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Gifted education: changing conceptions, emphases and practice

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Gifted education is leading an interdisciplinary paradigm shift moving education out of its historic role of entrenching systemic inequities. It is a crucible for pioneering investigations of optimal human development and provides a vehicle for increasing social equity. We review changing conceptions of intelligence, motivation and creativity, and consider current findings on processes that affect the development of high ability. We discuss the role of context and neuroscience as they apply to understanding the development of giftedness. We describe changing emphases in gifted education, focusing on the shift from categorical homogeneity to developmental diversity, concluding that giftedness and talent are best understood as dynamic, fluid, domain-specific and context-sensitive processes. Finally, we consider implications for educational practice: How do these changes impact definition, prediction, identification, programming, psychosocial practices and teacher development, opening up opportunities for optimal learning, development and fulfillment across the population, and across the life span?

Keywords: excellence and equity; elitism; giftedness; human capital; giftedness; talent development

Introduction

The concept of giftedness has been under scrutiny for some time now, both within the field of gifted education (Balchin, Hymer, & Matthews, 2009; Borland, 1989, 2005; Subotnik, Olszewski-Kubilius, & Worrell, 2011) and without (Sapon-Shevin, 1994; Tomlinson, 2008; White, 2006). Many of the questions have concerned whether gifted education is entrenching existing social inequities by favouring those who are already privileged. Other questions have been less political and more theoretical, grounded in the observation that gifted studies and education are disguised as scientifically based, but that giftedness is actually socially conferred. The call for a paradigm

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shift in gifted education is ever louder (e.g. Borland, 2005; Gillborn & Youdell, 2010; Matthews & Foster, 2009; Subotnik et al., 2011).

The need to re-examine the concept of giftedness is further necessitated by the fact that most efforts to understand it are problematically descriptive in nature. Reviews of the literature (Dai, Moon, & Feldhusen, 1998; Robinson & Clinkenbeard, 1998; Steiner & Carr, 2003) show that the research focuses heavily on characteristics of 'gifted children' in comparison with their 'nongifted' age peers. A thoughtful re-examination leads to questions about the underlying assumptions regarding definition, measurement, origins and trajectories of high-level ability. A theoretically, scientifically and philosophically defensible foundation is essential to sound practice.

Changing conceptions

Intelligence

From its inception, the field of gifted education has had close ties to theories of intelligence and to intelligence testing (Terman, 1925). Although this connection is still held in high regard by some (e.g. Gottfredson, 1997), many basic assumptions about intelligence have been challenged, including that it is by and large genetically based, is stable across the life span, is general across domains and that a high level of it is required for the development of high-level expertise. New perspectives – motivated both by new evidence and increasing awareness of the problematic impact of traditional practices – have enormous implications for how giftedness is defined, identified and addressed, and for how it is understood in the context of education more generally.

For quite some time, neural efficiency has been considered a biological advantage that distinguishes gifted children from their age peers (Gallagher, 1996; Geake, 2009). Upon closer scrutiny, however, some argue that intelligence is nothing more than a form of developing expertise (Sternberg, 1998). And just as intelligence can be seen as developing expertise, expertise can be seen as learned intelligent behaviour or experiential intelligence (Ceci, 1996; Gresalfi, Barab, & Sommerfeld, 2012).

This changing conception of intelligence represents a trend away from the essentialist approach and toward a more functional approach. Gardner (2003) articulated this trend succinctly when he defined intelligence as 'fit execution of a task or role' (p. 48). Seen this way, intelligence is a dynamic functional state, rather than a static personal trait, and is better assessed with task-specific criteria than with a contentious set of tasks presumed to measure a general quality of mind.

Motivation

When intelligence is understood as a dynamic functional state, it must necessarily include experiential and reflective dimensions, and so, high intelligence becomes bound to motivation. Motivation can be defined as an

internal process that initiates and sustains goal-directed behaviour (Pintrich & Schunk, 1996). Although the traditional IQ-based definition of giftedness is based on a clear distinction between intelligence and personality, there is no such distinction in the way that people function in their lives (Lohman & Rocklin, 1995). Cognitive capacity and processes cannot really be dissociated from motivation (Dai & Sternberg, 2004).

Motivation is involved in highly effective behaviour from skilled memory (Sternberg & Williams, 2002) to racetrack gambling (Ceci & Liker, 1986). In some domains, affect and motivation may actually be more important than cognitive abilities, prompting some scholars to highlight a 'rage to master' as the defining quality of artistically gifted children (Winner, 1996).

If one can accept that intelligence is dynamically responsive to environmental circumstances, rather than fixed at birth, it is easier to afford motivation a central role. Gottfried, Gottfried, Cook, and Morris (2005) identified a group of children who demonstrated high intrinsic academic motivation and above-average (but not gifted-level) IQ at the age of eight. Their educational outcomes several years later were equivalent to those of a gifted-IQ group's, a distinct case supporting the role of motivation in academic ability.

Creativity

Although divergent thinking tests have some reliability in predicting adult creative accomplishments (Cramond, Matthews-Morgan, Bandalos, & Zhuo, 2005), it is now widely accepted that real-world creative productivity is a long-term proposition and develops over time (Simonton, 1999). Truly creative work can be done only after many years of skill development, coupled with a drive to keep learning and growing (Csikszentmihalyi, 1996). A process account is needed to explicate how creativity is actualised.

