CHAPTER 3

A HISTORICAL OVERVIEW OF INSTRUCTIONAL THEORY AND PRACTICE IN THE UNITED STATES AND CANADA: THE DOUBLE SLINKY PHENOMENON IN GIFTED AND GENERAL EDUCATION

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We wanted a catchy title for this potentially pedantic topic, but now that we may have one, it probably needs to be explained. Why "double Slinky phenomenon"? A Slinky is a coiled steel spring that "walks" when the top end is pulled down from the first to the second of a series of stairs or the top part of a ramp, then-the trailing part leap-frogs to the third step or lower down the inclined plane, and so on. With two Slinkys working their way down, the progress was mostly but not entirely smooth or predictable, and one or the other would pull ahead or fall behind. Sometimes the two might even contact each other. Now let's name one Slinky "gifted education" and the other "general education" and send them on their way. This is the visual image we want to create for our narrative. Dual Slinkys, unevenly making their way along, only sometimes in synchrony even though they were made in the same factory. The analogy is imperfect, especially because education is an uphill rather than downhill enterprise, and not in a straight line, but we hope the image can remain in mind as we get to the main point of the chapter.

Educators often hear that pedagogical practices are not keeping up with the rapid pace of change in an increasingly complex world. This may be particularly true in the world of gifted education, which weaves a tapestry separate from, yet intimately connected to, general education. The very conception of giftedness has changed. The previously rarely questioned "truth" that a gifted child was someone with a high IQ who learned more quickly has been challenged and replaced with more nuanced perspectives—at least in theory. As definitions and models of giftedness evolved, the nature of gifted instruction in North America shifted to accommodate these new views (see Chapter 10, this handbook). New theories and ways of thinking about instruction in general education are slowly taking hold as well. At the intersection of gifted and general education much can be done to ensure that both make the most of what the other has to offer.

Early attempts at differentiation for gifted students advocated quicker completion of the curriculum (through acceleration), advanced subject matter (in precursors to Advanced Placement courses) and, later, the addition of "enrichment" through noncore topics and subjects. The common element in these practices was considerable focus on content and speed. Thankfully, giftedness is no longer just the ability to quickly answer "advanced" questions with a single, already known, correct response. Gifted learners can, in some cases, learn more quickly, but they do not speed their way through complex tasks (e.g., they take relatively more time planning; Shore & Lazar, 1996), and acceleration without pedagogical change is incomplete.

Driven by a fundamental reconceptualization of giftedness, the answers to the question of how to best educate highly able learners have changed and are changing again. Gifted and general education are

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in transition, moving away from an exclusive focus on content toward exploration of how people learn, development of higher level learning objectives, and diversification in the roles of learners and teachers in educational settings. But these movements are not in lockstep. Theories of expertise and the self-regulation of learning now motivate newer ideas about abilities and giftedness, and scholars in the field of creativity have also made considerable contributions to emerging trends in gifted education. In this chapter, we will trace developments in gifted pedagogy and look for points of contact and divergence with instruction in general education. The two live in a symbiotic relationship and although progress is neither fast nor steady, it is inevitable, and we will also identify some emerging trends.

IMPORTANCE OF THE TOPIC

We are all devoted to improving instruction, the learning experience, and their long-term impact on learners. Gifted education cannot thrive without solid core curricula and support from the school district (Tomlinson et al., 2002, 2008). General education and gifted education can inform practices in the other; both have lessons to offer and to receive. Yet the presence of gifted programs does not seem to favor national performance on international comparisons such as the Programme for International Student Assessment (PISA). Countries that have long traditions of identifying and teaching gifted students placed in the lower third and fourth quartiles of the 65 participating Organization for Economic Cooperation and Development (OECD) countries in mathematics (e.g., the United States, 44th; Russia, 42nd; Israel, 50th), whereas countries with much less focus on gifted education placed in the top quarter (e.g., Canada, 15th; Irving, Oppong, & Shore, 2016). Even top performing students in the United States are underrepresented (Finn & Wright, 2015), and these students are only average performers by international comparisons (Callahan, 1993). The point asserted here is that there are instructional disconnects between gifted and general education, and uneven outcomes.

General education—especially public general education—is sometimes regarded as having lost some of its luster in recent decades, and in some places it has become a public special education system with high performing students being pulled out by their parents and sent elsewhere. Yet some public systems flourish, and in some domains the luster is being brought back to light. For example, Lubienski and Lubienski (2013) found that public schools outperform demographically comparable private schools in mathematics, and the main reasons appear to be the level of teacher education and the higher number of mathematics contact hours in the public system. Conversely, many initiatives that were originally designed for learners with high ability would likely enhance the learning experience and outcomes in general education settings.

