A Nation Empowered

Evidence Trumps the Excuses Holding Back America's Brightest Students

VOLUME 2

Susan G. Assouline, Nicholas Colangelo, Joyce VanTassel-Baska, and Ann Lupkowski-Shoplik
Editors

Belin-Blank Center, College of Education, University of Iowa

Endorsed by the National Association for Gifted Children
1331 H Street NW, Suite 1001, Washington, DC 20005
(202) 785-468, www.nagc.org

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College of Education
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Acknowledgements

A Nation Empowered: Evidence Trumps the Excuses Holding Back America's Brightest Students evolved from the seminal publication, *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, Assouline, & Gross, 2004). Therefore, the first acknowledgement is to the editors and authors of that publication for opening the door to a much-needed and long-overdue conversation about the intervention of academic acceleration for high-ability students. In particular, we acknowledge the important role that Professor Emerita Miraca U. M. Gross played in creating *A Nation Deceived.* We also acknowledge the John Templeton Foundation for funding the establishment of the University of Iowa Belin-Blank Center's Acceleration Institute; the publication of *Guidelines for Developing an Academic Acceleration Policy;* and the publication and distribution of *A Nation Deceived,* Volume I, in 10 languages, and Volume II, in English. None of these advances in the field would have been possible without the private funding from the John Templeton Foundation.

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A Nation Empowered is a ten-year follow-up to *A Nation Deceived* (2004). The new publication emphasizes updated research, policy, and practice regarding acceleration. *A Nation Empowered* uses a two-volume format. The evidence in Volume 2 is the basis for dismissing the often used excuses that result in our nation's brightest students being held back. The goals of *A Nation Empowered* mirror those of *A Nation Deceived;* specifically, to create a publication that would be widely distributed to multiple stakeholders, including educators, school board members, and legislators, for the express purpose of revealing the evidence about the effectiveness of academic acceleration as an intervention for highly capable students.

Several individuals contributed to both volumes of *A Nation Empowered* and we want to give special recognition to them. We are grateful to the expertise of the Volume 1 writing consultant, Mary Sharp, whose contributions to Volume 1 were based upon the 18 chapters in Volume 2. We are also highly appreciative of the contributions from all of the authors for Volume 2. The entire central staff of the Belin-Blank Center contributed to the project in direct and indirect ways. Drs. Laurie Croft, Megan Foley-Nicpon, and Lori Ihrig are among the distinguished authors or co-authors of Volume 2 chapters. Two advanced doctoral students, Staci Fosenburg and Katherine Schabilion, served as the editorial assistants and their contributions are immeasurable. Robyn Hepker, of Benson & Hepker Design, created the cover art for both volumes as well as all the art for Volume 1. Kelli Parsons, Advertising Production Supervisor, and Michele Maakestad, Graphic Designer, both of Fusionfarm, were always gracious and encouraging and seemingly tireless in their extraordinary efforts to format and proof and re-format and re-proof the chapters in Volume 2. Fusionfarm is credited with printing and distributing both volumes under the leadership of Steve Lorenz, Project Manager.

Finally, we acknowledge the students, parents, educators, researchers, and policy-makers who are dedicated to finding the most appropriate interventions for highly-able students. They are our inspiration and empower our efforts.

Susan G. Assouline

Nicholas Colangelo

Joyce VanTassel-Baska

Ann Lupkowski-Shoplik

Introduction

Susan G. Assouline, Nicholas Colangelo, University of Iowa, Iowa City, IA
Joyce VanTassel-Baska, College of William & Mary, Williamsburg, VA
Ann Lupkowski-Shoplik, University of Iowa, Iowa City, IA

Academic acceleration is both a curriculum model and an intervention model. Pressey (1949) defined it as an educational intervention based on progress through an educational program at rates faster or at ages younger than typical. This elegant definition applies to at least 20 types of acceleration, which are presented in the first chapter of this volume. Each form of acceleration is recognition of the impact of individual differences on the cognitive and social-emotional development of students. Implementing acceleration demonstrates a positive response to these differences and appreciation that we have the tools available to tailor interventions to meet the needs of individuals or groups.

Many forms of acceleration are applicable for small or larger groups of students, whereas other forms are more appropriately applied to the individual student. Some forms, e.g., Advanced Placement coursework, may be implemented individually through online courses, or as a group, when taught to an entire class. The burgeoning technological sophistication of the past decade has produced a highly adaptable format for accelerating both the content and delivery of curriculum. Technology, a multi-dimensioned advancement, is a logical partner in addressing the individual differences among students, including our brightest. Many students will benefit from multiple opportunities to experience various forms of acceleration in their educational setting. The forms are not mutually exclusive nor do they need to be applied at the same time in a student's schooling.

In 2004, when *A Nation Deceived: How Schools Hold Back America's Brightest Students* was published, we were not yet able to determine the impact of the federal re-authorization of the Elementary and Secondary Student Education Act (named No Child Left Behind) despite the advocacy efforts on behalf of gifted learners who were being ignored and left behind. However, the 2008 publication of *High-Achieving Students in the Era of NCLB*, published by the Thomas B. Fordham Institute, revealed that the gains of high-achieving students languished throughout the prior 10-year period.

A 2015 report from Fordham tackles head on the educational issue du jour: Does Common Core eliminate the need for gifted education? Although there is little doubt that the standards and tests associated with the Common Core represent an improvement in rigor and accountability, they were not developed for our brightest students and will not, nor can they, go far enough to address the needs of our most capable students. Navigating the complex educational landscape, with constant shifts, continues to be challenging for our nation's most highly able students and their educators. However, low-cost/high-impact interventions such as acceleration provide multiple pathways to the common goal of being challenged and engaged in the learning process.

This report is presented as two volumes. Volume 1 gives voice to the issues facing high-ability students in the current educational climate and is a condensation of the evidence presented in the 18 chapters in Volume 2. The chapters in Volume 2 were authored by 33 different experts in the field. The theme throughout the chapters is striking: acceleration is the most effective intervention for high ability students. In 2004, the evidence about the effectiveness of academic acceleration as an intervention was unequivocal and strong. Today, that evidence continues to accrue and demonstrate positive results that are robust and unambiguous.

Overview of Chapters

A Nation Empowered, Vol. 2 is comprised of 18 chapters that fall into three broad categories: (a) General Topics, (b) Applications of Acceleration, and (c) Special Issues in Acceleration. Each chapter focuses on a specific topic related to acceleration. Although each chapter can stand alone as evidence supporting the effectiveness of the intervention, the collection presents a powerful message about the application of acceleration in multiple educational settings.

Section I: General Topics

Chapter 1: Types of Acceleration: Dimensions and Issues (Southern & Jones)

- There are 20 types of acceleration practices.
- As many as five dimensions provide a perspective about the ways in which the options vary.

- There are very few problems experienced with acceleration, and those that occur are typically attributed to incomplete or poor planning.
- Most acceleration practices are well-documented for effectiveness.
- Acceleration is cost-effective.

Chapter 2: The Academic, Socialization, and Psychological Effects of Acceleration: Research Synthesis (Rogers)

- *A Nation Deceived* (2004) led to increased attention and acceptance of academic acceleration and new research has contributed to the evidence base.
- The main conclusion from results across six previous meta-analyses or best-evidence syntheses is that academic acceleration produces notable academic gains regardless of the category of acceleration or form.
- Academic acceleration produces small-to-moderate social-emotional gains for gifted and talented students.
- The research on the effects of acceleration is overwhelmingly positive; however, decisions about individual students must be based on more than research.

Chapter 3: Effects of Academic Acceleration on the Social and Emotional Lives of Gifted Students (Cross, Andersen, & Mammadov)

- Extensive research has indicated that acceleration has positive effects on the academic as well as affective lives of students.
- The data indicate that the effects on the affective realm (social and emotional) are not as robust and straightforward as effects on the cognitive realm.
- Results of acceleration on psychological adjustment (i.e., feelings about self and measures of well-being) are positive but small in terms of effects.
- While we can be confident of the positive cognitive and affective impact of acceleration on white students, we do not have enough studies of diverse students to make the same claim regarding these students.

Chapter 4: The Role of Acceleration in Policy Development in Gifted Education (VanTassel-Baska)

- Currently, there is no existing federal or national policy on gifted education.
- Gifted education policy is comprised of the rules, statutes, codes, and regulations adopted by state legislatures, and interpreted by various agencies in the state.
- While few policy studies regarding gifted education exist, they provide two consistent findings: mandates matter and perceptions matter.
- Development of appropriate policies in gifted education provide the structure that holds gifted education together.
- Acceleration policies and practices can be critical in ensuring measurable outcomes and research-based options for gifted students.

Chapter 5: Whole-Grade Acceleration: Grade-Skipping and Early Entrance to Kindergarten or First Grade (Lupkowski-Shoplik, Assouline, & Colangelo)

- Whole-grade acceleration (grade-skipping) is a main example of grade-based acceleration in that it reduces the number of years a student spends in the K-12 system.
- Whereas there is considerable research evidence on the effectiveness of whole-grade acceleration, the prevalence of this intervention is relatively low because of controversy and lack of awareness of the research.
- The *Iowa Acceleration Scale (3rd edition)* provides an effective, systematic, and objective procedure for determining readiness for whole-grade acceleration.
- Effective decisions about whole-grade acceleration take into account both ability and social factors. A grade-skip is a public (social) event as well as an educational event.
- Early entrance to school is a form of whole-grade acceleration and has special issues because of the very young age of the child.

Chapter 6: Long-Term Effects of Educational Acceleration (Wai)

- Dosage of intervention recognizes that a single specific intervention may not be as important as the right mix or intensity of the intervention.
- Longitudinal studies indicate that students who were accelerated have few regrets about their acceleration.
- In the long-term, students who were accelerated demonstrate exceptional achievements as adults.
- Acceleration has a positive impact on both careers and life-satisfaction.
- The longitudinal studies stemming from the Study of Mathematically Precocious Youth (SMPY) provide some of the most comprehensive research on the positive long-term effects of educational acceleration.

Section II: Applications of Acceleration

Chapter 7: Professional Development for Teachers and School Counselors: Empowering a Change in Perception and Practice of Acceleration (Croft & Wood)

- Professional development is the cornerstone of ensuring appropriate programs and services to gifted learners, especially regarding the issue of acceleration.
- Counselors as well as other educators need a research-based understanding of acceleration in order to serve and counsel the gifted and their families effectively.
- The most effective delivery systems for professional development may be professional learning communities and independent learning options including online options.
- Content understandings that need to be emphasized in professional development include: (a) acceleration is beneficial to gifted learners in both cognitive and affective ways, (b) acceleration is a cost-effective option, and (c) acceleration may be accomplished through systematic procedures.

Chapter 8: Content Acceleration: The Critical Pathway for Adapting the Common Core State Standards for Gifted Students (VanTassel-Baska & Johnsen)

- Common Core State Standards (CCSS) create an opportunity for gifted educators to differentiate learning for the gifted.
- The CCSS provide many opportunities to accelerate content in both language arts and math from K-12, including the use of Advanced Placement (AP) and International Baccalaureate (IB).
- Specific approaches to differentiation of the standards include applying acceleration first, followed by the use of other differentiation strategies.
- Content-based curriculum must be accelerated for the gifted through using the CCSS and Next Generation Science Standards (NGSS) as a point of departure.
- Examples of accelerated content in reading and mathematics, using the CCSS standards, are readily available to assist teachers in the process.

Chapter 9: Talent Searches and Accelerated Programming for Gifted Students (Olszewski-Kubilius)

- The Talent Search Model, through multiple studies over nearly 50 years, has demonstrated its effectiveness as a system for talent identification and talent development of academically advanced learners ages seven to 13.
- The basic tenets of the Talent Search Model involve above-level testing of students to discover their ability in specific domains of learning (e.g., verbal and mathematical), followed by a set of opportunities for advanced learning, calibrated based on their test scores, to be at their optimal learning level.
- Research has shown the short- and long-term benefits of participating in talent development programs that are accelerative and fast-paced in nature both during the secondary school years and beyond in respect to college aspiration levels and achievement.

- Longitudinal research, conducted on talent search populations, also documented the importance of individual score differences in respect to creative productivity in adulthood, suggesting that the top one percent outperform the top five percent on most relevant measures.
- Talent search information should be routinely used by schools for purposes of programming for accelerative options.

Chapter 10: Acceleration and STEM Education (Ihrig & Degner)

- The authors highlight and refute four major excuses for not accelerating students who are talented in STEM subjects, including being concerned that acceleration causes academic harm, thinking the new standards or a focus on enrichment provides enough challenge for gifted students, and assuming that only students who get everything right are ready for acceleration.
- Research findings reveal that acceleration leads to increased levels of achievement in STEM, both in the short-term (while accelerated students are still in school) as well as many years later (during the careers of individuals who had previously been accelerated).
- Although the Common Core State Standards for Mathematics and the Next Generation Science Standards introduce more rigor into the curriculum, these standards are not sufficiently challenging for academically advanced students.
- Tools used to support decisions about STEM acceleration include: the Talent Search Model, the Diagnostic Testing -> Prescriptive Instruction model, IDEAL Solutions, above-level testing, and distance learning programs.

Chapter 11: State Residential STEM Schools: A Model for Accelerated Learning (Roberts & Alderdice)

- The central mission of state residential schools is to serve academically talented students, often through the use of accelerated approaches that include early admission, AP and IB, and various forms of personalized learning.
- Sixteen states have state residential schools for the gifted, the majority in the STEM areas, although a few in the arts and humanities.
- Admissions criteria vary but involve the use of multiple criteria that typically include SAT or ACT scores, teacher recommendations, and past record of high school course–taking, criteria consistent with research on identification effectiveness for the schools.
- Digital learning is a fixture of residential academies with multiple types of formats available for accelerated study.
- Research has demonstrated that many more gifted students (30% more) seek STEM careers if they attended a residential school than if they did not.
- Opportunities for research work, mentorships, and other one-on-one collaboration is a key feature of these schools.
- Outreach efforts to other K-12 schools is also a central part of the mission of these schools.

Chapter 12: Early Entrance to College: Academic, Social, and Emotional Considerations (Brody & Muratori)

- Early college entrance provides young people who are ready for the demands of college an opportunity to move forward on their educational trajectories one or more years earlier than is typical.
- Programs specifically designed to facilitate early entrance to college for talented students have become more widely available in recent years; these programs support the students academically, socially, and emotionally.
- Options are varied, including living at home and taking college courses, participating in state-supported residential high schools, or entering college early and living on campus with other early entrants. At least 23 different programs dedicated to early entrance for high-ability students are available.

Section III: Special Issues in Acceleration

Chapter 13: Early to Rise: The Effects of Acceleration on Occupational Prestige, Earnings, and Satisfaction (McClarty)

- Research has previously shown that accelerated students are more successful than same-age peers of similar ability who did not accelerate; data presented in this chapter demonstrate that accelerated students also have an advantage over older peers of similar ability who began their careers at the same time.
- Accelerated students have higher rates of productivity, work in more prestigious occupations, are more successful, and earn more money and increase their income faster than older, similar-ability, non-accelerated peers.
- Acceleration provides short-term benefits while students are still in school as well as long-term benefits in the workplace, and accelerated students are satisfied with their work.

Chapter 14: Acceleration and Economically Vulnerable Children (Plucker & Harris)

- High-ability students who are economically vulnerable achieve considerably less academically than economically secure students.
- Non-poor students are more likely to enroll in advanced courses, skip grades, and participate in other accelerative strategies.
- Very little research has been conducted examining specific acceleration strategies and how effective they are when used with economically vulnerable children.

Chapter 15: Acceleration Practices with Twice-Exceptional Students (Foley-Nicpon & Cederberg)

- Twice-exceptional students have co-existing high ability and disability, which presents several challenges in identification and intervention.
- Over the past decade, the number of empirical studies examining twice-exceptional students has increased, but efforts have not caught up with the need for such studies, especially with respect to academic acceleration.
- Implementation of acceleration varies according to the disability, with gifted students with a diagnosis of autism spectrum disorder (ASD) more likely to experience acceleration than gifted students with a diagnosis of attention deficit hyperactivity disorder (ADHS) or specific learning disability (SLD).
- Providing appropriate accommodations that address the challenges presented by the disability is critical to the implementation of successful acceleration.

Chapter 16: Radical Acceleration (Jung & Gross)

- Radical acceleration is a combination of options that results in a student graduating from high school three or more years earlier than usual.
- Empirical studies of radical acceleration demonstrate overwhelmingly positive academic, socio-affective, career, and later life outcomes for highly able individuals.
- Students who radically accelerate often have IQs at least three standard deviations above the mean.
- Educators who specialize in gifted and talented students are especially important in the identification process and in facilitating the various interventions.

Chapter 17: Academic Acceleration in Europe: A Comparison of Accelerative Opportunities and Activities (Hoogeveen)

- Current approaches to gifted education across the 51 countries that comprise the European continent reflect the evolution over several centuries of general education models, beginning in ancient Greek and Rome.
- Current models reflect country-specific systems and goals for working with gifted and talented students, which are reflected in different levels of acceptance for and approaches to acceleration.
- Specific examples of program implementation and best-practice serve as models.
- Similar to the U.S.A., academic acceleration is a cost-effective option.

- Similar to the U.S.A., professional development lags behind the evidence supporting the effectiveness of the intervention.