We now know that creative transformation rarely occurs without substantial mastery of a domain (Weisberg, 2006). The creative process involves a critical tension between the known and unknown, the old and the new. Creativity is a 'constrained stochastic process' (Simonton, 2003, p. 475): it builds on chance encounters in the real world and chance connections in the mind, yielding unique combinations and permutations of existing elements.

We are also learning that creativity is more social than solo. A creative discovery is not usually the product of an individual mind; it is more frequently the product of synergistic interaction, involving a group of people, none of whom are likely to make the same discovery on their own (Sawyer, 2003). These new understandings of the social nature of the creative process are now being applied to conceptions of giftedness (Keating, 2009).

Developmental processes

There is an emerging consensus that giftedness is the result of an interaction between genetic predispositions and environmental forces, and that it is not

innate but rather develops (Haworth & Plomin, 2010; Horowitz, 2000, 2009; Plomin et al., 2013). This argument is consistent with the proposition advanced in developmental biology that individual development is epigenetic, rather than genetically determined (Gottlieb, 1998). Simonton's emergenic–epigenetic model (Simonton, 1999) provides a framework for understanding giftedness and talent development as a complex process of combinations of multiple genetic traits finding good fits in certain talent domains in an epigenetically timely fashion.

Although the roles of nurture and environment are increasingly acknowledged, developmental process accounts of giftedness are still sorely lacking (Matthews, Subotnik, & Horowitz, 2009; Subotnik et al., 2011). Feldman (2003) argued that, 'For the field of gifted education to fulfill its potential, processes of development in person, domain, and culture will have to move to center stage, organize the conversation, and become the most important criteria for assessment' (p. 21). He envisioned a model that recognised the complexity and diversity of developmental pathways leading to giftedness and talent.

The role of context

The context of human development includes immediate social situations and the nature of the tasks, domains and fields that are encountered. On a larger scale, it includes the zeitgeist, historical period and culture. Although very few would reject the notion that gifted-level expressions entail some contextual support such as opportunities to learn and social and technical assistance, it has been rare until recently to think of context as an actual constituent of giftedness (Barab & Plucker, 2002; Keating, 2009; Ziegler, 2009).

Context can refer to a set of conditions that reside in the task or domain, rather than the person. Thus, changing the conditions (e.g. radically lowering the basket in the game of basketball) can change the criteria required for gifted identification (a lowered basket means that height is no longer a basketball advantage) (Lohman, 2005a). Context also includes the affordances and constraints that shape gifted expressions as they develop (Dai & Renzulli, 2008). For example, when one sets out to play a given piece of music, the nature of that music contributes to one's developing aesthetic appreciation and artistic expression. In addition, context concerns the connection of specific performance situations to particular memories, skills and dispositions, as shown in research with street children who engage in sophisticated mathematical thinking as they peddle their goods, but do not perform commensurately on academic assessments (Carraher, Carraher, & Schliemann, 1985).

Another application of context concerns changes over time in prerequisites for outstanding achievement. In the nineteenth century, for example,

scientists could make groundbreaking contributions to genetics without exceptional mathematical ability, but to make comparable contributions today, one needs highly advanced mathematical ability (Siegler & Kotovsky, 1986). On the other hand, some music pieces that were once deemed too difficult to play except by the most accomplished musicians are now played regularly even by music students (Ericsson, 2006). Not only has the bar been raised for excellence in most domains, but technical support systems are also continually stretching the limits of human potential.

Social and cultural circumstances constitute yet another dimension of context. Variations in physical living conditions, opportunity structure and the availability of educational resources can facilitate or hinder the development of gifts and talents (Bronfenbrenner & Ceci, 1994). Similarly, the availability or absence of social capital may nourish or depress talent development (Putnam, 1993, 2000). Opportunities for meaningful collaboration can create a critical mass that results in highly creative accomplishments (Keating, 2009; Putnam, 1993; Sawyer, 2003). And finally, variations in cultural norms can lead to differential understandings of what constitutes high human potential (Sternberg, 2007). The nurturing of talent and creativity can be seen as an enculturation process that involves a specific set of values, attitudes and modus operandi, along with appropriately targeted technical support and the right kinds of mentorship at the right junctures (Subotnik, 2009).

Neuroscience and giftedness

Although the neurosciences are still in the early stages, interdisciplinary approaches that integrate neuropsychological and behavioural aspects of high-level development promise to make significant strides in demystifying giftedness. For example, anatomical differences have been found in the brains of professional musicians as compared to non-musicians, differences which appear to be neural adaptations due to long-term musical practice (Wan & Schlaug, 2010). Although there is evidence for the role of genetic predispositions in high achievement, there is also strong evidence demonstrating the role of neuroplasticity in gifted development and the malleable nature of genetically based traits (Haworth & Plomin, 2010; Keating, 2011; Nelson, Thomas, & deHaan, 2006).

Changing emphasis: categorical homogeneity to developmental diversity

Increasingly, there are objections to a categorical approach to giftedness, the notion that children who achieve high IQ scores constitute a homogeneous group that is innately and qualitatively different from others (Dai & Chen, 2014; Keating, 2009; Warwick & Matthews, 2009).

Evidence for nature and nurture

Some theorists believe that giftedness is primarily genetic, with environmental factors providing necessary but not sufficient conditions for its emergence (Geake, 2009). Neural bases have been sought for general intelligence (Duncan et al., 2000) and mathematical giftedness (O'Boyle, 2000) among others. Behavioural geneticists argue, however, that the nature/nurture question is a false dichotomy (Plomin, 1997; Plomin et al., 2013) and developmental psychologists criticise methods that compare the relative impacts of genetic and environmental influences without considering contexts, processes and developmental timing (Horowitz, 2009).

