Learning and thinking styles are important for several reasons. To educate highly able students, we want to know whether their style of work is distinctly different from that of others. Moreover, when we usher students in a particular domain, we want to know whether there is a particular style of work the learner has to adapt to. Finally, each individual might have a unique profile of styles and preferences that warrant consideration for instructional differentiation and optimal match. For these reasons, educators need to know the basics of what research says about thinking and learning styles.

What Do We Mean By Thinking/Learning Styles?

Style, in a broad sense, refers to a distinctive manner of behaving, conducting, or expressing oneself. To the extent that individuals habitually and consistently display certain ways of thinking or certain manners of mastery, we call these thinking or learning styles. Thinking and learning styles are often grouped together because the two concepts overlap with each other: efforts of learning involve thinking, and thinking often leads to new learning. Various styles can be classified based on different facets of cognitive functions. For example, cognitive style concerns modality (e.g., auditory versus visual learners), encoding (e.g., image versus verbal representation of learning material), mode of information processing (e.g., holistic versus analytic), and executive function or cognitive control (e.g., sharpening versus leveling). Learning styles concern characteristic ways of processing new information (e.g., learning as reproducing what is learned versus as transforming it into a form that allows flexible use) and organizing new information (e.g., relying on externally provided
structure versus imposing structure of one’s own), among others. At a more intellectual level, thinking styles may involve preferences for tackling problems in a more analytic, judicial way than creative or practical manners (Sternberg, 1996). Some styles have clear personality underpinnings, such as impulsivity versus reflectivity, while others indicate specific preferences for a particular type of work or activity. For instance, Kolb (1971; Kolb, Boyatzis, & Mainemelis, 2001) proposed two dimensions along which people differ: the observation-experimentation continuum and the data-theory continuum. Namely, some individuals prefer activities that involve reflective observation of what is out there, while others prefer active experimentation; some prefer to pursue theoretical ideas and others prefer to work with data to solve practical matters. Although strictly speaking these “styles” are preferences given a set of choices, the literature often groups them together as part of the learner’s profile.

Teachers often like to invoke the concept of style in explaining individual differences they observed in their students. Yet, people typically don’t differentiate the scientific concepts of thinking and learning styles from related folk beliefs. Although not all folk beliefs are wrong, these beliefs often remain implicit and unexamined. For example, some people do not differentiate style and ability; for them, multiple intelligences (Gardner, 1983) are synonymous to multiple thinking styles. Some believe that styles work like personality traits or fixed characteristics of the person, rather than one’s characteristic way of dealing with a specific type of task environment. Although these assumptions are not necessarily “wrong,” they are nevertheless oversimplistic.

What the Research Says About Thinking and Learning Styles: Three Questions

The first question we can ask is whether gifted children as a group have unique thinking and learning styles, as some scholars argue that high intelligence (giftedness) indicates a style of work (see Cronbach, 1977). The research evidence is mixed regarding this question. In general, we should think of gifted children as diversely inclined in terms of their habitual ways of thinking and learning, although some stylistic dimensions might be viewed as “gifted” par excellence (Borland, 1988); that is, it is not the amount of abilities individuals have but the way they approach a task that constitutes giftedness. The following are some conclusions and principles that represent current thinking and the state of knowledge:

- Gifted learners (as defined by IQ) are more “legislative” and tend to impose structure on learning materials, rather than relying on structure provided by adults, including educators (Dai & Feldhusen, 1999;
Kanevsky, 1990; Snow, 1994; Sternberg & Grigorenko, 1993). They are also more field-independent, that is, not easily distracted by irrelevant background information (Davis, 1991). A related claim partly supported by research is that gifted children tend to be intuitive learners; that is, they tend to see the intangible and envision connections and possibilities that are not obvious (see Piirto, 1998, pp. 108–109).

- Some gifted children distinguish themselves from others in showing a characteristic tendency toward divergent thinking; that is, they tend to deviate from “conventional” ways of thinking and produce thoughts in many directions, although findings are mixed as to whether children’s divergent thinking is associated with creative productivity in adulthood (see Runco, 2005).

- Style and ability have a complex relationship; some stylistic dimensions, such as field dependence-independence and cognitive complexity-simplicity, have ability underpinnings (Davis, 1991); we still don’t know how to tease apart the stylistic and ability aspects of intellectual functioning, although attempts have been made (see Lohman & Bosma, 2002). One stylistic dimension that might underlie fluid intelligence is cognitive control for both automatic and controlled cognitive processes (Braver, 2012). Patterns of strengths and weaknesses involve various configurations of abilities, which reveals intricate style-ability interaction (Lohman, 1994; Renzulli & Dai, 2001). Recent studies by Lubinski, Benbow, and their colleagues indicate that interindividual differences (e.g., the math-verbal SAT disparity within the person predicts occupational preferences; see Lubinski & Benbow, 2006 for a review), suggesting that ability patterns may lead to different preferred styles of work: those stronger in math tend to prefer analytic work on objects and data, and those stronger in verbal ability tend to work more holistically with human affairs.

The second question we can ask is, “Does a domain of talent require a particular way of feeling and thinking and mental representation?” This question is important because failure to adapt to possible stylistic ways of a domain may impede one’s progress in that domain. Some domains (e.g., arts versus sciences, history versus chemistry) may require specific styles of functioning; for instance, Miller (1996) found that for many great physicists, including Einstein, spatial imaging was a quite dominant mode of thinking, leading to many new theoretical formulations. Labouvie-Vief (1990) suggested two modes of meaning making that shape differential developmental trajectories: In the mythos mode (speech, narrative, plot, or dialogue), experience is holistic and based on close identification between the self and the object of thought, whereas in the logos mode (reckoning, explanation, rule, principle, reason), knowing is objective and detached, and can be rendered purely analytic, mechanical, and computable. As a result, some children will find a better match between their styles of
functioning and some privileged domains. Sometimes a more “natural” style of processing stands in the way of progress in a more “professional” way of thinking and feeling. Bamberger (1986) studied a group of musically talented adolescents and observed difficulties they encountered in changing their intuitive way of processing music. Their experiences can even be characterized as a crisis in their efforts to switch to a more analytic style that would allow them to look at the music composition from a more critical stance.

The third question we can ask is what styles are educationally meaningful and informative from an instructional perspective so that an optimal match can be sought to maximize learning. Several candidates stand out as more relevant than others and are discussed in the sections that follow.

**Analytic Versus Holistic Processing**

This is the most researched dimension of cognitive styles. Some researchers even argue that many other dimensions can be grouped around this overarching one (Riding & Rayner, 1998). For example, Riding and Rayner also identified “verbal learners” versus “visual learners” based on their dominant preferred media of representation. But one can argue that it also reflects a preferred mode of information processing; visual learning is more holistic and verbal learning is more analytic. Holistic learners tend to process information by considering all available facts simultaneously; as a result, they tend to become synthesizers, focusing on how things fit together. Analytic learners tend to restructure the task in a way that allows them to tackle one thing at a time. This dimension is educationally important because instruction often involves analysis and synthesis, and there could be style compatibility in the process.

**Intellectual Styles**

Sternberg (1997) identified legislative (imposing rules by themselves), judicial (taking a critical stance), and executive (following well-defined procedures) styles as three self-governing styles (see Dai & Feldhusen, 1999). It is important to know that these styles likely reflect personality as much as ability. Sternberg (1996) also articulated three main dimensions of intellectual functioning: analytic, practical, and creative. Grigorenko and Sternberg (1997) found that after controlling for cognitive abilities, intellectual styles account for additional amounts of variation in achievement; more importantly, equally able thinkers tend to do better when assessment matches their strengths, styles, and preferences (Sternberg, Torff, & Grigorenko, 1998; see also Sternberg & Zhang, 2001). Pedagogy, as well as assessment format, need to be sensitive to the styles students bring into the instructional setting.