Chapter 18: Acceleration in Australia: Flexible Pacing Opens the Way for Early University Admission (Young, Rogers, Hoekman, van Vliet, & Long)

- Early admission to university is less likely to occur in Australia than in the United States.
- Intensive interviews with 12 Australian students who received early university admission indicate a generally positive attitude about acceleration to university.
- Research indicates that early university entrance can work well for academically talented students in Australia.
- Accelerated Australian students found the university setting to be a stimulating and positive experience.
- The results of the study reported in this chapter correlate with research findings in the United States, which suggest that accelerated students welcome the opportunity to enter university early and cope well with the new environment.

General Topics

Types of Acceleration: Dimensions and Issues[1]

W. Thomas Southern, Miami University of Ohio, Oxford, Ohio
Eric D. Jones, Bowling Green State University, Bowling Green, Ohio

Abstract

Acceleration allows academically talented students to move ahead through the curriculum at a pace commensurate with their abilities. "Acceleration" is a term that encompasses many different educational options, including early entrance to kindergarten, moving up a grade for math, concurrent enrollment in middle school and high school, or entering college early. It typically results in the student completing curriculum at a younger age than most students. The authors describe 20 different types of accelerative options, as well as the dimensions of acceleration. Issues in implementing one or more acceleration interventions, such as unintended consequences, pacing, curricular decisions, and costs are also considered.

Introduction

Pressey's (1949) definition describes acceleration as "progress through an educational program at rates faster or at ages younger than conventional" (p. 2). According to that definition, Southern, Jones, and Stanley (1993) identified 17 educational types of accelerative options. In this chapter, we discuss those 17 applications and three others. Specifically, entrance to school is now distinguished between early entrance to kindergarten and early entrance to first grade; also, we have included two other options outlined by Karen Rogers in this volume, International Baccalaureate and Accelerated/Honors High School, for a total of 20 options (see Table 1). The chapter also considers five dimensions of acceleration that characterize and may affect their availability to students who demonstrate academic precocity.

Types of Acceleration

1. Early Admission to Kindergarten: Students enter kindergarten prior to achieving the minimum age for school entry as set by district or state policy. The entry age specified varies greatly throughout the country and is generally stated in terms of birth date. For example, entry to kindergarten will be allowed for prospective students who will achieve the age of five years on or before September 30 of their entry year.

2. Early Admission to First Grade: This practice can result from either skipping kindergarten entirely or from moving a student from kindergarten into first grade in what would be the student's first year of school.

3. Grade-Skipping: A student is considered to have grade skipped if he or she is given a grade-level placement ahead of chronological-age peers. Grade-skipping may be done at the beginning of or during the school year. Radical acceleration is any whole-grade acceleration that is two (Stanley, 1976) or more (Gross, 2004) years above the student's grade based on chronological years.

4. Continuous Progress: The student is given content progressively as prior content is completed and mastered. The practice is accelerative when the student's progress exceeds the performance of chronological peers in rate and level.

5. Self-Paced Instruction: With this option, the student proceeds through learning and instructional activities at a self-selected pace. Self-paced instruction is a sub-type of continuous progress acceleration. Self-paced instruction is distinguishable from the more general continuous progress in that the student has control over all pacing decisions. Most self-paced instructional opportunities are provided within a larger instructional plan or Individualized Education Plan (IEP) for the younger student.

[1] *An earlier version of this chapter appeared in V.II of* A Nation Deceived: How Schools Hold Back America's Brightest Students *(Colangelo, Assouline, & Gross, 2004). This revision of the original chapter was completed by the editors of* A Nation Empowered.

Table 1: Types of Acceleration

1. Early Admission to Kindergarten	8. Curriculum Compacting	16. Accelerated/Honors High School or Residential High School on a College Campus
2. Early Admission to First Grade	9. Telescoping Curriculum	17. Credit by Examination
3. Grade-Skipping	10. Mentoring	18. Early Entrance into Middle School, High School, or College
4. Continuous Progress	11. Extracurricular Programs	19. Early Graduation from High School or College
5. Self-Paced Instruction	12. Distance Learning Courses	20. Acceleration in College
6. Subject-Matter Acceleration/Partial Acceleration	13. Concurrent/Dual Enrollment	
7. Combined Classes	14. Advanced Placement™	
	15. International Baccalaureate program	

6. Subject-Matter Acceleration/Partial Acceleration: Also known as content-based acceleration, this practice allows students to be placed in classes with older peers for a part of the day (or with materials from higher grade placements) in one or more content areas. Subject-matter acceleration may be accomplished by the student either physically moving to a higher-level class for instruction (e.g., a second-grade student going to a fifth-grade reading group) or using higher-level curricular or study materials while remaining in the original classroom. Subject-matter acceleration may also be accomplished outside of the general instructional schedule (e.g., summer school or after school) or by using higher-level instructional activities on a continuous progress basis without leaving the placement with chronological-age peers. Often content-based acceleration is accomplished by a whole class where the materials are deliberately advanced by one year. Honors classes at middle and early high school may choose to provide such advanced learning.

7. Combined Classes: While not in and of itself a practice designed for acceleration, in some instances (e.g., a fourth- and fifth-grade combined classroom), this placement can allow younger students to interact academically and socially with older peers. It may or may not result in an advanced grade placement later.

8. Curriculum Compacting: The curriculum is adjusted so the student's instruction entails reduced amounts of introductory activities, drill, and practice. Instructional experiences may also be based on relatively fewer instructional objectives compared to the general curriculum. The time saved may be used for more advanced content instruction or to participate in enrichment activities. Instructional goals should be selected on the basis of careful analyses for their roles in the content and hierarchies of curricula. The parsing of activities and goals should be based on pre-instructional assessment. Often the pre-assessment is accomplished through individual unit testing, followed by advanced activities for students who score near the ceiling.

9. Telescoping Curriculum: The student is provided instruction that entails less time than is normal (e. g., completing a one-year course in one semester, or three years of middle school in two years). Telescoping differs from curriculum compacting in that it involves larger chunks of time for the act of acceleration and the resulting time saved from telescoping always results in advanced grade placement. It is planned to fit a precise time schedule. Curriculum compacting, on the other hand, does not necessarily advance grade placement.

10. Mentoring/Tutoring: A student is paired with a mentor or expert tutor who provides advanced or more rapid pacing of instruction. The student may or may not receive credit for advanced work with a mentor.

11. Extracurricular Programs: Students elect to enroll in coursework, after school programs, or summer programs that confer advanced instruction and/or credit. Talent search programs are a good example of an extracurricular program offering accelerated classes during the summer. Most of these classes employ fast-paced learning and are content-based (Olszewski-Kubilius, this volume).

12. Distance Learning Courses: The student enrolls in coursework offered by an outside-of-school organization. Traditionally called correspondence courses and offered by mail, courses are increasingly offered online by a number of university-based and for-profit entities. The student may work on the computer at home or during school time. Local teachers are not responsible for instruction, although they may be responsible for supervising the students while they are working on the computer and are often responsible for assigning grades and assuring credit. Parents often pay for these courses, and the typical goal is for the student to earn advanced credit for the work completed.

13. Concurrent/Dual Enrollment: The student takes a course at one level and receives concurrent credit for a parallel course at a higher level (e.g., taking algebra at the middle school level and receiving credit at both the middle school and the high school level). Another example of dual enrollment courses is provided by a College in High School program, where a high school student takes a class taught by a high school teacher who has been specially selected and trained by a local college or university; college credit is awarded to the student upon successful completion of the course. This option is most often used to compress high school and college coursework.

14. Advanced Placement (AP™): The student takes a course (usually while in high school) that may confer college credit or placement upon successful completion of a standardized examination (e.g., achieving a three or higher on a scale of one to five). High school teachers receive specialized training before teaching AP courses. Students may take an AP examination without first taking the AP course at whatever age they wish as long as prerequisites have been met for math and science courses.

15. International Baccalaureate[2]: Schools are authorized by the International Baccalaureate (IB) program (see http://www.ibo.org/) to offer a specialized educational program. Students who successfully complete an IB high school diploma may receive advanced standing at selected universities worldwide if they perform well on the IB exams. Students may also select key courses for IB credit at some schools.

16. Accelerated/Honors High School or Residential High School on a College Campus[3]: Students attend a selective high school program designed specifically for gifted students, which may be provided as a residential program on a college campus or as a Governor's School. Both day schools like Thomas Jefferson High School in Alexandria, Virginia and residential schools such as The Illinois Mathematics and Science Academy offer advanced coursework that is often correlated to college level work, mentorships with scientists, and internships at national labs. Students may complete requirements for high school graduation at the same time as they complete college courses. The Texas Academy of Math and Science (https://tams.unt.edu/) is an example. Students enter after their sophomore year of high school; at the end of the two-year program, students have completed two years of college in addition to earning their high school diploma.

17. Credit by Examination: The student is awarded advanced standing credit (e.g., in high school or college) by successfully completing some form of mastery test or activity. The College Board's CLEP tests (see http://clep.collegeboard.org/exam) are an example of a national program available to students to earn college credit by examination. Students typically have mastered material through independent study or internship experiences and the tests document their level of mastery.

18. Early Entrance into Middle School, High School, or College: The student is provided an advanced level of instruction at least one year ahead of normal. This may be achieved with the employment of other accelerative techniques such as talent search classes for which they receive credit, dual enrollment and credit by examination, or by determination of teachers and administrators.

19. Early Graduation from High School or College: The student graduates from high school or college in three-and-a-half years or less. Generally, this is accomplished by increasing the amount of coursework undertaken each year in high school or college, but it may also be accomplished through dual/concurrent enrollment (see above) or extracurricular and distance learning coursework.

20. Acceleration in College: The student completes two or more majors in a total of four years and/or earns an advanced degree along with or in lieu of a bachelor's degree.

Dimensions of Acceleration

Despite conceptual distinctions that have been drawn, the practices of acceleration also overlap. For example, a mentor (see #10) may provide advanced instruction on a continuous progress basis (see #4). The mentor may function as an instructor, as a facilitator, or as a monitor of progress. On the other hand, even a cursory look at the list shows a variety of acceleration practices. There are several dimensions along which accelerative options differ. The five dimensions are: pacing, salience, peers, access, and timing (see Table 2).

Pacing

The pacing or rate of instruction defines acceleration, and it is along this dimension that acceleration practices diverge. Some of the practices cited in Table 1 do not represent differential curriculum pacing. For instance, credit by examination and acceleration in college are not necessarily differential pacing; rather, they are forms of administrative recognition of a student's past achievement. In fact, Southern and Jones (1991) have noted that, given the resistance to acceleration by parents and practitioners, even the forms of acceleration

[2] *This form of acceleration did not appear in the original Southern and Jones chapter. It was added by the editors of* A Nation Empowered.
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Table 2: Dimensions of Acceleration and Related Concerns[4]

Dimension	Concerns
Pacing	Calibration, reporting, continuity of the process over years
Salience	Age of student, stage of schooling, type of acceleration
Peers	Knowledge of the acceleration by others, type of acceleration, group or individual, degree of acceleration
Access	Population centers, acceptability by schools, state policy, cost, availability of courses or programs, transportation
Timing	Age-related issues, during school vs. outside of traditional school time

[4] *Table was modified by the editors of* A Nation Empowered.

that look as if they increase the pace of instruction are really forms of administrative recognition. Students are rarely grade-skipped, and those who are represent students with an extreme mismatch between their readiness for higher-grade curriculum and the curriculum offered by the grade level for their age. The mismatch may be so extreme, in fact, that even an advanced grade placement represents no great academic challenge for the student and other accelerative options are needed in addition to the whole-grade acceleration. Concerns about the pace of instruction and the potential for harm to children's social and emotional well-being would seem unfounded for accelerative practices that merely recognize what students have already accomplished. So, too, would the concerns that students would suffer from instructional "gaps" that might deter later learning experiences.

Several acceleration practices do involve changes in pacing, such as continuous progress, curriculum compacting, and subject-matter acceleration. However, even many of these practices differ in terms of the degree of differentiation and the control of pacing differences. In self-paced instruction, the student controls the pace toward completion of the learning experience. In other types of acceleration, such as curriculum compacting, a teacher is required to first assess the adequacy of the student's prior learning and then present materials at more traditional rates when students do not demonstrate prior accomplishments or more rapid learning. In telescoped classes, one might expect to see more potential failure from participants resulting from an inappropriate pace of instruction. After all, a group of students is put through a curriculum in half or two-thirds of the time. In practice, however, such problems rarely occur. Telescoped curricula tend to be employed in large urban areas where it is most likely one could assemble a highly homogeneous group of learners (Southern, Jones, & Stanley, 1993). Whenever a cohort group needs to be identified, the criterion level of students selected is set at very high levels. In the national talent searches (see Olszewski-Kubilius, this volume), students are given college admissions tests at the middle-school level, and qualifications for fast-paced mathematics courses are set at about the same level as the average score of college-bound seniors. This results in very few false positives in these programs (although it may result in larger numbers of students who might have been able to do the work but who did not meet the criterion). The most rapidly paced programs, therefore, often have the most stringent criteria for participation. This reduces the likelihood that students will experience stressful levels of challenge, or even perceive a rapid pacing of instruction.

Salience

Accelerative options vary by the degree to which they are noticeable to others, particularly to peers, and the acceptability of options tends to vary depending on their prominence. The degrees to which accelerative options are readily noticeable are apt to raise concerns about the risks of acceleration to the student's adjustment and achievement. The salience of acceleration may also bring it into conflict with values issues such as elitism and egalitarianism. Practices such as grade-skipping and early entry are particularly salient, while Advanced Placement (AP) or distance-learning courses are not likely to attract much attention, partially based on the age of the accelerant. The older the accelerant, the less salience is usually present. The salience of acceleration practices are noticeable depending on how they are employed. For example, self-paced instruction may be readily apparent to peers if it is provided only to students in the gifted education programs or if it is labeled as an "honors" class. If it is more broadly available or more modestly labeled, few if any peers are likely to be aware of the practice. Grade-skipping seems more salient and controversial. However, it is also possible to speculate that subject-matter acceleration is more salient in that the physical move may be required daily over an entire school year rather than all at one time. In point of fact, neither process has been demonstrated to cause academic or social/emotional difficulties (e.g., Kulik & Kulik, 1984; Rogers, 2002, 2004, this volume).

Peers

The degree to which acceleration will result in social separation from peers is the issue that raises the greatest concern with parents, educators, and students themselves (Jones & Southern, 1991; Southern, Jones, & Fiscus, 1989a, 1989b). There is a lack of empirical research to support the notion that separation from age-/grade-level peers is associated with difficulties in adjustment or achievement (Kulik & Kulik, 1984; Robinson, 2004; Southern, et al., 1993), but the concerns persist because the decisions to accelerate individual children are made by parents and educators regarding a child they know. This is not an abstract exercise. It is important to consider two issues regarding the dimension of separation. First, acceleration options vary in the degrees to which they involve separation. For example, early admission, grade-skipping, and some forms of content acceleration result in a complete separation from a chronological peer group for some or all of the academic day. On the other hand, subject-matter acceleration or telescoped curriculum is generally managed for groups of individuals, and leave a core chronological peer group intact.

Early entrance to school or skipping one grade level would arguably cause less dramatic separations from chronological peers than multiple grade-level placements. Those students who are placed at least two grade levels above chronological peers are considered to be radically accelerated (Stanley, 1976; Jung & Gross, this volume). For example, the Early College Program at the University of Washington allows students to enter college when they typically would be entering 8th or 9th grade (Hertzog & Chung, 2015; Janos & Robinson, 1985; Robinson & Janos, 1986).

While marked divergence from age-peers would seem to be an extraordinary intervention and potentially could result in serious difficulties, the separation can be managed and its influence can be mitigated. Consistent with best practices, programs that employ radical acceleration only admit students who score extremely high on appropriate entrance criteria. Support services in counseling and academic adjustment should be provided. Programs that recruit cohorts of students for radical acceleration have some advantage in dealing with the issue of separation from age-/grade-level peers compared to programs that are intended to provide for the needs of an individual student (Hertzog & Chung, 2015). Support services are generally easier to provide to groups of students, and the groups themselves provide opportunities to develop friendships and peer support. Some proponents of radical acceleration also advise that the radically accelerated student be able to reside at home or with close supportive relatives, and to maintain some social and extracurricular contact with age-/grade-level peers (Brody & Stanley, 1991).

Access

School districts vary widely in the kind of program offerings they make available to students. The number of AP classes is only a small part of the variance. The extent to which foreign languages are available (in range and depth) as well as the kind of mathematics courses that schools can offer students differentiate how students access accelerative options.

Access to accelerated educational opportunities is easier for students attending school districts where all school buildings are on one campus and a student can walk from one building to another for the necessary class if the student is accelerated in one subject, such as math. In the case where school buildings are across town from each other, transportation issues can limit student access to advanced courses.

Geographic isolation also limits the kinds of resources one might be able to access in given settings. Classically, rural schools have extensive bus networks to bring students to school. They also are more likely to have a limited number of teachers with advanced content expertise, thus offering fewer advanced courses in math, sciences, or foreign languages. Though a number of options are available to provide distance instruction, these often have cost implications that preclude their use by many families. For example, some online courses cost as much as $1,000 per semester. If a school district does not pay the cost of the classes, they can be prohibitively expensive for most students. Family income also limits access to summer programs and other accelerative options that might have high costs. Although many academic summer programs provide generous scholarships, the cost of partial tuition plus transportation to the program may still be prohibitive.

