes might impact their own lives.

Mishra, Koehler, and Henriksen (2011) argue that higher-order skills such as creativity cannot be taught in a vacuum, and a transdisciplinary transformational approach seeking common patterns and strategies is needed. Brown, Harris, and Russell (2010) explain that transdisciplinarity fosters collaboration across and beyond disciplines, creative emergence, and the generation of new meanings, all to create possible solutions for super-complex and multidimensional problems—called "wicked problems."

Thus, futures education should involve science, language, history, philosophy, science fiction, technology, psychology, medicine, and basically cover all life areas. It should focus on problem-solving, learning about the past and present, and thinking about possible futures. The multidimensional conception of instructing gifted at school will illustrate how future thinking literacy could be developed applied from early age through high school.

The Multidimensional Curriculum Model

Vidergor's (2015a, 2018a, 2018b) model illustrates an innovative way to improve learning and instruction, based on the premise that learners who actively construct knowledge develop a lifelong skill that not only helps them use critical thinking to process information, but also helps them predict and interpret experiences (Seimears, Graves, Schroyer, & Staver, 2012). The model contains six dimensions. Three are interconnected basic curriculum dimensions: (a) content; (b) process; and (c) product. The three additional key dimensions orbit around, interconnect, and focus on three different perspectives: (a) personal; (b) global; and (c) time. Figure 26.1 illustrates the components of the model.

Content consists of themes, issues, and concepts preferably relating to large interdisciplinary, multidisciplinary, or transdisciplinary concepts.

Process consists of working on more than one perspective using different teaching strategies and thinking tools in a blended learning environment.

Product should be multi-categorical and needs to reflect the new knowledge or skill gained and accumulated while researching the concept/issue using the selected perspectives.

Personal perspective stresses personal involvement and self-awareness of learners and creates interest and intrinsic motivation.

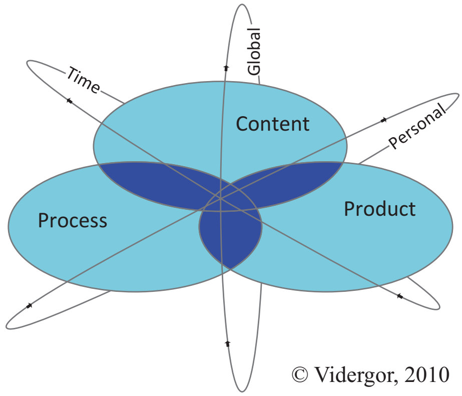

Fig. 26.1 The Multidimensional Curriculum Model (MdCM)

Global perspective challenges learners to look at an issue from the macro viewpoint, analyzing events and concepts by examining similarities and differences, involving different aspects influencing global events and trends.
Time perspective prepares learners to better predict and cope with future changes based on past and present knowledge using tools which help them analyze and consider possible personal or global consequences.

Applying MdCM encourages the development of future thinking literacy. The novel term and its different aspects are addressed below.

What Is Future Thinking Literacy?

Future thinking literacy developed in programs for gifted students has three major aspects: mechanical—including multiple relevant literacies; cognitive—comprised of thinking strategies; and pedagogical—charting key teaching strategies to engage students in the learning process (Fig. 26.2).

The Mechanical Aspect: Multiple Literacies

Leu, Kinzer, Coiro, Castek, and Henry (2017) point out that new literacies are needed because of the development of the internet, and they are multiple, multimodal, and multifaceted, involving critical literacies, strategic knowledge, and social practices. Buckingham (2015) explains that the novel literacies are not created in isolation but rather are an integral part of the social and institutional structures in which they are situated, and furthermore, they

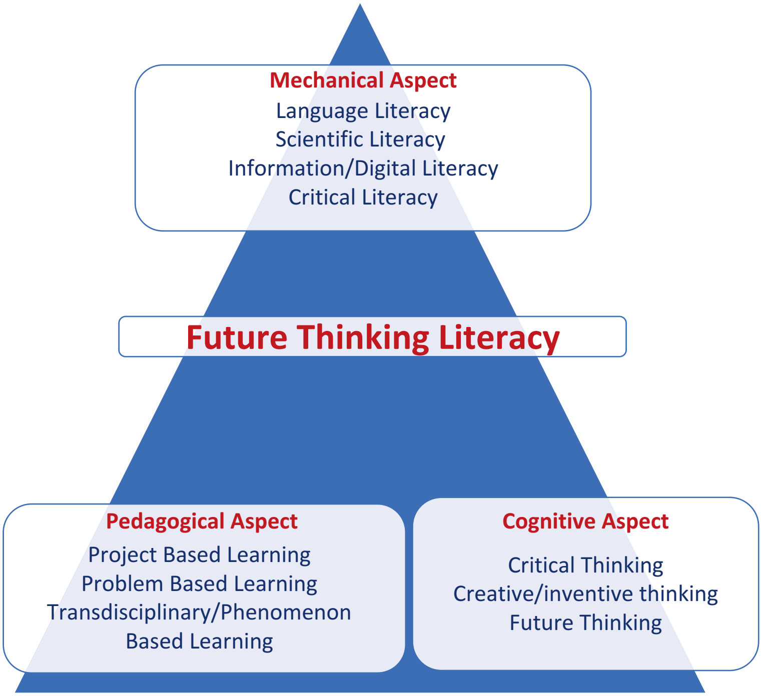

Fig. 26.2 Mechanical cognitive and pedagogical components of future thinking literacy

enable social action. These literacies cannot be taught as a set of cognitive abilities, as they are incorporated in learners' everyday life and previous experiences.

Key literacies addressed and developed by MdCM include:

Language literacy—a human right and fundamental part of the human experience requiring responsibility for making meaning, communication, and connection with others (Keefe & Copeland, 2011).

Scientific literacy—encompasses *practical civic* and *cultural scientific literacy,* which may aid in organizing curricula to meet the needs of different learners (Dillon, 2016).

Critical literacy—makes meaning of text using critical thinking to look for hidden messages (Stevens & Bean, 2007). It involves critical reading and writing that plays an explicit role in changing the world (Morrell, 2015).

Information/digital literacy—is "producing and sharing information in participatory digital environments" (Mackey & Jacobson, 2011, p. 62). Meta-literacy, as they define it, includes information, media, digital, visual, and cyber literacies.

All these literacies are required for future thinking to reach insights regarding future trends and developments, and all these literacies involve cognitive processes referred to as scientific, creative, and future thinking.

The Cognitive Aspect

Applying and developing future thinking literacy involves complex cognitive processes. The revised Bloom's Taxonomy (Anderson & Krathwohl, 2001) identified remembering, understanding, and applying as lower-order thinking skills and analyzing, evaluating, and creating as higher order ones. They explained that higher-order skills are involved in the creation of new knowledge while utilizing problem-solving and critical and creative skills and strategies. Passig (2007) added a higher-order skill situated between evaluating and creating named melioration: the competence to borrow a concept from a field of knowledge far removed from one's domain and adapt it to a challenge in an area of personal knowledge or interest. This competence improves an existing concept or object to solve a need or problem. Figure 26.3 maps the cognitive processes developed in the process of acquiring future thinking literacy.

Future thinking literacy consists of three main thinking processes divided into thinking strategies. Scientific thinking (Inquiry) and creative thinking

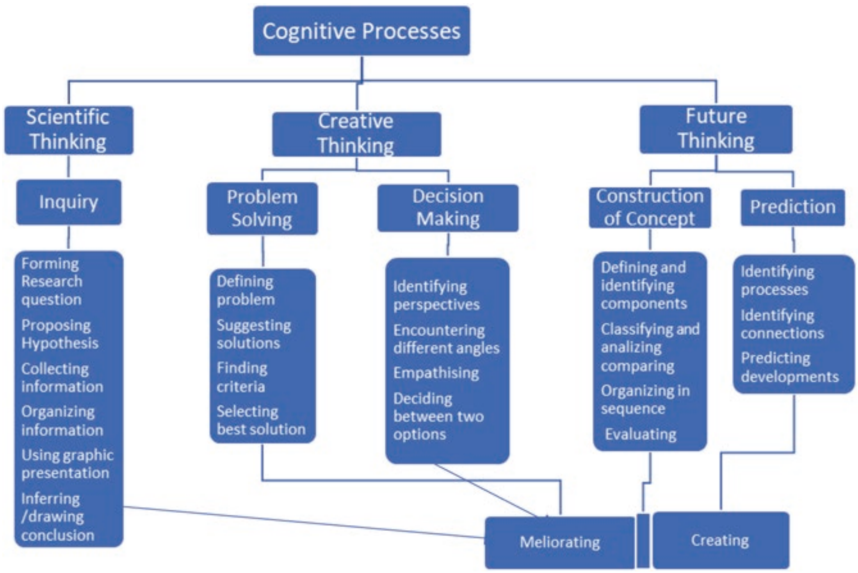

Fig. 26.3 Cognitive processes developed by future thinking literacy

(problem-solving and decision-making) lead to melioration, while future thinking (prediction) leads to the creation of novel ideas and products. The construction of concept enables the transition from melioration to creation. The three types of cognitive processes are addressed below.

Scientific/critical thinking: Most classical scientific inquiry skills (e.g., asking questions, formulating hypotheses, planning experiments, drawing conclusions) are classified as higher-order thinking skills (Zohar & Dori, 2003). Other examples of cognitive activities that could be classified as higher order are argumentation, comparison, problem-solving, dealing with differences of opinion, decision-making, and identification of hidden assumptions (Zohar & Nemet, 2002). The connection between scientific/critical thinking and creative thinking was explained via metacognitive thinking, which simultaneously involves critical and creative skills and procedures (Marzano et al., 1988). Vidergor (2018a) found a high correlation between scientific and creative thinking.

Creative/inventive thinking: Definitions of creativity vary. Perkins, Tishman, Ritchhart, Donis, and Andrade (2000) related to creative thinking as a subtype of critical thinking, the contrast between them lying more in the aims than in the processes. Hativa (2003) stated that critical thinking is based on standards of objectivity, strategies, and techniques involving problem-solving, reflectivity, and practicality which lead to decisions and actions. According to Sternberg, Kaufman, and Roberts (2019) "people are creative when they generate new, surprising, and compelling ideas" (p. 245). Creative thinking in the context of the presented model involves problem-solving and decision-making.