Ericsson's (2006) expertise model imposes no genetically based constraints on giftedness, except to the extent that nature factors such as temperament might influence personality attributes such as persistence, which is required for sustained deliberate practice and high-level performance. The extent to which early structured experience and neural plasticity lead to superior performance in the absence of constitutional predispositions is largely unknown.

Across fields, emphasis is shifting toward an understanding of giftedness as resulting from a complex and dynamic interplay of constitutional and environmental forces, with the former including, but not confined to, genes, and the latter including the technology, broadly defined, that facilitates talent development, as well as the social and cultural affordances that provide opportunities for synergistic interaction (Dai & Coleman, 2005; Horowitz, 2009; Haworth & Plomin, 2010; Keating, 2009). By focusing on 'giftedness in the making' (Dai, 2010), an integrative account be achieved.

Evidence for domain generality and domain specificity

High domain-general intelligence carries a learning advantage on a variety of tasks, especially as task complexity or novelty increases (Gustafsson & Undheim, 1996; Kanevsky & Geake, 2004). IQ does not predict levels of expertise, however, and sophisticated reasoning relies more on domain knowledge than it does on general intelligence; the advantage of high intelligence reaches a diminishing point as domain-specific knowledge and skills are acquired (Ackerman & Kanfer, 2004). Both expert reasoning and performance are context bound (Lohman, 2006) and studies of child prodigies and savants illustrate that giftedness entails a combination of domain-specific and domain-general resources (Feldman, 2003).

Changing practice

Definition

A thoughtful response to the empirical and philosophical critiques of traditional approaches to gifted education requires changing terms and definitions. One such revision puts the emphasis on temporary, local and practical

educational requirements, using the term 'gifted' not to describe individual students, but rather to designate relatively advanced academic demands in a certain area of study, demands that are available to those students who are ready, willing and able to benefit from an increased level of challenge (Borland, 2005; Dai, 2010; Keating, 2009; Matthews & Foster, 2009). Another approach emphasises finding and nurturing high-level abilities broadly across domains and across the population, rather than identifying giftedness in specific individuals (Claxton & Meadows, 2009; Hughes, 2009; Huxtable, 2009; Hymer, 2009; Hymer, Whitehead, & Huxtable, 2009). In both cases, the concept of giftedness and the requirements of gifted education are radically reformed from traditional practices.

Prediction

Historically, the once-and-forever rule applied: once a child achieved above a criterion test score (130 IQ, say), he or she was forever gifted. Later performance at lower levels rendered that child underachieving-gifted, rather than calling into question the permanency of the gifted label. This position is proving increasingly untenable as evidence accumulates demonstrating the fluidity of ability across time. In longitudinal research, over 50% of children who scored above 130 IQ at age seven scored below 130 by age twelve (Gottfried, Gottfried, & Guerin, 2009). Conversely, many who do *not* meet the gifted criterion on a first test administration would (if retested) achieve above the same cut-off later, thus becoming eligible for the gifted label later in their development.

Because of the regression to the mean factor, the higher we set the identification criterion, the greater the variability from one test administration to another (Lohman, 2006). The higher the cut-off used, the younger the child when first assessed and/or the more distant the future target, the poorer our capacity to predict gifted-level outcomes or (implicitly) not-gifted-level outcomes.

Identification

Emerging understandings of the fluidity, complexity and context sensitivity of human development should lead to gifted identification approaches that are similarly fluid, diverse and inclusive.

From categorical labelling to mismatch diagnostics

The act of assigning a student to a category such as 'gifted' ignores cultural, social, emotional, physical and intellectual needs and attributes. As with any label ('learning disabled', 'autistic'), the gifted label which accompanies traditional approaches to gifted education masks critical contextual

variables and the complexity of individual developmental diversity. Labels overfocus on the attributes shared by those who are so designated (i.e. high IQ or other academic advancement) and blind both the holder of the label and others to the important differences among those within the category (Kaufman, 2013; Matthews & Foster, 2014; Warwick & Matthews, 2009).

The closer assessment processes are to actual educational demands, the higher the probability that a child's special learning needs will be recognised and addressed. Rather than labelling certain children as once-and-forever 'gifted', then (and all others implicitly 'not gifted'), practitioners should be attempting to identify current mismatches between the educational challenges on offer and children's capabilities by subject area.

Domain specificity tied to educational services on offer

When giftedness is defined as advanced learning needs relative to age peers, domains of most concern are core academic subjects (e.g. language arts, mathematics, science) (Subotnik, et al., 2011; Worrell, 2009). Schools may also provide high-level education in other domains (spatial, social/emotional, musical, etc.), but doing so does not fall under the umbrella of gifted education, unless advanced curriculum is provided as needed in these areas.

Multiple measures

In order to meet the high-level learning needs of children from minority and disadvantaged backgrounds (addressing one of the most urgent sociological concerns about gifted education), three important conditions must be met: (a) programming must be appropriately diversified and matched to selection criteria; (b) the additional measures must be used for wider inclusion, rather than exclusion; and (c) implementation must include parents and teachers, who represent diversity in the community served (Robinson, Shore, & Enersen, 2007). Broadening assessment means increasing diversity, but not by excluding students who excel in traditional methods but do not do as well on additional measures.