Cost can also be an issue for dual enrollment programs intended for high school students needing college-level curriculum. Even if the college is conveniently located, the cost of a semester course can be too expensive for some students. Certain states, such as Michigan, provide programs for high school students to take college courses, and the school district pays for the majority of the costs associated with taking the courses (see http://www.michigan.gov/documents/mde/Early_College_Credit_3.2.07_188778_7.pdf).

The growing popularity of accelerated/honors high schools or Governor's schools (Roberts & Alderdice, this volume) has made it possible for students from rural areas to have access to higher-level curriculum and intellectual peers in states that provide these special schools. These schools, which are state-funded, are frequently available for free or a low cost to the participants. The trade-off is that the student would move away from home two or three years younger than is typical.

Timing

The age at which the student is offered accelerative options is associated with additional complications. Skipping first grade might have vastly different consequences from early graduation from college. Intuitively, one might suspect that the former would carry more potential risk than the latter. Few researchers have given careful consideration to the timing of acceleration, although some attention has been given to the timing of grade-skipping. Feldhusen, Proctor, and Black (1986) provided guidelines for grade-skipping. They suggested that grade advancements should take advantage of natural administrative and curricular breaks (e.g., entering first grade early, or skipping the last year of the intermediate grade into the first year of middle school). They also considered that early in the academic year may be better than later in the year. While the recommendations seem logical, a review of the literature does not reveal systematic comparison studies for students who are grade skipped at various levels or at various times of the year. Nor do studies reveal that some forms of acceleration present more risk to adjustment or achievement than others.

It would also be well to remember that types of acceleration differ not only by dimension, but by degree on each dimension. For example, salience of acceleration may be more relevant when considering early entrance to school than when considering early high school or college graduation even though both types of acceleration result in placements with older peers. Similarly, both curriculum compacting in early grades and telescoping curriculum in middle school may impact students very differently. An additional complication is that many of these options can be applied simultaneously. For example, students may be engaged in online learning, fast-paced summer coursework, and concurrent enrollment at the same time. Sometimes the effect of participating in multiple forms of acceleration is cumulative and increases the salience of the differentiations in the student's educational program. Some students amass enough credits through concurrent high school/university enrollment and extracurricular offerings to be able to finish university degrees extremely rapidly. Students in self-paced mathematics instruction may exhaust the district's curricular options long before they graduate from high school (Assouline & Lupkowski-Shoplik, 2011). In other instances, students may not use their participation in accelerative opportunities to move quickly through levels of schooling. Instead, they may elect to take extra coursework or achieve additional content majors.

Another set of limitations arises from school district policies, some explicit and some tacit. Many schools have formal policies that severely limit students' abilities to enter school early or to access content acceleration across various levels of school (e.g., intermediate students accessing content at the middle or high school level or policies that do not allow course credit to be officially awarded to students taking higher-level coursework while in lower grades). Even where policies do not explicitly limit accelerative opportunities, district personnel may informally limit their use. Teachers or principals who have concerns about accelerative practices may actually discourage their use by employing alarmist rhetoric about consequences or even denying that it is possible or legal to accelerate students. Thus, districts may have *de facto* prohibitions that deny students accelerative options. Also, schools may simply choose not to recognize some forms of accelerative options as equivalent. High school credits earned in summer programs have been rejected by some high schools, for example, even though the same body that accredits the high school also accredits the program provider. The *Guidelines for Developing an Academic Acceleration Policy* (see Colangelo et al., 2010; National Work Group on Acceleration, 2009) are helpful in assisting school districts to develop acceleration policies, in order to avoid some of these issues. (See www.accelerationinstitute.org for more information.)

In other cases, state laws or regulations may impede access. These laws often expressly limit accelerative options. Many states have laws that limit early entrance to school based on a calendar cutoff. States also may place limits on the kind of concurrent enrollment opportunities students may access. For example, not allowing credit earned from a high school class taken while in middle school to be recognized on a later high school transcript would discourage students from using that resource. In addition, certain regulations may unintentionally discourage students from participating in accelerative options. For example, regulations that govern extramural athletics may reduce the time students are eligible to participate in team sports. While the intent of the law was to manage reasonable eligibility terms, its effect might be to discourage students who are also interested in sports from taking large numbers of high school credit early.

Ironically, use of a variety of accelerative options might end up limiting opportunities available to students. The more acceleration is employed, the more likely the student will exhaust the district's curriculum. This, in concert with the limitations of family income, geographic isolation, school policies and state regulations, can result in a student having no realistic options other than accessing university-level coursework. If students are very young when this occurs, parents and university admissions personnel may be reluctant to allow full-time placement. This can result in a student "marking time" in high school.

Issues in Accelerative Practices

When outlining the dimensions and complications above, one might note that there are points that raise issues for employing the various practices. In general, issues arise from the deliberate consequences of employing accelerative options and the unintended consequences that might ensue. Still other complications are related to the types of decisions that are required in pacing and recognition of student learning. Other issues surround the interaction of accelerative practices and other bureaucratic structures that might be triggered. The following sections outline some of these issues.

Unintended Consequences

Since much of the educational community views acceleration with some skepticism (Southern et al., 1993), it is likely that these practices (especially those of grade-skipping and the various forms of early entry) will be employed with a great deal of reluctance. Since some accelerative options seem to present some risk, systematic plans to address concerns and potential consequences need to be developed prior to implementation. Unfortunately, plans often are implemented ad hoc, without knowledge or concern for later consequences. As a result, educators learn very little about the problems with acceleration that concern them the most.

Other problems occur from not planning ahead. For example, curriculum compacting in science at the intermediate level may appear to be educationally justifiable for a highly precocious elementary student with a penchant for scientific pursuits. However, when the student outstrips the ability of that school to provide appropriate laboratory and learning resources, or to provide appropriate mathematics required to support the science instruction, it might result in an unscheduled hiatus from learning new scientific content until such resources are available at higher levels.

Sometimes students are placed in coursework without consideration of subsequent sequences of instruction. For example, a high school student might be placed in a university-level composition course while in high school, but might actually qualify for a higher-level course, one that would grant more advanced standing. Without adequate counseling and without considering issues of high school articulation, students may actually be put behind by the practice. As students gain more advanced standing at earlier ages, the potential difficulties increase. Students who qualify for dual enrollment programs might be selecting high school/university credit courses as early as eighth grade, and they will need advisors who are familiar with the articulation of requirements for both high school graduation and university majors. With the current bureaucracy of public school education, it is possible that a student completes all the mathematics available in the district through extracurricular options only to discover that a low-level mathematics course is still required to fulfill a district or state requirement for graduation. It is also helpful for advisors to understand how to navigate the bureaucracies of universities since issues such as the transfer of university course credit frequently need to be negotiated. In other instances, the process may be not open to negotiation and may influence decisions about attendance at one institution over another. Awarding of AP credit is often in the hands of individual departments at universities that may establish their own score levels to receive credit. Thus, a score of five may be required by some departments in some universities even though a three would be accepted by the same department at a different institution. Comprehensive planning and articulation of the various accelerative practices should be done not only to provide advantages for students, but also to avoid unfortunate and unanticipated bureaucratic complications.

Pacing and Curriculum Decisions

Many of the accelerative options employ differential pacing procedures. In some, the teacher would seem to control the pace, and in others, the student controls the pace. However, in both cases, the decisions about optimal pacing may present difficulties. Teachers have to decide if the rate of learning for the student is matched to the presentation pace. For example, in the case of curriculum compacting, decisions need to be made concerning:

- selecting the important elements of the curriculum to be pre-tested and monitored;
- interpreting the results of pretests and ongoing assessments to determine if the student has adequate knowledge to move on, or inadequate knowledge to move on

but easily remedied gaps, or must go through the entire instructional process.

The teacher must also give consideration to the summative assessment of mastery that will allow a student to proceed to levels of the curriculum that are not under that teacher's purview. Normally, the teacher allows a student to proceed after a set period of instruction.

Analyzing and modifying curricula are challenging tasks for which many teachers are not prepared. When a teacher certifies that a student has met mastery requirements in shorter periods of time, the teacher also implicitly assumes substantial responsibility for that student's continued success. As the content becomes more complex and abstract, it becomes increasingly difficult for the teacher to maintain confidence unless he or she has substantial expertise in the content area. Uncertainties are apt to be more problematic if teachers are required to predict the success of an accelerated student across the school levels. For example, elementary school teachers are likely to be confident in certifying that a student has mastered elements of fourth-grade mathematics, but may feel considerably less confident certifying that a nine-year-old student has mastered algebra concepts. Moreover, assessment of mastery of sequenced content, such as mathematics and science, are less complex than assessment of mastery of less well-sequenced content, such as social studies and language arts. The responsibilities for modifying curricula and certifying mastery may, however, be well beyond the expertise and the tolerance of individual teachers. It is better if teachers at different levels can collaboratively share the responsibilities for modifying curricula and assessing mastery of material across levels of schooling rather than leaving the responsibilities to a series of individual teachers.

One way to ensure that students continue to advance their skills in the language arts area is to employ research-based curriculum materials that are calibrated to be one year advanced for such students. Reading selections are calibrated to be two grade levels above the age and grade level provided, using Lexile levels to document. Activities, projects, and questions are then calibrated to be at advanced differentiated levels as well (VanTassel-Baska & Little, 2011). All units are aligned with Common Core State Standards and other sets of standards employed by states (see VanTassel-Baska & Johnsen, this volume). Additional supportive materials have also been developed for students from low-income backgrounds (VanTassel-Baska & Stambaugh, 2006). Performance assessments for each unit of study also document the level of learning in analyzing literature, persuasive writing, grammar and usage, and speaking and listening skills. These data can be available for each subsequent teacher in the program to ensure that students continue to advance. Since the program is also calibrated to AP and IB coursework, a scope and sequence is available in the use of the units to ensure coverage into relevant AP and IB courses. Advanced and differentiated curricula are also available in other subject areas (see cfge.wm.edu).

Student-managed pacing also has a concomitant set of issues. Most revolve around the student's own ability to recognize mastery. Entry-level learners in any discipline may not realize the precise demands of the field. As the work increases in complexity and amount, easy confidence of precocious students will frequently give way to more conservative assessment of mastery. Most practices outlined above have some external review of student self-assessment inherent in the practice. For example, self-paced learning generally allows for some benchmark testing, and the same issues that beset teacher-assessed mastery of content also apply with student-managed pacing. The testing dimensions must consider sufficient content and have sufficient criterion validity to support the student's self-assessment of mastery. It may be that for some content or for assessments where the consequences of inadequate certification of mastery present too much risk, the teacher-directed assessments should augment or replace the student's self-assessments.

The problems associated with pacing overlap with those of recognition of mastery. Bureaucratic recognition of achievement must, at some point, coincide with credibility at another level of recognition. Elementary schools must be able to convince middle and high schools that the student has credibly met standards of which the secondary schools are the usual arbiter. High schools must convince post-secondary institutions that they are credible arbiters of standards normally imposed by two- and four-year colleges. The result is that performance criteria must be explicitly and credibly documented.

Interaction with Bureaucratic Entities

The final area of concern about types of acceleration involves the interaction of outcomes of acceleration with impinging rules and regulations. Early school entrance for academically precocious students is considered good educational practice. However, it may violate state regulations to admit students who are younger than four-and-a-half years old. Similarly, it may be permissible to allow gifted students to enter post-secondary option programs while they are in middle and high school, but they might also risk loss of athletic opportunity or eligibility in middle school and high school. The unforeseen outcomes of acceleration are a natural issue of the interplay of regulation and the age/grade assumptions of modern American education. It is generally assumed that a student will be of a certain age in a certain grade. A large range of school policies and practices are built upon this expectation. They may determine such things as when a student can enter school training programs, participate in grade-level programs, and even when students enter programs for the gifted. Although academic acceleration options can provide educational opportunities for gifted students, they also can run afoul of the schooling bureaucracy. Planning for acceleration should also consider the possibility that with acceleration, gifted students may find themselves in bureaucratic and social environments that have very different expectations. For example, the students who participate in dual enrollment or early entrance to college will confront differences in academic expectations, bureaucratic organization, and peer social behavior that are likely to be very different from their secondary schools. They may need assistance and supervision beyond what was formerly provided.

Summary

There is a broad range of accelerative options to address the varied academic needs of gifted students. Most types of acceleration have been well documented for effectiveness, and offer relatively low cost options to meet the needs of gifted students. Accelerative options, such as curriculum compacting and continuous progress, take advantage of the gifted student's capacity to learn more quickly and with less direction from the teacher. Accelerative programs may allow the student to move through and complete the standard curriculum more quickly than age-/grade-level peers. Some accelerative options will allow the student to clear the school's curricular requirements quickly and make time for participating in enrichment opportunities. They also allow students to explore multiple majors and degrees economically without delaying the beginning of their careers. Because the options serve a variety of purposes, educators should develop as broad a range of options as possible. Certainly, it will not be possible for some schools to develop the whole range. Rural schools, for instance, face challenges of distance and resources that may not be issues in suburban and urban schools (Jones & Southern, 1994; Hubbard & VanTassel-Baska, 2015). In developing options, it is important that educators recognize that accelerative programs will need to succeed in the context of schooling. The issues involved with pacing, salience, peers, access, and timing will need to be addressed deliberately. Issues include the range of curricular opportunities, popular beliefs about giftedness, and institutionalized assumptions that may be woven into the bureaucratic fabric of the schools will also need to be taken into consideration. Planning and collaboration among professionals, parents, and students in articulation and decision making are crucial, because failure to address issues that are implicitly associated with the variety of accelerative options will diminish the efficacy of accelerative programs. It is important to remember that most gifted students should benefit from some form of acceleration during their career in K-12. Making these options available and making them work is one of the central tasks of educators of the gifted.

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The Academic, Socialization, and Psychological Effects of Acceleration: Research Synthesis

Karen B. Rogers
University of St. Thomas, College of Education, Leadership, and Counseling, Minneapolis, Minnesota

Abstract

In the last decade, educators and policymakers have demonstrated an increased acceptance of academic acceleration as a viable evidence-based practice in schools. The purpose of this chapter is to determine if the increased attention on academic acceleration has been supported by well-designed studies. The author synthesizes the results and draws conclusions from a large number of studies on the variety of forms of academic acceleration. The research investigates whether or not the various forms of academic acceleration resulted in improved academic, social, and psychological outcomes for gifted students; if the continued use of acceleration options since earlier meta-analyses are supported with similar effects; and which forms of academic acceleration show the greatest promise in the current educational environment.

As demonstrated by the results of these research syntheses, academic acceleration produces notable academic gains for students with gifts and talents. Additionally, academic acceleration produces small-to-moderate social-emotional gains for these students. This research provides educators and educational decision makers with a large, research-supported menu of accelerative options that may result in substantial academic achievement for gifted learners. This information may help to overcome the myths of social maladjustment and psychological problems that seem to be a concern of educators and parents faced with a decision about acceleration.

Introduction

In *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, Assouline, & Gross, 2004), academic acceleration was defined as a series of options falling into two general categories of instructional management: (a) *subject-based acceleration*, options that expose the learner to advanced content, skills, and understandings before expected age or grade level in a specific content area or areas; and (b) *grade-based acceleration*, options that shorten the number of years a learner remains in the K-12 school system before entering a university or other postsecondary training. Several authors in the publication (e.g., Brody, Muratori, & Stanley, 2004; Colangelo, Assouline, & Lupkowski-Shoplik, 2004; Lubinski, 2004: Robinson, 2004; Rogers, 2004) argued that the category of accelerative options that will be most successful with an individual learner with academic gifts and talents depends upon the interaction of the learner's cognitive functioning levels, learning strengths, personal characteristics, interests inside and outside school, and general attitudes toward learning and school. A learner **without** the positive catalysts described will not likely be "cured" academically by shortening his/her years in the K-12 system (grade-based acceleration), no matter what his or her level of ability may be. On the other hand, this same learner might improve in academic achievement overall if provided with direct daily challenge beyond grade level in his/her specific academic talent area (subject-based acceleration). Likewise, a learner who is self-directed, motivated to learn new things, and working well beyond grade level in most academic areas might benefit equally well from more than one accelerative option in either category of academic acceleration (Rogers, 2002).

Since the 2004 publication of *A Nation Deceived*, there has been increased attention on viewing academic acceleration as an intervention and educator acceptance of acceleration as a viable evidence-based practice in schools. In recent *State of the States* reports (NAGC & CSDPG, 2009, 2013), there has been an increase in the number of states mandating acceleration as a state-wide practice. Minnesota, for example, has mandated that every district will include in their gifted program policy a statement of the forms of acceleration (i.e., early entrance to kindergarten, grade-skipping, concurrent enrollment) the district provides. But if the increase in attention and acceptance has been shown, what is not known is (a) whether the research that has followed this increase in attention has been positive and robust, and (b) whether or not there is general acceptance that academic acceleration must be individually considered, child-by-gifted-child, in its use. The argument for an idiosyncratic approach to accelerative decision-making for the gifted learner is most certainly enhanced by the large body of informative studies that support a variety of accelerative forms from which to choose. Understanding and being able to interpret the general academic effects of these accelerative forms and treating them as a menu of management options can be an effective first step in determining the "best" form (or forms) of academic acceleration for individual learners with gifts or talents. Instruments such as the *Iowa Acceleration Scale* (IAS) (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009) have proven viable and valid in predicting the success of an individual acceleration decision. For example, the IAS was reported to predict substantial academic, socialization, and motivational improvements when students recommended in the "excellent" and "good" categories of the instrument were followed up in their schools after an acceleration decision had been made (Forstadt, Assouline, & Colangelo, 2007).