Gifted education, in the public system or not, has sought to preserve many curricular features that budget-cutting and other pressures have somewhat pushed aside in education at large, such as the arts, advanced science, and social responsibility. Clark and Shore (2004) listed 19 specific ways that gifted education has taken or preserved initiatives that can enhance general education as well:

1. It brings attention to the full range of performance and potential in children.
2. It promotes knowledge (e.g., science or history) fairs.
3. It embraces major curriculum reforms that place inquiry-driven curricula—the student and teacher as researcher or explorer—at the center of pedagogical practice.
4. It formally incorporates high-level questioning into curriculum.
5. It uses formal curricular models to plan curriculum.
6. It embraces a working link between education and the creativity movement.
7. It champions the teaching of the fine and performing arts in schools.
8. It advocates the enhancement of additional language, global, future, and intercultural studies.
9. It searches for talent across cultural, national, or linguistic boundaries.
10. It expands the view of vocational education, from basic job training for young people lacking scholastic aptitude to links with the full range of occupations.
11. It focuses attention on the underrepresentation (and occasional underachievement) of girls.

12. It supports high-quality, universally accessible state-supported schools.
13. It advocates the concept of talent development on the school agenda.
14. It supports flexible school-entry ages.
15. It supports subject-matter clubs.
16. It creates college-for-kids weekend and summer programs.
17. It supports Advanced Placement courses and examinations and related forms of acceleration.
18. It is alert to the potential for loss of substance and level of the regular curriculum.
19. It keeps up the "class average."

In many ways, gifted education and theories in the study of giftedness (two distinct but connected subthreads) have signaled, championed, or anticipated instructional innovation, but have not necessarily led to it in practice. Neither has general education looked to gifted education for leadership, but some educators of the gifted have lived in both worlds (perhaps, most successfully, the people who also worked in the area of creativity). There is, however, considerable opportunity for benefit to both forms of education from an interchange of ideas. General education can be enhanced by taking on many of the characteristics of gifted education (if not the same expectations for individual achievement), because gifted education has shown that social-constructivist curriculum works while the general system is frequently found to be fighting it.

RELEVANT THEORY AND PRINCIPLES

Giftedness theory has increasingly embraced talent development as a frame of reference and the development of expertise as characteristic of what learners and teachers do (see Chapters 11, 12, 15, 26, and 30, this handbook), but general education teachers do not think of themselves as experts and do not broadly think of student learning in those terms. If gifted education is to have maximum impact, then its proponents and practitioners need to be well versed in social-constructivist learning theory and theory about self-regulation in learning (or self-regulated learning). These are the two most important instructional theories at this time, both of which have strong motivational strands and are based in general education (although the double Slinky effect is present, along with other barriers).

A Century of Developments in Instruction for Gifted Education

For much of the last century, IQ testing dominated thinking in North America about gifted students and the kinds of instruction they needed. Paradoxically, the origins of the IQ test had nothing to do with gifted learners, nor did the early work on intelligence testing even take place in North America. At the onset of the 20th century, the Paris government charged French psychologist Alfred Binet (and his student Théodore Simon) with developing methods to identify those students who would need assistance to succeed with the curriculum. Binet and Simon developed the notion of mental age on the basis of accomplishment of academic tasks typically demonstrated by pupils at different school ages. The test made its way across the Atlantic, where Lewis Terman worked with the U.S. Army to devise an adult version to screen applicants for officer training during World War I. Postwar, at Stanford University, Terman further developed Binet and Simon's ideas into standardized procedures, and had the idea of not just comparing mental and chronological ages but actually dividing the former by the latter (yielding a quotient) and thus was born the first Stanford–Binet Intelligence Quotient (IQ) test. High performance on an IQ test reflects getting more right answers to more questions more quickly. Creative responses were not advantageous.

In response to the perceived educational needs of students whose test results flagged them as having high IQs, North American schools in the early part of the 20th century appropriately attempted to teach these students more content, more quickly. Early publications on giftedness (e.g., Henry, 1958; Terman, 1916; Witty, 1952) typically advocated advanced subject matter and accelerated delivery of content, although not always exclusively. Strang (1958, 1960), for example, was an early proponent of developing creativity and focused on family relationships. Witty (1952), on the other hand, was a consultant to the *Quiz Kids* radio and television shows in which encyclopedic knowledge was a key to success, and high IQ was part of the screening (Robinson &

Jolly, 2014). The focus was very much on content (and more content). Historically there have been three kinds of differentiation on the basis of IQ:

- Gifted students were taught more advanced subject matter (through traditional teacher-centered instruction) in precursors to today's Advanced Placement classes.
- Gifted students were taught more quickly (whether through grade skipping, other forms of acceleration, or generally completing the work in less time, i.e., "compacting").
- Gifted students were taught enriched content, which might have included elaboration (not just advancement) in core subjects and the addition of noncore subjects such as art and music.

In the 1920s and 1930s, Leta Hollingworth (1943) worked extensively with gifted children and was the first to devise a curriculum that was different from the "more and faster" instructional norm of the day. She proposed that children are interested in exploring the world around them and designed her curriculum so that the students themselves made up work units around their own everyday materials. This was a very early precursor to the coconstruction of curriculum that occurs in some gifted and inquiry-driven classrooms today.