Performance task assessments

Recommendations from a six-year state-wide implementation study that illustrated a significant increase in identification of underserved gifted learners included that performance task assessment should be used as one component of a multiple-measures approach, in addition to traditional ability and achievement measures (VanTassel-Baska, Johnson, & Avery, 2002). Performance task assessments are comprised of challenging, open-ended problems that require higher order thinking and problem-solving. They emphasise reasoning processes, rather than fast right answers (VanTassel-Baska, 2009).

Timing

Current knowledge about the complexity and variability of developmental trajectories leads away from one-shot screening blitzes, and toward ongoing assessment processes. At a given point in time, any given student might require differentiated curriculum in one subject area or another, no matter what previous test results have indicated.

Racial and socio-economic underrepresentation

Institutional racism that works against high-level achievement among some groups of students has been documented internationally, including in the United Kingdom (Wallace & Eriksson, 2006). Across the United States, African-American students are half as likely as white students to be in gifted programmes (Graham, 2009). In Australia and Canada, Aboriginal students are much less likely than others to participate in gifted programming (Chaffey, 2009; Matthews, 2014).

In addition to the suggestions already made about broadening identification policies, recommendations for addressing the large and persistent underrepresentation of certain students include fostering a growth mindset, providing teacher education and professional development, and attending to the inequities in students' opportunities to learn (Dweck, 2006; Keating, 2009; VanTassel-Baska, 2009).

Some analysts of this problem observe that the underrepresentation of certain minorities in gifted education is less a reflection of racism in gifted education than a troubling symptom of much larger economic and cultural disparities. From this point of view, in order to close the achievement gap, all children must experience early opportunities to thrive and engage in learning (Warwick & Matthews, 2009; Worrell, 2009).

Another key to culture-fair gifted identification is casting the assessment net widely, that is using multiple measures in flexible and inclusive ways. The ongoing, proximal, domain-specific, multiple-measures approach is particularly appropriate when attempting to address underrepresentation of certain minorities in gifted identification (Lohman, 2005a).

Nonverbal measures

Proponents and makers of nonverbal measures argue that these are more culture-fair than academic achievement and intelligence tests (Naglieri, 2008). Current best practice suggests the inclusion of nonverbal measures in multiple-measures approaches, but only sparingly: 'Evidence shows that they should be measures of last resort, not first resort. When used alone, such tests increase selection bias while appearing to reduce it' (Lohman, 2005b, p. 111).

Summary of identification recommendations

In this consideration of changing conceptions, emphases and practice in gifted education, there is an ongoing role for attending to the learning needs of students who are so advanced relative to same-age peers that modifications are required in order for them to use their school time productively. The most defensible way to discover which children are so advanced that they require differentiated education is to consider many different information sources on a frequent and ongoing basis, including (a) a student's history of domain-specific academic achievement; (b) high-ceiling tests of domain-specific reasoning (including performance task assessments); and (c) assessments of domain-specific interest and motivation. Tests of general cognitive ability, nonverbal tests and other measures such as parent-and-teacher checklists or observations can be used supplementally as needed, but should not constitute major information sources. Gifted identification should be seen as reflecting current learning needs. And finally, wherever possible, the gifted label should be attached to programming options, rather than to individual students (Matthews & Foster, 2009).

There is also an increasingly urgent call for giftedness-finding and giftedness-cultivation in students whose learning needs are not advanced at a given point in time, especially among students from less-privileged and minority backgrounds (Hymer, Whitehead, & Huxtable, 2009; Warwick & Matthews, 2009).

Programming: a range of options

As findings accrue illustrating the enormous diversity, complexity and domain-specificity of gifted development, it becomes increasingly apparent that no one approach can work effectively for all. Instead of full-time segregated classrooms for students who have been identified as gifted, schools should be providing a range of options or a continuum of services (Reis, 2009).

High-level learning happens within individuals' zones of proximal development when levels of challenge match students' ability and motivation, and where there are opportunities to learn incrementally, with prompt feedback; consistent practice at progressively more difficult levels leads to gifted-level performance (Ericsson, 2006; Kanevsky, 2011). When teachers understand this approach and are given the resources and support they need, gifted education can happen in every classroom, without any labelling or assignment to special classes.

Other options include acceleration (in all its forms, from grade-skipping through subject-specific acceleration), which is the gifted programming option most validated by research findings (Robinson, Shore, & Enersen, 2007). There is also strong evidence for the talent search model (Lubinski

& Benbow, 2006), wherein those who qualify are eligible for advanced summer, weekend and online curriculum options; subject-specific acceleration options; and targeted instruction.

In addition to ensuring content knowledge and comprehension in each subject area, educators should ensure that students also have opportunities to use and develop their abilities to analyse, synthesise, apply and evaluate what they are learning (VanTassel-Baska & Brown, 2007). Problem-based learning and other inquiry-based strategies can assist educators in fostering giftedness more broadly across the population by engaging students in decision-making and complex creative problem-solving (Aulls & Shore, 2008).

Technology has the potential to transform the way we provide appropriate educational adaptations to a wide range of talented students, and there are technological innovations that make gifted education more accessible (Chen, Dai, & Zhou, 2013). For example, the Renzulli Learning System (Renzulli & Reis, 2008) employs a learner-centred and problem-based approach.

Along with offering a range of programming options, there is a move toward providing a range of grouping practices. Current evidence suggests grouping students for advanced curriculum work that is flexibly organised and matched to documented subject-specific learning needs (VanTassel-Baska & Brown, 2007).