The purpose of this chapter is to determine if the increased attention on the variety of forms of academic acceleration has been supported by well-designed studies on the direct effects of practice implementation upon learners with gifts and talents. To be answered are the following questions:

1. Have the more recent research studies of academic acceleration contributed new data on the most viable forms of acceleration for learners with gifts and talents?
2. Have new forms of academic acceleration provided by states and schools resulted in improved academic, social, and psychological outcomes for learners with gifts and talents?
3. Has the continued use of acceleration options since Rogers' (1992) initial meta-analysis been supported with equivalent effects?
4. Which forms of academic acceleration show greatest promise in the current learning environments in this nation's schools?

Methodology

Rationale for the Current Study

In this update of acceleration practices, the results of six previous meta-analyses or best-evidence syntheses are the foundation for the research synthesized. As indicated in Table 1, there has been a fairly consistent set of conclusions from each of these syntheses, even though the selection details for each synthesis differ. For example, Rogers (1992, 2004) analyzed each form of acceleration separately, based only on those studies of each respective form of accelerative option, whereas Steenbergen-Hu and Moon (2011) considered the form of accelerative option a moderating variable. Nevertheless, the first conclusion across these syntheses is that academic acceleration produces notable academic gains for students with gifts and talents, regardless of the category of acceleration or actual acceleration option provided. The second conclusion is that academic acceleration produces small-to-moderate social-emotional gains for these students, for most categories of acceleration option provided. It is important to note that this table combines little of the sophisticated analysis conducted by these meta-analysts, and it is important to go directly to the source for the study authors' more sophisticated analyses than reported in this table.

In 2006, a research grant from the Institute for Policy and Research on Acceleration (IRPA; renamed Acceleration Institute) at the University of Iowa's Belin-Blank Center allowed for an update to the meta-analyses previously conducted by Rogers (1992, 2004). A brief synopsis of this research was reported in the *IRPA 2008 Wallace Symposium Proceedings* (Rogers, 2010). The updated report presented in the following pages provides the details of that analysis, beyond the 2008 Wallace presentation, and includes additional studies that have been conducted for each of the accelerative options.

Procedure for Current Study Update

In the effort to collect all publications on the forms of acceleration, seven database searches were undertaken to cover the years 1990 through 2013. Citations produced from *ERIC, PsychINFO, Dissertations and Theses, Sociological Abstracts, Child Development & Adolescent Studies, Education FullText,* and *Academic Search Premier* were collected. The general descriptors for "gifted education" and for "academic acceleration" listed for each database, as guided by its respective thesaurus, included all keywords involving the acceleration provisions practiced in the field of gifted education. The publications were categorized by type of

Table 1: Summary of Meta-Analytical Synthesis 1984-2010

Study	Methodology	Number of Studies	Academic Effect Size	Social-Emotional Effect Size	Study Types Included
Kulik & Kulik, 1984	Analysis of comparison studies of accelerants (As) and non accelerants (NAs)	26	0.88	0.03 Popularity -0.03 Adjustment 0.07 School Attitude -0.02 Subject Attitude 0.17 Vocation -0.13 Extracurricular participation (inconsistency among studies of each S-E factor)	Published, unpublished; did not include pre-experimental case studies or correlational studies.
Rogers, 1992	Analysis of all studies of gifted accelerants 1862-1990	380	0.50 grade-based; 0.46 subject-based	0.14 grade-based 0.21 subject-based	Published, unpublished; including case studies, correlational
Kent, 1992	Analysis of studies that focused on social-emotional issues in elementary gifted learners, 1928-1987	23	Not Reported	0.13 short-term 0.28 longitudinal 0.15 telescoping 0.14 early entrance 0.12 grade-skipping	Published, unpublished; including case studies, correlational
Kulik & Kulik, 2004	Analysis of comparison studies of accelerants with same age or older age like ability peers	26	0.80 same age NA peers; -0.04 older age NA peers	0.28 same age NAs on school motivation -0.17 same age NAs on self-acceptance 0.29 older age NAs on school motivation -0.38 older age NAs on self-acceptance	Published, unpublished; did not include pre-experimental case studies or correlational studies
Rogers, 2004	Analysis of all quantitative studies of gifted accelerants, accelerative option by accelerative option	103 grade-based 205 subject-based	0.40 grade-based options combined; 0.38 subject-based options combined	None reported in this analysis	Published, unpublished; including case studies, correlational
Steenbergen-Hu & Moon, 2011	Analysis of comparison studies 1984-2008 for high-ability accelerants	38	0.40 comparisons with same age high ability peers	0.14 comparisons with same age high ability peers	Published, unpublished; did not include case study effects (pre-post, pre-experimental)

publication, form of accelerative option, whether or not the "study" was research or non-research, type of research design, sample sizes of comparison groups, and research question(s) asked about the acceleration practice. Not included in this study collection were evaluation studies of gifted curriculum, such as the William & Mary language arts, mathematics, social studies, and science units, which are not specifically instructional management options that require subject or grade-based acceleration to take place consistently; although this curriculum may make it possible for subject acceleration to occur. Between 1990 and 2008, a total of 22 forms of acceleration had been quantitatively researched during the period (Rogers, 2010), with an additional 42 studies found since the 2010 IRPA meta-analysis report. The data reported here as Table 2 include both sets of studies covering this period, 1990 – 2013. Because a preliminary report was provided as part of the *2008 Wallace Symposium Proceedings* (Rogers, 2010) and no other publication was pursued following that report, the two sets of data have been combined.

In order to be included as a research study in the current synthesis, the manuscript, published or unpublished, had to report the author's method for systematically collecting quantitative data about the purpose described in the study. Second, each report had to describe a recognizable study design, but designs were not limited to experimental and quasi-experimental studies only; case study observations with pre-and post-data, pre-experimental design, as well as correlation, regression, causal-comparative, and survey designs were included. No studies were eliminated because of methodological flaws, if a recognizable research design was evident. Third, to be included as research, each study had to yield dependable, quantitatively summarized results, either descriptive or inferential. Fourth, if several publications described the same research data, the most complete report was used for further analysis. When a single study reported findings from several different instruments or samples, separate effect sizes were first computed for each outcome, followed by a mean effect size estimate across all academic or social/emotional effects in that study, respectively. In cases where the findings of several instruments described a single outcome, such as mathematics achievement, the results were pooled to compute a composite effect size result. The method recommended by Strube (1991) was followed in this calculation of a composite effect size. When a study collected data from more than one accelerative option type or used more than one distinct comparison group, the report was counted as a distinct study under each acceleration option. Finally, the accelerative option described in each study had to have been used with gifted learners, with specifications included as to how the subjects were identified.

The majority of the qualifying studies reported quantitative results that could be reduced to the metric of effect size (ES). In general, calculating an effect size requires the subtraction of the mean achievement of the control group from the treatment group's mean achievement. This difference is divided by the pooled standard deviation of the two groups, i.e.,

$$\mathrm{ES} = \frac{M_{\text{experimental group gain}} - M_{\text{control group gain}}}{SD_{\text{pooled}}}$$

(Glass, McGaw, & Smith, 1981). For studies reporting correlations, effect size was calculated by dividing the square root of $1\text{-}r^2$ into $2r$. As each study's effect sizes were combined to one median effect, Hedges' *g* (Hedges, 1981) was used to combine the composite effect sizes across studies for a single overall effect size for academic, social, and emotional, respectively, because it weights for sample size (Hedges, 1981; Hedges & Olkin, 1985; Hedges, Shymansky & Woodworth, 1989). Correspondingly, a chi square analysis indicates whether the combined effect sizes differ significantly from each other or act as outliers among the studies. This analysis was the final step in the combination process.

Effect size can be interpreted in a variety of ways. In general, most meta-analysts recognize an effect size of .30 or higher as being of practical significance to classroom practice. According to Glass, McGaw, and Smith's (1981) interpretation, an effect size of .30 would suggest the grade equivalent improvement in a given outcome for one group of about three additional months of achievement of the experimental group over the control group or to suggest that the experimental group was that much further into the school year's teaching efforts. This could suggest that were the current teaching effort to continue for three years, the experimental students would be a full school year ahead of their equally able controls. When effect sizes are reported for social or emotional outcomes, it is often more understandable to interpret effect size in terms of how much additional growth was found on the measure of a social or emotional factor. For example, if a learner had scored a 50 on the initial measure (e.g., measure of social maturity) an effect size of .10 reported would indicate improvement of score to 54, an effect size of .30 would suggest a score of 62, and an effect size of 1.00 would suggest a score of 84 (Coe, 2002).

The Effects of Acceleration Options

Rogers (2010) identified 12 forms of subject-based acceleration and six forms of grade-based acceleration. Subject-based acceleration allows gifted learners to flexibly progress through the general K-12 curriculum or exposes these learners to knowledge, skills, and understandings beyond expected age or grade levels. Grade-based acceleration allows gifted learners to progress more quickly through the general K-12 curriculum, leaving the system anywhere from one to four years earlier than the normal age/grade lockstep system provides. Since 2010, the number of forms of acceleration has increased. The forms[1] are listed below and Table 2 provides a summary of the available research-based effects, i.e., effect sizes, for most of the forms.

- **Accelerated/Honors High School Classes:** Advanced students are grouped together for curriculum that extends and moves more rapidly through general or advanced education outcomes. These courses may also be offered as *College-in-the-Schools* programs, college coursework offered on the high school site (usually by a local university), utilizing either a high school teacher trained to offer this course or a college faculty member, and giving credit for successful completion of the course, usually restricted to the university that provides the instruction.

- **Accelerated Residential High School:** Programs are provided on a university campus as a residential program or as a Governor's School, for which students can complete both high school requirements and college courses as part of their program of study.

- **Advanced Placement (AP) Courses:** Students take AP classes in specific content areas and take external national exams to attain scores that qualify for advanced standing in those content areas at selected universities.

- **Compacted Curriculum:** The regular curriculum of any or all subjects is tailored to the specific gaps, deficiencies, and strengths of an individual student. The learner "tests out" or bypasses previously learned skills and content, focusing only on mastery of deficient areas, thus moving rapidly through the curriculum offered in the educational setting. Replacement activities are provided to fill in the learner's classroom time.

- **Competition Programs:** Co-curricular, academically-oriented programs allow students to work at their limits against others with similar talents for local, state, national, or international standing. It is to be noted that among the eight studies on competitions, most of them through the Olympiads, none have data that can be calculated in terms of effect size. Nonetheless, the research in this area must be recognized as supportive of academic and psychological gains for learners with gifts or talents.

- **Computer Online Courses:** Students enroll in online advanced, often individualized, courses during the school day in lieu of courses taken at the school site.

- **Concurrent/Dual Enrollment:** Gifted learners are allowed to attend classes in more than one building level during the same school year. For example, a junior high student attends high school for part of the school day and junior high classes for the remainder of the day. In some states, the term *Postsecondary Enrollment Options* is used when this dual enrollment occurs for high schoolers who are given both high school and community college or university credit for their work on a community college, college, or university campus. Another variation of this option is *Distance Education Courses,* which allow gifted learners to work with outside materials provided by a college or other organization in lieu of the regular grade-level curriculum of the school. Many schools award credit for this type of coursework.

- **Credit by Examination:** Students take a test to ensure mastery of the content area in order to place them at a higher content level. This is often offered as a course placement option at the university level (e.g., the College Level Examination Program [CLEP]). As with distance learning studies, there were two studies on the academic and psychological impact of credit by examination, but the data provided could not be calculated into an effect size metric for the most recent study. Nonetheless, the two studies merit attention.

1. Editors' note: Rogers's forms are highly similar to the 20 forms reported by Southern and Jones (this volume). However, there are some important distinctions, including elaborations about various forms. Therefore, the two lists are included in the respective chapters of the volume.

- **Distance Education Courses:** Students take televised or Skype courses from their home school along with students from other sites enrolled in the same course. Correspondence courses are also considered a form of distance education. None of the studies found since 2004 have had quantifiable data that could be converted to effect size metrics.
- **Early Entrance to Kindergarten or First Grade:** Gifted learners demonstrating a readiness to perform school work are allowed to enter kindergarten or first grade one to two years earlier than the usual beginning age.
- **Early Entrance to University:** A student enters college as a full-time student without completing a high school diploma. Students matriculate to university a minimum of one year earlier and participate in full-time academic work there.
- **Grade-Skipping:** Gifted learners bypass one to two grade levels, either in tandem or in separate years in the K-12 system.
- **Grade Telescoping:** Students progress more rapidly through the curriculum of several grade levels, either individually or in groups. A middle school student or group of students, for example, would complete the three years of middle school curriculum in two years' time.
- **Homeschooling:** Students study at advanced levels outside of the regular school, often using an external, commercial curriculum.
- **Honors Classes at University:** Advanced classes are offered to gifted students upon entering university programs as a full-time student.
- **Independent Study:** Gifted learners are provided with a structure for studying in depth a topic of interest on their own during the school day, in lieu of the regular school curriculum.
- **Individualized Acceleration:** Students work at their own pace through continuous progress content and skill outcomes.
- **International Baccalaureate Program:** Students participate in full college-level curriculum in high school, receiving advanced standing at selected universities if they score highly on the international diploma examination.
- **Mentorship/Coaching:** Students are placed with a content expert to extend learning in the expert's content area (one-year placement). This option connects high school students who have exhausted all high school curriculum in their talent areas with a community or university "expert" who oversees the student's studies and learning over the course of a year, usually outside of school time.
- **Multi-Grade/Combination Classrooms**: Learners of all ability levels are placed in a classroom that covers two years' curriculum, such as a combined first/second grade classroom.
- **Non-Graded/Multi-Age Classrooms:** Learners of all ability levels are placed in a classroom undifferentiated by grade levels. Students work through the curricular materials at a pace appropriate to individual ability and motivational levels.
- R**adical Acceleration:** Students complete the four years of high school and four years of university in four years' time; another permutation would be an individualized progression through K-16, not necessarily only occurring during the secondary years of school.
- **Saturday Classes on University Campus:** Students attend weekly all-day class in advanced subject area across an entire year.
- **Single-Subject Acceleration:** Gifted learners are allowed to bypass the usual progression of skills and content mastery in one subject where great advancement or proficiency has been observed. Often the learner continues to progress at the regular pace through the remaining subject areas.
- S**ummer University Classes:** Students attend a one- to six-week summer enrichment program working on advanced subject matter, often receiving credit in their home schools for their work.
- T**alent Search Programs:** Students demonstrating talents in one or more areas participate in above-level testing, for example, by taking the SAT or ACT in middle school through a university-based talent search program. Those students who achieve high scores are invited to attend advanced courses and programs that

typically occur outside of regular school time and often on a college campus or online.

Table 2 summarizes the type of effect, number of quantitative studies, number of outcomes, and average effect size found for many of these forms of acceleration for the years between 2008 and 2013. In some cases, this has resulted in effect sizes considerably different from those initially reported, particularly in Rogers' earliest synthesis (1992).

Mean academic effect sizes are **strong** for gifted participants in *accelerated/honors high school classes, AP classes, computerized online classes, grade-skipping, honors classes at university, International Baccalaureate diploma programs, radical acceleration;* and *Saturday enrichment classes* (n=1 study). In these most recent years, the number of studies for subject-based accelerative strategies has ranged from three to six per acceleration option (with the exception of AP). **Strong** effect sizes for social adjustment outcomes are shown for one option: *mentorships*. Psychological effects were found to be **strong** for *accelerated/honors high school classes* and *homeschooling* (n=1 study).

Moderate academic effects were found for a*ccelerated residential high schools* (usually on college campuses), *dual/concurrent enrollment, early entrance to kindergarten, homeschooling* (n=1 study), *individualized acceleration, single subject acceleration, summer classes on university campuses,* and participation in *talent search programs*. **Moderate** social effects were found for *grade-skipping, honors classes at university,* and *summer classes on university campuses.* One option reported a **moderate** negative social effect: *Accelerated residential high schools.* **Moderate** psychological effects were found for *AP classes, computer online classes, honors classes at university, single subject acceleration,* and *summer university courses.* **Moderate** psychological effects also were found for three grade-based acceleration options researched during this period: *early admission to university, grade-skipping,* and *radical acceleration.*

Slight, but positive academic effects were found for *curriculum compacting, individualized acceleration,* and *mentorships,* while **slight,** but positive social effects were found for *accelerated/honors classes, early entrance to kindergarten, early entrance to university,* and *radical acceleration.* Slight, but positive, psychological effects were found for *AP classes, curriculum compacting,* and *mentorships.* A slight negative effect was found for *early entrance to kindergarten.* (See Table 2.)[2]

One last analysis makes the attempt to find the patterns of effects among the variety of subject-based and grade-based acceleration options. As Table 3 summarizes, there was no difference between the general academic effects of subject-based acceleration options and grade-based options. Both categories of acceleration produce **moderate** academic effects for learners with gifts and talents; however, grade-based acceleration produces stronger (**moderate**) socialization and psychological effects, while those effects are smaller for subject-based acceleration. When the studies that collected data on students at different school levels (elementary, middle school, high school) were synthesized, it was discovered that there were some differences in various summary effects. For elementary school gifted learners, grade-skipping was the only metric that measured academic effects of grade-based options (gauged as "**strong**"), but for subject-based acceleration and socialization and psychological effects at the elementary level, the effects were **moderate**. All academic, socialization, and psychological effects were **moderate** at the *middle school* level for both subject-based and grade-based acceleration. And at the *high school* level, there were **strong** academic effects for both subject-based and grade-based options, and a **strong** psychological effect for grade-based options, but the remaining socialization and psychological effects are **slight** across both subject-based and grade-based options. In sum, grade-based acceleration has a slight academic advantage in effect at all three school levels and somewhat more positive socialization and psychological effects at all three school levels. (See Table 3.)