**Styles and Preferences in Creative Problem Solving**

If intellectual styles are psychologically more complex than cognitive styles, styles and preferences in creative problem solving refer to a class of preferred
modes of mental operation that are even more complex. Treffinger and Isaksen (2005) identified three dimensions of style: (a) Orientation to Change: some are more of a trailblazer (explorer), and others are better at following through with better articulation and technical precision (developer); (b) Manner of Processing: some prefer to work collaboratively (external) and others prefer to ponder a problem or solution by themselves (internal); and (c) Ways of Deciding: some are more person-oriented, making decisions together, and others are task-oriented, preferring to make decisions on their own. Teaching that is tailored to individuality clearly needs to heed these complex styles and preferences, as they partly determine what will transpire in teaching-leaning dynamics.

**GENERAL IMPLICATIONS OF RESEARCH ON THINKING AND LEARNING STYLES**

Given the fact that the nature of various styles proposed in the literature is not completely understood, teachers and parents need to keep the following two points in mind when using the concept of style as an intellectual tool for guiding practice and making educational decisions.

*Be aware of possible biological underpinnings of a specific style.* Some neurological research using EEG measures has yielded interesting findings regarding enhanced right hemispheric functions in gifted male adolescents (e.g., O’Boyle, Benbow, & Alexander, 1995). Although whether it has to do with style issues remains to be seen, it yields important insights about possible qualitative differences in cognitive functions (i.e., a matter of how). Evidence from gifted individuals with dyslexia and other learning disabilities implicates stylistic functioning of these individuals, suggesting that a mechanism of compensation may underlie the unique self-organization of brain functions.

*Be aware of the role of adaptation and socialization.* Pedagogical practices may reinforce certain styles but suppress expressions of other styles, for better or for worse. One can also ask how frequently teachers encourage intellectual risk taking by facilitating “educated guesses,” instead of expecting “correct answers” in classrooms. Besides, findings from Bamberger (1986) and Lubinski and Benbow (1992) have suggested that certain styles may be developed as a result of adaptation to domain constraints and the norm of a field or subfield (e.g., professional psychologists versus experimental psychologists). Thus, style is not only a matter of individual differences; it is developmentally shaped through experience and adaptation.
WHAT ARE SOME CHALLENGES IN UNDERSTANDING THINKING AND LEARNING STYLE?

There are three challenges inherent in the style research. The first is to differentiate style from ability. The initial impetus of the style research is dissatisfaction with the ability research, which measures differences in performance outcomes and levels but does not seem to yield much insight into differences in processes. Unlike ability constructs, style is about performance, rather than competence (Lohman & Bosma, 2002). To be useful and nonredundant, style concepts have to be empirically and theoretically distinguished from ability concepts. Style concerns how a task is performed, and ability addresses how well a task is performed. Given a problem, two persons may perform equally well, yet display different ways of accomplishing the task; for example, some may enlist images while others use verbal representations, and some may grasp the problem holistically while others break the task down to several components. We infer competence (i.e., ability) from performance outcomes, and style from underlying processes (e.g., dispositions). Intelligence can be conceptualized both as a capacity (competence) and as a style. As Cronbach (1977) argued, “intelligence is not a thing; it is a style of work” (p. 275). Albeit the distinction, it is not easy empirically to separate style and ability in performance-based measures, which tend to elicit maximal performance (ability) rather than typical engagement (style). Measurement innovations are needed to advance this line of research (Lohman & Bosma, 2002).

The second challenge is to reconcile two traditions of the style research. In general, cognitive style research is rooted in the long objective-analytic tradition, and typically uses performance measurements (e.g., Witkin & Goodenough, 1981), while learning style research takes a more phenomenological approach, assuming an experiential basis for learning preferences, and relying on self-report and interview data (e.g., Boulton-Lewis, Marton, & Wills, 2001). Compared to their cognitive style counterparts, researchers on learning style tend to be more pragmatic and concerned with different learners’ preferences for various learning activities and contexts (e.g., Dunn, Dunn, & Price, 1989). Thus, while performance-based cognitive styles are criticized for being close to abilities (Sternberg & Grigorenko, 2001), learning style theories are criticized for relying on introspective self-report measures, which are in many ways flawed (Klein, 1995). Learning styles, although often intuitively accessible to lay audience, are also criticized for the lack of a solid psychological foundation and empirical support.

The third challenge, probably the most critical, is to grasp the nature of a style, and the question of how it functions. Some researchers believe that cognitive styles are hardwired in one’s personality and therefore are fairly fixed, and even have a physiological substrate (Riding, 2001). Others treat style as
reflecting how the person interacts with a class of tasks, and thus say it cannot be separated from specific functional environments; in other words, style is sensitive to context and subject to change (Biggs, 2001). Whether we consider style as baggage one brings to performance or learning contexts or as an emergent characteristic that is inherently contextual has profound implications for how we measure and assess styles in research and how we provide proper instruction and counseling in practical settings.

WHAT ARE LIMITATIONS OF THE STYLE RESEARCH THAT EDUCATORS NEED BE AWARE OF?

Most of the style research in the field has used gifted and “nongifted” comparative designs. Kanevsky (1995) cautioned that “the pursuit of consistent group differences that can be used to distinguish gifted and non-gifted students will continue to be frustrated by the uniqueness of innate abilities and experiences” (p. 63). This caution also applies to research on style issues in the field. Group comparisons between gifted and nongifted students are still a dominant design in research. It can easily lead to simplistic but unwarranted conclusions (Kanevsky, 1995). Group comparison designs also sabotage the impetus for style research, which was initially intended to break a mental set or fixation with differential conceptions and measurements of ability in that psychometric measures only assess products, not processes, assuming competence as reflecting capacity, not performance. Besides, although links between specific ability and style constructs can be made through investigation, the unqualified, default assumption that intellectually gifted students (based on IQ or achievement) are a homogeneous group and differ from the rest of the students in terms of cognitive and learning styles is unwarranted. Comparative research will do well to bear in mind within-group variations when investigating between-group differences. Ultimately, to investigate style is to examine an intimate form of individuality that can only be observed through carefully designed tasks and settings.

There is also a lack of integration between research on style and broader issues of gifted education and talent development. Taken together, the style research in the field is largely descriptive, sporadic, and isolated. If this trend continues, it is inevitable that style will become a peripheral concern in the field, as it is always a difficult topic to research, and its relevance and importance to giftedness and gifted education will remain opaque.
Major Resources and References

Messick (1994) provided an overview of the style construct in the history of psychological research. Riding and Rayner (1998) gave a more comprehensive treatment on the topic of cognitive and learning styles. For more recent, updated reviews of mainstream perspectives on thinking and learning styles, see an edited volume by Sternberg and Zhang (2001) and a coauthored book by Zhang and Sternberg (2006). Of particular interest to giftedness, Kogan (1983) provided a developmental view on cognitive style, with a focus on risk taking and creativity. Milgram, Dunn, and Price (1993) published an edited volume entitled *Teaching and Counseling Gifted and Talented Adolescents: An International Learning Style Perspective*, although it was criticized for making many claims that were not empirically supported. More recently, Kozhevnikov (2007) reviewed literature and proposed an integrated framework of cognitive style, suggesting that cognitive styles represent heuristics that can be identified at multiple levels of information processing, from perceptual and automatic processes to metacognitive processes and conscious executive allocation of cognitive resources, based on the regulatory function they exert on cognitive processes. This conception gives the hope of unifying the conceptual framework for research on learning and thinking styles.