Hollingworth's findings and ideas were supported by the writings of John Dewey (1930) who was active during the same period. In Dewey's day, "learning by doing" might have meant apprenticeship to the trades, but his central tenet that learning should be based on activity is still being applied today. Dewey was also one of the first to extensively interpret learning as a social and interactive process. Developmental psychologist Jean Piaget (1954) subsequently developed advanced theories of the complex logical structures humans use to build new knowledge on top of existing knowledge, constructing meaning from the material learned, from which arose the term constructivism. However, his theories did not spell out the exact mechanism by which knowledge is constructed. One of Piaget's contemporaries was Russian researcher Lev Vygotsky (1978) whose 1930s work was not translated into English until the 1970s. Vygotsky argued that learning is most effective with peers, and dialog is the specific mechanism that allows learners to construct meaning. Learners test their understanding against that of others through dialog, hence the social part of social constructivism (Resnick & Nelson-LeGall, 1997). This research led to the construct of the zone of proximal development, in which learning takes place when students solve problems beyond their actual performance level but within their level of potential with the guidance of a teacher, more knowledgeable peer, or mentor. Vygotsky's theories emphasized an important collaborative learning dimension. Social constructivism remains a leading theory of how learners construct knowledge.

In 1959, a pivotal symposium took place in Woods Hole, Massachusetts. It was chaired by Jerome Bruner, and it brought together 34 prominent U.S. educators, psychologists, and scientists, plus Piaget's closest colleague, Bärbel Inhelder, to outline a vision for the future of education (Chichekian, Savard, & Shore, 2011). Bruner (1960) pointed out that "a schoolboy learning physics is a physicist, and it's easier for him to learn physics behaving like a physicist than doing something else" (p. 14). This departed from the common classroom practice of didactically teaching the conclusions in a given field of study, rather than focusing on how those conclusions are reached.

While such educational and psychological theories were being developed, the political situation in the middle of the 20th century was dominated by the space race and the cold war. Until then, instruction in public schools had been rather generic and provided only minimal differentiation for varying abilities and interests among learners. Sociopolitical events provided the motivation to invest in and develop gifted education in schools across the United States and elsewhere, such as the former Soviet Union (Dunstan, 1978). The Marland Report (U.S. Commissioner of Education, 1972) provided a multidimensional operational definition of giftedness that became widely accepted and is still used today, with only some variations; although it was not limited to high IQ, it nevertheless assumed that a "minimum of 3% to 5% of the school population" (p. 2) would be covered by this definition.

Creativity. The late 1950s and 1960s also brought a new spotlight on creativity, not intended specifically

for gifted education but for all learners. The zeitgeist was one of civil rights and greater inclusion of formerly marginalized groups in education. In this context, the development of a broader and more democratic view of human excellence was a natural progression from the limitations imposed by the narrow focus on high IQ as a hallmark of giftedness.

Getzels and Jackson (1962) forged one of the earliest alliances between giftedness and creativity through their work exploring the relation between these two concepts among high school students. They found that, although creativity and IQ seem to be manifestations of separate abilities, there is often a link between them when high levels of both are present in an individual. Liam Hudson (1968) showed that professionals in different fields tend to lean toward particular strength in one or the other. For example, physicists and philosophers lean toward very high IQs, versus biologists and lawyers who were relatively higher on the creativity measures. For their studies and subsequent research on creativity to be meaningful or even possible, there needed to be a way to measure creativity. The lack of such measures had frustrated creativity researcher E. Paul Torrance (1968) and provided motivation for him to develop ways to measure creativity. His findings and instruments (e.g., the Torrance Test of Creative Thinking), as well as instructional programs he developed (e.g., Future Problem Solving Program International) provided a framework utilizing varied curricular and extracurricular activities to stimulate creativity. Although not initiated specifically or exclusively for gifted learners, these activities (now in the form of international competitions attracting over 250,000 students annually) draw a disproportionate share of gifted students. Perhaps some of them will experience flow (Csikszentmihalyi, 1990) during a creative problem-solving activity. In learning situations, *flow* happens when learners are challenged but feel in control of the task and their own abilities, leading to high levels of student engagement; the situation is perceived as intrinsically rewarding. Students can lose all sense of time and self-consciousness while immersed in a flow-inducing activity (Nakamura & Csikszentmihalyi, 2002; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003).