(a) *Problem-solving:* De Bono (1985, 2006, 2017) coined the terms "parallel thinking" and "lateral thinking" and described the divergent and convergent thinking processes as the basics of creative thinking and problem-solving. Problem-solving skills as described in the Future Problem Solving Program (FPSP) *Coach's Handbook* (2001) include (a) identifying the problem; (b) defining the problem; (c) suggesting varied solutions; (d) suggesting criteria for evaluation of best solution; (e) applying criteria to select the best solution; and (f) designing an action plan.

(b) *Decision-making:* This is one of the competencies of critical thinking defined as "the mental processes, strategies, and representations people use to solve problems, make decisions, and learn new concepts" (Sternberg, 1986, p. 3). According to Holmes, Wieman, and Bonn (2015), "the ability to make decisions based on data, with its inherent uncertainties and variability, is a complex and vital skill in the modern world" (p. 1199) and needs to be developed by repeated practice based on data and feedback.

Future thinking—Future thinking consists of two main aspects: construction of a concept and prediction.

(a) *Construction of concept:* Passig (2000) determined that learning about the past is not enough; we should be able to develop an understanding of future possibilities and options. In order to teach learners to think about the future and incorporate into their thinking elements of problem-solving that take into consideration the time aspect, learners need to practice historical and current review of issues or subjects, leading to designing short-term (5 years) and long-term (20 or 50 years) predictions (Passig, 2001).

(b) *Prediction:* Passig (2004) determined that awareness of Future Time Span (FTS) can be developed using a model comprising four strategies, four levels of awareness, and five timespans. The four strategies are: (1) predictions by building a model of development over time; (2) scenarios that design several options of occurrence; (3) future imagery creating a collective/global view (global perspective); and (4) wild cards—illogical things that might happen followed by unconventional solutions. The four levels of awareness are: (1) continuity between events; (2) connection between events; (3) duration of events; and (4) acceleration/deceleration of activities. The five time ranges are: (1) immediate—0–5 years; (2) short-range—5–10 years; (3) median-range—10–30 years; (4) long-range—30–50 years; and (5) very long-range—50–100 years.

The Pedagogical Aspect

Different teaching-learning strategies such as project, problem, and phenomenon-based learning must be applied to impart these thinking skills and literacies. In general, future thinking literacy entails a capacity to decipher, criticize, and compose a future representation, addressing the historical and social contexts in which issues, topics, or products are developed using multiple text forms. In order to develop these competencies, learners need to work collaboratively on a phenomenon or transdisciplinary topic, via project and problem-based learning (Vidergor, 2018a, 2018b; Vidergor, Givon, & Mendel, 2019; Vidergor & Atias, in review).

Project-based learning—Bell (2010) defined PjBL as "a key strategy for creating independent thinkers and learners. Children solve real-world problems by designing their own inquiries, planning their learning, organizing their research, and implementing a multitude of learning strategies" (p. 39). According to Thomas (2000), PjBL should be central to the curriculum, be focused on questions and problems, involve constructive investigation, and be student driven and realistic.

Problem-based learning—Horak and Galluzzo (2017) found that learners in the PBL group outperformed their gifted peers receiving the traditional curriculum, and therefore, concluded there was sound evidence for the benefits of student-centered, inquiry-driven learning with gifted learners. Robinson, Dailey, Hughes, and Cotabish (2014) also found significant differences favoring PBL in the teaching of science to gifted elementary learners in second through fifth grades.

Transdisciplinary/phenomenon-based learning—The phenomenon-based approach to teaching and learning invites educators to break the boundaries of traditional subject teaching and move toward interdisciplinary explorations of phenomena (Symeonidis & Schwarz, 2016). Silander (2015) argued that holistic real-world phenomena help initiate learning, provided they "are studied as complete entities, in their real context, and the information and skills related to them are studied by crossing the boundaries between subjects" (p. 16). A phenomenon is an authentic object of observation, a systemic framework for the things to be learned (systemic model), or a metaphorical framework for the things to be learned (analogous model). Examples of phenomena include such topics as climate change, the EU, media and technology, water, or energy (p. 18).

Identification/Assessment

Identification and assessment of gifted learners' abilities are based on Sternberg and Kaufman (2018), where each model should use multiple tools, take into consideration non-intellective personal variables such as motivation, creativity, wisdom, initiative, courage, stamina, and also relating to contextual variables, such as enculturation and socialization.

MdCM encompasses different types of literacies, thinking, learning strategies, and products that are the direct outcomes of the learning. Diagnostic assessment of each of these aspects could shed light on performance and student abilities. Along with traditional tools and tests, assessment based on performance and products could use predetermined mutually agreed upon tools such as rubrics, alongside portfolios designed by the gifted learners themselves. These tools will better reflect learners' progress, competencies, talents, and personal interests.

Linking Theory to Practice: Futures Studies and Future Thinking Literacy in Schools

Futures studies could be used to personalize, differentiate, and accelerate learning, as well as for talent and leadership development as a result of exposure to real-life issues. Optimally, the school must create an environment that inspires students to explore the past, understand the present, and foresee possible futures. The proposed environment, the main product (group future scenario), and other teaching-learning implications are addressed in the first part while the second explicates the different stages of application.

Learning in Future Thinking Societies

The LIFTS center at school (Vidergor, 2018b) will be designed as open-space, inviting learners to investigate large relevant topics applying personal, global, and/or time perspectives sited to elementary, middle, and high schoolers. It will enable learners to work in a blended learning environment according to needs, ability, and interest. Learners will either work individually on a project supervised by an expert/mentor teacher, or in small groups to solve a problem and suggest a solution to be presented and applied to an authentic audience outside school.

The center will be equipped with the latest technology including video conferencing, with 3D printers and assessment showing real-time learner progress. Areas will be designed according to the station rotation model, incorporating one-on-one tutoring, individual learning cubicles for contemplation and reflection, as well as spaces for collaborative group work using computers/tablets and interactive screens. Large "thinking walls" will enable learners to jot down ideas and record creative thinking.

Within this blended environment, learners will use mobile phones as part of BYOD, game-like apps, tablets, learning apps (An, 2014), and MOOCS (Brahimi & Sarirete, 2015), rotating between classroom and computer room, flipping learning and working on selected personal projects with mentor teachers in specific time slots and spaces. Two other powerful tools to aid learning are collaborative game-based learning (Sung & Hwang, 2013) and the use of 3D printers (Schelly, Anzalone, Wijnen, & Pearce, 2015) for the development of creative thinking and entrepreneurship.

Collaborative Future Scenario Writing: The Final Product

The project products should be multi-categorical, that is, present a model, a drawing, or an exhibition with some written explanation of why it was chosen, what each part represents, and so on. Additional products would be an action plan based on the problem-solving process.

The final product involves writing a collaborative future scenario using future thinking. Atance and O'Neill (2001) defined episodic future thinking as the ability to project the self forward in time to pre-experience an event. The collaborative future scenario invites learners to project themselves into the selected future time span, summarizing the learning and looking into the future based on accumulated knowledge of the topic. Schwab, Cerutti, and von Reibnitz (2003) determined that the scenario approach involves developing future situations and describing the path from the present to these future situations, therefore, scenario planning process helps to make the desirable future real.

Collaborative future scenario writing (Vidergor, 2018b) is written in small groups, in the classroom in a non-competitive environment. It summarizes the learning, is performed after mini-inquiry and problem-solving, and is set in, and opens with, the selected time range (5, 10, 20 or 50 years). The learners project themselves into the future, write a story with a plot (500–1000 words, depending on student grade and level) in first person, relating to the studied issue. Scenarios are written in class, read and discussed in plenary looking for similarities and differences in learners' views of the future regarding the studied topic.

Added Value

Using the above-mentioned strategies enables personalized or individualized learning (Houchens et al., 2014), including self-regulation (Zimmerman, 2000), mixed-age grouping (Smit & Engeli, 2015; Smit, Hyry-Beihammer, & Raggl, 2015) based on learners' talents, curiosity and areas of interest (Mitra & Rana, 2001), creating engagement and flow of creativity (Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003), developing multiple intelligences (Gardner, 2003), catering to different learning styles (Schmeck, 2013), and addressing personal and cultural diversity (Banks, 2015).

Using MdCM and engaging students in future thinking could also develop social responsibility and leadership skills. Vidergor and Sisk (2013) stress the need to teach leadership and enhance gifted learners' characteristics for their own benefit and for the benefit of society. Teaching leadership to our gifted learners can develop their skills so that they become thinking, responsible, creative, and proactive leaders who are aware of other people's needs (Vidergor, 2015b) and can take responsibility for their own and their peers' learning (Vidergor, 2015c).

Stages of Application

Stage One: Scientific and Creative Thinking (Elementary School, Grades 4–6)

Thinking process: scientific thinking-inquiry, creative thinking, and future thinking.

Thinking tools: thinking maps, thinking hats, S.C.A.M.P.E.R. simplified future scenario.

Content mode: interdisciplinary

Perspectives: exploring the personal perspective (individual, family, class) and time perspective.

Sample subjects and projects: family, friendship, hurricane, the human body, holidays, animals, and food, designing a school garden, designing a healthy school kiosk, family healthy eating plan, designing and caring for petting zoo at school.

Main products: thinking maps, creative presentation, and simplified group future scenario. The group future scenario in elementary school will follow the basic criteria of scenario writing omitting processes and connections between processes. Students will be asked to try and incorporate the past and present of the issue or product they have investigated.

Stage Two: Future Thinking (Middle School, Grades 7–9)

Thinking process: continuing to elaborate on scientific and creative thinking. Introducing future thinking for certain issues. Not asking learners to focus on connections between processes and events.