Summary of Main Points

- Certain styles may be considered “gifted” par excellence; promising candidates include cognitive control, legislative style (domain-general), and hemispheric lateralization (domain-specific). Abilities and styles have intricate, complex relationships; intraindividual rather than interindividual differences in patterning and self-organization may contribute to a particular style or preference.
- Certain domains and fields may require specific modes or styles of functioning that require adaptation. Therefore, one should see style as a pervasive factor in talent development; changes in stylistic processing may indicate a developmental trajectory. This conjecture highlights the role of both environmental structuring (socialization) and active personal adaptation (changing styles over time).
- Certain ability/interest/style constellations may indicate specific niche potential and career trajectories. Instructional adaptations should include considerations of students’ stylistic functioning; match and mismatch of the learner’s and teacher’s style affects learning-teaching dynamics and educational outcomes.
• Matching the learner’s styles with curricular goals and pedagogy on the one hand and helping the learner adapt to new styles of functioning on the other are two main complementary teaching strategies.

• In counseling and guidance, various style concepts can be used, not as a tool to pigeonhole students, but as a heuristic devise to raise self-awareness, clarify options, and facilitate students’/clients’ academic and career decision making.

• Albeit the importance of style issues, there are many unanswered questions due to conceptual and methodological difficulties involved in the style research. A complete understanding of stylistic functioning involves integration of biological disposition, socialization, and dynamics of person-situation (or task) fit.

REFERENCES


**About the Editors**

Jonathan A. Plucker, Ph.D., is an endowed professor in the Neag School of Education at the University of Connecticut. His research, supported by more than $36 million in external funding, examines education policy and talent development, with more than 150 publications to his credit. Plucker is an American Psychological Association (APA) and American Association for the Advancement of Science (AAAS) Fellow and the 2012 recipient of the APA Arnheim Award for Outstanding Achievement for his research on creativity. His past leadership roles include serving as president of Division 10 of the American Psychological Association and chair of the Research and Evaluation Division of the National Association for Gifted Children. In 2011, he was ranked among the 100 most influential academics in education policy, and his work is widely mentioned in the media, including CNN, *The Wall Street Journal*, *New York Times*, and *Newsweek*.

Carolyn M. Callahan, Ph.D., is Commonwealth Professor in the Curry School of Education, University of Virginia, and the Associate Director of the National Research Center on the Gifted and Talented. She teaches courses in the area of education of the gifted and is executive director of the Summer and Saturday Enrichment Program. Dr. Callahan has authored more than 150 articles, 30 book chapters, and monographs in gifted education focusing on creativity, the identification of gifted students, program evaluation, and the issues faced by gifted females. Dr. Callahan has received recognition as Outstanding Faculty Member in the Commonwealth of Virginia and was awarded the Distinguished Scholar Award from the National Association for Gifted Children. She is a past-president of The Association for the Gifted and the National Association for Gifted Children. She has just completed a term as editor of *Gifted Child Quarterly*. 
**Cheryll M. Adams, Ph.D.,** is Director Emerita of the Center for Gifted Studies and Talent Development at Ball State University and teaches graduate courses in research and gifted education. She has authored or coauthored numerous publications in professional journals, as well as several books and book chapters. Dr. Adams has served as PI or Co-PI on three Jacob K. Javits grants. She serves on the editorial review board for *Roeper Review, Gifted Child Quarterly, Journal of Advanced Academics,* and *Journal for the Education of the Gifted.* She has received the NAGC Early Leader Award and BSU’s Outstanding Administrative Service Award. She has served on the Board of Directors of the National Association for Gifted Children and as president of the Indiana Association for the Gifted and of The Association for the Gifted. She currently serves on the board of the Florida Association for the Gifted.

**Jill L. Adelson, Ph.D.,** is an assistant professor in the educational psychology, measurement, and evaluation program at the University of Louisville. She earned her Ph.D. in educational psychology with a joint emphasis in gifted education and in measurement, evaluation, and assessment from the University of Connecticut, and she earned her master’s degree in curriculum and instruction with an emphasis in gifted education from The College of William and Mary. During her time in Virginia, she taught fourth-grade self-contained gifted and talented students. Dr. Adelson’s research interests include the application of advanced statistical methods to examine issues in gifted and mathematics education, including the effects of gifted programming and elementary students’ attitudes toward mathematics.

**Susan G. Assouline, Ph.D.,** is Director of the Belin-Blank Center and a professor of school psychology at The University of Iowa. She is especially interested in academically talented elementary students and is coauthor (with
Ann Shoplik) of both editions of Developing Math Talent (2005, 2011). She is codeveloper of The Iowa Acceleration Scale (2009), a tool designed to guide educators and parents through decisions about accelerating students. In 2004, she coauthored A Nation Deceived: How Schools Hold Back America’s Brightest Students with Nicholas Colangelo and Miraca U. M. Gross

Amy Price Azano, Ph.D., is an assistant professor of adolescent literacy at Virginia Tech. Prior to her current position, she was a researcher and project manager on the “What Works in Gifted Education” study at the National Research Center on the Gifted and Talented (NRC/GT) at the University of Virginia (UVA). As part of her work, she and her colleagues at the NRC/GT received a Curriculum Award from the National Association for Gifted Children. At Virginia Tech, her research focuses on rural gifted education, place-based pedagogy, and the literacy needs of rural youth. Prior to earning her Ph.D. in English Education from UVA, Dr. Azano taught high school English and served as codirector of UVA’s National Writing Project site. Her recent publications can be found in the Journal of Research in Rural Education, Journal of Advanced Academics, English Education, and TEACHING Exceptional Children.

Jamie S. Baker is currently the Acting Director of Secondary Education at New Mexico State University in Las Cruces, NM. Dr. Baker’s research interests include secondary preservice teacher preparation, program assessment, and development. She has also researched and published work related to understanding and serving diverse gifted youth. She is a National Board Certified Teacher in the area of Early Adolescent English Language Arts. She is also Co-Chair of a local Professional Development School (PDS) university-district partnership.

Ronald A. Beghetto, Ph.D., is the College of Education’s Associate Dean for Academic Affairs and Associate Professor of Education Studies at the University of Oregon. His research focuses on creativity in K–12 schools and the influence of past schooling experience on K–12 teacher development. Beghetto is a Fellow of the American Psychological Association (Division 10) and has received numerous awards for his teaching, including the University of Oregon’s highest teaching award for early career faculty (the Ersted Crystal Apple Award).

James H. Borland, Ph.D., is professor of education in the Department of Curriculum and Teaching at Teachers College, Columbia University, where he directs the programs in the education of gifted students. Dr. Borland is the author of numerous books, journal articles, and book chapters. He is editor of the Education and Psychology of the Gifted series of Teachers College Press and is past coeditor of the Section on Teaching, Learning, and Human Development
of the *American Educational Research Journal*. He has lectured on the education of gifted students across the U.S. and abroad, and he has consulted with numerous school districts, primarily as an evaluator of programs for gifted students. Dr. 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.

**Marguerite Brunner** is a doctoral student at the Curry School of Education at the University of Virginia. Currently she works with preservice and in-service teachers seeking endorsement in gifted education. Her research interests include teacher education, assessment, and underrepresented populations in gifted education. Marguerite has also worked at the National Research Center on the Gifted and Talented (NRC/GT) at the University of Virginia where she investigated best practice in gifted education as part of the research entitled “What Works in Gifted Education,” a study of the National Research Center on the Gifted and Talented.

**Thomas Brush, Ph.D.**, is currently the Barbara B. Jacobs Chair in Education and Technology, as well as Chair of the Department of Instructional Systems Technology in the School of Education at Indiana University, Bloomington. Dr. Brush’s research interests focus on developing methods and strategies to promote inquiry-oriented learning, particularly with more open-ended instruction. This involves studying methods for integrating tools to promote collaborative problem-based learning strategies into the learning environment itself and developing alternative techniques to deliver instruction to students.

**Nathan Burroughs, Ph.D.**, is a researcher at the Center for the Study of Curriculum at Michigan State University. His work focuses on issues related to educational inequality, with a recent emphasis on teacher preparation and opportunity to learn. Previously a researcher at the Center for Evaluation and Education Policy at Indiana University, he received his Ph.D. in Political Science from the University of Georgia.

