ACCELERATION AND THE TALENT SEARCH MODEL: TRANSFORMING THE SCHOOL CULTURE

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Individuals with very high cognitive ability need academic interventions that are at a greater depth and faster pace than those required by their typically developing peers. These interventions fall under the umbrella term *acceleration* for which Pressey (1949) typically is credited with the current, concise definition: learners "progress through an educational program at rates faster or at ages younger than conventional" (p. 2).

Southern and Jones (2015) defined 20 forms of acceleration encompassing early entrance programs, grade skipping, advanced placement coursework, concurrent/dual enrollment, and extracurricular programs, which include delivery of advanced instruction outside of the typical school day. Southern and Jones described programs based on the talent search model (Olszewski-Kubilius, 2015) as "a good example of an extracurricular program offering accelerated classes during the summer. Most of these classes use fast-paced learning and are content-based" (Southern & Jones, p. 10). Elementary school students participating in summer programs based on the talent search model are sometimes able to earn middle school or high school credit for the work completed and may be permitted to move ahead in the specific subject area they studied, resulting in content acceleration.

This chapter focuses on the remarkable research base and impact on practice of the talent search model. Researchers, educators, psychologists, and policymakers citing Pressey's (1949) definition of acceleration typically do not include Pressey's explanation of conventional education. However, understanding conventional or regular education is critical to a thorough understanding of the phenomenal impact of the talent search model, most of which occurs outside of the typical school setting. Pressey described "conventional or regular for an American child [is] to enter school shortly before or after his [or her] sixth birthday, to take a grade a year thereafter for twelve years, to enter college around eighteen, and graduate around twenty-two" (p. 2). In other words, Pressey's definition of conventional education does not include acceleration. Pressey's definitional paragraph concludes with questions salient to the topic of acceleration and the talent search model: "Whether the conventional pace and the normal ages are *desirable* [emphasis added] is an issue still to be determined, as is also the extent to which deviations from an established rate may be desirable for certain individuals" (p. 2).

Regarding individuals with very high cognitive ability, both questions have been answered by decades-long research on acceleration (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015; Colangelo, Assouline, & Gross, 2004). The regular pace and typical level of complexity are not sufficient for highly able students who need a faster pace and likely will need access to advanced content at younger ages than average learners. Much of the research that proves the effectiveness of acceleration as an educational intervention is rooted in the talent search model (Lubinski, 2004; Olszewski-Kubilius, 2015). Despite its robustly demonstrated effectiveness, this model is significantly underused in educational settings

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(Assouline, Colangelo, Heo, & Dockery, 2013; Lee, Matthews, & Olszewski-Kubilius, 2008; Olszewski-Kubilius, 2015; Subotnik, Olszewski-Kubilius, & Worrell, 2011).

Appreciating the multiple aspects of the talent search model (Assouline & Lupkowski-Shoplik, 2012; Olszewski-Kubilius, 2015; Stanley, 2000; Thomson & Olszewski-Kubilius, 2014) as a form of acceleration (Southern & Jones, 2015) within the context of conventional education allows educators and psychologists to compare the talent search model of gifted program identification with the other models or types of gifted programming (e.g., a resource room delivery model that offers enrichment programming to identified students; Assouline & Lupkowski-Shoplik, 2012; Callahan, Moon, & Oh, 2014; National Association for Gifted Children & Council of State Directors of Programs for the Gifted, 2015). Equally important is understanding the impact of the wide-spread implementation of the talent search model, as an accelerative intervention, albeit outside of the regular school setting, with students who are ready to progress at faster rates or at younger ages than conventional students.

THE TALENT SEARCH MODEL

The psychometric model of gifted assessment, founded by Julian Stanley at Johns Hopkins University in the early 1970s (Stanley, 2000), uses a two-step process. Stanley adapted Robert Browning's quote, "A [person's] reach should exceed his [or her] grasp, or what's a heaven for" to serve as an apt metaphor (Colangelo, Assouline, & Gross, 2004) for the model. Step 1 represents the student's current grasp of academic content at a specific grade level and can be revealed through the results of a grade-level achievement test (e.g., tests used by states to determine proficiency levels). By design, grade-level achievement tests cannot have sufficient floor (enough easy questions) for students who struggle academically; nor can they have sufficient ceiling (enough advanced questions) for students with high cognitive ability. If researchers are interested in determining whether students correctly respond to the test items, indicating mastery of content at a particular grade level, then a grade-level achievement test would be sufficient for educational planning purposes. However, the main purpose of above-level testing is to help students learn what they don't already know, in other words, to have them reach beyond their current achievement (Stanley, 2000).

To discover students who reason extremely well in a specific content domain (e.g., math) and simultaneously measure specific aptitude in that domain, a second step is necessary. Step 2 is the administration of an above-level test to students who have hit the ceiling on the grade-level test. Hitting the ceiling means that the test does not have enough difficult items to challenge high-ability students, and they "cluster" in the upper percentiles (e.g., 95th and above). To determine the degree to which the conventional or regular curriculum must be differentiated, through acceleration, so that high-ability students learn material that they don't already know, requires the administration of an above-level test (Stanley, 2000; Swiatek, 2007; Warne, 2012). The SAT, a college-entrance exam for 11th and 12th graders (http://sat.collegeboard.org/abouttests/sat), has proven to be an effective above-level test for middle-school students (Benbow, 1988, 1992).

The two steps of the model are embedded in Browning's quote and also are delineated in Figure 22.1. The bell curve on the left-hand side of the figure (Bell Curve A) represents students in the general population who take a grade-level standardized test in Step 1 of the talent search model. Test development experts create standardized tests so that the scores of the general population are spread out in a normal distribution (i.e., a bell curve). When students who score in the top 5% take an above-level test in Step 2 of the model, their scores create a second bell curve (Bell Curve B).