Conclusions, Discussion, and Future Directions

The research on academic acceleration since 2008, as reported here, provides educational decision-makers with a large, research-supported menu of accelerative options that may result in substantial academic achievement for gifted learners. When one looks at the academic effects of the various subject-based and grade-based options, there are several subject-based acceleration options with at least moderate mean effect sizes, and three grade-based acceleration options with moderate-to-strong effect sizes.

Considering the social effects that have been studied for some of these options, there also are several subject-based and grade-based options that produce moderate improvements in this domain. Whereas for psychological adjustments (e.g., self-efficacy, personal well-being, stability, etc.) there are

2 *Three forms of acceleration are not reported in Table 2:* grade telescoping, multi-grade classrooms, *and* nongraded classrooms *because there were no new studies since 1991 on these forms. The previous academic effect sizes of +.40, +.21, and +.39, respectively, are the most recent evidence of academic effects for these three options.*

Table 2: Mean Effect Sizes for Acceleration Options

Acceleration Option	Type of Effect	Number of Studies	Number of Outcomes	Mean Effect Size
Accelerated/honors high school classes	A	3	6	+0.69
	S	1	2	+0.11
	P	5	9	+0.60
Accelerated residential high school on university campus	A	2	5	+0.29
	S	2	3	-0.27
	P	5	11	+0.07
Advanced Placement courses	A	16	40	+0.60
	S	1	2	+0.01
	P	5	10	+0.19
Compacted curriculum	A	1	18	+0.20
	P	1	1	+0.17
Computer on-line courses	A	5	21	+0.72
	P	3	7	+0.24
Concurrent/dual enrollment	A	11	32	+0.41
	P	2	3	-0.04
Early entrance to Kindergarten or first grade	A	5	8	+0.30
	S	4	6	+0.20
	P	5	11	-0.20
Early entrance to university	A	10	23	+0.23
	S	4	6	+0.18
	P	6	16	+0.35
Grade-skipping	A	5	8	+0.67
	S	4	4	+0.34
	P	3	3	+0.42
Homeschooling	A	1	1	+0.42
	P	1	2	+0.82
Honors classes at university	A	2	7	+0.56
	S	1	1	+0.38
	P	2	9	+0.37
Individualized curriculum	A	2	6	+0.25
International Baccalaureate program	A	6	18	+0.70
	S	2	4	-0.08
	P	2	4	+0.03
Mentorship/coaching	A	4	9	+0.22
	S	1	2	+0.71
	P	2	2	+0.16
Radical acceleration	A	4	5	+0.61
	S	4	10	+0.18
	P	4	12	+0.42
Saturday classes on university campus	A	1	1	+1.56

Table 2: Mean Effect Sizes for Acceleration Options (continued)

Acceleration Option	Type of Effect	Number of Studies	Number of Outcomes	Mean Effect Size
Single-subject acceleration	A	13	27	+0.42
	S	6	8	+0.07
	P	13	51	+0.35
Summer university courses	A	11	19	+0.43
	S	5	7	+0.31
	P	10	32	+0.40
Talent search programs	A	6	21	+0.34

*Note: **A – academic effects**, including achievement, time on academic task, subsequent choice of advanced courses, grade point average, academic competency measures, perceptions of challenge, school satisfaction, concept attainment, clarity of instruction, honors/awards/scholarships received, intellectual efficiency, school aptitude, grasp of main idea, information processing speed, perceptions of school climate, success on exams, number of university credits awarded, school/subject aptitude, academic progress, education level attained, educational/career aspirations, college graduation age, sense of preparation for advanced coursework, college ranking, PhD received, adult income, patents received, caliber of career.*

***S = social adjustment effects**, including social cognition level, social maturity, engagement/leadership in organizations, co-curricular participation, friendship, peer acceptance, socialization, social presence, family harmony, social confidence, introversion or extraversion, social skill level, level of social problems, perceptions of social interference in learning, perceptions of parent/social support, level of social interaction, social self-concept, level of competitiveness, perceptions of popularity.*

***P = psychological adjustment effects**, including perceptions of appeal and meaning of academic effort, task commitment, trait anxiety, positive/negative emotions, perceptions of well-being, self-efficacy, self-regulation levels, worry, attitude toward subject, satisfaction with teachers, life satisfaction, global satisfaction, cheer, seriousness, mood levels, independence/autonomy, self-acceptance, flexibility, mental health, self-concept, self-confidence, stability, self-worth, mental attention, conduct, sense of integration, responsibility, persistence, distress, perceptions of relevance, perceptions of difficulty, locus of control, academic interest, motivation to learn, perceptions of readiness, priorities, intellectual satisfaction, happiness, intrinsic motivation, sensitivities, levels of psychological distress (i.e., depression, phobia, paranoia).*

several subject-based and all grade-based options reporting moderate-to-strong effect sizes. What is promising about this most recent meta-analysis is the remarkable focus on social and psychological outcomes that was not as evident and consistent in previous syntheses. The reported results bode well for helping to overcome the "myths" of social maladjustment and psychological problems, which may have deterred educational leaders from considering more of their brightest students for some form of acceleration, whether grade-based or subject-based.

In terms of the quality of research reported in more recent years, there seems to have been a decline in qualitative studies on the nature and outcomes of acceleration options; for Rogers (2010) report, approximately one- third of the studies were qualitative. With the years between 2008 and 2013, approximately one-tenth of the studies were qualitative in this area of educational practice. Some concerns must be raised, however, about the quantitative designs employed. Very large data bases have served as the student populations under study, for *dual enrollment* and *AP studies* in particular. For *residential high schools, honors classes at both high school and university, International Baccalaureate diploma programs, single subject acceleration, summer university courses, talent search, radical acceleration*, and *early admission to college,* survey data have been administered, usually across several cohorts, comparing participants with either "traditional" students or "gifted, non-accelerated" students. Usually structural equation modeling, Logit modeling, or regression studies are used for data analysis with what may be considered little regard for what is actually occurring for the gifted learners who participate. The individual student and best practice for that student is often unconsidered, despite the many calls over the years to "match" our acceleration decision to the cognitive, social, and emotional needs of individual learners with gifts or talents (e.g., Benbow & Lubinski, 1995; Kent, 1992; Rogers, 2002).

The forms of academic acceleration for gifted learners have shifted in research focus during this most recent period as well. *Advanced Placement,* now a more widespread program offered to underserved populations as well as more mainstream high ability learners, *dual/concurrent enrollment with college credit, International Baccalaureate diploma programs, early admission to university, single subject acceleration,* and *summer university courses* have focused on high school students, primarily, with some consideration given to middle schoolers, especially with *single-subject acceleration* and *summer university courses.* Currently, studies of elementary students, the mainstay of the previous century's research, are relatively few, with only *early entrance to schoo*l and *computerized on-line courses* producing more than one to two studies. If the "answers" to our accelerative decisions were clear, this set of circumstances might be appropriate, but the research on such options as *curriculum compacting, nongraded classrooms, grade telescoping,*

Table 3: Summary Effect Sizes by Category of Acceleration and School Level

	Subject-Based Acceleration	Grade-Based Acceleration
Effect Size Variables, All Levels Combined, Elementary, Middle, and High School		
Summary Academic Effets	+0.51	+0.50
Summary Socialization Effects	+0.16	+0.23
Summary Psychological Effects	+0.24	+0.34
Effect Size Variables, Elementary Level		
Academic Effects: Elementary	+0.42	+0.67
Socialization Effects: Elementary	+0.33	+0.34
Psychological Effects: Elementary	+0.31	+0.42
Effect Size Variables, Middle School Level		
Academic Effects: Middle School	+0.39	+0.45
Socialization Effects: Milddle School	+0.29	+0.26
Psychological Effects: Middle School	+0.36	+0.39
Effect Size Variables, High School Level		
Academic Effects: High School	+0.56	+0.50
Socializaton Effects: High School	+0.16	+0.23
Psychological Effects: High School	+0.21	+0.34

Note: Actual numbers of elementary vs. middle school vs. high school students were not parsed out and recalculated across various acceleration options. A secondary analysis to do such calculations is recommended. The composite effect size for those forms of acceleration that included elementary students, for example, were separated out, averaged, and reported in this table.

mentorships, individualized acceleration, homeschooling, and *Saturday classes* at the elementary school level is scant with major sets of effects, particularly social and emotional outcomes, basically unaddressed. At the high school level, more needs to be studied concerning *accelerated/honors classes* and *residential high schools* about actual academic as well as social and psychological effects.

The numbers of gifted students studied regarding the impact of acceleration practices is quite extensive, however. In a previous meta-analysis, a criticism of the work conducted on academic acceleration was that the sample sizes in the studies were small. With recent access to NELS data as well as university admissions records as sources for data, the sizes of studies have increased substantially. Across the subject-based acceleration option effects reported here, 50,660 students were studied (not including their comparison groups), while for grade-based acceleration option effects 2,811 students were studied.

Even though the research in the gifted field on acceleration practices is substantial, an important caveat needs to be repeated. It is imperative that decisions about both subject-based and grade-based acceleration be formulated on more than the research alone. Although the limitations of the studies found on the various forms of acceleration have been reported here, it is possible that the studies themselves do not match the specific settings and contexts of every state, district, or school. Therefore, it is important that those responsible for decisions collect adequate supplementary information about an individual learner's cognitive functioning levels, learning strengths, learning preferences, and interests and involvement inside and outside of school. With this additional information, the "best" decision for meeting the learner's educational needs through some form of acceleration provided at the right time and in the right place will most likely be made.

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** A complete reference list of all studies included in the current meta-analysis can be found on the* Nation Empowered *website (www.nationempowered.org/authors/rogers).*

Effects of Academic Acceleration on the Social and Emotional Lives of Gifted Students

Tracy L. Cross, Center for Gifted Education, William and Mary, Williamsburg, Virginia
Lori Andersen, University of Kansas, Lawrence, Kansas
Sakhavat Mammadov, William and Mary, Williamsburg, Virginia

Abstract

Decades of research have provided evidence that acceleration has positive effects for gifted students both in the cognitive (academic) and affective (social and emotional) realms. The data on the affective are not as robust or straightforward as the findings for the cognitive realm; therefore, for many parents and educators the affective is the major concern regarding acceleration. The purpose of this chapter is to provide a review of the effects of acceleration on the "social and emotional lives" of gifted students. The authors provide a detailed and nuanced understanding of the generally positive effects of acceleration by indicating how the type of acceleration can impact the social and emotional development of students. In addition, gender, ethnicity and developmental level can have a differential impact. The authors provide information on research limitations in terms of samples and research design. Despite the limitations, they conclude that there is enough research evidence to guide our understanding about the general effects of acceleration including a more differentiated and qualified understanding of its impact on the social and emotional lives of gifted students.

Introduction

Dr. Nancy Robinson, eminent scholar from the University of Washington, contributed a thoughtful chapter, "Effects of Academic Acceleration on the Social-Emotional Status of Gifted Students" (Robinson, 2004) to *A Nation Deceived: How Schools Hold Back America's Brightest Students*. Dr. Robinson's chapter created a solid foundation for the current chapter; however, the authors frame the topic slightly differently with a focus on the social and emotional lives of gifted students. The change, while subtle, actually opened up additional perspectives on the topic. Social and emotional lives are defined as a category that includes all aspects of the psychology of human experience from traditional social and emotional indicators to phenomenology to personality. For example, Rogers (2010) used three distinct categories of effects in her meta-analysis of the literature on acceleration: academic, social adjustment, and psychological adjustment. In this chapter, by using the heading of "social and emotional lives of gifted students," we shed light on the social and psychological adjustment effects of acceleration, which is more comprehensive than traditional emphases on social and emotional indicators alone.

Considerations Before Examining the Research

To organize the research base on the topic, it was necessary to consider the fact that there are numerous types of acceleration practices (Southern & Jones, 2004). Similar types of acceleration may affect students in multiple developmental stages. For example, early entrance to preschool or kindergarten versus early entrance to college impacts students 10 to 12 years apart in age. There are myriad factors and variables applicable in sorting out the potential impact of acceleration on the social and emotional lives of gifted children. For example, one could consider naturally occurring characteristics of gifted students such as asynchronous development (Silverman, 1997) and view them in light of differing acceleration techniques such as subject-area acceleration, grade-skipping, radical acceleration, and so on.

In addition to considering the interaction of varied student characteristics and types of acceleration, experience is another applicable variable. In some studies, the gifted students had considerable experience among students with similar abilities in a selected setting, and in other studies this was not the case. Another issue is related to the variability in the ways in which acceleration may affect students across cultural groups, including both those that encourage individual achievement and those that encourage community-based group performance, such as students from Native American backgrounds. The challenge in organizing the information for this chapter was representing the research base in an organized manner that addresses as many of the permutations as reasonable and to illustrate where more research is needed.

Results from meta-analyses, which examine a large number of studies (see Rogers, 1992; 2010; this volume) on the various subtopics of acceleration, elicit confidence about the intervention. Moreover, the growing corpus of qualitative studies is slowly building from compelling specific examples, wherein students who experience acceleration opportunities seem to benefit from them psychologically.

The research conducted on acceleration over the past 40 years has uncovered new factors and variables and raised important issues about the interpretation of data collected. For example, the role of context in influencing the findings; the relative developmental ages of the students being studied; students' previous experiences with nongraded or homeschooled environments; the changing referent group and how to interpret it appropriately across settings (e.g., the Big-Fish-Little-Pond Effect; Dai & Rinn, 2008; Marsh & Craven, 2002); the limitations of the instruments used to study acceleration; and the need to parse out nonaccelerative effects from the findings within specific studies.

The most obvious lesson learned from a perusal of research from the past 40 years has been that the findings have reflected samples largely absent of diversity (McCain, 2012). This phenomenon is particularly problematic due to the fact that many of the studies rely on convenience samples from programs run by universities and/or schools. Ultimately, the findings of the research in this area are treated as a "yes" or "no" phenomenon, when it is time to provide responses that are more specific to the condition and samples used. The research focusing on some groups, and/or permutations of factors and variables, leave researchers unable to fully address the question about the nature and degree of effects of acceleration on the social and emotional lives of gifted students.

The field of gifted education is becoming increasingly nuanced in its research into matters of a psychological nature, but we still use the terms social and emotional as a repository rather than as two categories under the broader heading of psychological changes, effects, influences, and so forth. Consequently, the authors chose the descriptive term "social and emotional lives" to represent the larger, more expansive framework, which includes both social and psychological adjustment, to better understand the many ways acceleration affects gifted students. This broader framework can include traditional topics such as self-concept, but also allows for other topics to be included such as resilience, lived experience, social coping, and impression management, while also allowing for increasingly nuanced and culturally specific topics that are more contemporary to the literature.

The Research Base

Effects Across Acceleration Strategies

Acceleration strategies are based on an assumption that a standard curriculum, as delivered in heterogeneous classroom settings, is insufficient to address gifted students' diverse needs. The complex cognitive, personal, and social characteristics of gifted students suggest that provision of different accelerative options should be carefully designed in a way that will build personal and social competencies. Although numerous acceleration strategies are available and studies continue to show positive outcomes as well as a lack of negative outcomes on social-emotional development for any form of acceleration (see Rogers, 2010; this volume), the best acceleration option should be chosen and tailored to the academic and social-emotional strengths of the individual child. Some of the acceleration strategies demand changes in the school curriculum (e.g., subject acceleration), whereas other strategies focus on student placement in more advanced levels of the existing curriculum (e.g., grade-skipping); the saliency of the social-emotional impact varies according to the strategy.

Early entrance to school. Analyses of now-classic studies (Hobson, 1963; Worchester, 1956) on early admission to kindergarten or first grade report positive results on social and emotional outcomes. These studies revealed that younger students had more positive or better social and emotional adjustment than their older classmates (Daurio, 1979; Eisenberg & George, 1979; Worchester, 1956) and were actively engaging in extracurricular activities and occupying school positions of leadership (Hobson, 1963). Rogers's (2010) meta-analysis that included studies of early entrance revealed positive academic and social adjustment, but negative psychological adjustment effect sizes (.30, .10, and -.24 respectively). Gagné and Gagnier (2004) investigated teachers' perceptions of the social-emotional and academic effects of early entrance to school. Kindergarten and second grade teachers from 18 school districts in the Canadian Province of Quebec evaluated the five best-adjusted and least-adjusted students within their classes on conduct, integration, maturity, and academic achievement. The group of students included 98 early entrants and 1,723 regular entrants. Early entrants were rated higher than regular entrants and, as a group, showed no evidence of greater risk for adjustment problems. However, sex differences in the adjustment of early entrants were identified, favoring girls. Robinson (2004) recommended that early entrance to kindergarten should be limited to children who were not younger than the cut-off birth date by more than three months.