**Tanya Chichekian** holds a bachelor’s degree in secondary mathematics education and an master’s degree in educational psychology with a specialization in the learning sciences from McGill University. She is currently pursuing her Ph.D. in educational psychology (learning sciences concentration). Tanya has received an Fonds de Recherche du Québec —Société et Culture (FQRSC) doctoral fellowship and was selected as the Ph.D. recipient of the Walter A. and K. Mary Marsh fellowship in Teaching and Learning. She has taught senior level mathematics for 3 years and served as the honors science program’s academic adviser at Dawson College in Montreal. Her research interests include mathematics and science education, inquiry-based teach-
ing and learning, high-ability learners’ cognitive and metacognitive skills, and
the development of learners’ and new teachers’ identity, knowledge, skills, and
motivation as inquirers.

Pamela Clinkenbeard is professor of educational foundations at the
University of Wisconsin-Whitewater. She codirects the master’s degree
emphasis in challenging advanced learners and the licensure program in gifted
education. Dr. Clinkenbeard has been a member of the Board of Directors
and Recording Secretary of the National Association for Gifted Children and
she received the NAGC Early Researcher Award. She is a past president and
current board member of the Wisconsin Association for Talented and Gifted
and serves on the advisory boards of the Center for Talent Development at
Northwestern University and the Gifted Education Resource Institute (GERI)
at Purdue University. Dr. Clinkenbeard directed educational programs for the
Duke University TIP, coordinated the graduate program in gifted education at
the University of Georgia, and served on the faculty of Yale University. She has
written several book chapters and has published in *Gifted Child Quarterly* and
*the Journal for Education of the Gifted*.

Nicholas Colangelo, Ph.D., is the Myron and Jacqueline Blank Professor
of Gifted Education and Director Emeritus of the Belin-Blank Center at
The University of Iowa (UI). In December 2012, he was appointed interim
dean of the UI College of Education. He is coeditor of *The Handbook of Gifted
Education* (three editions) and coauthor of *A Nation Deceived: How Schools
Hold Back America’s brightest Students*. Dr. Colangelo’s areas of expertise are the
social-emotional needs of gifted students and academic acceleration. He has
presented keynotes at major conferences in the nation and around the world.
He received the Distinguished Scholar Award, the President’s Award, and
the Anne Isaacs Founders Memorial Award from NAGC.

Mary Ruth Coleman, Ph.D., is a senior scientist at the Frank Porter
Graham Child Development Institute at the University of North Carolina at
Chapel Hill. She directs Project U-STAR-PLUS (Using Science, Talents and
Abilities to Recognize Students—Promoting Learning in Underrepresented
Students). Other projects have included ACCESS (Achievement in Content
and Curriculum for Every Student’s Success), a National Significance Project,
and applications of RtI for young children through the Recognition & Response
Project sponsored by the Emily Hall Tremaine Foundation. Dr. Coleman’s
publications include the 13th edition of *Educating Exceptional Children* by
Samuel A. Kirk, James J. Gallagher, Mary Ruth Coleman, and Nicholas J.
Anastasiow. She has served as President and on the Board of Directors for the
Association for Gifted (TAG), on the Board of the National Association for
Gifted Children (NAGC), and was on the Board of Directors for the Council
for Exceptional Children (CEC). She was president of CEC in 2007.
Kristina Henry Collins is a Ph.D. student at the University of Georgia (UGA), majoring in educational psychology with a concentration in gifted and creative education. Her research focuses on STEM identity development, parent engagement, and multicultural gifted education. Mrs. Collins holds a bachelor’s degree in Engineering (University of Alabama); master’s degree in Mathematics Education (Jacksonville State University); and an Ed.S. in Educational Psychology (UGA) with certification in educational leadership. Mrs. Collins has 18+ years as an educator and administrator, teaching and providing leadership in Title I middle and high school, and undergraduate settings. Mrs. Collins has worked as a Regional Program Coordinator for the Alabama Supercomputing Program to Inspire Research in Education; Program Development Coordinator of the Academy of Liberal Arts at Newton High School, a school-within-a-school magnet program designed for gifted and advanced students; and District-Level Professional Development Instructor of Instructional Technology and Teacher Leader for Georgia Keys to Quality.

David Yun Dai, Ph.D., is an associate professor of educational psychology and methodology at University at Albany, State University of New York. He received his Ph.D. from Purdue University and worked as a postdoctoral fellow at the National Research Center on the Gifted and Talented, University of Connecticut. He teaches courses pertaining to instruction, learning, motivation, and cognition. His research interests include the psychology of talent development and conceptual foundations of gifted education. He has published several books and many journal articles and book chapters on talent development and gifted education. He currently serves on the editorial boards of Gifted Child Quarterly, Journal for the Education of the Gifted, and Roeper Review.

Ken Dickson, a K–12 administrator for more than 30 years, focuses his research and practice on cultural diversity and advanced academics relationships particularly with regard to students with special needs who are traditionally underrepresented in advanced programs. Ken frequently presents on cultural diversity and academic relationships topics in a variety of forums. His advocacy for children with exceptional needs is evidenced by decades of services to various educational groups including service as a board member of the National Association for Gifted Children (NAGC); past chair of NAGC’s Special Populations Network; and membership on many NAGC committees; the board of the Council for Exceptional Children (CEC); the board of The Association for the Gifted; CEC’s Children and Youth Action Network; the board of CEC’s Culturally and Linguistically Diverse Exceptional Learners Division; and the National Alliance of Black School Educators Commission on Special Projects, Research & Evaluation and District Administration.
Robin K. Dickson, Ph.D., is an assistant professor working with a hybrid Ph.D. program in educational psychology and educational technology the College of Education at Michigan State University. A graduate of the University of Virginia’s Curry School of Education in educational psychology with emphasis on gifted and talented education, Dickson pursues her passion for understanding how rich learning environments nurture creativity and high achievement. At the Michigan Virtual School, she helped create “virtual summer camps” and online afterschool programs for middle school students in mathematics and science, as well as enrichment opportunities in research for high school students. Dr. Dickson’s current work focuses on how hybrid and online programs, from K–12 through Ph.D., can use new technologies and social media to empower a diversity of learners. She conducts evaluations of gifted and talented programs in K–12 schools, has spoken at state and national conferences, and published numerous book chapters and articles.

Stephanie L. D’Souza is currently a Ph.D. candidate in the Counselor Education and Counseling Psychology doctoral program at the University of Connecticut. She is pursuing a specialty track in gifted and talented education. She received her bachelor’s degree in psychology and her master’s degree in community counseling from the University of Oklahoma. She has worked in a variety of counseling settings and was a graduate research assistant at the National Research Center on the Gifted and Talented at the University of Connecticut. Her research interests include twice-exceptional student needs, twice-exceptional postsecondary students, qualitative research, and the counseling needs of marginalized groups.

Samantha Fields is currently working toward her doctorate in experimental psychology at East Tennessee State University. She is interested in quantitative psychology and has research interests in individual differences, maladaptive outcomes, trauma and stress events and resilience, and creativity and decision making.

Brent Gault, Ph.D., is an associate professor of music education at the Indiana University Jacobs School of Music. He has taught elementary and early childhood music courses in Texas, Wisconsin, Connecticut, Pennsylvania, and Indiana and specializes in elementary and early childhood music education. Gault has presented at conferences of the American Orff-Schulwerk Association, the Dalcroze Society of America, the International Kodály Society, the International Society for Music Education, the Organization of American Kodály Educators, and MENC: The National Association for Music Education. In addition, he has presented and lectured at colleges and for music education organizations in the United States, Canada, Europe, and China. Gault has published articles in various music education periodicals, including the *Bulletin of the Council for Research in Music Education*, the *Journal*
Katherine Gavin, Ph.D., is an Associate Professor at the Neag Center for Gifted Education and Talent Development at the University of Connecticut. The main focus of her research is the development and evaluation of advanced math curriculum for elementary students. Dr. Gavin received the 2006 National Association for Gifted Children Early Leader award and the Neag School of Education Distinguished Researcher Award from the University of Connecticut. She has published more than 100 articles, book chapters, and curriculum materials on mathematics education with a focus on gifted students. She has more than 30 years experience in education as a math teacher, curriculum coordinator, math department chair, and assistant principal. She works with teachers nationally and internationally who are interested in developing mathematical thinking and talent in their students.