There are two comparisons that are made for the scores earned by the students taking the above-level test. First, students' scores are compared with the normative group for whom the test was developed (i.e., older students in higher grades). Second, the students' scores are compared with other talent search participants (i.e., same-age, bright students with high achievement), which permits educators, parents, and psychologists to understand how a student performed compared with other bright

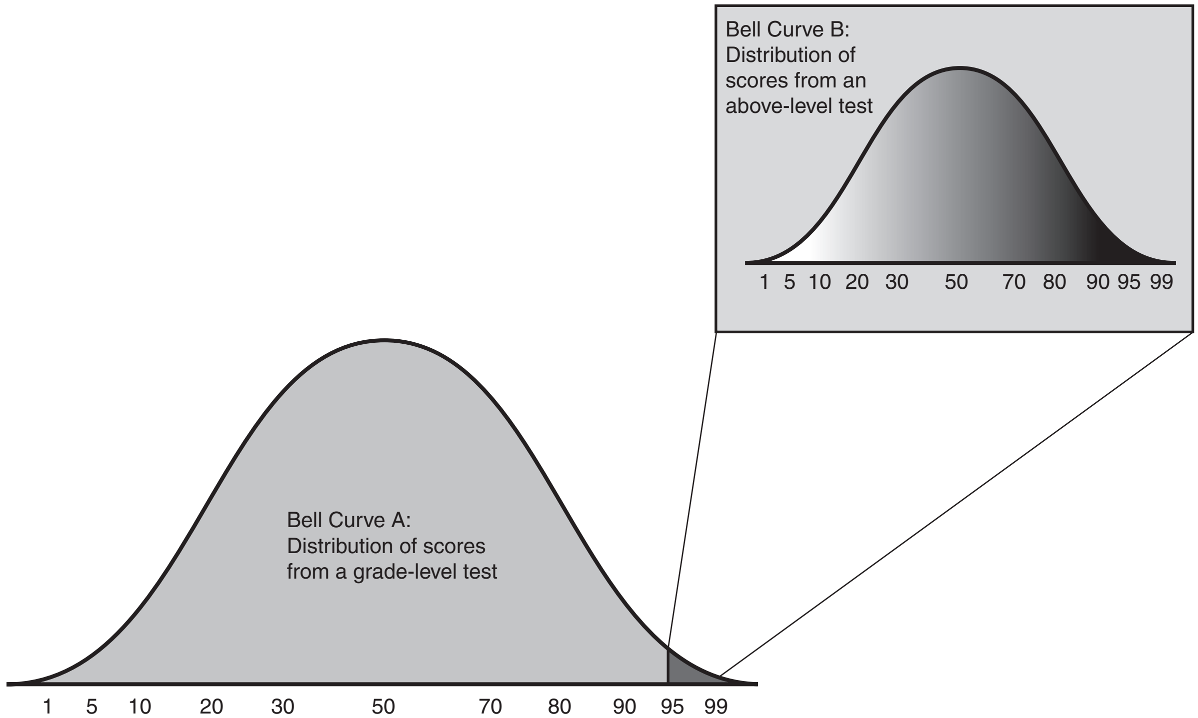

FIGURE 22.1. The two-step process of the talent search model. From "The Talent Search Model of Gifted Identification," by S. G. Assouline and A. E. Lupkowski-Shoplik, 2012, *Journal of Psychoeducational Assessment, 30*, p. 49. Copyright 2012 by Sage. Reprinted with permission.

students. The above-level test differentiates exceptionally talented students from talented students and helps talent search program staff and faculty to differentiate programming for these students.

IMPORTANCE OF THE TOPIC

A key concept underlying the talent search model is the discovery of academic talent through above-level testing (Brody, 2009). Discovery is an important and even a necessary first step; however, it is not sufficient to address the needs of gifted students. Talent development is an equally important component of the model. The alignment between the assessment process for discovering academic talent (above-level testing) and the development of that talent through differentiated educational intervention (accelerated programming) is one of the model's many strengths.

Indeed, the power behind administering an above-level test (e.g., the SAT) to seventh and eighth graders, is found in the differentiation of talented students. This is relevant for selecting appropriate programs on the basis of the talent search test scores. The benefits of talent discovery and development also are long-term. Lubinski, Webb, Morelock, and Benbow (2001) found that profoundly gifted students (junior high students earning SAT scores that were significantly higher than high school students; approximately one out of 10,000) demonstrated significant differences in their developmental trajectories and in career-related pursuits compared with more moderately gifted students (see Chapter 31, this handbook). These findings speak to the validity of an above-level measure for differentiating among exceptionally talented students. Equally important is the impact of educational interventions: 95% of the students in Lubinski et al.'s longitudinal study experienced some form of educational acceleration and many wished they had accelerated sooner and/or had experienced more accelerative interventions.

HISTORICAL AND CONTEMPORARY PERSPECTIVES

Julian Stanley offered the first large-scale testing of middle school students with the SAT, in January 1972. He called this testing a "talent search." Stanley followed the process of above-level testing originally used by Leta Hollingworth (Stanley, 1990) by administering the math portion of the SAT as an above-level test to raise the ceiling and identify students demonstrating exceptional mathematical reasoning ability.

The SAT and other similar tests (e.g., the ACT; http://www.act.org/products/k-12-act-test) have been selected for use in talent searches because talented junior high students, who are several grades below the normative group for whom the tests were developed, typically would not have been exposed to the test's content; therefore, they could use their reasoning abilities to solve problems, even if the content was unfamiliar.

Predating today's large-scale talent search testing by nearly a decade, Stanley founded the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University in 1971 (Brody, 2009; Stanley, 1996). Eventually, SMPY would become a research program that was distinct from the operations of the large-scale talent search organizations, first conducted at the Center for Talented Youth at Johns Hopkins University (Stanley, 1996). Since relocating in 1998 to Vanderbilt University, SMPY researchers have continued conducting a comprehensive decades-long longitudinal study of multiple cohorts of talent search participants (Lubinski & Benbow, 2006; Wai, 2015). This research has contributed greatly to our understanding of the impact of talent search accelerated programming (see Table 22.1).