Grouping. Grouping students by ability (homogeneous grouping) allows them to work at a pace of learning that often exceeds the school's typical curriculum. There is a long-standing controversy regarding the effectiveness of homogenous versus heterogeneous grouping on gifted students' academic and social-emotional lives (Benbow & Stanley, 1996; Feldhusen & Moon, 1992; Kulik & Kulik, 1997; Oakes, 1990, 1992; Rogers, 1991; Slavin, 1990). Although some scholars advocate heterogeneous grouping (Oakes, 1990, 1992; Slavin, 1990), research suggests that this type of grouping has negative impacts on gifted students' social and emotional lives. Boredom and demotivation due to the lack of challenge (Baker, Bridger, & Evans, 1998), social ostracism (Gross, 1989), being misunderstood (Kulik & Kulik, 1987), and teasing and bullying by peers (Moon, Nelson, & Piercy, 1993) are among the negative impacts. Many researchers in the field of gifted education believe that gifted students benefit from homogenous grouping both academically and socioemotionally (Adams-Byers, Whitsell, & Moon, 2004; Feldhusen & Moon, 1992; Kulik & Kulik, 1997; Rogers, 1991; Sayler & Brookshire, 1993).

Special classes. Special classes provide a range of opportunities for high-ability students with an intense and focused interest to master challenging materials in various content areas. Several studies included affective variables to investigate the social and emotional outcomes of the special classes. Moon, Swift, and Shallenberger (2002) examined gifted fourth and fifth graders' perceptions of a self-contained class. Qualitative and quantitative analyses of the data suggested that the self-contained classroom provided a challenging learning environment for gifted students, but there were different social and emotional outcomes for specific students during the school year. Specific emotional benefits that students listed in their focus groups were feeling smarter and happier and feelings of accomplishment, pride, and achievement. Parents of the students reported increased happiness and self-esteem and improved self-discipline as part of the emotional benefits of participation in the self-contained class. Students indicated that they were also experiencing some emotional challenges such as feeling "regular" because of no longer being at the top of the class, being embarrassed by poor grades, and feeling pressured, stressed, confused, or some combination of these emotions. Unhappiness and stress were emotional concerns that parents thought their children experienced during the program. The social concerns reported by the students included being "new" to a group, missing old friends, losing old friends, and being teased or insulted by students outside the class. Teachers and administrators noted that the program was effective in helping the students to develop social skills.

Wright and Leroux (1997) studied 25 gifted adolescents' self-image during the transition year in a grouped classroom in secondary school. The researchers employed the *Harter Self-Perception Profile for Adolescents* (Harter, 1988) and an interview technique. The findings revealed that the self-image of the students increased significantly in the subscales Romantic Appeal and Close Friendship. The qualitative data suggested that gifted students enjoyed being within a gifted group. Overall, there was no change in Global Self-Worth scores: The gain in female scores was offset by a decrease in male scores. This finding suggested that females had a more consistently positive response to the social atmosphere created in the grouped setting than males. The students were conscious of being labeled as different. Students' Social Acceptance scores remained below the scores of Harter's norming group. This implies that, although grouping was related to statistically signification improvements in students' self-perceptions, in some areas these improvements did not bring students self-perceptions to the level of typical students.

Single-subject acceleration. High-ability students who are served in regular classrooms spend a good deal of their time in practicing already mastered skills, working on unchallenging tasks, and reviewing content for which they already show substantial proficiency and/or mastery. Single-subject acceleration allows students to move more rapidly through the content with specific modifications in curriculum. The student may be placed in a classroom one or more years ahead of his or her actual grade level, or be asked to stay in his or her own classroom to work independently through the advanced curriculum. These two options might have different outcomes socially and emotionally. However, the research on the effects of this acceleration strategy on the social and emotional lives of gifted students is far more limited than that on academic outcomes. Lee, Olszewski-Kubilius, and Thomson (2012) investigated students' perceptions of their social competence in gifted programs of different types. They found more positive effects for subject acceleration on social competence over whole-grade acceleration. Students who had experienced subject acceleration were found to have higher interpersonal ability scores than other students.

Grade-skipping. Rogers (2010) found an average effect size of .34 across four studies for social adjustment effects and an average effect size of .42 across three studies for psychological adjustment effects of grade-skipping. These effect sizes are small to medium-sized positive effects. On the other hand, in an analysis of the literature, Neihart (2007) concluded that there were no substantial positive or negative social or psychological adjustment effects for grade-skipping. Assouline, Marron, and Colangelo (2014) described the overall effects of grade-skipping as positive. In general, the effects of grade-skipping appear to be positive and larger than for most other accelerative strategies, given the overall effect sizes found by Rogers (2010; this volume) and Steenbergen-Hu and Moon (2011).

Gross (2006) provided an update of the findings from a 22-year longitudinal study of students with IQs greater than 160. She compared students who were accelerated to those who were not accelerated. Her findings indicated that students who were accelerated two or more years in early elementary school had far greater social self-esteem in childhood and better social relationships later in life. She found that students who were denied accelerative opportunities experienced social problems throughout their academic careers and attributed this to early negative social experiences that prevented these students from learning social skills. Gross's conclusion creates an urgency in terms of accelerative decisions for highly gifted students because delays in the provision of accelerative options could have long-lasting effects on social adjustment.

Summer programs. Special classes that are not a part of the regular school program tend to be extracurricular, accelerative offerings during summer sessions or weekends throughout the academic year. The contributions of summer programs to gifted students' social and emotional lives are documented by a large number of studies (Barnette, 1989; Brookby, 2004; Cunningham & Rinn, 2007; Kolloff & Moore, 1989; Parker, 1998; Rinn, 2006). Analyses of these studies revealed increases on social and emotional measures as a result of participating in a summer program. Kolloff and Moore examined the self-concepts of gifted students in Grades 5–10 in three summer residential programs. Self-concepts of students in all grade levels and programs were significantly higher at the end of the programs. In the program evaluation of the Torrance Creative Scholars Program, a two-week summer program for students completing grades four through eight, Parker (1998) found that 66% of the respondents reported increases in self-concept. Parents of the participants reported increases in self-esteem, independence, maturity, and responsibility among their children. Similarly, Barnette (1989) studied 54 gifted adolescents' self-esteem and cohesion in a three-week nonresidential summer program; the results of the study revealed positive changes on both measures.

Studies that were conducted in recent years reported similar findings. Brookby (2004) found a significant increase in mathematically gifted high school students' social self-concepts as a result of participating in a summer residential program. Rinn (2006) examined the effects of a three-week summer residential program on two aspects of peer relations self-concepts of gifted students. Both same-sex and opposite-sex peer relation self-concepts increased over the course of the program based on subscale scores on the *Self-Description Questionnaire II* (Marsh, 1990). Cunningham and Rinn (2007) conducted a similar study examining academic, general, and emotional stability self-concepts, and found very small increases in general and emotional stability self-concepts over the course of the program. However, prior participants in the program had lower initial values of general self-concept than students who were first-time participants. This may indicate a more realistic appraisal of self-concept after exposure to other students who are equally able.

Early college options. There are several types of early college options available to students (e.g., residential academies with their own advanced curricula, residential academies offering early entrance to college, and early college high school). Overall, the effect of early college is positive, and provides development and growth opportunities for students. According to Neihart (2007), when appropriate selection criteria are applied, early college students do very well socially and emotionally. Rogers (2010) found an average mean effect size of .20 for six social adjustment studies and .29 for nine psychological adjustment studies, while Steenbergen-Hu and Moon (2011) found an overall effect size of .21 for eight studies. In other words, the effect of early college on social and emotional development is small and positive.

Early college high school. The majority of contemporary studies of the psychological or social adjustment effects of early college involve students at residential academies (e.g. Boazman & Sayler, 2011; Cross & Swiatek, 2009; Heilbronner, Connell, Dobyns, & Reis, 2010; Rollins & Cross, 2014a, 2014b); however, a recent study included the Early College High School model (McDonald & Farrell, 2012), a nonresidential program in which students attend community college. Early college high school (ECHS) is a dual enrollment program in which students take high school classes concurrently with community college classes, but unlike residential academies, students live at home. An increasingly more common option that is not limited to gifted students is called dual credit (DC). In DC programs, high school students can take a limited number of college-credit-bearing classes, often in their own schools. This option is not reported on in this chapter because it is not unique to gifted students and because the curriculum of the courses does not tend to be as rigorous as the other options, such as Advanced Placement courses or accelerated courses.

ECHS is an option that has been studied in populations of disadvantaged students. McDonald and Farrell (2012) conducted focus group interviews of 31 disadvantaged students (29% low-SES; 45% first-generation college students; 10 Hispanic; one African American) who ranged in age from 13 to 16 years old and were enrolled in an ECHS program in which they attended classes at a local community college. The participants described how the transition to a context where a scholarly identity was accepted freed them from the stress of impression management and allowed them to develop their personal academic identities. Evidence was found of unique struggles faced by underrepresented students. This group of students displayed a greater capacity for self-regulation and delayed gratification than age peers.

In another ECHS study, McCain (2012) investigated the academic identity development of eight high-achieving African American students who were enrolled in an early college program at a historically Black high school. This group of students demonstrated a strong sense of academic identity that they attributed to several factors. First, family influences were a motivating force for these students, although these forces had different forms. Some students were motivated to sustain a family history of high achievement, while others were motivated to not repeat the mistakes of their parents. Second, the students exhibited a higher level of maturity in their decisions regarding social interactions; they described selecting peers who would not interfere with achievement. The group prioritized academics over peer interactions, demonstrating greater maturity than age peers. Third, evidence was found of students' support for stereotypical views of "acting Black," and the students rationalized why they did not mirror the stereotype. Acting Black is generally understood as behaving in a manner consistent with the stereotypical values of African American communities. Students attributed not "acting Black" to coming from a two-parent home, living in the suburbs, and having a church life; the high-achieving students had a clear disdain for those who "acted Black." However, McCain posited that attending a historically Black school allowed the high-achieving students to have strong academic identities without "acting White." Acting White is generally understood as a pejorative descriptor of African American students behaving in a manner stereotypically believed to represent the white or Caucasian community's values.

Taken together, these studies imply that self-regulation is a critical skill to students who access college coursework while still in high school. These studies are among the few that include African American and Hispanic students, who are notably absent from most other studies of gifted students. The finding that self-regulation is important to underrepresented students' success is similar to research with nondiverse samples; however, the lack of peer acceptance of students' scholarly identities before entering early college may be more acute for students belonging to underrepresented groups. The students' views about "acting Black" raise questions about the effects of the identity dissonance between racial and academic identities on students psychologically. More research is needed in this area. However, similar to nondiverse students, these students felt the need to be selective in their social interactions to ensure academic success.

Residential academies. Residential academy (RA) students typically substitute the academy curriculum for their last two years of high school, although some may be accelerated by up to four years. In one RA model, students obtain an associate's degree and their high school diploma at the same time. In the other form of RA, students take college classes, Advanced Placement (AP) courses, and so forth. In both cases, the curriculum is accelerated compared to the students' traditional high schools. These students have the experience of leaving home for college earlier and entering a situation in which the mean ability level of their peers is much higher. Several studies have examined the effect of this combination of experiences in terms of students' psychological and social adjustment and are discussed in the following section.

Cross-sectional studies. Heilbronner, et al. (2010) examined students' reasons for leaving an early college program and compared the perceptions of students who completed the program (completers) and those who left the program (leavers). They found that many students who left the early college program did so for reasons that were categorized as *positive attrition*. In other words, these students left the program to seek improved fit in a different program and not for social-emotional reasons. A small number (2 of 13 leavers) did so for primarily social-emotional reasons. The vast majority of the 44 students in the study viewed their program participation as a positive experience that helped them to develop and prepare for future college experiences. Boazman and Sayler (2011) compared correlates of personal well-being for 174 students who had been enrolled in a residential academy to a norming sample. They found that the academy students had much higher life satisfaction in terms of personal safety and future security. Smaller positive effects were observed for satisfaction with life achievement and overall life satisfaction, whereas a small negative effect was observed for satisfaction with personal relationships. Larger scores in global self-efficacy and seriousness were observed in the academy group.

Longitudinal studies. Cross and Swiatek (2009) examined the social coping of students at a residential academy. Major findings included that, over time, students became more likely to see themselves as accepted by their peers and to deny giftedness, and became less likely to engage in high levels of social interaction. Rollins and Cross (2014a, 2014b) measured psychological stress of students at a residential academy five times over the course of an academic year. The analyses showed that students were quite resilient and adopted successful coping strategies to deal with the stress of increased academic challenge and attending a residential academy. Both studies support the conclusion that gifted students experience positive development when they are engaged in an academic context that is better matched to their abilities.

Effects across cultural groups. Few studies have included substantial numbers of racially or ethnically diverse students; however, more recently a few studies have focused on underrepresented populations (e.g., Lee, Olszewski-Kubilius, & Peternel, 2010; McCain, 2012; McDonald & Farrell, 2012). The vast majority of extant research describes only Asian and White students, leaving many unanswered questions about the effect of acceleration on the psychological and social adjustment of underrepresented students. The studies with diverse student samples will be summarized in this section.

Project EXCITE. Lee et al. (2010) conducted a qualitative study of 30 students in grades four through nine who were Project EXCITE participants. Project EXCITE is an enrichment program for elementary students that begins in third grade. Of the 30 students, 17 had experienced one to two years of subject acceleration in mathematics and 13 had not. Of the 17 accelerants, 12 were successful and had earned A's or B's, whereas five were not successful and earned grades of C or lower. Positive effects for the accelerants included reduced boredom, increased interest in math, increased motivation, higher confidence, and stronger identity as a "smart student." As far as social effects, fewer than half of the accelerants had made new friends in their advanced classes. The majority of the students did not perceive negative peer pressure concerning academics. The students exhibited high levels of self-regulation and were able to prioritize academics above socialization. Lee et al. found that the teachers believed that negative peer pressure would be more of an issue than the students' responses implied. Through semistructured interviews they found that students (a) had enhanced motivation and confidence, (b) tended to not socialize with new classmates in the advanced classes and instead preferred to socialize with "regular" friends, (c) did not perceive negative peer pressure towards academics or peer competition, (d) had increased academic confidence, (e) felt their personal intelligence was affirmed - they "felt smart," and (f) perceived dual stigmatization—being a racial minority and gifted. These findings imply that students' feelings about their own readiness may be an important placement consideration. Teachers believed negative peer pressure existed, but there was little evidence for negative peer pressure found in this qualitative study.

Early college high school. Two studies represented the effect of early college high schools on underrepresented students and were discussed in the previous section on Early College High School (McCain, 2012; McDonald & Farrell, 2012). Similar to the Project EXCITE study, issues of academic identity and self-regulation were identified as important.

Issues associated with underrepresented students. Researchers (McCain, 2012; McDonald & Farrell, 2012) concluded that there may be greater positive psychological and social adjustment effects for underrepresented and first-generation students when they are accelerated. Further, McDonald and Farrell's findings imply that, without accelerative opportunities and left in the traditional comprehensive high school environment, gifted students may stay in hiding due to their unwillingness to be exposed as gifted. As observed by Lee et al. (2010), students feel twice stigmatized due to their giftedness and their culture. The Information Management Model (Cross & Coleman, 2005) describes how gifted students may respond to feelings of stigma and differentness from age peers. Some students respond by disidentifying with academics or finding ways to fit in with their age peers through other means, such as focusing on athletics. From the standpoint of the Information Management Model (Cross & Coleman, 2005), the combined pressure of cultural and social norms may create more acute impression management issues for these students. It is likely that the degree of difficulty depends on the school context in terms of racial and ethnic diversity and SES profile. However, limited evidence currently exists in the literature. As McCain (2012) noted, if Black students are the majority at a school, this may reduce concerns of Black students appearing to "act White." No specific evidence concerning other underrepresented groups was located. Furthermore, a larger proportion of racial and ethnic minority students are also members of lower SES groups, and these social class differences can contribute negatively to impression management. More research is needed with regard to within- and across-group differences in the psychological and social adjustment effects of acceleration.

Psychological Adjustment

Psychological adjustment refers to students' feelings about themselves and measures of personal traits that affect well-being. Results from numerous studies and meta-analyses (e.g., Goldring, 1990; Kulik & Kulik, 1991; Rogers, 2004, 2010; Steenbergen-Hu & Moon, 2011), lead to the conclusion that the effect of acceleration on psychological adjustment is, in the worst case, not negative and, at best, is small and positive. In her review of 49 studies that reported 149 psychological outcomes, Rogers's (2010; this volume) analysis yielded a clustered average effect size of +.20, a small positive effect. Steenbergen-Hu and Moon reviewed 23 studies that reported 133 effect sizes, combining psychological and social adjustment effects in their analyses. They did not find a statistically significant social-emotional effect for acceleration. Neihart (2007) reached a similar conclusion—that there were no harmful effects associated with acceleration, but no advantages either. Studies have reported benefits such as positive self-esteem and higher educational aspirations (see Neihart, 2007 for a review). The effects varied somewhat across accelerative strategies (as described above). Studies pertaining to two important areas of psychological adjustment—self-concept and resilience—are described below.