Marcia Gentry, Ph.D., directs the Gifted Education Resource Institute at Purdue University where she enjoys working with doctoral students, engaging in research, providing direct services to gifted youth, and working with educators from around the world to improve services for gifted, creative, and talented youth. Her research has focused on the use of cluster grouping; the application of gifted education pedagogy to improve teaching and learning; student perceptions of school; and on nontraditional services and underserved populations. Dr. Gentry developed and studied the Total School Cluster Grouping Model and is engaged in continued research on its effects concerning student achievement and identification and on teacher practices. She is currently directing several research projects aimed toward discovering and developing talents among students from underrepresented populations. She remains active in the field through service to the National Association for Gifted Children and the American Education Research Association and by writing, reviewing, and presenting research aimed to improve education for children, youth, and teachers.

Krista D. Glazewski, Ph.D., is an associate professor of instructional systems technology at Indiana University. Her research examines the use of technology to support student inquiry and problem-solving. A former middle school teacher herself, she also explores means of supporting teachers as they adopt new technological and curricular innovations. She has been a part of leading or directing three large-scale university/school/community partnerships.

Tarek C. Grantham, Ph.D., is an associate professor in the Department of Educational Psychology at the University of Georgia. He teaches in the gifted and creative education program, leading the diversity and equity strand. Dr. Grantham’s research addresses the problem of underrepresentation among ethnic minority students, particularly Black males, in advanced programs. He has
coedited two books: *Gifted and Advanced Black Students in School: An Anthology of Critical Works* and *Young, Triumphant, and Black: Overcoming the Tyranny of Segregated Minds in Desegregated Schools*. Dr. Grantham has served as program chair for the Special Populations Network of the National Association for Gifted Children and on the board of The Association for the Gifted and Talented—cochairing its Parent, Community, and Diversity Committee. Dr. Grantham was awarded the Mary M. Frasier Excellence and Equity Award by the Georgia Association for Gifted Children.

**Miraca U. M. Gross, Ph.D.,** is Emeritus Professor in the School of Education and Honorary Director of GERRIC at The University of New South Wales in Sydney, Australia. Her research has focused on issues of equity for gifted students, ability grouping, acceleration, socioaffective development, and the highly gifted. She has won several international research awards including the Hollingsworth Award for Excellence in Research in Gifted Education and the Mensa International Education and Research Foundation Awards for Excellence. In 2008, Mensa further honored her with their Lifetime Achievement Award. In 2005, the National Association for Gifted Children honored her with their Distinguished Scholar Award (the first time this was awarded to a scholar outside North America). In retirement, she retains her keen interest and involvement in teaching and research within the field of gifted education.

**E. Jean Gubbins, Ph.D.,** is Associate Director of The National Research Center on the Gifted and Talented and professor of educational psychology at the University of Connecticut. Dr. Gubbins is involved in research studies focusing on STEM high schools, math education, and using gifted education pedagogy with all students. Her research interests stem from prior experiences as a classroom teacher, teacher of gifted and talented students, evaluator, educational consultant, and professional developer. She teaches graduate courses in gifted education and talent development related to identification, programming, curriculum development, and program evaluation.

**Thomas P. Hébert, Ph.D.,** is professor of educational studies at the University of South Carolina, where he teaches graduate courses in gifted education. He was a teacher for 13 years, 10 of which were spent working with gifted students at the elementary, middle, and high school levels. He served on the board of directors of the National Association for Gifted Children (NAGC). He was the inaugural recipient of the Mary M. Frasier Equity and Excellence Award from the Georgia Association for Gifted Children for his research contributions on diverse students, received the Neag School of Education Outstanding Alumnus Research Award from The University of Connecticut, and was named an NAGC Early Scholar. He conducts workshops nationally and internationally on topics related to gifted education. His
areas of research interest include social and emotional development of gifted children, underachievement, culturally diverse gifted students, and problems faced by gifted young men.

Nanseol Heo is a Ph.D. candidate in the counselor education and supervision program at The University of Iowa. She is also a research assistant at The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development. In 2011, she was awarded the exceptional graduate student recognition from The University of Iowa College of Education. Her research focuses on the social maladaptation of creative and gifted students and career counseling for gifted and talented students.

Holly Hertberg-Davis, Ph.D., is an educational consultant specializing in differentiation of instruction, development of advanced curriculum, and the delivery of effective professional development. She is a former faculty member of the Curry School of Education at the University of Virginia, where she taught courses in the education of the gifted and was a principal investigator for the National Research Center on the Gifted and Talented. She has written and presented extensively on her primary research interests: differentiation of instruction, staff development, and equity in Advanced Placement and International Baccalaureate courses.

Nancy Hertzog, Ph.D., is professor of educational psychology at the University of Washington and the Director of the Halbert and Nancy Robinson Center for Young Scholars. From 1995–2010, she held a faculty position in the Department of Special Education and directed University Primary School (serves children from preschool through first grade) at the University of Illinois at Urbana-Champaign. Her primary area of interest relates to ways that teachers engage and challenge all students. Currently, Dr. Hertzog’s research focuses on how teachers differentiate their instruction to address the diverse needs of their students. She is the author of two books related to early childhood gifted education, and has published in the *Journal of Curriculum Studies, Gifted Child Quarterly, Journal for the Education of the Gifted, Roeper Review, Teaching Exceptional Children, Early Childhood Research and Practice*, and *Young Exceptional Children*.

Jessica A. Hockett, Ph.D., is an education consultant specializing in differentiated instruction, curriculum design, and teacher professional development. She has worked with more than 60 school districts on various initiatives related to curricular, instructional, and program improvement. Before earning her Ph.D. in educational psychology from the University of Virginia, Dr. Hockett was a secondary English, social studies, and math teacher in both general and gifted program settings. Her book *Exam Schools: Inside America’s*
Jennifer L. Jolly received her Ph.D. in educational psychology with a concentration in gifted education from Baylor University. Currently she is an associate professor in elementary and gifted education at Louisiana State University. Her research interests include the history of gifted education and parents of gifted learners. Jolly is the vice-president of The Association of the Gifted (CEC-TAG) and also serves as editor-in-chief of NAGC’s Parenting for High Potential. She also is on the editorial advisory board for Gifted Child Today and the Journal for the Education of the Gifted. She received the Michael Pyryt Collaboration Award from AERA/Research on Creativity, Giftedness, and Talent SIG (with Dr. Alex Garn and Dr. Michael Matthews), the Louisiana Council for Exceptional Children Higher Education Professional of the Year, and the American MENSA Research Award. Before her tenure at LSU, she taught in both gifted and regular education classrooms as a public school teacher.

Susan K. Johnsen, Ph.D., is a professor in the Department of Educational Psychology at Baylor University where she directs the programs related to gifted and talented education. She is editor of Gifted Child Today; coauthor of Identifying Gifted Students: A Practical Guide, the Independent Study Program, RtI for Gifted Students, Using the National Gifted Education Standards for University Teacher Preparation Programs, Using the National Gifted Education Standards for PreK–12 Professional Development; and author of more than 200 articles, monographs, technical reports, and other books related to gifted education. She has authored three tests used in identifying gifted students. She serves on the Board of Examiners of the National Council for Accreditation of Teacher Education (NCATE) and is a reviewer and auditor of programs in gifted education. She is past president of The Association for the Gifted (TAG) and past president of the Texas Association for Gifted and Talented (TAGT).