Thinking tools: thinking maps, thinking hats, Substitute Combine Adapt Modify Put to another use Eliminate Reverse (S.C.A.M.P.E.R.), problem-solving stages, timeline, and group future scenario.
Content mode: multidisciplinary.
Perspectives: exploring the personal, semi-global (class, school, community), and time perspective (construction of concept and prediction, paying attention to processes).
Sample subjects and projects: ecology, energy, technology. Investigating products such as the plane, cellphone, computer, and caring for the elderly or people with special needs.
Main product: group future scenario following all criteria without connections between events or processes.

Stage Three: Futures Studies (High School, Grades 10–12)

Introducing a new subject at school named futures studies. This novel subject will integrate science, math, language, history, philosophy, science fiction, technology, psychology, medicine, and basically covers all areas of life. It will involve problem-solving, creating new products, and learning about the past and present, and thinking about possible multiple futures.

Thinking process: relating to future thinking especially seeking to outline and understand processes and connections between processes or events that will lead to future developments and multiple future representations, suggesting not one, but several possible futures.
Thinking tools: problem-solving and inventive thinking stages, future scenario.
Content mode: transdisciplinary, starting by identifying a problem that needs addressing.
Perspectives: exploring the global (national/international) and time perspectives.
Sample subjects: emigration, global economy, human rights, employment, the EU, media and technology, public health.
Main product: multiple group future scenarios. Asking students to write two to three different possible scenarios and explain the differences between them. Discuss scenarios presented by other groups and compare/contrast based on predetermined criteria.

Conclusion

The multidimensional instructional-based conception of giftedness puts together theory and practice and stresses the need to develop future thinking literacy among gifted learners in the school context. It is based on the Multidimensional Curriculum Model. It suggests combining the cognitive, personal, and emotional aspects in an innovative environment which could develop gifted learners' abilities and skills relevant in our and future time. Developing future thinking literacy is performed in three stages using different thinking tools and teaching strategies. In elementary and secondary school gifted learners will practice thinking using interdisciplinary and multidisciplinary content. In high school a new subject named "Futures Studies" will be offered to learners, in which they will examine global issues using a transdisciplinary approach, attempting to solve problems and suggesting action plans for the benefit of all humankind.

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27

Giftedness as a Propensity to Use Creativity-Generating Intellectual Styles

Li-fang Zhang

Giftedness is a multifaceted construct and, as such, can be conceptualized in numerous ways. In this chapter, I argue that giftedness can be conceptualized as a propensity to use creativity-generating intellectual styles. This chapter comprises three parts: The first part introduces the construct of intellectual style and provides justifications for the present conception; the second part reviews research evidence supporting the present conception; and the third part discusses the implications of the research findings for identification and education of gifted students.

Intellectual Styles and Conception of Giftedness

Intellectual styles—an all-embracing term for such constructs as cognitive styles, learning approaches, career personality types, personality styles, thinking styles, teaching styles, and many other constructs (with or without the word "style")—refer to people's preferred ways of processing information and dealing with tasks (Zhang & Sternberg, 2005). Intellectual styles are distinct from abilities: Whereas abilities refer to what individuals can do, intellectual styles refer to individuals' preferred ways of doing what they do. The field of

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intellectual styles has a history extending back more than eight decades (Allport, 1937). Notwithstanding its long history, until recently, it was constantly struggling with its identity due to several major challenges. One such challenge was posed by three long-standing controversial issues concerning the nature of intellectual styles: style overlap, style malleability, and style value.

Style overlap concerns the issue of whether styles are constructs that are different from one another or constructs that are similar to one another but with different labels. Style malleability pertains to the classic debate over nature versus nurture—that is, whether people are born with particular intellectual styles that remain static or whether they acquire their intellectual styles after they are born and change them when appropriate. Style value concerns the question whether or not some styles are more effective than others and should thus be nurtured.

Over the years, many scholars have examined the aforementioned issues concerning the nature of styles conceptually and empirically (e.g., Kogan, 1980; Royce, 1973; Sternberg, 1997b). Based on both empirical evidence and theoretical conceptualization, Zhang and Sternberg (2005) proposed the *Threefold Model of Intellectual Styles*. This model is considered a key milestone in the field of intellectual styles for three reasons. First, it has built a common language among scholars within the field by using the general term "intellectual styles" to cover all style constructs. In this way, various labels that seem like they might or might not refer to different things are unified.

Second, the model has established an overarching conceptual framework by classifying all existing style constructs into three types of intellectual styles: Type I styles, which are more creativity-generating and denote higher levels of cognitive complexity; Type II styles, which denote a norm-favoring tendency and suggest lower levels of cognitive complexity; and Type III styles, which may show the characteristics of either Type I or Type II styles, depending on the stylistic demands of the specific task being undertaken. Such a categorization enables people to understand their own or others' intellectual styles in terms of five simple dimensions of preferences for (1) a low degree of structure versus a high degree of structure, (2) cognitive complexity versus cognitive simplicity, (3) conformity versus nonconformity, (4) autonomy versus authority, and (5) individual work versus group work (see Zhang & Sternberg, 2005 for details).

Third, the model adopts an unambiguous stance on each of the three controversial issues concerning the nature of styles. According to the model, the various style constructs have certain features in common but also have their own defining characteristics; intellectual styles are malleable as a function of socialization and training; Type I (creativity-generating[1]) styles are more adaptive than Type II (norm-favoring) styles; while the value of Type III styles shifts owing to their inconsistent relationship with other attributes. It should be noted that the value of an intellectual style is not determined by any individual or group; rather, it lies in the association between the style and particular human attributes and outcomes. Styles that are routinely positively correlated with human attributes and outcomes commonly considered and empirically shown to be desirable (e.g., critical thinking, openness personality trait, motivation to approach success, better mental and physical health, and a wide array of other desirable attributes and outcomes), across domains and across contexts, are deemed to carry adaptive (i.e., desirable, effective, and positive) value. In contrast, styles that are consistently positively associated with human attributes and outcomes widely considered and empirically shown to be undesirable (e.g., neuroticism, lower levels of cognitive development, identity confusion, etc.), across domains and across contexts, are said to have maladaptive (i.e., undesirable, ineffective, and negative) value.

To substantiate Zhang and Sternberg's (2005) argument concerning the malleability and value of intellectual styles, I subsequently wrote two monographs—one on style malleability (Zhang, 2013) and the other on style value (Zhang, 2017). It was during the process of searching the literature for my book on style malleability (Zhang, 2013) that I noticed that gifted students[2] tend to manifest greater use of Type I intellectual styles than the general student population. Specifically, research (e.g., Delbridge-Parker & Robinson, 1989; Hawkins, 1997; McCarthy, 1975; Swiatek & Cross, 2007) has consistently shown that, while gifted adolescents tend to score significantly higher than the general adolescent population on the introversion, intuition, thinking, and perceiving scales of the *Myers-Briggs Type Indicator* based on Jung's (1923) theory of personality types, the most common personality styles among gifted adolescents are the intuitive and perceiving styles—both classified as Type I intellectual styles (Zhang & Sternberg, 2005). These overwhelmingly consistent findings aroused my curiosity: Would the gifted student population also score higher than the general student population on Type I styles as evaluated by inventories based on other style constructs? Results from a further literature search provided an affirmative answer to this question. Specifically, in addition to the personality style construct, four other

[1] Hereafter, the terms "creativity-generating" and "Type I" will be used interchangeably and the terms "norm-favoring" and "Type II" will be used interchangeably.

[2] As introduced in the section, "Intellectual Styles of Gifted Students" (see in the next part, "Empirical Evidence"), the great majority of the studies involved research participants who were identified as academically gifted based on their school GPA's and/or standardized test scores.

style constructs have generated research on the intellectual styles of the gifted: field dependent and field independent (FDI) cognitive styles (also known as perceptual styles; Witkin, 1948), thinking styles (Sternberg, 1988), reflective and impulsive styles (also known as conceptual tempo; Kagan, 1965), and career personality styles (Holland, 1973). The specific styles—classified as three types of styles based on Zhang and Sternberg's (2005) threefold model of intellectual styles—within each of the five style constructs are presented in the Appendix. The definitions of all of the specific styles and the details of the primary inventories measuring the style constructs can be found in a number of publications (e.g., Zhang, 2013, 2017; Zhang & Sternberg, 2006).

Like research based on personality styles, research based on the other four style constructs has unambiguously shown that gifted students tend to score higher on creativity-producing intellectual styles than the general student population. It was precisely such an affirmative answer that prompted my conceptualization of giftedness as a propensity to use creativity-generating styles.

A key advantage of this conception is the fact that the intellectual style construct is multifaceted, as is giftedness. As has been articulated by Zhang and Sternberg (2005), an intellectual style is—to varying degrees—cognitive, affective, physiological, psychological, and sociological. It is cognitive because whatever styles are used in information processing, some kind of cognitive process is inevitably involved. It is affective because one's way of dealing with a task and processing information (i.e., adopting an intellectual style) is in part contingent upon how one feels about the task. If one is truly interested in the task at hand (assuming that the task requires creativity and a deep understanding), one may, for example, use a Type I style in dealing with the task. In contrast, if one is not interested in the task, one may simply use a Type II style. It is physiological in a way because the use of a style is in some measure affected by how the information provided is perceived (i.e., through hearing, touch, or vision). It is psychological because the use of a specific style depends to some extent on the dynamic interaction between personal attributes (e.g., personality, value, resilience) and the environment. Finally, an intellectual style is sociological because the employment of a style is influenced by the preferences of the society in which one lives for different ways of thinking.

The multifaceted nature of intellectual styles makes the present conception of giftedness easily understood and practical because creativity-generating intellectual styles have been found to be associated not only with giftedness but also with a wide range of desirable human attributes (Zhang, 2017), including those deemed (by prominent scholars in the field of giftedness) to be essential components of giftedness. These include cognitive attributes such as metacognition (Borkowski & Peck, 1986; Shore, 2000), critical thinking (Callahan & Miller, 2005), and problem solving (Sternberg, 1997a) as well as non-cognitive attributes such as creativity (e.g., Feldhusen, 2005; Renzulli, 1978), drive for knowledge (Heller, Perleth, & Lim, 2005), achievement motivation (Gagné, 2005), and epistemological and psychosocial development (Csikszentmialyi & Robinson, 1986). The intimate connection between creativity-generating intellectual styles and other attributes that are essential components of giftedness makes the present conception of giftedness even more appealing because it does not exclude other conceptions of giftedness; on the contrary, it complements and validates them.