Stanley's conception of the talent search model was primarily pragmatic and implicitly

TABLE 22.1

A Brief History of the Talent Search Model and Related Educational Initiatives

Year	Event	Comments
1916	Leta Hollingworth first uses above-level testing (Stanley, 1990) by administering the Stanford–Binet to a profoundly gifted child.	The Stanford–Binet, as one of the first individually administered IQ tests, is grounded in the principle of individual differences.
1969	Julian Stanley administers the SAT to 13-year-old Joe Bates (Stanley, 1996).	
1971	Julian Stanley founds SMPY and uses the math portion of the SAT as an above-level measure to identify exceptionally talented students younger than age 13 (Stanley, 1996).	The SAT is a secure test.
1972	The first large-scale talent search testing at Johns Hopkins University uses the math portion of the SAT (Stanley, 1996).	The verbal portion of the SAT is added to talent search in 1973.
1979	The Center for Talented Youth at Johns Hopkins University is created to take over the operational aspects of SMPY, including the large-scale testing of middle school students with the SAT.	
1980	Julian Stanley identifies students scoring 700 or above on the math portion of the SAT before the age of 13 (Stanley, 1990) to focus on and mentor students with exceptionally high ability in math.	Now called the Study of Exceptional Talent at Johns Hopkins University (Brody, 2009).
1980	Talent Identification Program is developed at Duke University. Programs at Northwestern University and the University of Denver follow soon after. Programs following the talent search model later become available in Arizona, California, Georgia, Illinois, Indiana, Iowa, Minnesota, North Carolina, Pennsylvania, Texas, Washington, Wisconsin, and in the countries of Australia, Canada, and China.	Built on college entrance exam system, testing offered outside of typical school day using a secure test.
1981	Sanford J. Cohn adapts the talent search process for students as young as age 7 at Arizona State University (Cohn, 1991).	

1985	The ACT is administered in large-scale talent searches.	Traditional system of testing on Saturday. ACT includes a test of science.
1985	School and College Ability Test is used to identify mathematically and verbally talented students in second through fifth grades.	Delivery system is not secure; testing is done in school using a paper-pencil format.
1991	Secondary School Admission Test is administered as an above-level test in Iowa and Texas (Lupkowski-Shoplik & Assouline, 1993).	Verbal and quantitative areas tested.
1992	EXPLORE, an eighth grade test, is introduced as an above-level test for fourth through sixth graders. Schools may also sponsor above-level testing in their schools (http://www.belinblank.org/inschooltesting).	Test is not secure. Students may test in their schools or through the traditional model of testing on Saturday. Includes a test of science. EXPLORE discontinued by ACT in 2016.
2000–present	The No Child Left Behind legislation is passed. Core curriculum for reading and math and next generation science standards for science are adopted and implemented. New testing consortia are enacted.	Impact of broad federal policies or initiatives on gifted education.
2004	*A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, Assouline, & Gross, 2004) is published. Both volumes feature several chapters related to the talent search model.	
2015	*A Nation Empowered: Evidence Trumps the Excuses Holding Back America's Brightest Students* (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015) is published. Both volumes feature several chapters related to the talent search model.	
2016	Above-level testing for fourth through sixth graders expands to include I-Excel and PSAT 8/9. I-Excel, developed by the Belin-Blank Center, is offered exclusively as an online measure. It is administered in the school setting and students' scores are available to teachers and parents. See http://www.i-excel.org. PSAT 8/9, developed by The College Board, is offered as a traditional paper/pencil test and is administered through the traditional talent search model (i.e., outside of the school setting on a Saturday morning).	I-Excel includes eighth-grade level content in four areas: science, math, English, and reading. Content is licensed from ACT. PSAT 8/9 includes a verbal test and a quantitative test. As of 2016, it is only available via paper/pencil.

Note. SMPY = Study of Mathematically Precocious Youth.

psychological: Find exceptionally talented youths and devise and implement appropriate educational options for them (Stanley & Benbow, 1986). Rather than spending a lot of time developing definitions of giftedness or even specific aptitude (e.g., mathematical talent), Stanley and his colleagues took a simple approach: Operationally define giftedness or talent as students earning a high score on above-level tests such as the SAT at a young age (Stanley & Benbow, 1986). This simple, objective, and elegant definition has served high-ability students well.

In the years since the first administration of the SAT to high-ability seventh and eighth graders, literally millions of exceptionally talented youth have been discovered and provided with challenging educational services using a variety of above-level tests (Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003; Olszewski-Kubilius, 2015). Although not inherently psychological, it was evident that the very nature of the process, as well as the end result (i.e., the discovery and development of academic talent) was psychological:

> What is particularly striking here is how little that is distinctly psychological seems involved in SMPY, and yet how very fruitful SMPY appears to be. It is as if trying to be psychological throws us off the course and into a mire of abstract dispositions that help little in facilitating students' demonstrable talents. What seems most successful for helping students is what stays closest to the competencies one

> directly cares about: in the case of SMPY, for example, finding students who are very good at math and arranging the environment to help them learn it as well as possible. (Wallach, 1978, p. 617)

Additionally, SMPY, the longitudinal study that was an outgrowth of those first large-scale talent searches in the Baltimore area, has borne out the initial promise: Exceptionally talented youth who are discovered and challenged educationally, often through accelerated programming and curriculum, perform very well academically, achieve at high levels in their careers, and demonstrate high levels of life satisfaction (Benbow & Lubinski, 2006; McClarty, 2015a, 2015b; Wai, 2015).