Jae Yup Jung, Ph.D., is a senior lecturer in the School of Education and a Senior Research Fellow at the Gifted Education Research, Resource and Information Centre (GERRIC) at The University of New South Wales, Australia. His major research interest is in the decision making of gifted and nongifted adolescents on topics such as careers, university entrance and friendships, usually incorporating motivational and cultural perspectives. He has published in a range of journals including Gifted Child Quarterly, Journal for the Education of the Gifted, Roeper Review, Journal of Career Assessment, Journal of Career Development, and Research in Higher Education.

M. Layne Kalbfleisch, Ph.D., is an associate professor of educational psychology and Director of KIDLAB at George Mason University. She is
the Chair of the Brain, Neuroscience, and Education SIG in the American Educational Research Association and a founding associate editor of *Frontiers in Educational Psychology*. Her transdisciplinary research examines twice exceptionality and the relationship between talent and disability in autism, attention disorders, and constructivist learning to better understand the roles of physical, emotional, and social information in problem solving. She has more than 30 scholarly publications across educational psychology, special and gifted education, neuroethics, and cognitive neuroscience. She received the inaugural “Scientist Idol” award for messaging science to the public from the National Science Foundation and contributed to the 2007 OECD-CERI publication, “Understanding the Brain: The Birth of a Learning Science.”

**James C. Kaufman, Ph.D.,** is professor of educational psychology at the University of Connecticut. He is the author/editor of more than 20 books and 200 papers on creativity. Kaufman is the President of APA’s Division 10 and was the cofounding editor of *Psychology of Aesthetics, Creativity, and the Arts*. He is currently the founding editor of *Psychology of Popular Media Culture*. His awards include the Daniel E. Berlyne Award and the Paul Farnsworth Award from APA’s Division 10, the E. Paul Torrance Award from the National Association of Gifted Children, the Mensa Education & Research Foundation’s Award for Excellence in Research, and the Early Career Research Award from the Western Psychological Association.

**Stephanie Klupinski** is the Vice President of Legal and Legislative Affairs at the Ohio Alliance for Public Charter Schools. She holds a J.D. from the Moritz College of Law at the Ohio State University, an M.P.P. from the Ford School of Public Policy at the University of Michigan, and a B.A. in English from the University of Pennsylvania. Her research areas include labor relations in charter schools and legal issues in gifted education.

**Robert Kunzman** is professor of education at Indiana University and the managing director of the International Center for Home Education Research (http://icher.og). He has studied homeschooling intensively for 10 years, and is the author of *Write These Laws on Your Children: Inside the World of Conservative Christian Homeschooling*.

**Qin Li** is a Ph.D. student at Claremont Graduate University where she is pursuing a degree in positive developmental psychology. Her primary research goal is to gain a better understanding of the creative process in order to develop methods of creativity enhancement. Her areas of research include creativity, talent development, and other topics related to creativity, such as mental illness, expertise, and aging. She has presented her work at the conferences of the American Psychological Association, the Western Psychological Association, and the Society for Research in Child Development.
Matthew Makel, Ph.D., is a gifted education research specialist at the Duke University Talent Identification Program. He received his Ph.D. from Indiana University. His research examines the nature and development of the abilities, perceptions, and environments of academically talented youth to better understand the factors that lead to the expression of talent. He focuses primarily on academic self-concept, implicit beliefs, long-term outcomes, replication, talent development, and time allocation. He also seeks to communicate and translate research findings to nonresearchers.

Evie Malaia, Ph.D., investigates how linguistic structure (syntax) and meaning (semantics) emerge through network interaction during neural processing of sensory information. Her research employs a combination of motion capture, electrophysiology, and neuroimaging in studying language as a complex system. After earning her Ph.D. at Purdue University working on sign language processing, she trained in the Cognitive Neuroimaging Laboratory at Indiana University. She is currently an assistant professor at the University of Texas at Arlington Southwest Center for Mind, Brain, and Education, Department of Curriculum and Instruction.

Maureen A. Marron, Ph.D., served as an associate research scientist at the Belin-Blank Center’s Institute for Research and Policy on Acceleration from 2006–2013. She was actively involved in the establishment of the Institute for Research and Policy on Acceleration (IRPA) and made a major contribution to the Guidelines for Developing and Academic Acceleration Policy (coauthored by IRPA, the National Association for Gifted Children, and The Council of State Directors of Programs for the Gifted). In fall 2013, she became an assistant professor of education at Iowa Wesleyan College.

Michael S. Matthews, Ph.D., is associate professor and Coordinator of the Academically & Intellectually Gifted graduate programs at the University of North Carolina at Charlotte. He is coeditor of the Journal of Advanced Academics, and is active in the National Association for Gifted Children (which awarded him the Early Scholar Award), and the American Educational Research Association. Dr. Matthews is also a board member and past vice president of the North Carolina Association for the Gifted & Talented. His research focuses on motivation and achievement, including underachievement and dropping out; science learning; gifted education policy; parenting; and issues related to the assessment and identification of gifted learners from diverse backgrounds, particularly English language learners.

Matthew McBee, Ph.D., is assistant professor of experimental psychology at East Tennessee State University where he teaches courses on statistics, experimental design, and quantitative research methodology. He is interested in many aspects of gifted and talented education, with a particular focus on the
About the Authors

identification of gifted students. He has also contributed statistical expertise to
research in disciplines such as autism spectrum disorders, reading and writing,
pediatric obesity, and transfusion medicine.

D. Betsy McCoach, Ph.D., is an associate professor in the Department of
Educational Psychology at the University of Connecticut. Betsy has published
more than 75 journal articles, book chapters, and books. Betsy served as the
founding coeditor for the Journal of Advanced Academics, and she is the current
coeditor of Gifted Child Quarterly. Betsy serves as a Co-Principal Investigator
and research methodologist on several federally funded research grants, and she
has served as the Research Methodologist for the National Research Center
on the Gifted and Talented for the last 7 years.

Kimberly McCormick, Ph.D., is an assistant professor of learning and
assessment in the Teacher Education Department at Salisbury University. She
holds a bachelor’s degree in elementary education from Butler University and
a master’s degree in educational psychology with a specialization in gifted and
talented education from Ball State University. She attended graduate school at
Indiana University, where she earned a Ph.D. in learning and developmental
sciences with a specialization in educational psychology. She teaches courses
in educational psychology, assessment, and gifted and talented education. Her
research interests include gifted and talented education, connecting student
engagement to the academic and social needs of gifted and talented students,
and understanding and measuring student engagement in schools.

Tracy C. Missett, Ph.D., is an assistant professor at Sweet Briar College.
She holds a bachelor’s degree in rhetoric and communications studies from
the University of Virginia, a law degree from the University of California,
Hastings College of the Law, a master’s degree in education from Teachers
College, Columbia University, and a Ph.D. in Educational Psychology from
the University of Virginia. Her research interests include twice-exceptional
students, particularly those with emotional disabilities, and creativity as a com-
ponent of giftedness.

Sidney M. Moon, Ph.D., is professor of gifted, creative, and talented
studies and Associate Dean for Learning and Engagement in the College of
Education at Purdue University. She has been involved in the field of gifted,
creative, and talented studies for 31 years. In that time, she has contributed
more than 75 books, articles, and chapters to the field. Sidney is active in the
National Association for Gifted Children where she has served as Chair of
the Research and Evaluation Division, a member of the Board of Directors,
and Association Editor. Currently, she is serving as treasurer of the American
Educational Research Association Special Interest Group (SIG), Research on
Giftedness, Creativity, and Talent. Her research interests include talent devel-
development in the STEM disciplines (science, technology, engineering, and mathematics), academic talent development, and personal talent development.

**Sharlene Newman, Ph.D.**, is a cognitive neuroscientist in the Department of Psychological and Brain Sciences and the programs in cognitive science and neuroscience at Indiana University. Her research is very much concerned with questions of how different regions of the brain work together, and how the functional connectivity (or the communication) between regions vary with task, context, and individual differences in ability. To date, she has worked to obtain a clearer perspective of the functional and synergistic activities of neurocognitive networks. The investigation of individual differences is a thread that runs through her research on language processing and problem solving. The research tool that she has primarily used is functional MRI. However, recently she has begun to incorporate diffusion tensor imaging to explore structural connectivity, as well as electrophysiological techniques, in order to more precisely examine the temporal dynamics of cognition.