Empirical Evidence

In this part, two types of research findings supporting the present conception of giftedness are reviewed. The first type comprises studies aimed at identifying the intellectual styles of the gifted, while the second type consists of studies examining the relationship between intellectual styles and several attributes long considered to be crucial to the notion of giftedness.

Intellectual Styles of Gifted Students

This section presents research evidence demonstrating that giftedness tends to be associated with the use of creativity-generating intellectual styles. The presentation follows the order in which the individual style models were mentioned in the first part of this chapter.

Personality Style Profiles of Gifted Adolescents The personality style profiles of highly able adolescents have been extensively investigated since the mid-1970s (e.g., Delbridge-Parker & Robinson, 1989; Hawkins, 1997; McCarthy, 1975; Swiatek & Cross, 2007). Although the authors of these studies defined the concept of giftedness differently, varying from high academic ability to special talents in such areas as mathematics and music, they all reached one prime conclusion: Gifted students have different personality style profiles from those of the general student population, regardless of the fact that gender differences in personality styles within the student gifted population follow the same patterns as those within the general student population.

Sak (2004), for example, analyzed the findings of 14 studies comprising 19 samples involving 5723 gifted adolescents and compared the participants' scores on each of the eight personality style scales with those of the general adolescent population. Results indicated that the gifted adolescents were significantly more likely to score higher on the introversion, intuition, thinking, and perceiving personality styles than the general adolescent population. In addition, the most common personality styles among the gifted students were the intuitive and perceiving styles (both of which are creativity-generating intellectual styles).

The above general findings on the personality style profiles of gifted students have been supported by studies conducted since 2004 as well as those not included in Sak's (2004) review. For example, early in 1993, Mills examined the personality styles of 610 academically talented students (aged between 12 and 16 years) participating in the talented summer programs at Johns Hopkins University. A comparison group of 224 students, matched with the talented students in terms of sex, age, and socioeconomic status were selected from three schools in Pennsylvania. Participants' scores on the *Myers-Briggs Type Indicator* (Myers, 1962) indicated that the academically talented students scored significantly higher on the Type I intuitive and perceiving personality styles as well as on introversion and thinking than the research participants chosen from the general student population. Although Zhang and Sternberg (2005) classified the introverted and thinking personality styles as Type III styles, Zhang's (2017) subsequent review of the literature suggested that both introversion and thinking had demonstrated the characteristics of Type I styles more often than they had those of Type II styles. Therefore, it could be argued that the gifted students in Mills's (1993) study tended to report more frequent use of creativity-generating personality styles compared with the general student population.

Cross, Neumeister, and Cassady (2007) investigated the personality styles of 931 gifted students who were attending a public residential academy in the United States. The researchers concluded that both genders in this gifted sample generally scored higher on the creativity-generating intuitive and perceiving styles. Moreover, gender-specific comparisons between the gifted and normative samples suggested that giftedness was associated with the introversion and thinking personality styles. Thus, Cross and his fellow researchers' findings dovetailed with those of Mills (1993).

As another example, Swiatek and Cross (2007) examined the personality style profiles of 339 gifted students who had just entered a state-funded residential academy for academically gifted adolescents (11th graders) in the United States. As in other studies, these gifted students were typified by their high levels of orientation toward intuition and perception as evaluated by the *Myers-Briggs Type Indicator* (Myers, 1962).

In this context, it is worth mentioning that the general finding that gifted students tend to score higher on the creativity-generating personality styles has been obtained not only among adolescents but also among other age groups in the gifted population. For instance, Oakland, Joyce, Horton, and Glutting (2000) compared the personality styles of 401 young children (aged 8 through 17 years) identified as academically gifted with the personality styles of 1152 children of the same age group not identified as gifted drawn from two school districts—one in Texas and the other in Washington in the United States. The participants responded to the *Student Styles Questionnaire* (Oakland, Glutting, & Horton, 1996) designed for children based on the *Myers-Briggs Type Indicator* (Myers & McCaulley, 1985). Results showed that the school children identified as gifted demonstrated a stronger preference for imaginative styles, whereas the students not identified as gifted indicated a stronger inclination to use practical styles.

In the same way, a preference for creativity-generating personality styles has been identified among gifted teachers—assuming that exceptional and exemplary teachers can be considered gifted. In this regard, when Mills (2003) examined the personality styles of gifted students, she also assessed the personality styles of a group of 63 teachers identified as exemplary teachers on the basis of students' evaluations as well as observations and performance ratings given by administrators at the Center for Talented Youth, Johns Hopkins University. Results indicated that the teacher participants, unlike non-gifted teachers but like gifted students, showed a strong orientation toward thinking and intuition—which are both creativity-generating personality styles. Similarly, Rushton and his colleagues (Rushton, Knopp, & Smith, 2006; Rushton, Morgan, & Richard, 2007) concluded in their studies of exemplary teachers in Florida that exemplary teachers were significantly more likely to be intuitive and perceiving than their non-gifted peers.

Field Dependence/Independence of Gifted Students As noted earlier, although FDI is commonly acknowledged as the pioneering intellectual style construct, research focusing on the perceptual styles of gifted students has not been fruitful. Notwithstanding this, the three existing studies conducted among different age groups of children yielded unequivocal findings revealing the close association between the creativity-generating field-independent style and giftedness.

The earliest study (Steele, 1989) was conducted among preschool children in Texas, the United States. Participants were 62 gifted children (with IQs ranging from 125 to 160; aged between 31 and 74 months) and 83 non-gifted children (with IQs ranging from 86 to 124; aged between 29 and 76 months). The children were given a number of cognitive style tests, including the *Preschool Embedded Figures Test* (Coates, 1972). Results suggested that the gifted preschoolers generally displayed higher levels of field independence than did the non-gifted preschoolers.

A study by Young and Fouts (1993) was carried out among 150 second- and third-grade students selected from three schools located in a small, rural school district in the United States. The study aimed at comparing the levels of FDI of three groups of students: (1) 50 students who had been selected and enrolled in the district's *Program for the Academically Talented*; (2) 48 students who had been nominated for gifted services in the district, but who were ultimately not selected; and (3) 52 students who had not been nominated for gifted services and who were randomly selected for the purpose of comparison. All participants were assessed on the *Children's Embedded Figures Test* (Witkin, Oltman, Raskin, & Karp, 1971). Results showed that the students who had been selected for gifted services were the most field independent; the students who had not been nominated for gifted services were the least field independent; and the level of field independence of the students who had been nominated but not selected for gifted services was in between that of the first two groups.

A final study (Fehrenbach, 1994) compared the levels of FDI between gifted and average readers. Research participants were 30 school children identified as gifted and 30 children not identified as gifted selected from a student population of 300 eighth, tenth, and twelfth graders attending regular public schools in small towns or rural areas in Kansas. The children were deemed gifted based on their scores (above 95th percentile) on the Comprehension Subtest of the *Iowa Test of Basic Skills* as well as those on the *Wechsler Intelligence Scale for Children – Revised* (Full Scale or Verbal; Wechsler, 1974). Children's levels of FDI were evaluated with the *Hidden Figures Test* (Ekstrom, French, Harman, & Dermen, 1976). Furthermore, the participants were assessed on their use of reading strategies with an essay and a challenging passage from the *Informal Reading Inventory* (Burns & Roe, 1985). Results indicated that the gifted readers' levels of field independence were significantly higher than those of the average readers. Moreover, field independence was significantly associated with the use of reading strategies beneficial to reading comprehension, including summarizing accurately, re-reading, and analyzing the structure or content of the story.

Thinking Styles of Gifted Students In the first decade of the twenty-first century, two groups of scholars (Alborzi & Ostovar, 2007; Park, Park, & Choe, 2005) compared the thinking styles of gifted high school students with those of non-gifted students. Both studies found that giftedness was closely associated with creativity-generating thinking styles.

In the first study, Park, Park, and Choe (2005) compared the thinking styles of 179 students from two schools especially designed to cultivate high-quality intellects in mathematics and sciences with the thinking styles of 176 students from general high schools in South Korea. Results revealed that the gifted students scored significantly higher on Type I thinking styles as assessed by the *Thinking Styles Inventory* (Sternberg & Wagner, 1992), whereas the general high school students scored significantly higher on Type II thinking styles. Moreover, within the gifted group, better performance on the *Scientific Giftedness Inventory* (a measure of creativity, leadership, morality, motivation, and scientific accomplishment) was significantly related to higher scores on the creativity-generating thinking styles.

Alborzi and Ostovar's (2007) study of school students was also a comparative one. The research sample comprised 200 junior high school students, including 91 participants studying in schools for gifted students in Shiraz, Iran, and 109 students not identified as gifted in four general schools, also located in Shiraz. All participants responded to the *Thinking Styles Inventory* (Sternberg & Wagner, 1992). The study found that the gifted students tended to report the use of both Type I and Type III thinking styles, particularly the former, while the "non-gifted" students were more likely to report the use of Type II thinking styles.

Career Personality Styles of Gifted Adolescents Although Holland's (1973) theory of career personality styles/types originated in the United States, both of the existing studies on the career personality styles of gifted adolescents were conducted in Germany. In both studies, gifted students scored significantly higher on the Type I career personality styles (i.e., artistic and investigative) than non-gifted students.

In the first study, Sparfeldt (2007) investigated the career personality styles of 204 German adolescents with an average age of 20 years. The participants comprised a group of 106 intellectually gifted students (with a mean IQ of 136) and a matched group of 98 students of average intellectual ability (with a mean IQ of 103). Participants' career personality styles were measured with a German language version of an inventory based on Holland's (1997) model of vocational choices. Results indicated that the intellectually gifted adolescents scored significantly higher on the investigative style than the students of average intellectual ability.