Thinking skills. A somewhat strange phenomenon occurred around the same time. Psychometricians were increasingly aware of the limitations of IQ to explain the complexity of intelligence and began to develop either hierarchical models in which subordinate abilities to general intelligence were postulated in a tree-like pattern (e.g., P. E. Vernon, 1950) or multidimensional representations of many equally weighted kinds of intelligences (e.g., Guilford, 1967, and more recently Gardner, 1983). An apparent off-shoot of this kind of theorizing was the growth of instructional programs intended to teach the specific intellectual skills represented by the variously identified components of intelligence. Among these were Mary Meeker's (1969, 1979) Structure of Intellect Institute devoted to Guilford's (1967) model of the same name, teaching materials, and teacher certification, and Edward de Bono's (1982) thinking "hats" with a somewhat more creativity-based flavor. De Bono's program became an offering by the British television network BBC and was adopted by Venezuela in 1979 as a nation-wide component of the world's first and only Ministry for the Development of Intelligence. These programs, except perhaps for Gardner's (1983), had limited staying-power. Perhaps their major failing was separating thinking processes from the core content of the curriculum.

That defect did not prevent gifted education from jumping on the band-wagon. Meeker, de Bono, and Gardner are regularly featured at local, national, and international gifted conferences, and their materials are featured in catalogs of resources for general and gifted education. The gifted education Slinky in this case was slightly behind the general education Slinky, but appears to have carried on longer, perhaps because of the unfulfilled need for differentiated materials.

Early models. Drawing on theories based on social constructivism and the enhanced role of creativity in education, and supported by U.S. government initiatives and funding for gifted education, the 1960s, 1970s, and 1980s proved explosively productive with a proliferation of new models for instruction in gifted education (see Maker, 1982;

Renzulli, 1986; Sternberg & Davidson, 1986, 2005). With some (but not all) of these models, there was a move away from exclusive focus on what students are learning (i.e., specific content) to a focus on how students are learning. However, these models avoided the errors of the thinking-styles efforts and generally kept close connections among the content, the way new knowledge is generated in different content, and how the content and ways of knowing in the disciplines can be combined. Furthermore, programs of instruction that were not necessarily originally intended to provide a complete gifted curriculum were sometimes adopted for exclusive use with gifted learners (with and without adaptations, and with varying degrees of success). One of the first comprehensive attempts to create this broader perspective, just preceding Bruner's (1960, 1984) insights, was philosopher Otto Neurath and colleagues' *International Encyclopedia of Unified Science* (Neurath, Carnap, & Morris, 1955), which provided a systematic overview of the nature of thinking, learning, and knowledge generation in a range of scientific disciplines. The encyclopedia project spanned the 1940s to the early 1970s in several volumes. Although the volumes remained relatively obscure, they were familiar to one pioneer in gifted education, Virgil Ward. These mid-20th century works can be directly connected conceptually to Bruner's point that one learns a subject best by emulating an expert in that field. Some threads of gifted education marched to that drumbeat.

The expectation of gifted education curricula at this time was that they should be qualitatively different from the curricula used in general education (Maker, 1982). Differences from general curricula might be evident in the areas of content, process, or the learning environment (Gallagher & Gallagher, 1995), and it was also expected that there should be differences in student outcomes and products under these curricular modifications (Renzulli, 1977). Maker (1982) further proposed that content in gifted curricula should differ from general education in terms of its abstractness, complexity, variety, organization, and the study of people and methods. Sternberg and Davidson (1986, 2005) observed that provisions varied with the conceptualization or definition of giftedness. Additionally, the learning processes implicated in teaching gifted students were to differ from general education in that they should stress higher levels of thinking, open endedness, evidence of reasoning, freedom of choice, discovery, pacing, and group interaction. These ideas appeared in general education as well, but were embraced sooner in gifted education models and practices.

An example of such a model developed explicitly as curriculum for high ability learners was Joseph Renzulli's (1977) enrichment triad. The model proposed a school-wide plan for developing and enhancing creative productivity. Renzulli notably differentiated between "schoolhouse" giftedness and "creative–productive" giftedness, showing influences of the creativity movement and a wider view of giftedness. This model is more inclusive: It envisioned a talent pool of 15% to 20% of a school's population (Renzulli, Reis, & Smith, 1981), in contrast to the Marland Report's (U.S. Commissioner of Education, 1972) "minimum" of 3% to 5%. The enrichment triad (above average ability, high task commitment, and high creativity) implied three types of learning activities (see Chapter 12, this handbook). Type I enrichment is general exploration, designed to expose learners to various possible fields of interest, and Type II consists of training in specific thinking and learning skills. Type III is the most extensive and comprises investigative projects in which the learner takes on the role of an inquirer, acting for all intents and purposes like a professional or expert in the chosen field.

Before Renzulli's model, educators of the gifted were less interested in social constructivism and were more focused on acceleration or advanced content. His work provided a major boost for social constructivism, but full realization of the importance of this theory came later. Nonetheless, these kinds of models provided good examples of one of the early shifts in gifted education, broadening inclusion criteria and starting to coconstruct curriculum through sharing the roles and responsibilities of asking questions, finding problems, determining projects to pursue, choosing methodology for such pursuits, and evaluating the quality of evidence.