Psychosocial factors

As with cognitive development, so with psychosocial development children and adolescents with gifted learning needs are more heterogeneous than they are alike (Moon, 2006). This means that checklists of characteristics or social/emotional needs of gifted learners are neither reflective of the research, nor useful. At the same time, however, there are psychosocial factors involved in gifted development and education.

Psychosocial stages in talent development

Although talent development is highly domain specific, there are some broad generalisations that apply to the psychosocial stages experienced across domains (Dai & Renzulli, 2008; Dai & Speerschneider, 2012; Subotnik et al., 2011). Young children benefit from wide exposure to, and playful exploration of, a variety of domains, but as they develop domain-specific competence, they need more challenge, instruction and disciplined practice. As they move from competency to expertise, the important factors include awareness of one's strengths and weaknesses; acquisition of self-promotion and social skills; and a restoration of self-confidence (Subotnik, 2009).

Motivation and engagement

The pleasure that children and adolescents take in the learning process is critical to their eventual cognitive and academic outcomes (Gottfried et al., 2009), and an intense desire to take learning as far as possible is essential to extraordinary accomplishment (Winner, 1996). It is of some concern, then, that academically advanced students are at more risk than others for disengaging from school in the adolescent years, and that the greater the degree of advancement, the truer this is (Keating, 2009).

Attribution theory and mindsets

Across all social, cultural and economic conditions, children's mindsets are critical to the development of their abilities (Dweck, 2006). Those who hold a fixed mindset believe that some people are inherently smart and some are not; they tend to feel judged and evaluated in everything they produce. Those with a growth mindset, on the other hand, conceptualise intelligence as dynamic, developing over time with opportunities to learn. Those holding the growth mindset perceive their failures as learning opportunities; they have greater confidence, and higher academic and career success. This is particularly important for African-Americans, highly able girls and other students who are vulnerable to stereotype threat (Graham, 2009).

Effort, practice and perseverance

Contrary to widespread misconceptions that giftedness is effortless, learning at a deep and meaningful level requires a tremendous investment of effort and practice over time. Success in every field requires drive, tenacity and the willingness to overcome obstacles (Ericsson, 2006; Gottfried et al., 2009; Lubinski & Benbow, 2006).

Social and cultural contexts

Social and cultural contexts can foster or sabotage gifted-level abilities (Horowitz, 2009; Keating, 2009). A social milieu that supports giftedness – whether it be a family, a classroom, a school or a community – fosters a growth mindset and leads to authentic engagement in diverse interests, taking into account the importance of motivation, attribution, effort and persistence over time, and of contexts that reward both individual and collective creative productivity.

Teacher development

In order to create the learning climate that supports gifted-level development, educators need resources, training and support (VanTassel-Baska,

2009). They need to understand the incremental nature of learning, focusing on students' current learning needs, by subject area, and providing appropriate differentiation for those with advanced learning needs. Specific recommendations for putting these ideas into practice include that (a) gifted education principles and experience be infused into all pre-service education classes; (b) licensing or certification be required for work with gifted learners; (c) technology be used to create information sources for teachers; and (d) teachers be supported in studying their own teaching practices in personally relevant ways (Robinson et al., 2007). These concepts have been incorporated into the United States National Council for Accreditation of Teacher Education standards for gifted and talented teacher preparation programmes (National Association for Gifted Children, 2006).

Conclusion

There is a paradigm shift in progress with promise for psychologists, sociologists, educators and parents interested in supporting high-level development across the population. Emerging perspectives conceptualise giftedness as a dynamic, domain-specific and socially mediated process, resulting from complex interactions of dispositions, aptitudes and social–cultural environments, and leading to diverse pathways and outcomes.

Thinking about giftedness as exceptional domain-specific academic advancement that can change over time leads to a realisation that the closer identification practices are to school-based learning, the likelier they are to be appropriate, defensible and culture-fair. This means considering many different information sources on a frequent and ongoing basis and understanding that assessment results reflect current, rather than permanent learning needs. In fact, wherever possible, the gifted label should be attached to differentiated programming options, rather than individual students.

If giftedness and talent development are dynamic, fluid, domain-specific and context-sensitive processes, educational responses should include a wide range of curriculum and programming options. Best practice involves grouping students for advanced curriculum work in flexibly organised ways that are matched to documented learning needs, which can happen in a number of different ways. It also involves recognising important psychosocial factors, such as motivation, mindsets, effort, practice, perseverance and social/cultural contexts.

On the front edge of an interdisciplinary paradigm shift, gifted education offers a crucible for pioneering investigations of optimal development, taking into account racial, cultural, socio-economic, gender and other kinds of diversity. Such investigations promise not only to support best practice in gifted education, but also to shed light on the nature of and requirements for optimal human development more generally.

Notes on contributors

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References

Ackerman, P. L., & Kanfer, R. (2004). Cognitive, affective, and conative aspects of adult intellect within a typical and maximal performance framework. In D. Y. Dai & R. J. Sternberg (Eds.), *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development* (pp. 119–141). Mahwah, NJ: Lawrence Erlbaum.

Aulls, M. W., & Shore, B. M. (2008). *Inquiry in education: The conceptual foundations for research as a curricular imperative*. New York, NY: Erlbaum.

Balchin, T., Hymer, B. J., & Matthews, D. J. (Eds.). (2009). *The Routledge international companion to gifted education*. Abingdon: Routledge.