In the second study, Vock, Kőller, and Nagy (2013) compared the career personality styles of intellectually gifted adolescents and academically high achieving students with those of their intellectually non-gifted and academically low achieving counterparts respectively. Students who were at or above the 98th percentile of an intelligence scale were classified as intellectually gifted, while those who were at or below the second percentile were classified as less intelligent. Similarly, students who had earned a grade point average (GPA) at or above the 98th percentile in their final school examination were categorized as high achievers, while those who had obtained a GPA at or below the second percentile were regarded as low achievers. Two waves of data collection were conducted—Wave 1 (in 2002) and Wave 2 (in 2004). Participants for the first wave of study were randomly selected from 4649 students attending 149 schools. Of these students, 2318 were also candidates for the second-wave study. As in Sparfeldt's (2007) study, a German language version of an inventory based on Holland's (1997) model of vocational interests was used to identify the participants' career personality styles. Results from both waves of data suggested that, compared with the less gifted students, the gifted students scored significantly higher on the creativity-generating investigative style as well as on the realistic style (classified as a Type III style). At the same time, data from both waves of study indicated that, unlike the low achievers, the high achievers tended to report the use of the investigative style. Furthermore, data from Wave 2 suggested that the high achievers had a propensity to adopt the artistic style as well as the investigative style.

Reflectivity and Impulsivity of Gifted Students As mentioned in the previous section, when Steele (1989) compared the cognitive styles of gifted preschool children with those of non-gifted preschool children, she administered several cognitive style tests. One of the tests was a measure of reflectivity-impulsivity—*The Kansas Reflection-Impulsivity Scale for Preschools* (Wright, 1971). She concluded that gifted preschool children, particularly boys, were more likely to be reflective than their chronological peers.

Summary Empirical evidence generated from research on at least five style constructs indicates that gifted students tend to use creativity-generating intellectual styles, in contrast to the general student population. Undoubtedly, the studies reviewed here are limited. For example, with the exception of the studies on the personality styles of gifted adolescents, studies of the gifted based on the other four style constructs were anecdotal. As another example, the studies on personality styles, FDI, and reflectivity/impulsivity were conducted exclusively in the United States, while the studies based on thinking styles and career personality styles were carried out in South Korea, Iran, and Germany. As such, one wonders if the findings could be replicated in other cultural contexts, and, concomitantly, if the present conception of giftedness is defensible. For at least two reasons, one can say with great confidence that the findings reviewed here can be replicated, and that the present conception of giftedness is sound. First, regardless of the fact that they were based on different style constructs, and the fact that their data sources were obtained from different age groups and cultural contexts, the available studies yielded consistent and unambiguous findings. That is to say, the present conception of giftedness is not based on vague observations; rather, it is well founded on inductive reasoning. Second, and equally importantly, the afore-presented findings are supported by findings presented in the next section.

Intellectual Styles and Attributes Commonly Recognized in the Gifted

When Young and Fouts (1993) discussed their finding that the gifted students scored higher on the field-independent style (a creativity-generating style) than the students not identified as gifted, they argued that, because most gifted students are identified based on their academic performance (and the academic performance of students happens to be related to the field-independent style), the students with the field-dependent style (a norm-favoring style) had been passed over by the gifted program in its selection process. Such an argument is not justifiable. For one major reason, I would argue that the students who are more likely to be passed over by the prevailing selection procedure of identifying the gifted are those with a propensity to use creativity-generating intellectual styles. That is, students who perform better academically are not always those who use creativity-generating intellectual styles. On the contrary, better academic performance is often related to norm-favoring intellectual styles—at least in the general student population (e.g., Fan & He, 2012; Zelniker & Jeffrey, 1976; Zhang, 2017; see more elaboration on this under "Implications for Identification and Education of Gifted Students").

Then, what are the key attributes related to the use of creativity-generating intellectual styles among gifted students? This question cannot be directly answered because studies on the relationship between the attributes of gifted students and their intellectual styles are few and far between (e.g., Ramiro, Navarro, Menacho, & Aguilar, 2010; Torrance & Reynolds, 1978). Nevertheless, the question can be addressed indirectly because there is abundant empirical evidence demonstrating a strong association between creativity-generating intellectual styles and human attributes (Zhang, 2017), including a number of essential attributes of the gifted that have long been investigated in the field of giftedness (see earlier—in the part entitled "Intellectual Styles"). In what follows, some of the key findings concerning the relationships between creativity-generating intellectual styles and several cognitive and non-cognitive giftedness-crucial attributes are highlighted.

Intellectual Styles and Cognitive Attributes Essential to the Notion of Giftedness In the styles literature, much has been documented on the significant relationship between the use of creativity-generating intellectual styles and higher levels of intelligence and abilities—the very intellectual attributes that most gifted programs focus on in selecting gifted students (see Zhang, 2017 for details). At the same time, a number of studies have shown a strong association between the use of creativity-generating intellectual styles and other cognitive attributes, including the previously mentioned ones vital to the notion of giftedness. For example, in examining the relationship between field-dependent/independent styles and problem-solving skills among university undergraduates in Cyprus, Angeli (2013) concluded that students with higher levels of field independence significantly outperformed field-dependent students. As another example, Liu, Huang, Kinshuk, and Wen (2013) investigated the relationship between FDI and metacognitive skills among Taiwanese high school students—as demonstrated in the process of keyword reformulation—when performing an animal identification task in two image search systems in hypermedia environments. The researchers found that students who scored higher on the field-independent style performed significantly better than those scoring higher on the field-dependent style. Similarly, Sun, Wang, and Chang (2013) identified a strong relationship between Type I thinking styles and the use of higher-order cognitive strategies (see also Zhang, 2010).

Groves (2005) studied the relationship between diagnostic thinking (a clinical reasoning skill) and learning approaches (Biggs, 1978)—an activity-centered style construct according to Grigorenko and Sternberg's (1995) classification of style constructs—among first-year students in a medical school in Australia. The study found that students who scored higher on the deep learning approach (a creativity-generating intellectual style) tended to achieve higher scores on both the structure of knowledge subscale and the total inventory assessing diagnostic thinking.

Finally, Zhang's (2003) research on the relationship between thinking styles and critical thinking dispositions among two samples of mainland Chinese students suggested that a wide range of thinking styles, particularly creativity-generating thinking styles, were beneficial to critical thinking dispositions. A similar conclusion was reached in Magno's (2013) study of the association between learning approaches and critical thinking among senior high school students in the Philippines in that the findings indicated that critical thinking called for both Type I and Type II intellectual styles, especially the former.

Intellectual Styles and Non-cognitive Attributes Essential to the Notion of Giftedness There is abundant empirical evidence supporting the significant relationship between creativity-generating intellectual styles and non-cognitive attributes essential to the notion of giftedness. For example, in Zhang's (2017) monograph *The Value of Intellectual Styles*, an entire chapter was devoted to reviewing empirical evidence of the significantly positive relationship between Type I intellectual styles and creativity. Creativity-generating intellectual styles have also been shown to be related to the drive for knowledge and passion for engaging in intellectual activities. In this regard, Arteche, Chamorro-Premuzic, Ackerman, and Furnham (2009) found that university students in the United Kingdom and the United States who reported adopting the deep learning approach more often scored significantly higher on the *Typical Intellectual Engagement Scale* (Goff & Ackerman, 1992). Von Stumm and Furnham (2012) arrived at the same conclusion in their study of British university students. Likewise, in her research on Hong Kong Chinese university students, Lo (2019) discovered that students scoring higher on Type I thinking styles scored significantly higher on cognitive engagement (Reeve, 2012) than did those scoring higher on Type II thinking styles.

Fan and Zhang (2009) explored how Chinese university students' thinking styles as measured by the *Thinking Styles Inventory—Revised* (Sternberg, Wagner, & Zhang, 2003) were related to their achievement motivation as assessed by the *Achievement Motives Scale* (Gjesme & Nygard, 1970). Results showed that creativity-generating thinking styles significantly positively contributed to motivation to approach success but negatively to motivation to avoid failure. Similarly, Kyndt, Dochy, Struyven, and Cascallar's (2012) study of university students in Belgium revealed that, regardless of students' perceptions of their workload, autonomous learning motivation—a desirable type of motivation (the opposite being controlled motivation; Ryan & Deci, 2000)—was positively related to the deep learning approach.

Csikszentmialyi and Robinson (1986), in their work "Culture, time, and the development of talent", discussed four time lines that affect the development of giftedness: epistemological development, psychosocial development, progression in a given domain of endeavor, and progression in a given field as a social structure. A great deal of research in the field of intellectual styles has focused on the relationship between intellectual styles and student development along the first two time lines—epistemological development and psychosocial development (see Zhang, 2017 for a detailed review). In this connection, Zhang (2002) investigated the relationship between epistemological development based on Perry's (1970) theory of intellectual development and thinking styles (Sternberg, 1997b) among university students in Hong Kong. Results showed that students who reasoned at the dualistic level of intellectual development tended to confine themselves to the use of Type II thinking styles, and that those who reasoned at the relativistic level tended to report the use of a wide repertoire of thinking styles (i.e., all three types of thinking styles), especially Type I styles. Zhang's (2002) finding concerning the significant relationship between Type I styles and epistemological development corroborated those of studies on the association between epistemological development and other style constructs such as field dependence/independence (Case & Globerson, 1974) and reflectivity/impulsivity (Solís-Cámara, 1996).

Finally, different aspects of psychosocial development have been tested against several intellectual style constructs. One of the earliest studies was conducted among gifted students in the United States. Torrance and Reynolds (1978) studied the relationship between modes of thinking, as assessed by *Your Style of Learning and Thinking* (Torrance, Reynolds, Riegel, & Ball, 1977), and career awareness among 200 gifted and talented students in the 1977 career awareness component of the Georgia Governor's Honors program. Students' career awareness was assessed through their writing of a soliloquy in the first person, using present and past tenses—writing as if they were looking back on their own careers. Results indicated that, compared with students with the norm-favoring analytic mode of thinking, students with the holistic mode of thinking (a creativity-generating style; Zhang & Sternberg, 2005; also see Appendix for definition) were more satisfied with their projected future career, more committed to working toward a better world, and had more positive perceptions of themselves. The conclusion that creativity-generating styles are significantly related to more adaptive psychosocial development has also been reached by other scholars investigating the association between different style constructs and different domains of psychosocial development (e.g., Cassidy & Eachus, 2000; Murphy & Janeke, 2009; Ng, 2015).