**Paula Olszewski-Kubilius, Ph.D.,** is the Director of the Center for Talent Development and a professor in the School of Education and Social Policy at Northwestern University. Her most recent work is a coauthored monograph: “Rethinking Giftedness and Gifted Education: A Proposed Direction Forward Based on Psychological Science.” She has served as editor of Gifted Child Quarterly, coeditor of the Journal of Secondary Gifted Education, and on the editorial review boards of Gifted and Talented International, Roeper Review, and Gifted Child Today. She currently is on the board of trustees of the Illinois Mathematics and Science Academy and the Illinois Association for the Gifted and serves on advisory boards for the Center for Gifted Education at The College of William and Mary and the Robinson Center for Young Scholars at the University of Washington. She has served as president of the National Association for Gifted Children from whom she received the Distinguished Scholar Award.

**Stuart Omdal, Ph.D.**, was an elementary teacher for 15 years, both in the regular classroom and as a gifted education coordinator facilitating the Schoolwide Enrichment Model. Since completing graduate school at the University of Connecticut in 1995, he has been a professor of gifted education at the University of Northern Colorado (UNC). He is the Director of the Summer Enrichment Program and Director of the Center for the Education & Study of Gifted, Talented, Creative Learners at UNC. His professional interests include creativity in education, twice-exceptionality, underachievement of students from nondominant cultural and language groups, and the implementation of Response to Intervention in gifted education. He is on the board of directors for the Association for the Education of Gifted Underachieving Students (AEGUS) and the Colorado Association for Gifted and Talented
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(CAGT), and has served on board of directors for the National Association for Gifted Children.

Anne T. Ottenbreit-Leftwich, Ph.D., is as an associate professor of instructional systems technology at Indiana University. Her expertise lies in the areas of the design of digital curriculum resources, the use of technology to support preservice teacher training, and development/implementation of professional development for teachers and teacher educators. Her current research focuses on teachers’ value beliefs related to technology and how those beliefs influence teachers’ technology uses and integration.

Jean Sunde Peterson, Ph.D., Professor Emerita at Purdue University, was a classroom teacher for many years and was named State Teacher of the Year. She developed summer foreign language day camps for children prior to graduate work in counseling and development at the University of Iowa. She directed school counselor preparation for several years at Purdue University and continues to focus most of her research and writing on concerns related to the social and emotional development of high-ability youth. Her national and international workshops, conference keynotes, and presentations address those areas, as well as academic underachievement, bullying, negative life events, development-oriented group work with children and adolescents, and listening/responding skills for teachers and parents. She has authored more than 100 books, invited chapters, and journal articles; has received national awards for scholarship; and has received awards at Purdue for teaching, research, and service.

Rebecca L. Pierce, Ph.D., is associate professor of mathematical sciences at Ball State University, Director of Undergraduate Programs, and a former fellow at the Center for Gifted Studies and Talent Development. Dr. Pierce has taught mathematics and statistics to elementary, middle school, high school, and college students. Dr. Pierce directs the Ball State Institute for the Gifted in Mathematics. She has authored or coauthored numerous publications in professional journals, as well as several books and book chapters and has made presentations on statistics, statistical methods and career opportunities for mathematics and statistics majors. With other Ball State colleagues, she was awarded several Javits’ grants. She serves as a reviewer for Roeper Review, Gifted Child Quarterly, Journal for the Education of the Gifted, and Teaching Statistics and as an editor for The Statistics Teacher Network. She received the Leadership Award from the Indiana Association for the Gifted.

Jane Piirto, Ph.D., is Trustees’ Distinguished Professor at Ashland University. She is the author of 17 books, both scholarly and literary, including Talented Children and Adults: Their Development and Education (three editions), Understanding Creativity, Understanding Those Who Create (2 editions),
“My Teeming Brain”: Understanding Creative Writers, Creativity for 21st Century Skills, The Three-Week Trance Diet, A Location in the Upper Peninsula, Saunas, six poetry and creative nonfiction chapbooks, and many scholarly articles and chapters. She was awarded Distinguished Scholar of the National Association for Gifted Children and won a Lifetime Achievement Award from the Mensa Education and Research Foundation.

**Sally M. Reis, Ph.D.**, is the Interim Vice Provost for Academic Administration, a Board of Trustees Distinguished Professor, and Teaching Fellow in Educational Psychology at the University of Connecticut where she also serves as Principal Investigator at The National Research Center on the Gifted and Talented. She was a teacher for 15 years, 11 of which were spent working with gifted students on the elementary, junior high, and high school levels. She has authored more than 130 articles, 14 books, 60 book chapters, and numerous monographs and technical reports. Dr. Reis serves on several editorial boards and is the past president of the National Association for Gifted Children.

**Ronald Reeve, Ph.D.**, is Director of the Curry Programs in Clinical and School Psychology at the University of Virginia. He completed his Ph.D. in Education and Psychology at the University of Michigan. For 3 years, prior to joining the faculty at the University of Virginia, he served as a school psychologist in Michigan. He has conducted research and engaged in public policy work in the areas of high incidence disabilities in children, including learning disabilities and attention deficit hyperactivity disorders. For the past several years, Dr. Reeve’s work has focused on children with autism spectrum disorders. He serves as the supervising psychologist for the Curry Autism Spectrum Services specialty clinic, where he and his research team are actively researching a range of ASD-related topics, including parent stress and coping, validity of assessment techniques, and enhancing safe driving among adolescents and young adults with high functioning levels of ASD, among others.

**Joseph S. Renzulli, Ph.D.**, is a professor in the Department of Educational Psychology at the University of Connecticut and was selected as a Board of Trustees Distinguished Professor. He holds dual directorships at the Neag Center for Gifted Education and Talent Development and the federally funded The National Research for the Gifted and Talented. He is noted for developing the three-ring conception of giftedness and the Schoolwide Enrichment Model. His research has focused on the broadening the process of identification and the development of giftedness in young people and on organizational models and curricular strategies for total school improvement. A focus of his work has been on applying the strategies of gifted education to the improvement of learning for all students. He is a Fellow in the American
Psychological Association and was a consultant to the White House Task Force on Education of the Gifted and Talented.

**M. R. E. Richards, Ed.D.,** is an educational consultant in gifted education, curriculum design, and differentiation and is an adjunct professor at the University of Northern Colorado in both gifted and science education. Her background in science and education allows her to understand the needs of both fields and design curriculum to meet the educational growth of a diverse student population while including the background content and skills in science that are needed in high school and postsecondary education.

**Anne N. Rinn, Ph.D.,** is an associate professor of educational psychology and the coordinator of the graduate program in gifted and talented education in the Department of Educational Psychology at the University of North Texas. She holds a Ph.D. in educational psychology, with a minor in higher education and student affairs, from Indiana University. Her research focuses on the academic, social, and emotional development of gifted adolescents and college students, as well as the effects of gifted programming on student development as a whole. She is an active member of the National Association for Gifted Children, the Texas Association for the Gifted and Talented, and the American Educational Research Association.

**Julia Link Roberts, Ed.D.,** is the Mahurin Professor of Gifted Studies at Western Kentucky University. She is Executive Director of The Center for Gifted Studies and the Carol Martin Gatton Academy of Mathematics and Science in Kentucky. She is President of The Association for the Gifted, a division of the Council for Exceptional Children, and a member of the Executive Committee of the World Council for Gifted and Talented Children. Dr. Roberts received the National Association for Gifted Children Distinguished Service Award and the Acorn Award as the outstanding professor at a Kentucky college or university.