Expertise. While developing their domain expertise, experts in a field are attentive to the process first, and are able to evaluate their course of action without waiting to get to the end of the process. Gifted education in recent decades borrowed extensively from the field of expertise, and gifted learners display striking similarities to how experts act (Coleman & Shore, 1991), including the effective use of existing knowledge bases, strengths in reflection and self-monitoring, and having many ways to categorize, plan for, and think about problems (see Chapters 17 and 18, this handbook). Gifted learners can be viewed as experts in the field of academic learning when expertise is thought of as the process of learning and consolidating skills required for mastery of a particular domain (Sternberg, 1998, 2001; Sternberg, Grigorenko, & Ferrari, 2004). In Sternberg's (1998, 2001) view, the traditional view of intelligence and how it is measured (IQ tests) is narrow and misleading, particularly when used as a predictor of broader life success. He argued that intellectual ability and giftedness is much more than a simple IQ measure, and a broader understanding of high ability that can be thought of as developing expertise should be supported. This has implications for the kinds of instruction used with gifted pupils who learn through active participation and role modeling to become developing or emerging experts or pre-experts. Sternberg (1998, 2001) and others (see Barfurth, Ritchie, Irving, & Shore, 2009) suggested that metacognitive skills are as important as learning and thinking skills. Sternberg's model included the interaction of knowledge and motivation with metacognitive, learning, and thinking skills. He further contended that contextual variables have a greater impact on test results than is generally recognized in traditional, decontextualized forms of IQ testing.

Learning styles. Gifted education has dabbled with notions of learning styles. General education occasionally raised it, but this was never a driving force in conceptualizing instruction. Learning- or cognitive-style characterizations have been too numerous to list here (see collections by Coffield, Mosely, Hall, & Ecclestone, 2004; Riding & Rayner, 2000), and ranged from fairly simple preferences for different kinds of classroom environments (Dunn & Dunn, 1978) to perceptual predispositions (M. D. Vernon, 1963). The attraction of cognitive styles was that they offered ways to individualize or differentiate teaching. An example that directly influenced instruction in gifted education for decades was the assertion that gifted pupils preferred to work alone rather than with others. That assumption has been debunked (French, Walker, & Shore, 2011); gifted learners do like to work with others, especially when they have some influence in who those others are and when and how the others pull their weight in the collaboration. Overall, the impact of learning styles on instruction at a systemic level has been limited.

Later models. The changing conceptions of giftedness and how it is manifested (and measured) have important implications for what gifted education should look like. Thinking about giftedness as developing expertise included not only analytical abilities (most commonly measured in IQ tests and most frequently stressed in traditional academic work) but also practical and creative abilities (Pelletier & Shore, 2003), forming what Sternberg (2001) called a triarchic pattern. His research on expertise showed that students whose education and instruction were a close match to their pattern of abilities (Sternberg, 1985) outperformed students whose instruction did not as closely match their triarchic pattern of abilities (see Chapter 10, this handbook).

Similarly, Tomlinson et al. (2002, 2008) developed a parallel curriculum model in which ascending intellectual demands of individual learners can be met through a layered approach. A strong foundational knowledge framework anchors the four curricular layers (core, connections, practice, and identity), and when students demonstrate interest and advanced ability, they can work at greater levels of challenge. The deepest layer, the curriculum of identity, aims to teach expertise by offering learners the possibility of projecting themselves into a discipline and working much like a practitioner or expert in the field through their schoolwork. The authors cautioned that one should not assume this approach to be appropriate only for highly able learners. On the contrary, it

could be applicable in general education, too, because a suitable level of challenge is the result of the match between the interest (and readiness) of the student and the intellectual demand of the situation.

Concentrating on the process of building knowledge rather than the end state of possessing knowledge is one of the components that set inquiry-driven pedagogy apart from traditional instructional models, in which the teacher is often the disseminator of facts and information (Aulls & Shore, 2008; Shore, Aulls, & Delcourt, 2008). Examples abound of positive outcomes of using inquiry-driven pedagogy with gifted learners, for whom it is notably well suited, but this is a methodology that can and should be common to gifted and general education (Robinson, Shore, & Enersen, 2006; Shore, 2010). Educators also continue to debate whether the importance of the presence of likeminded peers justifies pull-out or specialized programs for gifted students, and whether the learning opportunities available in gifted education because of differences in thinking skills could reasonably be provided through general education (Shore, 2000).

Although it has undergone some revision, IQ testing is still widely used today to attempt to measure people's intelligence by how quickly and accurately they answer questions to which the tester already knows the answer. Similarly, despite many models and frameworks that suggest effective pedagogies for better student outcomes, bright learners (those who "aced the IQ tests") are still subjected to high-stakes testing through SATs and teaching-to-the-test in programs such as the International Baccalaureate (Chichekian & Shore, 2014). Many better models have been developed, but are rarely, partly, or possibly never put into practice.