Summary This section has highlighted empirical evidence on the relationship between creativity-generating intellectual styles and several cognitive and non-cognitive attributes that have long been recognized as being crucial to the concept of giftedness. Such evidence is important because it supports the present conception of giftedness by having built a firm connection between the present conception and other long-established conceptions of giftedness.

Implications for Identification and Education of Gifted Students

The idea of applying the notion of intellectual styles in the context of gifted education is nothing new. Early in 1993, when Sternberg and Grigorenko elaborated the relationship between thinking styles and giftedness, they rightly pointed out that in some domains (e.g., mathematics), gifted children and gifted adults use different thinking styles, with the former tending to make greater use of Type II styles and the latter, greater use of Type I styles. They called for educators to take the notion of styles into consideration when identifying and teaching gifted students. However, after nearly three decades, such sensible advice has not been acted on.

The findings presented in this chapter strongly support Sternberg and Grigorenko's (1993) call for the concept of intellectual styles to be taken into account in identifying and educating gifted students. More importantly, the findings suggest that giftedness is generally associated with the use of creativity-generating intellectual styles and that creativity-generating styles are intricately entwined with other key attributes that have long been acknowledged to be associated with being gifted. In view of such empirical evidence, I would like to emphasize further the importance of taking the notion of intellectual styles into consideration in the identification and education of gifted students.

Identification of Gifted Students

Currently, schools identify gifted students primarily based on students' scores on school tests and/or standardized tests, especially traditional IQ tests. Unfortunately, these tests routinely favor norm-conforming intellectual styles while penalizing creativity-generating styles. Chiefly because of this, students who are highly creative in how they use their abilities tend not to perform well on these tests, which results in their being passed over by the current gifted identification mechanisms.

In view of the findings presented in this chapter, which show that gifted students generally score statistically significantly higher on creative-generating intellectual styles than the general student population, one might be tempted to argue that the current identification system is reasonably efficacious. However, this argument is not valid: While it is true that the gifted students involved in the afore-reviewed studies showed a propensity for creativity-generating intellectual styles, it does not mean that they would not deploy norm-favoring styles when they had to—such as in the case of school tests and standardized tests. As Sternberg (1997b) contended, people are somewhat flexible in their use of styles and try, with varying success, to adapt themselves to the stylistic demands of a given situation. In line with this contention, it is possible that the gifted students in these studies were flexible in their use of styles, adapting themselves to the demands of the tests. Moreover, it should be remembered that, although both intellectual styles and academic abilities contribute to academic achievement, intellectual styles are different from abilities (Sternberg, 1997b; Zhang, 2017). Gifted students can perform well academically and exhibit a propensity for the use of creativity-generating styles at the same time. However, this does not imply that the current selection procedure, which focuses almost exclusively on school grades and standardized test scores, can effectively identify all students with a strong disposition to use creativity-generating intellectual styles, nor does it suggest a strong correlation between good academic performance and creativity-generating styles. As a matter of fact, styles researchers (e.g., Fan & He, 2012; Zelniker & Jeffrey, 1976; Zhang, 2017) have reached the conclusion that those in the general student population who demonstrate better academic performance are often those who adopt norm-favoring intellectual styles.

Then, which students are being passed over by the existing gifted identification system? Most likely, the students who are overlooked by the system and denied the opportunity to benefit from a gifted program are those who have a strong preference for creativity-generating styles. The preference of these students for creativity-generating styles is so strong that the students are at a severe disadvantage in tests that almost exclusively require the use of norm-favoring styles. More broadly, the propensity of these students for creativity-generating intellectual styles could be completely suppressed by the way the students are typically treated at school—by being constantly told what to do and how to do it.

How then can schools ensure that all students have an equal opportunity to be identified as gifted and allowed to attend a gifted program—if schools continue to use performance on school tests and/or standardized tests as the key selection criterion for gifted programs? How can schools minimize their suppression of creative spirits? In relation to school achievement tests, I suggest a two-step strategy. To begin with, schools should recognize that students use their abilities differently. In recognition of this fact, teachers could be encouraged to design tests that assess diverse intellectual styles. Similarly, test publishers should realize that the various existing standardized tests measure nearly the same thing: aspects of general intelligence (Sternberg, 2019). However, general intelligence tests essentially require norm-favoring styles and do not make provision for creativity-generating styles. What are needed are test items that allow creativity-generating styles to be integrated into the existing standardized tests.

It should be realized that significant improvements in school tests and standardized tests cannot be made overnight, given that different parties and various procedures would be involved, and that desirable psychometric properties of the tests must be well established before they are put into use. Fortunately, based on the research findings presented in this chapter, a relatively easy procedure would be to assess (or at least observe) students' intellectual styles, with students who scored significantly higher on creativity-generating intellectual styles being considered for some kind of gifted program. Of course, this is not to say that an evaluation of students' intellectual styles should be the only means of identifying giftedness; rather, it should be adopted in combination with other selection methods.

Education of Gifted Students

The notion of intellectual styles should be taken into account not only in the identification of gifted students but also in the education of the gifted. Indeed, the findings reviewed earlier have implications for both special gifted education programs and inclusive gifted education.

It is true that gifted students, as a group, have a propensity to use creativity-generating intellectual styles. However, gifted students, like the general student population, are not a homogeneous group. Their intellectual styles, among other attributes, vary as a function of numerous personal and environmental factors, with some students having a stronger tendency to use creativity-generating styles than others. Similarly, some gifted students have a stronger inclination to use norm-favoring styles than others. This diversity in the use of intellectual styles among gifted students dictates that the education of these students capitalizes on students' intellectual styles. For example, within the context of special gifted education, selecting the right type of programs for gifted students has always been a challenge, especially when deciding between acceleration and enrichment programs (Renzulli, 1977; Sternberg & Grigorenko, 1993; VanTassel-Baska, 2010). With research findings showing that gifted students generally have a propensity for the use of creativity-generating intellectual styles, it is safe to say that enrichment programs in which students are allowed plenty of flexibility to do things their own way would generally be more suitable for gifted students. However, for those gifted students who prefer to be given more structure in their learning (i.e., those who express a preference for norm-favoring styles), an acceleration program in which students are usually told what to do would be more appropriate.

Similarly, in assessing gifted students, gifted program providers need to be highly sensitive to the present research findings showing that gifted students have a general inclination to use creativity-generating styles. As such, tests designed for gifted students should allow ample opportunities for creative thinking. At the same time, the use of a variety of testing formats would allow students with different styles to show their strengths.

Equally, or perhaps even more importantly, the notion of intellectual styles should be taken into consideration in educating the gifted in inclusive settings. Being educated in inclusive settings can be particularly frustrating for gifted students because their propensity for creative thinking could be routinely suppressed by a learning environment in which students are typically expected to follow rules and procedures. Because students identified as gifted are the minority in inclusive settings, their need for creativity can easily be neglected. For this reason, it is imperative that teachers of gifted students in inclusive settings bear in mind the strong tendency of gifted students to use creativity-generating intellectual styles. By doing so, teachers could become more conscious of the need to diversify both their instructional styles and their assessment formats so that gifted students would benefit from their learning experiences. Indeed, the diversification of teachers' instructional and assessment methods would benefit not only students identified as gifted but also students who are not identified as gifted—for the simple reason that any student, identified as gifted or not, could prosper in a learning environment that allowed for diverse ways of using their abilities. Furthermore, because intellectual styles are malleable, as are giftedness and the attributes associated with giftedness, allowing for creativity-generating intellectual styles would not only accommodate gifted students' need for creativity but also stimulate the development of creativity and other essential attributes of giftedness.

This is, however, easier said than done. Creative thinking, or in the context of this chapter, creativity-generating intellectual styles, cannot be effectively developed without the support of the larger environment. Classroom teachers would not be able to do much to foster creativity-generating intellectual styles unless they genuinely felt that these styles were valued. In fact, it would be appropriate to say that the cultivation of creativity-generating intellectual styles is heavily contingent upon the level of support from the broader cultural and educational systems. That is to say, gifted students' propensity for the use of creativity-generating intellectual styles cannot be properly accommodated without the concerted efforts of all parties—within and beyond schools.

Appendix: Intellectual Styles Involved in Research on Gifted Students

	Style type	Type I (Creativity-generating)	Type II (Norm-favoring)	Type III (Either creativity-generating or norm-favoring)
Style construct	Personality style[a]	Intuitive, perceiving	Sensing, judging	Thinking, feeling, introversion, extraversion
	Perceptual style[b]	Field independent	Field dependent	
	Thinking style[c]	Legislative, judicial, global, hierarchical, judicial	Executive, local, monarchic, conservative	Oligarchic, anarchic, internal, external
	Conceptual tempo[d]	Reflectivity	Impulsivity	
	Career personality style[e]	Artistic, investigative	Conventional, realistic	Social, enterprising
	Mode of thinking[f]	Holistic	Analytic	Integrative

Notes: Theoretical foundations: [a]Jung's theory of personality styles, [b]Witkin's construct of field dependence/independence, [c]Sternberg's theory of mental self-government, [d]Kagan's model of reflectivity-impulsivity conceptual tempo, [e]Holland's theory of career personality styles, [f]Torrance's construct of brain dominance

The classification of styles is based on Zhang and Sternberg's (2005) *Threefold Model of Intellectual Styles* and on Zhang's (2017) further specification in *The Value of Intellectual Styles*.

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28

Uniform Points of Agreement in Diverse Viewpoints on Giftedness and Talent

Robert J. Sternberg and Don Ambrose

This volume presents numerous and diverse viewpoints on giftedness and talent. These widely differing viewpoints might lead one to conclude that, almost a century after Lewis Terman started his "genetic studies of genius" in 1921, there still is little agreement among scholars in the field of giftedness as to what giftedness and talent are, how they should be identified, and how they should be developed. Scholars of giftedness have gone in very different directions, some of them seemingly irreconcilable.