Self-concept. Studies have assessed the effect of accelerative strategies on various domains of self-concept (Brookby, 2004; Coleman & Fults, 1982; Cunningham & Rinn, 2007; Lee et al., 2012; Karnes & Wherry, 1981; Kolloff & Moore, 1989; Maddux, Scheicher, & Bass, 1982; McQuilkin, 1981; Manor-Bullock, 1994; Parker, 1998; Preckel, Götz, & Frenzel, 2010; Rinn, 2006; Wright & Leroux, 1997). In general, participation in residential summer programs was associated with small gains in academic self-concept; however, students who attended full-time residential academies experienced a decrease in academic self-concept. An explanation for this difference may be that the short duration of summer programs does not cause the student to change the referent group for comparison, thus academic self-concept does not decrease as it does for students who are surrounded by equal- or higher ability peers in a new school and are no longer the "big fish." Similarly, Cunningham and Rinn (2007) noted that students who had prior experiences in summer residential programs had initially lower academic self-concepts than the first-time participants, but both groups had gains in academic self-concept over the course of the program. This observation of a drop in academic self-concept is supported by the theory that self-concept is adjusted when the student joins a new referent group that includes more similar ability peers and evidence of this effect (e.g., Marsh & Hau, 2003). However, it is important to note that, although a drop in academic self-concept has been observed in these situations, generally the levels of academic self-concept remain higher than average. Thus, the drop in academic self-concept likely reflects a more realistic self-appraisal and should not be of concern for most students. However, 12 of 44 students surveyed by Adams-Byers et al. (2004) cited reduced self-esteem and class rank as a social-emotional disadvantage of homogenous grouping, indicating this is a concern for some students. Rollins and Cross's (2014a) longitudinal study of gifted students at a residential academy explored how students adjusted and reframed such comparisons to avoid negative effects. If a student's identity is largely defined by his or her relative academic ranking, counseling should be provided to help the student gain perspective on this issue.

Aspects of self-concept other than academic self-concept have been studied and, generally, accelerants scored higher than other students. For example, Lee et al. (2012) surveyed past participants of summer residential programs and found that the participants had higher levels of global self-worth and much higher levels of scholastic self-competence than a norming sample. Many, but not all, aspects of self-concept increased over the course of short-term gifted programs. Cunningham and Rinn (2007) found very small increases in general and emotional stability self-concepts, and Rinn (2006) found increases in same-sex and opposite-sex peer relations over the course of summer residential programs. However, Little, Kearney, & Britner (2010) found no difference in gifted students' self-concepts after participation in a summer mentoring program, except for an increase in job competence. Overall, accelerants generally had higher self-concepts than non-accelerants and short programs tended to have positive effects on the self-concepts and peer relations of participants. Long-term homogeneous grouping of gifted students caused reduced self-concept, but most students adjusted and avoided negative effects.

Resilience. Rollins and Cross's (2014a) assessments of psychological adjustment in gifted students at a residential high school academy provide evidence of the resilience of gifted students. Psychological distress was measured five times over the course of an academic year using the Youth Outcome Questionnaire (YOQ; Burlingame, Wells, & Lambert, 2004). Their analyses revealed that the students who perceived the greatest initial increase in stress also experienced the most rapid reductions in stress over time. One limitation of this study was that 41 out of 170 students who did not graduate were not evaluated for psychological distress. Although students experienced moderate increases in anxiety, fearfulness, and depression upon transitioning to the new environment, they were resilient and able to develop coping mechanisms or adapt. Through interviews, Rollins and Cross (2014a) found that students modified how they thought, felt, or behaved to reduce stress and maintain achievement; this is evidence of enhanced social maturity (Neihart, 2007). Notably, students described social interactions as a lower priority than academic performance. Although many students perceived the school to be a negative experience in terms of the increased demands and personal constraints, the experience had utility value because it encouraged changes that better prepared them for college. The students were cognizant of the positive changes that had occurred within themselves during the experience. Rollins and Cross (2014a) described the students' responses as characteristic of thriving in a challenging context.

Social Adjustment

Social adjustment refers to social interactions and their effect on the student. Similar to what has been found for psychological adjustment, the overall effect of acceleration on social adjustment appears to be in the range of not harmful to small and positive. These conclusions are very similar to those made by Robinson (2004). Far fewer studies have been conducted regarding social adjustment than for psychological adjustment, which refers to personal traits that affect well-being and self-perceptions. This is likely due to the greater challenge of operationalizing or measuring social adjustment. In her best evidence synthesis, Rogers (2010) examined social adjustment effects reported from 27 studies and found an average effect size of .14, a very small positive effect. Neihart's (2007) analysis and synthesis identified several studies that reported accelerants had more satisfying social relationships (e.g., Gross & van Vliet, 2005) and that there was no evidence of significant negative effects on social development (e.g., Gagné & Gagnier, 2004). Accelerants have also been compared to normative samples on various measures of social adjustment. For example, Lee et al. (2012) found levels of perceived interpersonal competence that were comparable to a norming sample and found no relationship between acceleration and social competence in a large study of past participants of Center for Talent Development programs. Such findings imply that acceleration does not negatively affect social competence.

Longitudinal studies. Researchers have also examined changes in social adjustment over time. To that end, several studies have been conducted in residential academies (RA). RAs are state funded residential high schools for gifted adolescents. There are two basic models of RAs; the first is a self-contained school, meaning that it can provide all of the services needed by the students, including the actual courses taken. This model is often referred to as the North Carolina model as it was the first of its kind. The second type is an early entrance to college program, wherein students take their classes in a university, often graduating with both a high school diploma and an Associates degree. The schools range in size from approximately 120 students to approximately 600 students and from serving either two grades (11 & 12) or three grades (10-12). Some schools charge nothing to attend while others now charge a few thousand dollars per year.

In a longitudinal study of students who were enrolled in a residential academy, Cross and Swiatek (2009) found changes in some social coping behaviors, namely that students became more likely to deny giftedness, less likely to engage in extracurricular activities, and more likely to see themselves as accepted by peers. Although an increased likelihood of denial of giftedness may seem to be a negative effect in this setting, it can be viewed as a positive change. Residential academy students have new referent groups that are more similar to self; the increase reflects this shift. Although statistically significant, the adjustment of students' views of themselves was not a large change. The reduction in social activities was explained by lower involvement in extracurricular activities because students found friends through other venues. Overall, changes in social coping strategy use were minor and residential academy students benefitted from accepting peers with similar high ability.

The results of Cross and Swiatek (2009) demonstrated that the appropriate interpretation of changes in social coping behaviors is context dependent. In a heterogeneous ability setting, increases in denial of giftedness may indicate higher levels of engagement in the process of impression management, which is a negative effect because it indicates these students may be hiding their abilities to avoid negative social consequences from age peers. However, in a homogeneous ability setting, the same increase may indicate a more realistic self-appraisal of ability, which is a positive effect because it indicates students have more realistic self-appraisals when compared to cognitive peers. In this way, the same behavioral change can be viewed as a positive or negative adjustment.

Interpersonal ability. Rollins and Cross (2014a) found that residential academy students' interpersonal relations scores did not change appreciably over the course of one year, implying that social adjustment experiences in the new context were similar to those before entering the academy. In other words, the research implies that students' interpersonal abilities are likely established by the beginning of the junior year of high school and unlikely to change appreciably. This is in agreement with the findings of Gross and van Vliet (2005), based on their comparisons of accelerants with nonaccelerants over the course of a 22-year longitudinal study of students with IQs greater than 160. They found that students who had not been provided acceleration opportunities suffered in terms of social relationships and that these problems continued later in life. Gross and van Vliet posited that students learn the social skills associated with friendship early in elementary school and that acceleration should occur before students accumulate negative social experiences caused by a mismatch in emotional maturity between gifted students and nongifted age peers. These findings have important implications for decision makers regarding acceleration -- that the withholding of acceleration opportunities for highly gifted students can have a bigger and longer lasting negative effect on adjustment than the provision of acceleration opportunities.

Conclusions

Robinson's (2004) synthesis, coupled with the current review, guides our understanding of the effects of acceleration on the social and emotional lives of gifted students. The complex and nuanced studies lead to the primary conclusion that it is important to move from an omnibus statement claiming that acceleration has a positive influence on the social and emotional lives of gifted students to a generally positive, but more qualified statement. For example, there have been relatively few studies across acceleration approaches that have found negative impacts—but there have been some. Cross and Swiatek (2009) found changes among gifted adolescents in a residential academy in some social coping behaviors. The students became more likely to deny giftedness, less likely to engage in extracurricular activities, and more likely to see themselves as accepted by peers. On the other hand, there have been many studies that have found no negative effects and many that found positive effects (Neihart, 2007; Rogers, 2010). Given the fact that most of these studies have relied on self-reported data (typically from children), retrospective studies, and imperfect instruments with data collected in relatively short periods of time without evidence of long-term effects, one should remain cautious about extrapolating from existing data.

The researchers' limited capacity to utilize research designs that can determine cause and effect adds to the complexities of studying this topic. These types of studies are very difficult to arrange in schools and therefore are quite rare. As a consequence, there are few studies that use the most rigorous designs to determine cause-and-effect relationships among social emotional needs or outcomes and academic acceleration. Most studies are self-report, survey, observation-based, causal-comparative, quasi-experimental, or qualitative in nature. While there are a large number of studies in aggregate on the topic of acceleration, once sorted by their respective variables, very few topics have enough true experimental research underpinning them to be compelling.

At this point, we can say that the effects of acceleration on psychological adjustment vary somewhat by virtue of the type of program (i.e., the degree of acceleration) and the setting or context in which the program exists (Neihart, 2007). In short-term programs, the social-emotional effects are generally positive, but in year-long schools, a drop in self-concept scores may occur (Marsh et al., 1995). We also see some evidence of a similar drop in special classes for gifted students. The observed drop in self-concept associated with some forms of programming and how to interpret that drop merits discussion. Many researchers and educators agree with Sternberg (1999), who noted that to be competitive in challenging fields, a person needs a realistic assessment of his or her abilities. In other words, this realistic appraisal effect, interpreting a drop in self-concept as a potential positive, was not a common view before these types of findings emerged, which warranted further analysis and interpretation.

Research on early entrance to school generally reports positive effects. Gagné and Gagnier's (2004) study revealed that early entrants, as a group, were more adjusted than regular entrants; however, 37% of early entrants were less well-adjusted. This finding, while not common, led to a recommendation to not admit students with a birthday more than three months from the cut-off day for entrance (Robinson, 2004). Obviously, additional long-term research is needed.

Although there are few studies on the social-emotional lives of gifted students who attend early college high school programs, the preliminary results are positive. The published studies have reported on diverse student bodies and have documented positive effects on identity formation and lived experience.

Overall, grade-skipping has shown the most positive effects across acceleration techniques, although a few studies have reported neither a positive or negative effect. Moreover, Gross (2006) reported that the practice of more radical forms of grade-skipping for elementary-aged students with IQ scores 160 and above led to better social self-esteem and social relationships.

Grouping students for instructional purposes receives attention from professionals and laypeople from outside the field of gifted education. Most of the concerns about grouping were primarily philosophically based. The criticisms have tended to treat all forms of grouping as tracking students, a practice long rejected by gifted educators and general educators alike. Empirically there is support of flexible grouping techniques as having positive effects on the social and emotional lives of gifted students.

While researchers and gifted educators have much to be optimistic about, we have the most data representing gifted students from summer programs held at universities or in schools, ranging primarily from middle- to upper-middle-class students, most often with very little diversity represented. But once we shift our focus to students who come from more diverse backgrounds or from financially impoverished backgrounds, our data drops off significantly—so much so that the recommendation is to not make unqualified claims until more research is conducted. For example, although one would be hard pressed to make a case that acceleration causes harm to White students from middle- and upper-middle-class backgrounds, we cannot say with confidence that the same is equally true for gifted students from underrepresented groups who attend schools as minority students. Emerging research shows that the acceleration of minority students has positive effects academically and social-emotionally when the students attended schools in which there was a minority majority (e.g. Black students were accelerated in a school with a predominantly Black population). However, the research base in this area is quite limited.

It is time to explore and portray this topic in increasingly sophisticated developmental ways. By focusing more on development over time, myriad ways in which acceleration can affect the gifted students who participate—and those who do not—will be made more evident. The progress made to date has well positioned us to go deeper into the topics by incorporating important psychological constructs that have yet to be included. Recent examples of expanding research on the impact of acceleration on the social and emotional lives of gifted students include:

- needing a more diverse student body;
- drawing on new psychological constructs and/or instruments;
- increasing the number and types of study designs;
- conducting delayed or follow-up assessments over time;
- emphasizing context;
- increasing the number of qualitative studies; and
- expanding the variables and factors studied.

Movement in this direction will better address our questions about the effects of acceleration on the social and emotional lives of gifted students.

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The Role of Acceleration in Policy Development in Gifted Education

Joyce VanTassel-Baska
College of William and Mary, Williamsburg, Virginia

Abstract

This chapter examines the issues associated with constructing educational policy in the area of gifted education. Acknowledging that no federal policy exists, the author traces the research conducted on gifted education state and local policies. This research is the basis for discussing directions essential in overcoming the patchwork quilt model for gifted education policy that is currently in place across the country. In particular, the chapter delineates the role of acceleration in framing a state and local policy for the gifted, noting the need for solid research-based options to be at play for gifted students and the relative cost benefits of employing acceleration processes liberally in their various forms. The chapter concludes with a list of questions to consider in judging the efficacy of gifted education policy overall and a decision model to be employed by states in examining different policy alternatives. Based on the criteria examined and rated, acceleration options appear to be the most cost effective and the best researched of all educational policy options available for consideration, even though they receive less public acclaim than other options.

Introduction

Before addressing policy concerning acceleration as an intervention for gifted students, we must acknowledge that currently a national or federal policy for gifted education does not exist. Consequently, individual states and local education agencies (LEAs) implement gifted education programming in a variety of ways (National Association for Gifted Children [NAGC] & Council of State Directors of Programs for the Gifted [CSDPG], 2013). The result is inconsistency across states in terms of availability of options and continuity of practice, including the implementation of acceleration. This is why it is important to consider what information is necessary for policymakers to develop and implement policy for gifted students, which is particularly relevant so that high ability students have equal access to identification and services, regardless of geography. The role of accelerative interventions in both the articulation and enactment of such policies is a critical consideration. Research that informs best practice should be the foundation of policy formulation and implementation. Because research on the effectiveness of acceleration is the bedrock for best practice in gifted education, it should play a major role in policy development and enactment of gifted education practices at state and local levels.

What is Educational Policy?

Educational policy may be defined as a course of action adopted by a governing board, and motivated to solve an educational problem or issue. The substance of policy usually rests in a set of governmental agency rules and/or standards by which educational agencies allocate resources to address the identified need. The ultimate test of any educational policy is the extent to which it improves the lives of students, promotes effectiveness and efficiency of schooling (Hannaway & Woodroffe, 2003), and protects student's rights and opportunities, all of which suggest that educational policy must be evaluated periodically to be sure it is accomplishing what is desired.

Gifted education policy at the state level is tied to the rules, statutes, codes, and regulations adopted by state legislatures, interpreted by state school boards of education and state departments of education, and implemented by local school districts. Ideally, policy in gifted education that is binding on local districts would be based on research evidence and address the areas of identification, programs/services, personnel preparation, assessment and evaluation. Most districts employ their state plans as a vehicle of accountability for receiving state funding, and focus on identification and limited programming features (Passow & Rudnitski, 1993; Shaunessy, 2003; U.S. Department of Education, 1993; VanTassel-Baska, 2003). The importance of coherent and comprehensive state policy in gifted education cannot be overstated because not only is it influenced through all policy levers such as mandates, laws, and court cases, it also affects the daily lives of gifted students and those professionals who work on their behalf.

Research on Gifted Education Policy

The *No Child Left Behind Act* neither excludes nor includes gifted learners (National Association for Gifted Children, 2003). Because gifted learners are not addressed, the implicit message is to focus on specific mandates addressed in the legislation, which compromises services for the gifted. Research reports in the field of gifted education have had negligible impact on changing this situation. Federally commissioned reports have empirically documented the need for gifted services (U. S. Department of Education, 1993), citing research that gifted students spend the majority of the school day in the regular classroom without curricular modifications or accommodations to meet their special needs even though they have already mastered 33–50% of the material to be taught prior to the start of the school year. More localized studies have found that gifted students are also at a greater risk for dropping out of high school or underachieving if their needs are not met, with 20% of high-school dropouts identified as gifted and more than 30% underachieving (Russo, Harris, & Ford, 1996; Stambaugh, 2001). Because of the lack of federal response to the needs of gifted learners, specific policies and funding mechanisms are typically left to the advocacy efforts of interested stakeholders in state and local governments, causing great diversity and inequity in funding and services among and within states (Baker & Friedman-Nimz, 2004; Baker & McIntire, 2003; Passow & Rudnitski, 1993; Purcell, 1992; Shaunessy, 2003).

Whereas states with greater fiscal health boast more mandates and programming initiatives (Purcell, 1995), there is a variance among funding mechanisms employed within certain geographic or specific socioeconomic regions, causing inequity of resources among certain groups (Baker, 2001; Baker & Friedman-Nimz, 2004; Russo et al., 1996). Regardless, the impetus for state gifted policies, with or without funding, is reliant upon advocacy efforts, with a knowledgeable and persistent "champion" to spearhead the process (Robinson & Moon, 2003). The majority of states that do have mandates have identification mandates (Passow & Rudnitski, 1993; Stephens & Karnes, 2000), and approximately half of those states with mandates boast a mandate or partial mandate for gifted services, with the remainder of states citing no service mandate (Shaunessy, 2003).

What Do We Understand From the Research on Gifted Education Policy?