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart contexts? Cognition, ability, and talent development in an age of situated approaches to knowing and learning. *Educational Psychologist, 37*, 165–182.

Borland, J. H. (1989). *Planning and implementing programs for the gifted*. New York, NY: Teachers College Press.

Borland, J. H. (2005). Gifted education without gifted children: The case for no conception of giftedness. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (2nd ed., pp. 1–19). Cambridge: Cambridge University Press.

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nuture reconceptualized in developmental perspective: A bioecological model. *Psychological Review, 101*, 568–586.

Carraher, T. N., Carraher, D. W., & Schliemann, A. D. (1985). Mathematics in the streets and in schools. *British Journal of Developmental Psychology, 3*, 21–29.

Ceci, S. J. (1996). *On intelligence: A Bioecological treatise on intellectual development*. Boston, MA: Harvard University Press.

Ceci, S. J., & Liker, J. (1986). A day at the races: A study of IQ, expertise, and cognitive complexity. *Journal of Experimental Psychology: General, 115*, 255–266.

Chaffey, G. W. (2009). Gifted but underachieving: Australian indigenous children. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 106–114). Abingdon: Routledge Falmer.

Chen, J., Dai, D. Y., & Zhou, Y. (2013). Enable, enhance, and transform: How technology use can improve gifted education. *Roeper Review, 35*, 166–176.

Claxton, G., & Meadows, S. (2009). Brightening up: How children learn to be gifted. In T. Balchin, B. Hymer, & D. J Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 3–9). Abingdon: Routledge.

Cramond, B., Matthews-Morgan, J., Bandalos, D., & Zhuo, L. (2005). A report on the 40-year follow-up of the torrance tests of creative thinking: Alive and well in the new millennium. *Gifted Child Quarterly, 49*, 283–291.

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

Dai, D. Y. (2010). *The nature and nurture of giftedness: A new framework for understanding gifted education*. New York, NY: Teachers College Press.

Dai, D. Y., & Chen, F. (2014). *Paradigms of gifted education: A guide to theory-based, practice-focused research*. Waco, TX: Prufrock Press.

Dai, D. Y., & Coleman, L. J. (2005). Introduction to the special issue on nature, nurture, and development of exceptional competence. *Journal for the Education of the Gifted, 28*, 254–269.

Dai, D. Y., Moon, S. M., & Feldhusen, J. F. (1998). Achievement motivation and gifted students: A social cognitive perspective. *Educational Psychologist, 33*, 45–63.

Dai, D. Y., & Renzulli, J. S. (2008). Snowflakes, living systems, and the mystery of giftedness. *Gifted Child Quarterly, 52*, 114–130.

Dai, D. Y., & Speerschneider, K. (2012). Cope and grow: An affective curriculum for talent development. *Talent Development and Excellence, 4*, 181–199.

Dai, D. Y., & Sternberg, R. J. (Eds.). 2004. *Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development*. Mahwah, NJ: Lawrence Erlbaum.

Duncan, J., Seitz, R. J., Kolodny, J., Bor, D., Herzog, H., Ahmed, A., Newell, F. N., & Emslie, H. (2000). A neural basis for general intelligence. *Science, 289*, 457–460.

Dweck, C. S. (2006). *Mindset: The new psychology of success*. New York, NY: Random House.

Ericsson, K. A. (2006). The influence of experience and deliberate practice on the development of superior expert performance. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The cambridge handbook of expertise and expert performance* (pp. 683–704). New York, NY: Cambridge University Press.

Feldman, D. H. (2003). A developmental, evolutionary perspective on giftedness. In J. H. Borland (Ed.), *Rethinking gifted education* (pp. 9–33). New York, NY: Teachers College Press.

Gallagher, J. J. (1996). A critique of critiques of gifted education. *Journal for the Education of the Gifted, 19*, 234–249.

Gardner, H. (2003). Three distinct meanings of intelligence. In R. J. Sternberg, J. Lautrey, & T. I. Lubart (Eds.), *Models of intelligence: International perspectives* (pp. 43–54). Washington, DC: American Psychological Association.

Geake, J. (2009). Neural interconnectivity and intellectual creativity. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 10–17). Abington: Routledge.

Gillborn, D., & Youdell, D. (2010). Critical perspectives on race and schooling. In J. A. Banks (Ed.), *The Routledge International companion to multicultural education* (pp. 173–185). Abingdon: Routledge.

Gottfredson, L. S. (1997). Mainstream science on intelligence: An editorial with 52 signatories, history, and bibliography. *Intelligence, 24*, 13–23.

Gottfried, A. W., Cook, C. R., Gottfried, A. E., & Morris, P. E. (2005). Educational characteristics of adolescents with gifted academic intrinsic motivation: A longitudinal investigation from school entry through early adulthood. *Gifted Child Quarterly, 49*, 172–186.

Gottfried, A. W., Gottfried, A. E., & Guerin, D. W. (2009). Issues in early prediction and identification of intellectual giftedness. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 43–56). Washington, DC: American Psychological Association.

Gottlieb, G. (1998). Normally occurring environmental and behavioral influences on gene activity: From central dogma to probabilistic epigenesis. *Psychological Review, 105*, 792–802.

Graham, S. (2009). Giftedness in adolescence: African American gifted youth and their challenges from a motivational perspective. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 109–129). Washington, DC: American Psychological Association.