Yet, we would argue that, despite all the differences in points of view, there are some commonalities in these diverse viewpoints, and that there are at least ten points on which the various investigators of giftedness would agree. Of course, this is only our opinion, and others might think we overstate the agreements. But this, at least, is our reading of the chapters.

1. **Giftedness Is More Than IQ**

Lewis Terman based his identification of the gifted almost exclusively on Stanford-Binet IQ scores (see successive versions of this test in Terman &

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Merrill, 1937, 1973; Roid, 2006). (Terman also counted California residency and relaxed his criteria somewhat for siblings.) Today, few gifted programs make decisions solely on the basis of IQ, although some have a minimum IQ cutoff, after which other factors may be taken into account.

We are impressed by the fact that our contributors all see more in giftedness than a high IQ, a great step forward from the days of Terman and his immediate followers. At the same time, there are still selective colleges and universities, at least public ones, where admission can be granted solely on the basis of scores on standardized tests (such the ACT or SAT), which are largely proxies for IQ (Frey & Detterman, 2004; Koenig, Frey, & Detterman, 2008). So, the grip of IQ and its proxies—other tests that measure largely the same things but that go by other names—is by no means gone. Much of the contemporary field of intelligence research, including that for the gifted, still views IQ as some kind of ultimate criterion for who is more or less intelligent (see Sternberg, 2020a, 2020b).

We believe that there is a need to go "beyond IQ" (Sternberg, 1985) because we have known ever since the Terman studies (Terman, 1925; Terman & Oden, 1959) and the Subotnik studies (Subotnik & Arnold, 1994) that IQ predicts adult gifted performance, but only at a modest to moderate level. There is much more to being a great leader or musician or artist or scientist or lawyer or physician than IQ. And not all gifted adults have stellar IQs. Although we do not yet have excellent predictors of gifted future performance, this volume gives at least a wide variety of directions to pursue to expand our horizons of theory and measurement.

2. **Giftedness Is More Than Good Grades in School**

Besides standardized test scores, the other measure probably most widely used to identify gifted children has been grades in school. But this measure, too, is weak. Although it has the advantage over IQ that it also takes into account motivation to succeed, the type of motivation that leads to success in school is not necessarily the type that leads to success in life. A colleague of one of ours in Germany, who is a professor at a prestigious university that admits students to their psychology program solely by school grades (Funke, 2018), has noted a serious problem with admission by school grades. In particular, one may end up selecting students who are very good at doing what they are told to do but not necessarily those who are good at figuring out what they should do. The problem with this is that creatively gifted students often are those who do not want to do what they are told to do (Sternberg, 2017, 2018). They want to do things their way, not someone else's.

3. Giftedness and Talent Are Partially Domain-Specific

IQ tests and their proxies are largely domain-general. Even the SAT and ACT, with their multiple subtests, are largely domain-general, correlating highly with psychometric *g,* as noted above. Such tests would seem like reasonable advisory devices to use, so long as they are supplemented by other kinds of measurements that are potentially more relevant to giftedness and talent in specific domains. After the early years, the best predictor of future behavior is past behavior of the same kind. So, if one wishes to identify children who will be gifted in certain ways, the best measures may be criterion measures of their performance in the relevant domains, not measures of abstract general skills.

4. More Skills Are Involved in Giftedness than Academic Skills in General

The experts in our book have very different ideas about what is involved in giftedness and talent beyond IQ-based skills. This was true in the two earlier volumes as well (Sternberg & Davidson, 1986, 2005). The range of skills is quite large. What is clear, though, is that just looking at IQ will give an exceptionally narrow view of the range of abilities in which individuals can excel.

5. Motivation, Passion, and Attitudes Are Important to Giftedness

Gifted and talented individuals show unusual levels of passion and sheer drive to excel in the areas in which they are gifted or talented. It is not always clear whether the abilities lead to the passion, the passion to the development of the abilities, or some combination of both. Giftedness, though, should not be viewed solely as a matter of scores on intellectual tasks.

6. People's Environments Promote Gifted Thinking and Behavior to Very Different Degrees

There are many reasons why members of diverse populations have been underserved by traditional methods of gifted identification, instruction, and assessment, but almost certainly one of them is that our various instruments have not been sufficiently responsive to the large differences in environmental contexts in which children grow up. Children's gifts always develop in a context, not in a sterile environment that necessarily leads to elevated scores on a single kind of test that was designed for children who all are basically from the same background. That single test may work well for some but not for others.

Research across cultures shows that children vary remarkably in the skills in which they excel, and had they grown up elsewhere, these skills might have manifested themselves in different ways (Phillipson & McCann, 2007).

7. **People Mean Different Things by Giftedness Because Giftedness Is Socially Constructed**

Constructs like *giftedness, intellectual disability, reading disability,* and the like are all socially constructed. This is not to say that they are not real. Of course, they are real, in the sense that some people are not only better than other people at certainly socially valued behaviors, but *much* better. Similarly, some people are not only worse, but much worse. But beyond that, giftedness means different things to different individuals and groups.

For example, the Juilliard School of Music and the Bronx High School of Science are both schools for gifted children in New York City, but they look for characteristics that are quite different from each other. The gifted children who are admitted to one would likely, for the most part, not even have a chance for admission to the other. But in a society that does not permit music (there are some) or that devalues science (as does much of the United States today, led by the current US president in 2020), giftedness in one field or another may seem less valuable than in other societies.

This means that the criteria for admission are somewhat arbitrary. What does a cutoff on an admissions test mean, in any case? Given that tests all have standard errors of measurement, the difference between a score above and below a cutoff score may be statistically meaningless. Even when holistic admissions are used, the judgments are reliable and the outcome for a given individual may depend on who looked at the admissions data and on what day, or even at what time of day.

The field therefore needs to stop looking for any deep "truth" about giftedness. There is none. Societies invent criteria for giftedness. Rather, the field needs to look for how to identify children who need special instruction, regardless of labels, and for young people and adults who have the potential to change the world—to make the world a better place. That, in the end, is what the gifted movement ought to be focusing on.

8. **Many People Identified as Gifted Do Not Optimally Utilize Their Gifts**

There exist today a variety of societies for high-IQ people, the most well-known of which is probably Mensa. Such societies may serve a useful function in bringing together people who view themselves as having something in common. But the society also points out something else: How many highly accomplished, gifted adults point to membership in Mensa as one of their signature accomplishments, or really, as an accomplishment at all? How many gifted, accomplished adults would even apply, given that their accomplishments speak for their gifts more than membership in any particular society would?

A problem with our social construction of giftedness long has been the gap between what we seem to mean by "giftedness" in the field of giftedness and what society means by "giftedness" in terms of the contributions we seek in gifted adults. Those who score high on IQ tests may be admitted to high-IQ societies, but they are not those who, by virtue of their IQ or membership, change the world the way great leaders, artists, writers, composers, and other professionals do. If we do not reconcile the two definitions, we may be left with a society that does not take our work fully seriously because it does not believe the children we identify are those who will make profound and meaningful changes to the world.

9. **Gifted Programs Are Undervalued and Underfunded**

In the hundred or so years since Lewis Terman started his longitudinal studies of gifted children, we in the gifted field still have not greatly succeeded in convincing our societies to value and fund our gifted programs at the level we believe they should be supported. There are wide differences among societies, but these differences are dwarfed by the regularity that there simply are not enough resources to go around and most of the resources go to around.

10. **Gifted Education Has to Be Tailored to Individual Needs: One Size Fits All Programming Is Not Optimal**

Much of gifted programming is, unfortunately, cookie-cutter. There may be gifted programming, for example, but it is all the same for every student labeled as "gifted." Sometimes, there appear to be options, but the options are all variants of the same thing. A lot of noise has been made in the past about whether acceleration or enrichment is better, but the dichotomy always was a false one. There is no one best option for every gifted child, or adult, for that matter. Gifted individuals need programs tailored to their strengths but also to their weaknesses, which all of them have. Most of all, they need to have a hand in shaping their own destiny, because part of their gift is forging their own path rather than simply following paths laid out for them by others.

The essays in this volume represent highly diverse positions on giftedness and talent but they have some commonalities, even if the differences seem to stand out more than the differences. In this chapter, we have discussed ten of the commonalities that we believe are shared by all, or at least, almost all of our contributors. These commonalities point out the directions in which gifted programming could be directed right now. Will it be? As always, only time will tell.

Sterile Certainty in Our Fragmented, Porous, Contested Field

In another chapter in this volume Don Ambrose borrowed some discoveries from other academic disciplines to show how some fields are unified, insular, and firmly policed while others are porous, fragmented, and contested. A unified, insular, firmly policed field is dominated by a single theoretical perspective while a fragmented, porous, contested field is turbulent with multiple conceptions of phenomena floating around causing uncertainty. Both of these patterns have their benefits and drawbacks.

Ambrose also reported another phenomenon that strongly influences scholarship in most academic disciplines and professional fields. Various leading scholars in multiple disciplines report that many professionals in their fields are trapped in a form of dogmatism that mathematician William Byers (2007, 2011) calls *sterile certainty.* Other names for this phenomenon created by scholars from other disciplines include the flight from reality in the human sciences, the tyranny of metrics, and reductive megalomania.

Over a decade ago, a collaborative analysis revealed that the field of gifted education was fragmented, porous, and contested (Ambrose, VanTassel-Baska, Coleman, & Cross, 2010). Based on the chapters in this volume, that still seems to be the case. It also seems that the field suffers from sterile certainty in various ways. Below are some depictions of these patterns as illustrated by the chapters in the volume.

- Robert Sternberg pushes us away from sterile certainty by proposing a novel, context-sensitive approach to gifted education with his emphasis on active, concerned citizenship and ethical leadership. His approach injects a healthy dose of ethical awareness into a field that has been dominated by objective, mechanistic measures of academic achievement. Also, his magnification of large-scale world problems confronting gifted young people connects the field with powerful contextual influences. This magnifies the "porous" aspect of our fragmented, porous, contested field because he imports important concepts from diverse disciplines to reshape our thinking about the nature and purposes of high ability.