Since its inception, the talent search model has been implemented outside of the regular school setting. This was a deliberate, pragmatic decision made by Stanley (2000). Stanley recognized that many school personnel were resistant to acceleration. Working with the students directly rather than going through a school filter helps ensure that exceptionally talented students and their families hear directly from experts in gifted education about the educational options available to the students. Rather than dealing with the red tape and roadblocks often encountered by trying to establish programs in many different schools, SMPY staff members and members of other university-based talent searches focus their energy on working with individual students and making sure they receive appropriately challenging instruction, matched to their abilities and motivation. The SMPY staff members assist students and their families as they navigate school systems and attempt to get credit for their work, but working directly with schools in a systematic fashion was never a focus of Stanley's work.

Parents register their children for testing, and students take the SAT or ACT during several national testing days, which are usually on Saturdays. After testing, students attend university-based programs, which take place during the summers and/or on Saturdays, and are often located on college or university campuses or accessible through distance-learning opportunities. Some of these university-based talent searches and programs are listed in Table 22.1, whereas others are described in Olszewski-Kubilius (2015).

Although the traditional implementation of the talent search model is outside of the regular school setting (Assouline & Lupkowski-Shoplik, 2012), schools aren't completely removed from the process. Frequently, students and their families learn about the regional talent search program via information provided by their local school. However, it is up to the parents to register the student for testing and to follow up on any educational opportunities available to the student, such as summer programs or distance learning courses. After students participate in an academic program through the talent search, they and their families must initiate communication with their local school to learn how to obtain school credit for work completed with the talent search organization should that be available and desirable. Although there are often positive relationships between the schools and the talent search organizations, they do not typically work together on programs for gifted students and maintain their distinct roles, especially with respect to gifted students (Assouline & Lupkowski-Shoplik, 2012; Lee, Matthews, & Olszewski-Kubilius, 2008).

RELEVANT THEORY AND PRINCIPLES

Above-level testing (Stanley, 1990) is the psychometric foundation on which the talent search model and subsequent talent development programs are built. Equally important as the psychometric foundation are three principles from developmental psychology (H. B. Robinson, 1983; Stanley & Benbow, 1986): (a) learning is sequential and developmental; (b) individual differences in many psychological attributes occur; and (c) individuals learn best when there is an optimal match between their readiness to learn and the material presented. These principles provide the psychological bedrock for the accelerative nature of academic programming associated with the talent search model. Four educational applications of the principles are considered.

Principles From Developmental Psychology

The first principle, *learning is sequential and developmental*, drives the scope and sequence of modern curriculum. Course sequences, as well as class syllabi, reflect that learning, understanding, and problem-solving are acquired gradually, in orderly patterns, and in more or less predictable sequences.

The second principle is *individual differences in psychological attributes* (e.g., cognitive ability) *exist* (see Chapter 40, this handbook). The principle of individual differences helps psychologists and educators understand why children progress through the acquisition of knowledge and develop at extremely different rates. Individual differences explain why students cannot all respond to the same curriculum at the same time. Daniel Keating emphasized that

> one of the important principles advanced (in theory, research, and practice) by SMPY [and talent search programs] is a workable model of educating for individual development, as opposed to categorical placement approaches that dominate most of contemporary education. I think this is a potentially generalizable way of dealing with developmental diversity. Folks who are interested in a wide range of educational issues could learn from the SMPY experience. (Stanley, 1996, p. 232)

The first two principles lead directly to the third principle, *optimal match*, which refers to the match between student readiness to learn and complexity and novelty of content that are necessary for new learning. Effective teaching ascertains the student's current status in the learning process and presents problems slightly exceeding that level of mastery so that students can learn new material without being unnecessarily frustrated by content that is too hard or bored by content they have already learned.

Another way to think about optimal match is to consider that the pace of educational programs should be adjusted to meet the abilities, achievements, and readiness of individual students (H. B. Robinson, 1983). This is related to Vygotsky's zone of proximal development, which is the distance between the child's actual developmental level, as determined by the ability to solve problems independently versus the ability to solve problems under adult guidance or in collaboration with more capable peers (Vygotsky, 1978). Put more simply, learning should be matched with the child's readiness to learn; once a student has mastered a certain level of skills, it is time to move to the next level. If the student is ready for more challenge, yet not permitted to progress in a reasonable amount of time, boredom results (N. M. Robinson & Robinson, 1982). Moving to the next level of the regular curriculum in a reasonable amount of time will require that the regular curriculum is accelerated for students who are ready.

Educational Applications of the Psychological Principles

Smorgasbord of educational options. SMPY, followed by the university-based talent search organizations (see Table 22.1), identified a wide variety of educational options that can be used to accelerate and/or supplement a student's educational program. Called the *smorgasbord* of educational options (Benbow, 1979), they include accelerative opportunities such as early entrance to kindergarten, grade skipping, testing out of courses, distance learning, fast-paced classes, advanced placement courses, summer programs, dual enrollment in high school and college, and early entrance to college. These are highly cost-effective options, because most of them use resources or curricula that have already been developed for older students.

Additionally, the smorgasbord includes enrichment options that provide additional challenges, including extracurricular activities, research and internship opportunities, individual projects, and courses outside of the typical school curriculum (Lupkowski-Shoplik et al., 2003), some of which may be appropriate for students who do not need such accelerated experiences.

Pyramid of educational options. Assouline and Lupkowski-Shoplik (1997, 2011) assembled examples of educational options into a pyramid to help parents and school personnel visualize the level of students' talent relative to appropriate educational options, as well as to consider whether the options are accelerative or enrichment in nature. The broad base of the pyramid represents all talent search participants (i.e., students who took the above-level test; see Bell Curve B in Figure 22.1). Students invited to take an above-level test are already high achievers on the grade-level content; however, by definition, approximately 50% will earn scores that are at or below the average score for the above-level test. Therefore, they would benefit from less accelerative options such as classroom enrichment, competitions and contests, and ability grouping. Students earning above-average scores on the above-level test would benefit from subject-matter acceleration, fast-paced summer programs, and individually paced instruction in an area of strength.