Concurrent Developments in General Education

It is impossible to fully understand the implications of these developments in instruction for gifted learners without also considering what was going on in general education.

Programmed instruction. Early forays into formal programmed instruction were made in the 1920s when Sidney Pressey developed an automatic test-administration and scoring machine (McDonald, Yancher, & Osguthorpe, 2005). Soon after, it was also used to attempt to reduce teachers' routine burdens with a switch that enabled the machine to "teach" by remaining on question until the right answer was entered. Economic conditions in the 1930s and 1940s, and perhaps the impossibility of the task as envisaged, prevented this initiative from gaining a following at the time.

In the 1950s, sociopolitical trends necessitated rethinking the education system as a whole, not only for gifted learners. Parents were concerned that their children would not be competitive in an increasingly technological and scientific world. The educational needs of a growing population would have to be met, and there was a perceived need to be ready for potential threats that might require trained military personnel quickly. Enter B. F. Skinner, whose background in training animals through operant conditioning had convinced him that similar methods would be equally effective and efficient teaching human beings. After all, humans react to stimuli and respond to rewards as well as animals do. In Skinner's (1950) view, the problem with classrooms in the United States was that they did not provide feedback quickly enough and generally used ineffective methods of classroom management. He built on the late 19th and early 20th century work of behavioral psychologist Edward Thorndike (1898) who proposed that learning is the association formed between a stimulus and a response in the wake of a favorable outcome, and a key element in Skinner's theories was that desired behavior needs to be intermittently reinforced by rewards (praise, good grades, or a feeling of accomplishment) to keep drawing the intended response.

Although Skinner (1950) rejected the idea that theories of learning were necessary, his work was foundational for the programmed-instruction movement. Teaching was broken down into standardized small bits of frequent questions with predetermined single, correct answers, arranged sequentially in an effort to produce desired behavior and predetermined learning trajectories through appropriate reinforcement. Nevertheless, programmed instruction, before the more sophisticated computer-based

applications now emerging, found little place in gifted education, except in the practice of giving some students work to do independently.

Motivational and social dimensions of learning. A slightly more nuanced learning theory was developed by Clark Hull (1943). Although still based on stimulus-response reinforcement, drive reduction and need satisfaction came into his theories, adding a motivational dimension to learning. Taking the variability of internal psychological conditions and external context further, Robert Gagné (1962) proposed that many levels and categories of learning exist, each requiring different kinds of external and internal conditions. Although his early work was in military training, he adapted his work to instructional design (Gagné, 1985; Gagné, Briggs, & Wager, 1992). His categories of learning included verbal information, intellectual skills, cognitive strategies, attitudes, and motor skills. To these he added a series of specific events of instruction for improving retention of knowledge. He believed that retention was best achieved through building sequentially on earlier knowledge, with instruction considering relevant characteristics of the learner.

As a counterpoint to the programmed-learning movement and proponents of linear, sequential learning, Jerome Bruner (1960) developed more holistic notions of learning. His famous quote that "knowing how something is put together is worth a thousand facts about it" (Bruner, 1984, p. 183) illustrated close kinship with the constructivist theories of Piaget and Vygotsky, and refuted the primitive computer model of humans as information processors. Bruner's spiral-curriculum concept was based on the premise that learners should be introduced to concepts gradually, and revisit them. With each visit, an added layer of complexity allows learners to incorporate new information into knowledge they have previously constructed. Gifted learners have been shown to value novelty and complexity (Maniatis, Cartwright, & Shore, 1998). Although Bruner's theories included scaffolding, they did not specifically address learning that occurs from observing others. For that, we need to look to Albert Bandura's (Bandura & Walters, 1963) social cognitive theory that incorporated the interaction of cognitive, environmental, and behavioral elements. Bandura emphasized the value of modeling the behavior and emotional reactions of others. This was seen as beneficial to learners because it greatly shortened the learning trajectory compared to someone who has to learn everything through trial-and-error without role models. Bandura (1977, 1997) also studied self-efficacy and its impact on learning.

John Flavell (1976, 1979) and his colleagues were among the first to suggest that educators would be wise to consider how learners thought about their own learning and understanding, as well as proposing that these skills, which he labeled *metacognitive*, could and should be taught alongside traditional content, combining the process and the product of learning. This led to more refined theories of self-regulated learning that considered the complex interactions of cognitive, motivational, social, and behavioral characteristics of learners (Corno & Mandinach, 1983; Pintrich & De Groot, 1990; Zimmerman, 1994). Analyzing the kinds of pedagogical interactions that are most likely to engender motivated cognitive engagement (e.g., Lajoie, 2008) has enabled researchers to better understand ways in which teachers can support individual differences in domain knowledge, as well as tactical and strategic knowledge (Winne, 1996).