**Ann Robinson, Ph.D.,** is professor of educational psychology and Director of the Jodie Mahony Center at the University of Arkansas at Little Rock where she coordinates the graduate programs in gifted education. She is a former editor of the *Gifted Child Quarterly,* was President of the National Association for Gifted Children, and received the Early Leader, the Early Scholar, and the Distinguished Service Awards from NAGC. In 2003, “A National Study on Local and State Advocacy in Gifted Education” was juried as the *Gifted Child Quarterly* Paper of the Year. She was recognized as the Purdue University Alumna of Distinction for the College of Education, was honored by the William Jefferson Clinton Presidential Library for her public service, and was the University of Arkansas recipient of the Faculty Excellence Award for Research. Ann publishes and presents nationally and internationally.
on advocacy, biographical inquiry, and evidence-based interventions for teachers and students.

**Bryan J. Rothenberg** is a Juris Doctorate Candidate, expected 2014, at Capital University Law School. He has a bachelor's degree from Ohio University with a focus in finance and economics. He was a legal intern at Ohio Alliance for Public Charter Schools, and his research interests include minority representation in gifted education.

**Stephen T. Schroth** holds a Ph.D. in educational psychology/gifted education from the University of Virginia. He serves as an assistant professor of educational studies at Knox College in Galesburg, IL, before which he worked as a classroom teacher, literacy coach, and gifted coordinator with the Los Angeles Unified School District. With Jason A. Helfer, Dr. Schroth has been the recipient of the 2008, 2010, and 2011 MENSA Education & Research Foundation Award for Excellence in Research and of the Philip Wright Green/Lombard College Prize for Distinguished Teaching, Knox College's highest recognition for classroom excellence. The author of more than 300 monographs, articles, reviews, and other curricular materials, recent publications include “Identifying Gifted Students: Educators Beliefs Regarding Various Processes and Procedures” in the *Journal for the Education of the Gifted* (with J. Helfer). He is a past Chair of the Arts Network of the National Association for Gifted Children.

**Bruce M. Shore, Ph.D.,** is Emeritus Professor of Educational Psychology at McGill University in Montreal, Fellow of the American Educational Research Association, and a licensed teacher and psychologist. For 21 years, he held a jointappointment in McGill's teaching-improvement unit. He served as Department Chair, McGill Association of University Teachers President, and Dean of Students. Awards include the National Association for Gifted Children's Distinguished Scholar, The McGill Faculty of Education Distinguished Teaching Award, the David Thomson Award for Graduate Supervision and Teaching, and the Principal's Prize for Excellence in Teaching. His research is on intellectual giftedness and on inquiry-based teaching and learning.

**Del Siegle, Ph.D.,** is a professor in gifted and talented education and Head of the Department of Educational Psychology at the University of Connecticut. He is a past president of the National Association for Gifted Children (NAGC) and chair-elect of the Research on Giftedness, Creativity, and Talent SIG of the American Educational Research Association (AERA). Along with Betsy McCoach, he is coeditor of *Gifted Child Quarterly*. He also writes a technology column for *Gifted Child Today*. Dr. Siegle is coauthor with Gary Davis and Sylvia Rimm of the popular textbook, *Education of the Gifted*.
and Talented. He is also author of a new book, *The Underachieving Gifted Child: Recognizing, Understanding, and Reversing Underachievement*.

**Katherine Strand, Ph.D.**, is an associate professor of music education at the Indiana University Jacobs School of Music where she teaches undergraduate and graduate courses and directs the International Vocal Ensemble. She has taught pre-kindergarten through 12th-grade public school music in Virginia and Illinois. Strand specializes in classroom composition, action research, and integrated arts curriculum development. She has presented sessions at the national conferences of numerous music association conferences. Her articles have appeared in *Music Education Research*, the *Journal of Research in Music Education*, the *Journal of Music Teacher Education*, the *Bulletin of the Council for Research in Music Education*, *Arts Education Policy Review*, *Philosophy of Music Education Review*, *General Music Today*, *Music Educators Journal*, and *Teaching Music*.

**Dana Thomson** is Research Director at the Center for Talent Development at Northwestern University’s School of Education and Social Policy. Her research interests include the social and emotional development of gifted students, the role of the family in talent development, the development of creative potential, and the needs of special populations of gifted children. She received a bachelor’s degree in philosophy from Carleton College and a master’s degree in education, with a concentration in gifted, from Northwestern University.

**Carol Ann Tomlinson, Ed.D.**, is William Clay Parrish, Jr. Professor and Chair of Educational Leadership, Foundations, and Policy at The University of Virginia’s (UVA) Curry School of Education and Co-Director of the Curry Institutes on Academic Diversity. She has been recognized as Outstanding Professor at Curry and has also received an All-University Teaching Award. She is author of many books on differentiated instruction, including *How to Differentiate Instruction in Mixed-Ability Classrooms; The Differentiated Classroom: Responding to the Needs of All Learners; Integrating Differentiated Instruction and Understanding by Design* (with Jay McTighe); and *Leading and Managing a Differentiated Classroom* (with Marcia Imbeau). Dr. Tomlinson has also served as President of NAGC. Prior to joining the faculty at UVA, she was a public school teacher and was selected Virginia’s Teacher of the Year in 1974. She works throughout the U.S. and internationally with educators who seek to develop classrooms that are responsive to the varied needs of learners.

**Nicholas Uzl** is a Juris Doctorate Candidate, expected 2014, at the Moritz College of Law at The Ohio State University. He earned a bachelor’s degree in political science, with a focus on American politics from Kent State University. He served as a legal intern with the Ohio Alliance for Public Charter Schools. His research interests include gifted education programs in charter schools.
Joyce VanTassel-Baska, Ed.D., is Professor Emerita at The College of William and Mary, where she founded the Center for Gifted Education. She directed the Center for Talent Development at Northwestern University, served as state director of gifted programs in Illinois, and also served as a regional director, a local coordinator of gifted programs, and a teacher of gifted high school students. Her major research interests are in the talent development process and effective curricular interventions with the gifted. An author of 22 books and more than 500 other publications on gifted education, she was the editor of Gifted and Talented Internationals and received the Distinguished Scholar Award from the National Association for Gifted Children and the Outstanding Faculty Award from the State Council of Higher Education in Virginia. She has received the President’s Award from the World Council on Gifted and Talented and the Collaboration and Diversity Service Award from CEC-TAG.

Jordan Wade is a doctoral student in the Curry Programs in Clinical and School Psychology at the University of Virginia. Prior to beginning her graduate training, she worked at The Mariposa School in Cary, NC, which uses the principles of Verbal Behavior and Applied Behavior Analysis to teach functional communication skills to children with autism spectrum disorders. At Mariposa, she provided individualized instruction and taught social skills groups. Jordan is currently a member of the Curry Autism Spectrum Disorders Research Group; her research interests include evaluating outcomes of behavior-oriented early intervention programs for children with ASD and developing family support programs. Additionally, she conducts comprehensive diagnostic assessments within the Curry Autism Spectrum Services specialty clinic at the Sheila C. Johnson Center at the Curry School of Education.

Kristofor Wiley, Ph.D., is an assistant professor in education at Drury University. He developed curriculum and trained teachers with Project Parallax at the University of Virginia before completing his dissertation on the social and emotional traits of gifted students. His research interests also include teacher education, program evaluation, and the conceptual foundations of the field.

Frank Worrell, Ph.D., is a professor in the Graduate School of Education at the University of California, Berkeley. He also serves as director of the school’s psychology program, faculty director of the Academic Talent Development Program, and a faculty director of the California College Preparatory Academy. His research centers on academic talent development, the relationship of psychosocial variables to academic and psychological functioning and the translation of research findings into school-based practice. Dr. Worrell is a coeditor of the Review of Education Research; a Fellow of Divisions 5, 16, and 52 of the American Psychological Association; a Fellow of the Association of
Psychological Science; and an elected member of the Society for the Study of School Psychology.