Moving from the wide base to the narrow top of a pyramid of educational options represents two things at once: the educational program is more accelerative and simultaneously, the number of students needing multiple forms of acceleration is relatively smaller. All talent search participants (the base of the pyramid) would benefit from academic counseling, educational planning, and some level of enrichment. The most highly talented students (the top of the pyramid) would benefit from the most accelerative options, such as grade skipping, early entrance to college, and testing out of college courses.

Focus on domain-specific identification and programming: Homogeneous grouping. Rather than identifying the "all-around gifted" student with general ability tests, the talent search model (Assouline & Lupkowski-Shoplik, 2012) uses above-level testing to discover students with specific talents in math, science, and language arts. Targeting individual aptitudes leads to differentiated programming in those subjects and allows students to focus on their area of strength. This approach is in direct contrast to most gifted programs in the United States, which focus on identifying students on the basis of achievement and ability tests (Assouline & Lupkowski-Shoplik, 2012; Callahan, Moon, & Oh, 2014). University-based talent search centers have found it much more efficient to group students for instruction in math, for example, on the basis of their performance on mathematical reasoning ability than on the basis of overall mental ability (Olszewski-Kubilius, 2015; Stanley, 2005; Stanley & Benbow, 1986).

The diagnostic testing–prescriptive instruction model. To document what students already know and move them through the curriculum at a steady pace, Stanley expanded on the special-educational method of prescribing instruction on the basis of diagnostic testing. He devised the diagnostic testing–prescriptive instruction (DT→PI) model (Assouline & Lupkowski-Shoplik, 2011; Lupkowski & Assouline, 1992; Stanley, 2000). For high-ability students needing acceleration in mathematics, this method is robust. It involves pretesting students to determine what they already know, as well as mentor-led instruction tailored to help students master what they have not yet learned. Students demonstrate mastery by taking posttests. Students using the DT→PI model move ahead at an individualized pace, and a classroom using the DT→PI model can have students studying several different levels of math at the same time (e.g., algebra I, geometry, and algebra II). Students using the DT→PI model in university-based talent search summer programs have completed as many as 2 or more years of precalculus math in 3 weeks (Stanley, 2000). DT→PI classes have demonstrated that highly talented students can learn the material rapidly in a 3-week summer program. Additionally, DT→PI reveals that students also learn a great deal of content before they begin the summer program course. Taking the various pretests helps to document what they learn outside of a formal school setting. University-based talent searches continue to use the DT→PI component to the talent search model in their fast-paced, accelerated, academic summer programs (Olszewski-Kubilius, 2015).

RESEARCH REVIEW

Assouline and Lupkowski-Shoplik (2012), Brody (2009), and Olszewski-Kubilius (2015) have documented several research-related questions connected to the talent search model, especially as it relates to the discovery and development of talent. These are questions that revolve around the validity and robustness of the discovery process. The massive amount of data gathered through test scores have yielded highly consistent results. Guidelines for recommending participation in the above-level testing are effective (Ebmeier & Schmulbach, 1989; Lupkowski-Shoplik & Swiatek, 1999; Olszewski-Kubilius, 1998). Also, guidelines for the use of the above-level scores to recommend accelerated curriculum are also valid (Brody, 2009; Olszewski-Kubilius, 2015). The data from above-level testing lends itself to better understanding the academic needs of high-ability students. Additional research with talent search participants is useful in helping professionals better understand high-ability students and the need for accelerated curriculum (Brody, 2009; Wai, Lubinski, & Benbow, 2005).

Some of the most important findings out of the talent search model are from the longitudinal research specifically related to acceleration. Research reviews on this topic can be found in Brody (2009); Brody, Assouline, and Stanley (1990); Lubinski (2004); Lupkowski-Shoplik, Benbow, Assouline, and Brody (2003); and Swiatek and Benbow (1991). In one recent publication, Wai (2015) summarized the decades of research conducted on talent search participants: Talented students who accelerate in school report a positive experience, academically and in terms of their career-related achievements. These results were apparent more than 20 years after the students accelerated, indicating what a positive impact the accelerative experiences have on the students' educational and occupational achievements over time.

PRACTICE AND POLICY ISSUES

Despite the conclusions by gifted education experts (e.g., VanTassel-Baska, 1996), the talent search model has been and continues to be largely underused in practice and policy (Assouline et al., 2013; Olszewski-Kubilius & Lee, 2005). More than 20 years after the talent search model was established, Stanley commented that the impact of the model on educational policy was less than he had hoped (Stanley, 1996). He pointed out that talent search programs usually worked directly with students and their families, which meant that the impact was typically very specific to individual students (e.g., the individual student might be allowed to move up a grade level for math or have some other similar adjustment made to the typical school experience). Because the talent search programs typically don't work directly with the schools, the unfortunate consequence was that system-wide changes were not made on a school, district, or regional level. Curricular adjustments were made at an individual student level. Focusing on the individual allowed the talent search programs to be nimble in addressing the academic needs of advanced students because talent search personnel didn't have to deal with school procedures and administrative bureaucracy; however, the unintended consequence was that the impact on schools and national educational policy was not significant. This statement in no way minimizes the fact that the talent search model has had a positive impact on enormous numbers of young people in the United States and other countries, but it does suggest that there are many more students whose parents are not informed about the benefits of this model.

The University of Minnesota's Talented Youth Mathematics Program: A University–State–K-12 School Model

Whereas the talent search model has had minimal influence on school practice or policy, the University of Minnesota's Talented Youth Mathematics Program (UMTYMP; http://mathcep.umn.edu/umtymp) is one striking exception that has led to a state-wide policy change in Minnesota. Founded in the mid-1970s as a direct outgrowth of SMPY's work (Keynes & Rogness, 2011) and administered by the University of Minnesota's School of Mathematics Center for Educational Programs, UMTYMP focuses on mathematically talented students in sixth through 12th grades. Program goals focus on the identification of exceptionally mathematically talented students who will benefit from the challenging, stimulating program provided in a culture of math and an environment where students work with individuals with similar talents and of similar ages.