PRACTICE AND POLICY ISSUES

Specific practices in gifted education have drawn from ideas and practice in general education to a greater degree than the other way around. Some ideas from general education were applied sooner and more widely in the gifted sector, often to provide enrichment opportunities, including adopting an inquiry approach; preserving fine and performing arts; language education; global, future, and intercultural studies; and Advanced Placement. Gifted and general educators have lived mostly in separate worlds, and not enough effort has been made to consider how both may benefit from exchange of theories and pedagogical practices.

Developments in various segments of education do not happen at the same time, and practitioners frequently seem to underestimate the powerful benefits that could be gained from a better

cross-pollination of ideas and practices. Tomlinson et al. (2002, 2008) emphasized the importance of a strong general curriculum in a good gifted curriculum. Attempts to share the curriculum necessarily include bringing social constructivism to all learners, and providing for appropriate differentiation respecting learner differences in interests, abilities, and aptitudes.

Diversity and Multicultural Issues

One of the great disappointments in gifted education over the last century has been the scores of children whose potential for excellence has gone unrecognized and undeveloped. Because identification has been focused on a limited dimension of cognitive performance, often regarded as not culture-fair, countless kinds of talent have remained untapped through the decades. Girls (e.g., Callahan, 1986) and learners from culturally diverse and economically challenging conditions (e.g., Bernal, 2001; Castellano & Frazier, 2010; Ford, 1998; Gallagher & Gallagher, 1995; Obomsawin, 1983) have been underrepresented in gifted education, and more needs to be done to ensure the inclusion of diverse talents.

Dual Exceptionality

The presence of high ability in one or more areas, together with the presence of learning challenges or disabilities in other areas, has confounded gifted educators for a long time (see Chapter 35, this handbook). Together with the asynchronous development that is part and parcel of giftedness, it has occasionally made it difficult for educators to figure out which of a learner's many facets should be addressed first or most. In addition, general education has widely embraced the philosophy and practices of "inclusive education" that openly reach out to meet the needs of learners with barriers to effective learning, but gifted education has more actively espoused the concept of differentiation. Trying to do both may be akin to mixing oil and water.

Learners with dual exceptionalities face practical and philosophical challenges to school services. Modern schools in North America are more widely equipped to deal with learning disabilities than giftedness, but learners with dual exceptionality think and learn more like gifted pupils without disabilities than like most students having only a disability (hannah & Shore, 2008; Martini, Wall, & Shore, 2004). Twice-exceptional learners should be taught as gifted learners with disabilities, not vice-versa. Use of the Renzulli enrichment triad model with twice exceptional learners, for example, has successfully increased the level of challenge, motivation, and confidence, and showed learning gains plus creative productivity (Baum, 1988; Huntley, 1990).

The notions of strengths-based education and talent development in general education and gifted education might have potential to improve the educational lot of learners with dual exceptionality. Such optimism might underlie some of the sustained interest in Gardner's (1983) multiple intelligences decades after the fading of Guilford's (1967) model—just seven to 11 intelligences of Gardner's model might be easier to track than the dozens of intelligences in Guildford's model.

Policy Issues

With this chapter's particular attention to the United States and Canada, we have parallel but somewhat distinct trajectories in terms of policy. The common threads lie in nearly every major curricular reform movement since the 1980s, adopting a social-constructivist or inquiry-based pedagogical approach (see Chichekian et al., 2011, for an overview). In the United States, these initiatives were first taken by national teachers' associations, such as the National Council for the Social Studies (1994), National Council of Teachers of Mathematics (2000), and the National Research Council (1996, 2000). U.S. legislative policies essentially caught up in the relatively recent Common Core (National Governors Association, 2010) proposals that have been controversial at times. Even the National Research Council (2012) backed off on its use of the term *inquiry* because it saw this as an impediment to acceptance of the underlying principles, but gifted education seems not to be wavering in its open commitment to inquiry. One must wonder if this could be another wedge issue between the two, at least rhetorically.

In Canada, however, despite the absence of a federal education office, highly centralized and powerful provincial ministries of education took the lead and mandated strongly social-constructivist

curricula in the early 1990s, then phased them in grade-by-grade over a decade or more. Although schools and teachers often scrambled to keep up, the new pedagogies were the rule rather than exception in provinces that led this process, such as Quebec (Ministry of Education of Quebec, 2001, 2004) and Alberta (Alberta Learning, 2004). It is interesting that Quebec has no formal gifted education policy and Alberta offers individual education plans following identification largely by IQ, yet Quebec, was the highest ranking jurisdiction (8th) outside Asia on the 2012 PISA mathematics assessment, and Alberta was just behind the Canadian average (17th). As noted earlier, the United States was ranked 44th among 65 countries. One could hypothesize that a head start and progress on this social-constructivist curricular agenda might account for some of this difference, despite policy initiatives in U.S. gifted education such as the Javits funding program and the presence of a U.S. Department of Education.