Gresalfi, M., Barab, S., & Sommerfeld, A. (2012). Intelligent action as a shared accomplishment. In D. Y. Dai (Ed.), *Design research on learning and thinking in educational settings* (pp. 41–64). New York, NY: Routledge.

Gustafsson, J. E., & Undheim, fJ. O. (1996). Individual differences in cognitive functions. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 186–242). New York, NY: Simon & Schuster Macmillan.

Haworth, C. M. A., & Plomin, R. (2010). Quantitative genetics in the era of molecular genetics: Learning abilities and disabilities as an example. *Journal of the American Academy of Child and Adolescent Psychiatry, 49*, 783–793.

Horowitz, F. D. (2000). Child development and the PITS: Simple questions, complex answers, and developmental theory. *Child Development, 71*(1), 1–10.

Horowitz, F. D. (2009). A developmental understanding of giftedness and talent. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 3–19). Washington, DC: American Psychological Association.

Hughes, J. (2009). Teaching the able child … or teaching the child to be able? In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 161–168). Abingdon: Routledge.

Huxtable, M. (2009). Creating inclusive and inclusional understandings of gifts and talents through living educational theory research. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 292–298). Abingdon: Routledge.

Hymer, B. (2009). Beyond compare? Thoughts towards an inclusional, fluid, and non-normative understanding of giftedness. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 299–307). Abingdon: Routledge.

Hymer, B., Whitehead, J., & Huxtable, M. (2009). *Gifts, talents and education: A living theory approach*. Chichester: Wiley-Blackwell.

Kanevsky, L. S. (2011). Deferential differentiation: What types of differentiation do students want? *Gifted Child Quarterly, 55*, 279–299.

Kanevsky, L. S., & Geake, J. (2004). Inside the zone of proximal development: Validating a multifactor model of learning potential with gifted students and their peers. *Journal for the Education of the Gifted, 28*, 182–217.

Kaufman, S. B. (2013). *Ungifted: Intelligence redefined*. New York, NY: Basic.

Keating, D. P. (2009). Developmental science and giftedness: An integrated life span framework. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 189–208). Washington, DC: American Psychological Association.

Keating, D. P. (Ed.). (2011). *Nature and nurture in early child development*. New York, NY: Cambridge.

Lohman, D. F. (2005a). An aptitude perspective on talent: Implications for identification of academically gifted minority students. *Journal for the Education of the Gifted, 28*, 333–360.

Lohman, D. F. (2005b). The role of nonverbal ability tests in the identification of academically gifted students: An aptitude perspective. *Gifted Child Quarterly, 49*, 111–138.

Lohman, D. F. (2006). Beliefs about differences between ability and accomplishment: From folk theories to cognitive science. *Roeper Review, 29*, 32–40.

Lohman, D. F., & Rocklin, T. (1995). Current and recurrent issues in the assessment of intelligence and personality. In D. H. Saklofske & M. Zeidner (Eds.), *International handbook of personality and intelligence* (pp. 447–474). New York, NY: Plenum.

Lubinski, D., & Benbow, C. P. (2006). Study of mathematically precocious youth after 35 years: Uncovering antecedents for the development of math-science expertise. *Perspectives on Psychological Science, 1*, 316–345.

Matthews, D. J. (2014). Gifted education in transition: From elitist enclave to promising opportunities for empowerment and inclusion. *International Journal of Talent Development and Creativity, 2*, 23–29.

Matthews, D. J., & Foster, J. F. (2009). *Being smart about gifted education: A guidebook for parents and educators*. Scottsdale, AZ: Great Potential Press.

Matthews, D. J., & Foster, J. F. (2014). *Beyond intelligence: Secrets for raising happily productive kids*. Toronto: House of Anansi.

Matthews, D. J., Subotnik, R. F., & Horowitz, F. D. (2009). A developmental perspective on giftedness and talent: Implications for research, policy, and practice. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 209–225). Washington, DC: American Psychological Association.

Moon, S. M. (2006). On being gifted and adolescent: An overview. In F. A. Dixon & S. M. Moon (Eds.), *The handbook of secondary gifted education* (pp. 1–5). Waco, TX: Prufrock.

Naglieri, J. A. (2008). Traditional IQ: 100 years of misconception and its relationship to minority representation in gifted programs. In J. L. VanTassel-Baska (Ed.), *Alternative assessments with gifted and talented students* (pp. 67–88). Waco, TX: Prufrock.

National Association for Gifted Children. (2006). *CEC-NAGC Initial knowledge and skill standards for gifted and talented education*. Retrieved February 9, 2009, from http://www.pagiftededucation.info/documents/NCATEFinalInitialStandards4-14-06.pdf

Nelson, C. A., Thomas, K. A., & deHaan, M. (2006). *Neuroscience of cognitive development: The Role of experience and the developing brain*. Hoboken, NJ: Wiley.