Each year approximately 400 students in sixth through 12th grades take their math courses through UMTYMP instead of their own schools.

In a 2-year period, students complete 4 years' worth of high school math curriculum. This form of acceleration is known as telescoping (see Southern & Jones, 2015, for a comprehensive treatment of the 20 forms of acceleration). Successful students may then move to the 3-year calculus component, which includes concepts on linear algebra, differential equations, multivariable calculus, and vector analysis. A state law passed in 1984 requires schools to grant high school credit on their transcripts for students who have completed UMTYUMP courses. Students completing the calculus component courses receive University of Minnesota credit and satisfy nearly half the requirements for a math degree by the time they graduate from high school. The program is partially supported by the state of Minnesota. This support reflects an important level of cooperation among the state, a public university, and the K–12 school system, and also it demonstrates broad respect for the need for accelerative options, including a variety of possibilities for implementation, for very talented students.

Diversity and Multicultural Issues

Disparities in achievement between students from lower socioeconomic environments and/or underrepresented minority students and students from higher socioeconomic environments is likely the most significant issue facing today's educators. This disparity impacts us socially, economically, and ethically. Because the talent search model relies on testing and is largely an out-of-school model, it is not surprising that this model may be perceived—incorrectly—to be elitist, biased, and/or irrelevant for bright students who also are underserved. However, Plucker and Harris (2015) reveal that accelerative strategies, including implementation of the talent search model, have a positive impact on students from diverse or economically vulnerable backgrounds. However, there is still a paucity of research on these vulnerable populations and acceleration.

In recognition of the potential benefit of the talent search model, many university-based talent searches have implemented programming especially for students who come from underresourced backgrounds and live in households where parents might not be aware of opportunities through the university-based programs offered by the talent search model. For example, the Center for Talent Development at Northwestern University offers a program called Project EXCITE to close the achievement gap between minority and nonminority students. Students in Project EXCITE participate in the program for six years starting in third grade, in an effort to increase the number of minority students taking honors and advanced placement courses in high school. Results have been impressive—70% of students participating in Project EXCITE complete 1 or more years of high school math before ninth grade (Olszewski-Kubilius & Clarenbach, 2012).

FUTURE CONSIDERATIONS AND DIRECTIONS

The millions of students who have benefitted from talent search programs is testimony to the strength of the model. Participating in talent search testing and subsequent programs offers students significant benefits (Olszewski-Kubilius, 2015; Rotigel & Lupkowski-Shoplik, 1999), many of which are also relevant to schools and the way in which they can use talent search practices: (a) more precise identification of students' talents, (2) educational recommendations tailored to the abilities of the student, (3) outside-of-school educational opportunities with intellectual peers, and (4) more opportunities for students to learn about their own capabilities.

The next challenge is to take this well-researched method and make it more accessible to schools. This challenge is multifaceted and part of the challenge lies in the fact that 21st century gifted programs for elementary and middle school students (the main participants in the talent search model) remain suffused in conventional models and have seen little change over the past several decades (Callahan et al., 2014). Students identified for school-based gifted programs tend to be in resource/pull-out programs. The amount of time in the resource-room varies from state to state, with most leaving it up to the school (National Association for Gifted Children & Council of State Directors of Programs for the Gifted, 2015). The typical identification system for resource room/pull-out programs relies primarily on grade-level achievement tests and ability tests.

Another challenge is that school personnel lack familiarity with acceleration as an intervention for high ability, as well as with the specific benefits of the talent search model. The idea of emphasizing individual differences and matching the student to varying levels of curriculum is a departure from the "one-size-fits-all" approach found in most schools. Even if today's teachers wanted to offer greater differentiation, they do not implement the processes that have proven true.

The talent search model provides a robust, research-supported process that is effective in a school of any size and offers a menu of options from which to choose. Small, rural schools can still (a) accelerate; (b) group students; (c) use distance learning; (d) give credit for outside-of-school activities, such as academic summer program participation; and (e) work hand-in-hand with university-based talent searches.

SUMMARY AND CONCLUSIONS: THE JULIAN C. STANLEY EFFECT GENERATES A REVOLUTION WITHIN GIFTED EDUCATION

Pressey's (1949) monograph provided an elegant definition of acceleration, as well as a comprehensive treatment of the issues. Over the many decades, there has been significant progress in the implementation and research of many of the 20 forms of acceleration (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, 2015; Colangelo, Assouline, & Gross, 2004). However, one form of accelerative programming, the talent search model, which has a robust research record (Olszewski-Kubilius, 2015), is vastly underused in schools. The impact of the talent search model and subsequent accelerative programming for gifted students is as beneficial as the model is logical. A natural assumption would be that this effective model, grounded in psychological principles, and supported by a robust research agenda would be applied in schools, the setting common to all students and in which they spend most of their formative years. However, this is not the case; the application of the talent search model in schools is shockingly low. Olszewski-Kubilius and Lee (2005) found that fewer than 10% of educators used talent search scores to program for their students. This would explain why Assouline et al. (2013) found that nearly 70% of students who had tested in a talent search program were not receiving differentiated programming during the regular school day.

Circling back to Pressey's (1949) definition of acceleration as learning at a faster pace and at a younger ages than conventional education, as well as his question concerning the relevance of conventional education, we see that there has been clear progress in addressing the need of very bright students through the talent search model. On the other hand, the talent search model has been applied outside of the school setting, rather than as an integral part of the school-based curriculum or programming options. From an equity perspective, this psychological model of academic intervention must be available in schools, as well as outside of schools.