Policies make a difference when their impact can be felt, even directly imposed, in every classroom. As for policies in gifted education, they do not appear to have an impact on general student performance, but they very likely make an important difference in the lives of students in other ways, when they ensure that programs happen and the programs are well aligned with defensible educational policy and practice. For example, Field, Reis, and Sedam (2006) surveyed graduates of secondary gifted programs that included Renzulli Type III projects about their school experiences. Their most valued memories were participation in these projects.

Policy progresses slowly, and can follow practice, but is essential long term. Policies promoting 21st century pedagogy appear to make a difference.

FUTURE CONSIDERATIONS AND DIRECTIONS

Effective pedagogical practice is receiving widespread attention in general educational research. The lag (another Slinky phenomenon) in implementation is not new. Gifted education remains a worthy test bed for many of these ideas, but international comparisons might be especially useful as benchmarks. A problem from the perspective of gifted education, however, is that gifted education seems to have very little influence on general education. Why is unclear; causes could range from lack of critical mass, continuing perceptions of elitism, or more successful and effective "squeaky wheels" in other domains.

There remains the decades-old challenge of creating and sustaining communication between gifted and general education. A gap remains, despite both formally espousing similar instructional practices, with possibly one enormous disconnect: inclusion versus differentiation. How to move from "apart" to "a part" is not obvious.

The nature of instruction has shifted with definitions and models of giftedness, and gained from and contributed to general education. Both are heading now toward widespread acceptance in principle of social-constructivist, inquiry-based, student-centered, 21st century theory, but the reality remains of content-packed, teacher-centered, teaching-to-the-test leaning where bright kids endure, and some people prefer this approach. There are related subquestions. For example, is gifted pedagogy fundamentally unique, or are the differences in expectations or individual goals? Instructional practices are driven by evaluation practices. The North American jurisdictions that have ranked high in PISA comparisons do not have practices that parallel the No Child Left Behind Act (2001) with their fiscal and reputational consequences, but they do have province-wide achievement exams that tap the kinds of thinking processes assessed by PISA, as one example. Alignment is critical among curriculum, assessment, and identification practices.

SUMMARY AND CONCLUSIONS

Gifted and general education draw from overlapping theories, models, and practices, but rarely synchronize. Both increasingly incorporate social-constructivist, inquiry-based, student-centered theory that often faces resistance from critics uncomfortable with the ideas or practices—perhaps because of misalignment among goals, instruction, and evaluation practices.

Gifted education and giftedness theories have sometimes anticipated, but not necessarily led to,

broader instructional innovation. General education has not typically looked to gifted education for leadership or even good examples, but bridges exist, for example, in the area of creativity. Gifted education has demonstrated that social-constructivist theory works, and embraced talent development, self-regulated learning, and the development of expertise as characteristic of what learners and teachers do. These are equally available to general education.

The United States has relatively excelled in innovation and provision of supported gifted education, teacher education, and legislative mandates—even if these endure shifting political winds. There is no federal office of education in Canada; provincial ministries of education are all-powerful and protective of that constitutional authority. But strong provincial ministries of education can and do insist on strong social-constructivist general curricula, oversee teacher education, and provide attractive teacher salaries. These might contribute to the higher performance of Canada, especially certain provinces, on international comparisons of student performance (OECD, 2013). Gifted programming struggles nevertheless in most provinces, for reasons ranging from ideology to lack of local initiative.

So what happened to the Slinkys? Within gifted education we have a half-century of inquiry-based models, yet some gifted programs remain traditionally taught and content-driven. Acceleration unconnected to curricular adaptation remains a common offering, sometimes the only option. Definitions of giftedness have evolved considerably in the past century, but the majority of legislatures still privilege a measure created a hundred years ago. The lead end of the gifted Slinky is a step forward. Will the tail end ever leapfrog ahead?

In general education, even though social-constructivist ideas were made available in the late 1970s, and anticipated by Bruner and others in the 1950s and 1960s, there still remains strong resistance to inquiry-based practices. At the same time, there is noticeable excitement about 21st-century skills. But they are not everywhere. Educational expertise from major associations is state-of-the-art, nearly every U.S. state has committed to the Common Core, so all of North America is more or less committed to the same kind of pedagogical regime, but the outcomes lag at different rates. Gifted programs with the qualities of inquiry-based learning remain scarce in Canada. Dewey exclaimed "activity" in the 1930s, but children still sit in rows and columns of desks and endure high proportions of teacher talk and some people think that is a sign of quality education. Creativity remains part of the gifted-education message but regular education has treated arts and music as dispensable with the first budget contractions.

This chapter has most likely reinforced a point with which we are familiar more than identified a new one. Theory and practice in general education and gifted education have had similar sets of instructional building blocks for a century, but have progressed at different rates at different times and with somewhat different preferred practices. Bridge building between the two is needed at multiple levels. Inclusion versus differentiation may be very hard to reconcile. Perhaps the place to start seeking common ground is in the instructional tools themselves. Awareness of how these tools have come about and been received within gifted and general education can facilitate such dialog. And dialog is the means to constructing meaning.

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