- Leonie Kronborg shows how the fragmented, porous, contested structure and dynamics of the field of gifted education manifest on the large scale in Australia, a nation that doesn't have a uniform policy at the national level, nor in most states. And her overview of various diverse theories of giftedness further illustrates the conceptual fragmentation in the field.
- Barbara Kerr, Jonathan Wright, Jonathan Huffman, Maxwell Birdnow, Miriam Reder, Olivia Stull, and Robyn Malmsten also reinforce the fragmented, porous nature of the field through their beehive model, which imports discoveries from diverse fields, including psychology, sociology, and education, among other disciplines. Their portrayal of giftedness as diverse doesn't align with the single dominant theory pattern of a unified, insular, firmly policed field.
- Sandra Kaplan and Eugenia Mora-Flores show some of the intricate complexity that makes gifted education a fragmented, porous, contested field because the experiences and socioeconomic situations of urban bilingual students differ so much from their mainstream peers that a unified, firmly policed conception of giftedness would represent an uncomfortable force fitting of a theory onto ground-level realities in their cases. They also help us attack sterile certainty by using the concept of academic prejudice to highlight the ways in which the supposed precision of mechanistic certainty misses and hides the impressive abilities of urban, bilingual students.
- Dean Simonton shows how fragmented and porous gifted education is by carrying out an in-depth analysis of the somewhat confusing overlap that emerges when professionals grapple with conceptions of giftedness, talent, and genius.
- Dowon Choi and James Kaufman reinforce the notion that gifted education is a fragmented, porous, contested field because it is influenced by the neighboring interdisciplinary field of creativity studies. Moreover, their overview of multiple theories of creativity reveals that creativity studies itself is fragmented, porous, and contested.
- Hava Vidergor describes and integrates various conceptions of giftedness in her multidimensional model. She works to synthesize diverse concepts in recognition that this is a fragmented field.
- Through their talent development megamodel, Rena Subotnik, Paula Olszewski-Kubilius, and Frank Worrell illustrate how difficult it would be to force gifted education into a unified, insular, firmly policed pattern by

taking us on excursions into a variety of domains that influence the long-term development of the gifted. A field has to remain porous when patterns from other fields keep crossing its borders to work their way into a prominent model of talent development.

- Robert and Michelle Root-Bernstein artfully address the problem of sterile certainty and the tyranny of metrics by revealing more about the complexities of creativity, giftedness, and talent development. They also show the mismatch between traditional measures of high ability and creative productivity. In addition, their magnification of the importance of the polymath and creative achievement protects us from falling into a dogmatic sinkhole, which could come from shortsighted notions about domain-specific expertise.
- Joyce VanTassel-Baska also helps us avoid this sinkhole by illustrating how domain specificity and interdisciplinary inquiry can work together through her integrated curriculum model. Arguably, this model has been the most important driver of interdisciplinary work at the level of practice in the field.
- James Borland provides an especially strong buttress against sterile certainty with his critique of the gifted child paradigm and the way it forces most practitioners and many researchers into a rather confining, barren set of concepts and procedures. His analysis also shows how the field often strives to be unified and insular based on a craving for the certainty offered by this paradigm.
- Donna Ford, Kristina Henry Collins, Tarek Grantham, and James Moore continue the important battle against sterile, certain conceptions of high ability that sustain racial bias (for an early, high-impact example of this sterility, see Herrnstein & Murray, 1994). Their work on equity and cultural responsiveness in their fight on behalf of Black and other underrepresented young people is forcing gifted education to wake up from this form of dogmatic slumber.
- Elena Grigorenko, Elena Shmeleva, and Dmitry Ushakov undermine sterile certainty while showing how gifted education remains fragmented, porous, and contested. Their analysis illustrates how context-sensitive conceptions of giftedness have to be when the evolution of a society causes significant changes in contextual pressures influencing the development of high ability over time. This context sensitivity also undermines sterile certainty by creating turbulence in the conceptual frameworks of the field.
- Gifted education is dominated by research from the United States so it's easy to become trapped within conceptions strongly influenced by American culture. Sheyla Blumen helps us escape this form of sterile certainty by showing how the ethnic-linguistic diversity and socioeconomic

deprivation that prevail in Andean, South American countries strongly shape perspectives on giftedness in those regions of the world.

- Jennifer Reidl Cross and Tracy Cross work against sterile certainty by arguing for a school-based conception of giftedness instead of one excessively based on the precise measurements of a standardized identification procedure.
- It's much easier to be a sterile, certain scholar or practitioner if we believe that everyone processes information in much the same way. Fortunately, Li-fang Zhang reminds us that analyses of intellectual styles show much diversity in cognitive processing. Predicting and controlling human thought and action with precision become more difficult when we realize that these diverse styles come into play in most individual endeavors.
- Sylvie Tordjman, Maud Besançon, Caitriona Pennycook, and Todd Lubart also help us resist sterile certainty by showing how a very holistic, context-sensitive process for identifying and meeting the needs of bright young people in France works better than excessively mechanistic procedures.
- Joseph Renzulli and Sally Reis use the latest applications of the Three-Ring Conception of giftedness to show how focusing on the development of giftedness is more appropriate than adhering to the firm notion that some children are gifted and should be identified through standardized measures. In so doing, they magnify the diversity in the student population and the inaccuracies embedded in sterile, certain identification and programming practices.
- Sally Reis makes it difficult to remain firmly attached to sterile certainty in her chapter on creative-productive gifted women. She shows us how women of high ability often have to overcome barriers hindering the discovery of aspirations and the development of their talents that are seldom confronted by men. A precise, mechanistic identification system tends to ignore these gender-specific contextual influences.
- Jonathan Plucker, Jacob McWilliams, and Jiajun Guo push us away from sterile certainty by emphasizing the importance of various, intricate contextual influences on giftedness and gifted education in their exploration of sociocultural perspectives. In one of several examples they show how student performance can be suppressed when a young person has to deal with excessive contextual pressures such as a requirement for outside employment and playing on sports teams while trying to do well academically, and then falters somewhat due to unreasonable work overload.
- Ugur Sak levels a direct attack on the concept of sterile certainty in gifted education by showing in elaborate detail how "fuzzy" and complex the concept of giftedness is. He also illustrates the field's porous nature by

importing concepts from outside disciplines (e.g., philosophy) to make us even more aware of this fuzziness and complexity.

- Roland Persson illustrates both of the issues of sterile certainty and the fragmented, porous, contested structure and dynamics of the field by exploring evolutionary processes and recognizing the powerful influences of context.
- Carolyn Callahan and Amy Price Azano warn us against sterile certainty by showing how unidimensional conceptions of giftedness cause us to ignore the hidden abilities in deprived, rural student populations.
- Barbara Kerr, Jonathan Wright, Jonathan Huffman, Maxwell Birdnow, Miriam Reder, Olivia Stull, and Robyn Malmsten show how sterile certainty cannot stand up very well in gifted education because high ability emerges from a wide variety of phenomena including manifestations of intelligence, multiple aspects of personality, and a variety of complex contributors to privilege and deprivation.
- David Yun Dai vigorously undermines assumptions of mechanistic predictability in gifted education by showing how phenomena in the field align with the dynamics of complexity theory, which magnifies the importance of unpredictable, contextual influences. Leading scholars in unified, insular, firmly policed disciplines tend to ignore unpredictable contextual influences on phenomena because those influences can undermine the mechanistic predictability that provides the sterile certainty they prefer.
- Jennifer Drake and Ellen Winner show how complex and multidimensional the gifted education field is by drilling down deep into its artistic dimensions, and then connecting them with a variety of other phenomena in other dimensions of the field. It will be difficult to keep one's mind locked within sterile certainty after exploring their intriguing insights about artistic giftedness.
- Li-fang Zhang protects us from sterile certainty by highlighting the importance of intellectual styles. Arguably, this can run against the sterile, certain dogmatism of those who deny the existence of cognitive styles because learning styles were pushed aside in educational and psychological research (see Ambrose, 2012).
- Sonja Laine and Kirsi Tirri provide yet another helpful illustration of the ways in which gifted education is strongly influenced by contextual pressures. Their depiction of the shaping of gifted education by the more egalitarian socioeconomic influences in Finland shows how these influences make the field more fragmented and porous, and less likely to align with sterile certainty, because the education of the gifted varies from one cultural and socioeconomic setting to another.

It might seem ironic that a fragmented, porous, contested field incorporating so many diverse, competing concepts would also be bound up in sterile certainty. But firmly grabbing hold of a sterile, certain concept or practice could be the natural psychological response when professionals face turbulence in a fragmented field. At the practical level, school administrators want to avoid controversy in the selection of students for gifted programs so they are inclined to lock themselves into a sterile, certain method of identification. When challenged by parents they can say, "sorry, we would like to let Isabel into the program, but the test scores won't allow it." At the level of theory and research, scholars who cannot tolerate ambiguity might be inclined to rely heavily on the certainty provided by rigorous, quantitative precision.

Metaphorically speaking, the professionals in gifted education seem to be floating around on many, small icebergs of sterile precision, launching into arguments whenever those bergs grind up against one another as they float around in a fragmented, porous, contested ocean. What will happen if a form of cognitive climate change melts the icebergs of sterile certainty? Will we be able to build some kind of a networked structure that will keep us afloat? Will that networked structure approximate the "networked science" that has been so productive in twenty-first-century STEM fields? Networked science brings together diverse minds from around the world to produce creative, productive ideas that a single genius cannot generate (Nielsen, 2011). If we can create such a network, will it enable us to benefit from "cognitive diversity"? Cognitively diverse teams solve complex problems by bringing together and synthesizing diverse theories, belief systems, and problem-solving heuristics (Page, 2007, 2010, 2017). As we see it, the contributors to this volume have given us the raw materials for a highly productive, cognitively diverse, international, floating network. The ten points of agreement outlined earlier in this chapter could be important connectors that hold together the network as it strengthens and integrates over the decades to come.

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[1] Note: Page numbers followed by 'n' refer to notes.

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