Julian Stanley (1996) expressed disappointment that the talent search model wasn't adopted more readily by schools; nevertheless, the effect of his work is incredibly far-reaching. Stanley's model for identifying academically talented youth and providing appropriate educational programs has resulted in tens of thousands of academically talented students being recognized and challenged annually for more than four decades. Assouline and Lupkowski-Shoplik (2012) referred to the impact of this important work as the "Julian C. Stanley Effect" to indicate the impact of this intervention, and therefore its founder, on literally millions of gifted students, as well as on the educational landscape in the United States and beyond (Brody, 2009). Stanley's dedicated work on academic acceleration that resulted from his "talent searching" encouraged people to recognize the empirical evidence supporting this practice; his work created what Benbow and Lubinski (2006) called a revolution within the field of gifted education.

References

Assouline, S. G., Colangelo, N., Heo, N., & Dockery, L. (2013). High-ability students' participation in specialized instructional interventions: Variations by aptitude, grade, gender, and content area. *Gifted Child Quarterly*, *57*, 135–147. http://dx.doi.org/10.1177/0016986213479654

Assouline, S. G., Colangelo, N., VanTassel-Baska, J., & Lupkowski-Shoplik, A. (Eds.). (2015) *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

Assouline, S. G., & Lupkowski-Shoplik, A. (2011). *Developing math talent: A comprehensive guide to math education for gifted students in elementary and middle school* (2nd ed.). Waco, TX: Prufrock Press.

Assouline, S. G., & Lupkowski-Shoplik, A. (2012). The talent search model of gifted identification. *Journal of Psychoeducational Assessment*, *30*, 45–59. http://dx.doi.org/10.1177/0734282911433946

Assouline, S. G., & Lupkowski-Shoplik, A. E. (1997). Talent searches: A model for the discovery and development of academic talent. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 170–179). Boston, MA: Allyn & Bacon.

Benbow, C. P. (1979). The components of SMPY's smorgasbord of accelerative options. *Intellectually Talented Youth Bulletin*, *5*(10), 21–23.

Benbow, C. P. (1988). Sex differences in mathematical reasoning ability in intellectually talented preadolescents: Their nature, effects, and possible causes. *Behavioral and Brain Sciences*, *11*, 169–232. http://dx.doi.org/10.1017/S0140525X00049244

Benbow, C. P. (1992). Academic achievement in mathematics and science of students between ages 13 and 23: Are there differences among students in the top one percent of mathematical ability? *Journal of Educational Psychology*, *84*, 51–61. http://dx.doi.org/10.1037/0022-0663.84.1.51

Benbow, C. P., & Lubinski, D. (2006). Julian C. Stanley Jr. (1918–2005). *American Psychologist*, *61*, 251–252. http://dx.doi.org/10.1037/0003-066X.61.3.251

Brody, L. E. (2009). The Johns Hopkins talent search model for identifying and developing exceptional mathematical and verbal abilities. In L. V. Shavinina (Ed.), *International handbook on giftedness* (pp. 999–1016). New York, NY: Springer Science + Business Media.

Brody, L. E., Assouline, S. G. A., & Stanley, J. C. (1990). Five years of early entrants: Predicting successful achievement in college. *Gifted Child Quarterly*, *34*, 138–142. http://dx.doi.org/10.1177/001698629003400402

Callahan, C. M., Moon, T. R., & Oh, S. (2014). *National surveys of gifted programs: Executive summary*. Charlottesville, VA: National Research Center on the Gifted and Talented.

Cohn, S. J. (1991). Talent searches. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 166–177). Boston, MA: Allyn & Bacon.

Colangelo, N., Assouline, S. G., & Gross, M. U. M. (Eds.). (2004). *A nation deceived: How schools hold back America's brightest students* (vol. 2). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

Ebmeier, H., & Schmulbach, S. (1989). An examination of the selection practices used in the talent search program. *Gifted Child Quarterly*, *33*, 134–141. http://dx.doi.org/10.1177/001698628903300402

Keynes, H. B., & Rogness, J. (2011). Historical perspectives on a program for mathematically talented students. *Mathematics Enthusiast*, *8*, 189–206.

Lee, S. Y., Matthews, M. S., & Olszewski-Kubilius, P. (2008). A national picture of talent search and talent search educational programs. *Gifted Child Quarterly*, *52*, 55–69. http://dx.doi.org/10.1177/0016986207311152

Lubinski, D. (2004). Long-term effects of educational acceleration. In N. Colangelo, S. G. Assouline, & M. U. M. Gross (Eds.), *A nation deceived: How schools hold back America's brightest students* (vol. 2, pp. 23–38). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

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. http://dx.doi.org/10.1111/j.1745-6916.2006.00019.x

Lubinski, D., Webb, R. M., Morelock, M. J., & Benbow, C. P. (2001). Top 1 in 10,000: A 10-year follow-up of the profoundly gifted. *Journal of Applied Psychology*, *86*, 718–729. http://dx.doi.org/10.1037/0021-9010.86.4.718

Lupkowski, A. E., & Assouline, S. G. (1992). *Jane and Johnny love math: Recognizing and encouraging mathematical talent in elementary students*. Unionville, NY: Trillium Press.

Lupkowski-Shoplik, A., Benbow, C. P., Assouline, S. G., & Brody, L. E. (2003). Talent searches: Meeting the needs of academically talented youth. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 204–218). Boston, MA: Allyn & Bacon.

Lupkowski-Shoplik, A., & Swiatek, M. A. (1999). Elementary student talent searches: Establishing appropriate guidelines for qualifying test scores. *Gifted Child Quarterly*, *43*, 265–272. http://dx.doi.org/10.1177/001698629904300405

Lupkowski-Shoplik, A. E., & Assouline, S. G. (1993). Identifying mathematically talented elementary students: Using the lower level of the SSAT. *Gifted Child Quarterly*, *37*, 118–123. http://dx.doi.org/10.1177/001698629303700304

McClarty, K. L. (2015a). Early to rise: The effects of academic acceleration on occupational prestige, earnings, and satisfaction. In S. G. Assouline, N. Colangelo, J. VanTassel-Baska, & A. Lupkowski-Shoplik (Eds.), *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2, pp. 171–180). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

McClarty, K. L. (2015b). Life in the fast lane: Effects of early grade acceleration on high school and college outcomes. *Gifted Child Quarterly*, *59*, 3–13. http://dx.doi.org/10.1177/0016986214559595

National Association for Gifted Children & Council of State Directors of Programs for the Gifted. (2015). *State of the states in gifted education: Policy and practice data*. Washington, DC: Author.