O'Boyle, M. W. (2000). A new millennium in cognitive neuropsychology research: The era of individual differences? *Brain and Cognition, 42*, 135–138.
Pintrich, P. R., & Schunk, D. H. (1996). *Motivation in education: Theory, research, and applications*. Englewood Cliff, NJ: Prentice Hall.
Plomin, R. (1997). Identifying genes for cognitive abilities and disabilities. In R. J. Sternberg & E. L. Grigorenko (Eds.), *Intelligence, heredity, and environment* (pp. 89–104). New York, NY: Cambridge University Press.
Plomin, R., Haworth, C. M. A., Meaburn, E. L., Price, T. S., Welcome Trust Case Control Consortium, & Davis, O. S. P. (2013). Common DNA markers can account for more than half of the genetic influence on cognitive abilities. *Psychological Science, 24*, 562–568.
Putnam, R. D. (1993). *Making democracy work: Civic traditions in modern Italy*. Princeton, NJ: Princeton University Press.
Putnam, R. D. (2000). *Bowling alone: The collapse and revival of American community*. New York, NY: Simon & Schuster.
Reis, S. M. (2009). Turning points and future directions in gifted education and talent development. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 317–324). Abingdon: Routledge.
Renzulli, J. S., & Reis, S. M. (2008). *Enriching curriculum for all students* (2nd ed.). Thousand Oaks, CA: Corwin.
Robinson, A., & Clinkenbeard, P. R. (1998). Giftedness: An exceptionality examined. *Annual Review of Psychology, 49*, 117–139.
Robinson, A., Shore, B. M., & Enersen, D. L. (2007). *Best practices in gifted education: An evidence-based guide*. Waco, TX: Prufrock Press.
Sapon-Shevin, M. (1994). *Playing favorites: Gifted education and the disruption of community*. Albany, NY: State University of New York Press.
Sawyer, R. K. (2003). Emergence in creativity and development. In R. K. Sawyer, V. John-Steiner, S. Moran, R. J. Sternberg, D. H. Feldman, J. Nakamura, & M. Csikszentmihalyi (Eds.), *Creativity and development* (pp. 12–60). Oxford: Oxford University Press.
Siegler, R. S., & Kotovsky, K. (1986). Two levels of giftedness: Shall ever the twain meet? In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 417–435). Cambridge: Cambridge University Press.
Simonton, D. K. (1999). Talent and its development: An emergenic and epigenetic model. *Psychological Review, 106*, 435–457.
Simonton, D. K. (2003). Scientific creativity as constrained stochastic behavior: The integration of product, person, and process perspectives. *Psychological Bulletin, 129*, 475–494.
Steiner, H. H., & Carr, M. (2003). Cognitive development in gifted children: Toward a more precise understanding of emergent differences in intelligence. *Educational Psychology Review, 15*, 215–246.
Sternberg, R. J. (1998). Abilities are forms of developing expertise. *Educational Researcher, 27*, 11–20.
Sternberg, R. J. (2007). Cultural concepts of giftedness. *Roeper Review, 29*, 160–165.
Sternberg, R. J., & Williams, W. M. (2002). *Educational psychology*. Boston, MA: Allyn & Bacon.
Subotnik, R. F. (2009). Developmental transitions in giftedness and talent: Adolescence into adulthood. In F. D. Horowitz, R. F. Subotnik, & D. J.

Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 155–170). Washington, DC: American Psychological Association.
Subotnik, R. F., Olszewski-Kubilius, P., & Worrell, F. C. (2011). Rethinking giftedness and gifted education: A proposed direction forward based on psychological science. *Psychological Science in the Public Interest, 12*, 3–54.
Terman, L. M. (1925). *Genetic studies of genius*. Stanford, CA: Stanford University Press.
Tomlinson, S. (2008). Gifted, talented and high ability: Selection for education in a one-dimensional world. *Oxford Review of Education, 34*, 59–74.
VanTassel-Baska, J. (2009). The role of gifted education in promoting cultural diversity. In T. Balchin, B. M. Hymer, & D. J. Matthews (Eds.), *International companion to gifted education* (pp. 273–280). London: Routledge.
VanTassel-Baska, J., & Brown, E. F. (2007). Toward best practice: An analysis of the efficacy of curriculum models in gifted education. *Gifted Child Quarterly, 51*, 342–358.
VanTassel-Baska, J., Johnson, D., & Avery, L. D. (2002). Using performance tasks in the identification of economically disadvantaged and minority gifted learners: Findings from project STAR. *Gifted Child Quarterly, 46*, 110–123.
Wallace, B., & Eriksson, G. (Eds.). (2006). *Diversity in gifted education: International perspectives on global issues*. Abingdon: Routledge.
Wan, C. Y., & Schlaug, G. (2010). Music making as a tool for promoting brain plasticity across the life span. *The Neuroscientist, 16*, 566–577.
Warwick, I., & Matthews, D. J. (2009). Fostering giftedness in urban and diverse communities: Context-sensitive solutions. In T. Balchin, B. Hymer, & D. J. Matthews (Eds.), *The Routledge international companion to gifted education* (pp. 265–272). Abingdon: Routledge.
Weisberg, R. W. (2006). Modes of expertise in creative thinking. In K. A. Ericsson, N. Charness, P. J. Feltovich, & R. R. Hoffman (Eds.), *The cambridge handbook of expertise and expert performance* (pp. 761–788). New York, NY: Cambridge University Press.
White, J. (2006). *Intelligence, destiny, and education*. Abingdon: Routledge.
Winner, E. (1996). *Gifted children: Myths and realities*. New York, NY: Basic Books.
Worrell, F. C. (2009). What does gifted mean? Personal and social identity perspectives on giftedness in adolescence. In F. D. Horowitz, R. F. Subotnik, & D. J. Matthews (Eds.), *The development of giftedness and talent across the life span* (pp. 131–152). Washington, DC: American Psychological Association.
Ziegler, A. (2009). Research on giftedness in the 21st century. In L. Shavinina (Ed.), *International handbook on giftedness* (pp. 1509–1524). New York, NY: Springer.