Olszewski-Kubilius, P. (1998). Talent search: Purposes, rationale, and role in gifted education. *Journal of Secondary Gifted Education*, *9*, 106–113.

Olszewski-Kubilius, P. (2015). Talent searches and accelerated programming for gifted students. In S. G. Assouline, N. Colangelo, J. VanTassel-Baska, & A. Lupkowski-Shoplik (Eds.), *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2, pp. 111–121). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

Olszewski-Kubilius, P., & Clarenbach, J. (2012). *Unlocking emerging talent: Supporting high achievement of low income, high-ability students*. Washington, DC: National Association for Gifted Children. Retrieved from http://files.eric.ed.gov/fulltext/ED537321.pdf

Olszewski-Kubilius, P., & Lee, S.-Y. (2005). How schools use talent search scores for gifted adolescents. *Roeper Review*, *27*, 233–240. http://dx.doi.org/10.1080/02783190509554324

Plucker, J. A., & Harris, B. (2015). Acceleration and economically vulnerable children. In S. G. Assouline, N. Colangelo, J. VanTassel-Baska, & A. Lupkowski-Shoplik (Eds.), *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2, pp. 181–188). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

Pressey, S. L. (1949). *Educational acceleration: Appraisal of basic problems. Bureau of Educational Research Monograph No 31*. Columbus: Ohio State University.

Robinson, H. B. (1983). A case for radical acceleration: Programs of the Johns Hopkins University and the University of Washington. In C. P. Benbow & J. C. Stanley (Eds.), *Academic precocity: Aspects of its development* (pp. 139–159). Baltimore, MD: Johns Hopkins University Press.

Robinson, N. M., & Robinson, H. B. (1982). The optimal match: Devising the best compromise for the highly gifted student. *New Directions for Child Development*, *17*, 79–94. http://dx.doi.org/10.1002/cd.23219821708

Rotigel, J. V., & Lupkowski-Shoplik, A. E. (1999). Using talent searches to identify and meet the educational needs of mathematically talented youngsters. *School Science and Mathematics*, *99*, 330–337. http://dx.doi.org/10.1111/j.1949-8594.1999.tb17492.x

Southern, W. T., & Jones, E. D. (2015). Types of acceleration: Dimensions and issues. In S. G. Assouline, N. Colangelo, J. VanTassel-Baska, & A. Lupkowski-Shoplik (Eds.), *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2, pp. 9–18). Iowa City, IA: Belin-Blank International Center for Gifted Education and Talent Development.

Stanley, J. C. (1990). Leta Hollingworth's contributions to above-level testing of the gifted. *Roeper Review*, *12*, 166–171. http://dx.doi.org/10.1080/02783199009553264

Stanley, J. C. (1996). In the beginning: The study of mathematically precocious youth. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 225–235). Baltimore, MD: Johns Hopkins University Press.

Stanley, J. C. (2000). Helping students learn only what they don't already know. *Psychology, Public Policy, and Law*, *6*, 216–222. http://dx.doi.org/10.1037/1076-8971.6.1.216

Stanley, J. C. (2005). A quiet revolution: Finding boys and girls who reason exceptionally well mathematically and/or verbally and helping them get the supplemental educational opportunities they need. *High Ability Studies*, *16*, 5–14. http://dx.doi.org/10.1080/13598130500115114

Stanley, J. C., & Benbow, C. P. (1986). Youths who reason exceptionally well mathematically. In R. J. Sternberg & J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 371–387). New York, NY: Cambridge University Press.

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. http://dx.doi.org/10.1177/1529100611418056

Swiatek, M. A. (2007). The talent search model: Past, present, and future. *Gifted Child Quarterly*, *51*, 320–329. http://dx.doi.org/10.1177/0016986207306318

Swiatek, M. A., & Benbow, C. P. (1991). Ten-year longitudinal follow-up of ability-matched accelerated and unaccelerated gifted students. *Journal of Educational Psychology*, *83*, 528–538. http://dx.doi.org/10.1037/0022-0663.83.4.528

Thomson, D., & Olszewski-Kubilius, P. (2014). The increasingly important role of off-level testing in the context of the talent development perspective. *Gifted Child Today*, *37*, 33–40. http://dx.doi.org/10.1177/1076217513509619

VanTassel-Baska, J. (1996). Contributions of the talent-search concept to gifted education. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 236–245). Baltimore, MD: Johns Hopkins University Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Wai, J. (2015). Long-term effects of educational acceleration. In S. G. Assouline, N. Colangelo, J. VanTassel-Baska, & A. Lupkowski-Shoplik (Eds.), *A nation empowered: Evidence trumps the excuses holding back America's brightest students* (vol. 2, pp. 71–83). Iowa City, IA: Belin-Blank Center for Gifted and Talented Education.

Wai, J., Lubinski, D., & Benbow, C. P. (2005). Creativity and occupational accomplishments among intellectually precocious youths: An age 13 to age 33 longitudinal study. *Journal of Educational Psychology*, *97*, 484–492. http://dx.doi.org/10.1037/0022-0663.97.3.484

Wallach, M. A. (1978). Care and feeding of the gifted. *Contemporary Psychology, 23*, 616–617. http://dx.doi.org.proxy.lib.uiowa.edu/10.1037/017469

Warne, R. T. (2012). History and development of above-level testing of the gifted. *Roeper Review*, *34*, 183–193. http://dx.doi.org/10.1080/02783193.2012.686425