Policy studies in gifted education are few; however, there are two consistent findings across them. First, *mandates matter.* States that do not mandate gifted education have experienced significant cuts in programming or the elimination of programs (Brown, 2001; Landrum, Katsiyannis, & DeWard, 1998; Purcell, 1995). Although mandates do not guarantee meaningful education (U.S. Department of Education, 1993) or cohesive implementation, states with accountability systems enjoy higher academic results (Carnoy & Loeb, 2002). Second, *perceptions matter.* When policies make sense to those who implement them, the likelihood of systemic change is greater (Brown, 2001; McDonnell & Elmore, 1987; Rand Corporation, 1978). State policies can legitimize the need for gifted services and set the stage for dispelling misconceptions associated with giftedness. Gallagher (2002) specifically lists four recommendations to incorporate into gifted policy that will better educate gifted students. The suggestions include:

a) multi-dimensional identification;

b) more inclusive placement procedures, especially for International Baccalaureate and Advanced Placement programs (see also Bleske-Rechek, Lubinski, & Benbow , 2004);

c) differentiated programming of content; and

d) a greater level of program evaluation and accountability to include how gifted services make a difference in the lives of gifted students.

VanTassel-Baska (2003) illustrated the importance of curriculum policy that includes curriculum flexibility to better meet the needs of diverse learners; curriculum differentiation that specifically addresses the selection of high-level materials and worthwhile curriculum; articulation and alignment throughout the child's K-12 experience; grouping policies based on best practices (Kulik & Kulik, 1992; Rogers, 2007); and teacher development to support the necessary training to implement effective strategies and high-level curriculum for gifted learners. While a documented need for stronger policy in gifted education exists, the evidence for its presence in the field is scarce. Specific policies in or related to gifted education such as Advanced Placement (Bleske-Rechek et al., 2004; Dounay, 2006), identification (Stephens & Karnes, 2000), and self-report documents from most of the 50 states are available through the state education websites. However, a comprehensive study of intended policies, impact on student populations, and how policies are translated to practice as evidenced by stakeholder perceptions and actual policy documents does not exist.

Table 1: Policy Approaches and Possible Impact on Gifted Students

Policy Approach	Main Components	Expected Results	Advantages	Caveats
Mandates	Need for funding Investment of resources in new authority and governing structures	Compliance Skill enhancement Competency development	Long term behavior changes	Backlash against trying to standardize delivery of programs and services Negative reaction to coercive nature of mandates
System-Changing Rules and Regulations	Similar to mandates	Short-term assistance for gifted	Perceived to be less coercive Stakeholders less defensive	May be more subject to future changes in intent and operation than a mandate May not have accompanying monitoring system
Use of Existing Educational Policies to Benefit the Gifted	Gifted education per se is not referenced, yet is implicit in some state requirements (e.g., Virginia requires that high schools offer three different AP classes, which will also benefit gifted learners).	Students and parents are informed of opportunities that exist outside of specific gifted programming and can take advantage of these options.	Cross-reference state legislation to gifted education programming; Important to have firm articulation of curriculum that prepares students for advanced work in earlier grades.	Specific focus may be on other populations (e.g., low-income) not gifted; however, if there is flexibility in permitting younger students access, gifted students will benefit.

Current Gifted State Policy

Overall, the few models for gifted education legislation and regulations fit into two broad categories. The first category is premised on a group orientation, either permissive or mandatory. The vast majority of state statutes and regulations for gifted education fit in this category with varying degrees of strength and specificity. The primary characteristic is specification of state and local level responsibilities, but without individualized substantive and procedural requirements that serve as the basis and avenue for litigation if the responsibilities are not met by the state. Most states employ self-monitoring strategies as the model for compliance with regulations rather than using state-level resources for on-site monitoring purposes. Perhaps the strongest state policy monitoring for gifted programs occurs in Ohio (see IRPA, NAGC, & CSDPG, 2009, p. 20).

The second model, a federal model, is analogous to the federal Individuals with Disabilities Education Act (IDEA, 2004), in that it is mandatory as well as individually oriented. It includes an individualized program requirement, which in the IDEA is "Free and Appropriate Education" as documented in an individual education plan (IEP), and an impartial dispute–resolution mechanism, which in IDEA includes at least a due process hearing and judicial review. This second model may yield a body of case law to fill in the gaps, but, to the extent that parents of gifted children follow the path of parents of students with disabilities, the trade-offs include adversarial relationships between parent and district as well as high transaction cost (Zirkel, 2009). Thus far, only a handful of states, including Pennsylvania, have fully opted for this model, usually with partial differentiation from the framework for students with disabilities.

Policy Mechanisms

There are several policy approaches used in education that can be considered when gifted education policy is addressed at the state level. The various instruments employed in policy implementation are described in Table 1.

State of the States Report: A Snapshot of State Policy

The biennial State of the States Report has been a staple for professionals in the field of gifted education over the past 20 years and offers an important view of gifted education across states that is relative to policy and practice. Commissioned by both the National Association for Gifted Children (NAGC) and the Council of State Directors of Programs for the Gifted (CSDPG), the report provides valuable statistics that yield important comparisons across states and across time periods.

Data from the 2012-13 State of the States Report (NAGC & CSDPG, 2013) provide a snapshot of the extent of state support for gifted learners in that school year. Forty-two states responded, although some responding states did not give complete information. Survey responses from 36 states indicated that 14 of those states allocated no funding for gifted and talented education while 15 states spent $10 million or more, representing an overall increase from the previous two years. Mandates in gifted education were reported by 23 states in both identification and services, while five states reported a mandate only in identification, three states reported a service mandate only, and 11 states reported no mandate at all. The funding for these mandates varies across states: four states fully fund the mandate, 18 states' mandates receive partial funding, and eight states do not fund the mandate.

Only one state reported requiring gifted and talented training in initial teacher preparatory programs, while 17 states required classroom teachers working in specialized programs for gifted students to have a certificate or endorsement in gifted education. States reported changes to gifted and talented teacher training and/or curriculum planning due to implementation of the Common Core State Standards occurring in districts (n=14) and at the state level (n=11), but there is little evidence of the impact of the Common Core State Standards on teacher training efforts in gifted education. While over half of the 42 states reporting noted that they required programming for the gifted, most also noted that districts had great latitude in making decisions about the nature of those programs. While more states report monitoring programs and student performance, only a fifth collect demographic data that would allow inferences to be drawn about student profiles.

Based on this data, it is fair to suggest that despite mandates in more than half (32) of the states, many states fail to provide strong direction regarding the education of gifted and talented students. In states that do, there is often a lack of specificity and clarity in the state laws and policies designed to guide LEAs in establishing identification procedures, programs, and services for gifted learners. Additionally, there is a broad range of state and local resource allocation.

How Should Acceleration-Focused Interventions Affect Policy?

NAGC's (2004) policy paper on acceleration focuses on ensuring that different types of acceleration are included and that different stages of schooling are addressed from early childhood through adolescence. Furthermore, this policy paper encourages the inclusion of acceleration in state policy to ensure effective implementation across districts.

The Institute for Research and Policy on Acceleration (now called the Acceleration Institute), the National Association for Gifted Children, and the Council of State Directors of Programs for the Gifted provided a strong basis for both state and local district policy development with *The Guidelines to Developing an Acceleration Policy* (IRPA, NAGC, & CSDPG, 2009; see Appendix C). They recommend constructing acceleration policies that:

- Are widely available and equitable;
- Are based on data supporting the need;
- Include implementation guidelines that have a process for awarding credit;
- Prevent nonacademic barriers and unintended consequences through an evaluation of policy effectiveness.

Types of acceleration that are research-based provide an important foundation for making decisions about program, curriculum, and service options at all levels of schooling (see Rogers, this volume). Moreover, accelerative options (see Southern & Jones, this volume) provide the basis for establishing a meaningful scope and sequence of opportunities for gifted learners throughout the K-12 continuum. Specific policies on acceleration also ensure that gifted students receive acceleration as a viable alternative in their program plan (IRPA, NAGC, & CSDPG, 2009). Lastly, acceleration interventions can be easily assessed for efficacy with individuals and groups of learners, helping to satisfy the call for evaluation of programs and services for the gifted. Thus, acceleration options are an integral part of policy formulation for gifted learners.

However, state laws and policies vary greatly in the acceleration opportunities afforded gifted and talented students across the nation. Nine states specifically permit acceleration, while 11 states leave the decision up to LEAs. Eight states have policies specifically permitting early entrance to kindergarten, and 29 states specifically permit gifted students to be dually or concurrently enrolled in high school and college.

Access to information about programs, services, and student performance allows advocates to monitor state and LEA commitment to ensuring academic growth in all student populations. Thirty states (of the 42 reporting) require all local districts to report on their gifted and talented services through state accountability procedures or guidelines. Those reports may include information about teacher training, service options, and demographics of students served, among other topics which vary by state. Less than half of the states (N =19) publish gifted education indicators in state reporting (these included number of identified students, availability of AP coursework, achievement/performance of gifted students as a separate group).

As evidenced, states vary considerably in the types of policies enacted for gifted learners. Yet they are similar in the pattern of policies attended to. Identification is by far the strongest area of policy enactment by states, while linkages of identification to services and the larger school reform agendas outside of the core of gifted education are generally lacking. Although acceleration policies appear to be gaining ground, only a few states require differentiation of standards for gifted learners, personnel preparation of leadership, and alignment of content standards to gifted education objectives. Even fewer states provide accountability systems for local districts to adhere to policies, incorporate gifted programming, or disaggregate test data on gifted students.

Considerations for Quality Gifted Policy Development at State and Local Levels

All states need to have comprehensive policies for educating gifted and talented students in the following areas: identification, program and service provisions, personnel preparation, and program management. Furthermore, supplemental state policies that exist and affect gifted students need to be analyzed and linked to gifted education in some way. Existing policy should be regularly assessed for its effectiveness. A state/local advisory council can provide oversight to the state/local service delivery plan, which receives the local Board of Education approval.

Identification policy. Identification policy requires an operational definition of giftedness that can be used as the basis for determining a funding formula for the state. Many states use their definition to restrict the number of students served such as providing a cap on the percentage of students served. Other states cap the numbers served via score cutoffs on instruments used for identification. Still other states do not cap the numbers served but specify the types of instruments that must be employed in the identification process and/or the areas in which students may receive services, theoretically controlling the numbers of students eligible for services.

Multiple criteria should be employed to identify students in each category of giftedness. Most documents in the field suggest at least three criteria be employed for each area, although research is less clear about the number to be used as long as it is more than one tool.

Equal stringency should be applied to the identification for all categories of giftedness. Clear specifications that identification may occur in all categories of giftedness (e.g., general academic ability, specific academic aptitude, creativity, leadership, and the visual and performing arts) should be cited.

With respect to the consideration of acceleration in any of its forms, states policy should include the recommendation to use above-level (see Olszewski-Kubilius, this volume) measures to ensure that highly gifted students are recognized in the academic areas of reading and math at the ages when they are ready to progress at a faster rate of learning and with advanced material. Typically, this would be in the primary grades despite the fact that widespread testing for gifted programming often does not occur before second grade or third grade and talent-search above-level testing programs are typically not accessible until third grade. Traditional intelligence measures such as the *Cognitive Abilities Test* (CogAT; Lohman & Hagen, 2011) may also be used to target high aptitude areas by examining subscores in quantitative and verbal areas.

A systematic process for the linking of identification procedures to appropriate program and service provisions, including accelerative options, should be articulated. A process for equitable decision making at screening, identification, selection, and placement stages, including an appeals process, also may be delineated. Specific provisions for the identification of special populations, including low income, ELL, and twice-exceptional learners, are important. Research suggests that the following options may be useful: adjusting the entrance criteria to represent local norms, which may mean that the percentile ranking is lower than national norms; adding measures such as performance-based assessment or nonverbal measures to assess latent abilities; and taking the top 10% of these students across all measures used may be more effective in ensuring representation in gifted programs (VanTassel-Baska, Johnson, & Avery, 2002; Lohman & Lakin, 2008).

Educational programs and services. Educational programs and services for the gifted must provide an optimal match to the mechanisms used to identify students. Thus, a careful delineation of program and service components should be included in state regulation and may include grouping arrangements that are conducive to administering gifted programs and include cluster, resource room, pull-out, special classes, or self-contained programs. At least one of these options should be considered to ensure adequate service delivery to gifted learners, consistent with the research on ability grouping of the gifted (Rogers, 2007). Furthermore, contact time for programs and services needs to be sufficient to demonstrate learning gains at the conclusion of a program or school year. Typically that would mean that school-based programs require at least an hour a day contact time or its equivalent across a week or a month (Callahan & Plucker, 2014).

Curriculum should be modified in each relevant subject area for identified students according to the need for acceleration, complexity, depth, challenge, and creativity. Such curriculum differentiation is built upon and extends standards-based regular curriculum and requires the development and/or use of curriculum designed for gifted students (VanTassel-Baska & Little, 2011; VanTassel-Baska, 2013). Instruction employed in classrooms for the gifted is appropriately diverse in technique and emphasizes inquiry-based tactics and strategies such as problem-solving, critical thinking, and research.

Curriculum objectives should be closely tied to assessment practices for gifted programs. In addition to above-level standardized tests, performance-based tasks, and portfolio approaches are encouraged (Johnsen, 2012) to match the nature of differentiated instruction provided.

A modified and extended program (i.e., value-added) is articulated to accommodate at-risk and highly gifted populations identified. Low income, culturally diverse, second language learners, and twice-exceptional students should be addressed specifically in state regulation to ensure appropriate services (VanTassel-Baska, 2009; Callahan & Plucker, 2014).

Acceleration in the learning rate of gifted learners is an important option for a quality gifted program (IRPA et al., 2009). The following accelerative options are central to such efforts:

- Enter kindergarten early, based on meeting the identification guidelines for general intellectual ability;
- Advance more than one grade based on review of performance and ability criteria;
- Advance in one subject area;
- Enter middle school, high school, or college early as determined by overall performance, demonstrated readiness, and relevant exit examination testing;
- Test out of state standards requirements early.

Other advice related to making informed decisions about whole-grade acceleration may be found in the *Iowa Acceleration Scale* (Assouline et al., 2009)

Social–emotional support for student development is included as a part of the service delivery plan. Academic guidance and career counseling are available at grades 6–12, emphasizing the need for advanced course-taking early and the use of student assessment data to counsel students on college and career alternatives.

Personnel preparation. Endorsement or certification of teachers in gifted education is a necessary provision to include in regulations regarding personnel preparation (see Croft & Wood, this volume). The personnel preparation initiative should contain these components, which are based on the approved National Council for Accreditation of Teacher Education (NCATE) standards for gifted program teacher preparation (National Association for Gifted Children & Council for Exceptional Children, 2006) and the *NAGC Pre-K-Grade 12 Gifted Program Standards* (Johnsen, 2012):

- A minimum of 12 hours of coursework in gifted education should be required and linked to university-based programs with a statewide university network collaborative working on implementation. The 12-hour course requirements should reflect the NCATE standards for gifted program teacher preparation. Frequent, regularly scheduled staff development opportunities for all program staff should be required. In addition, all classroom teachers, school counselors, and administrators should receive professional development in the national standards for gifted education personnel (VanTassel-Baska & Johnsen, 2007).
- Individuals who serve as gifted education program coordinators should be required to complete an additional 15 hours of coursework in educational administration, in addition to the requirements for endorsement or certification for working with gifted learners (VanTassel-Baska & Feng, 2004; Wood, 2014).

Assessment of the Administrative and Political Consequences and Implications of Each Policy Option

Before new state policy can be enacted, it is critical that a formal assessment be conducted to answer the following questions:

- What are the perceived costs and benefits of the new policy?
- How does it fit within existing policy?
- What are the interests of stakeholder groups related to the new policy or the issue that the policy is designed to address?
- Are there links between these desires and interests and the potential consequences for each policy option?
- Does the policy option consider the unique needs of underserved populations (e.g., low income, minority, twice-exceptional, and ELL)?
- Are there unintended consequences of the policy for any of the groups noted above?

Moreover, it is useful to rate each policy option on a scale of one to five in regard to the following criteria:

- Clarity (Is the policy clearly articulated?)
- Comprehensive (Does the policy address all relevant components e.g., program/service design?)
- Connectedness (Does the policy reflect connectedness to existing and newly proposed policies?)
- Feasibility (Is the policy practical for implementation?)
- Research-based (Does the policy have research support in the gifted education literature?)

Thus, the four policy areas for policy development—identification, program and services, personnel preparation, and program management—all should receive ratings that ensure their high quality for gifted education regulations. Acceleration practices, considered to be part of the program and services area, should receive special consideration to ensure that they are linked to any separate state policies, e.g. Advanced Placement, International Baccalaureate, and dual enrollment programs for secondary students.

Another way to rate policy options would be to consider them by the type of program to be instituted at the state level and then to use the results for deciding on particular choices. Gallagher (2006) established a decision-making matrix for use in gifted education that examined different policy options and their relative "play" in the larger society. For example, the option of residential schools for the gifted has strong support from parents, policy-makers, and the general public, producing evidence of strong outcomes for students and having light costs and personnel needs. Table 2, adapted from Gallagher (2006), illustrates a set of six policy options that states (and some large districts) may, and often do, consider for providing gifted services to students.

These options are examples and are not considered exhaustive of the many possibilities. Each option is rated based on a set of criteria that must be considered in adopting policy: 1) cost, 2) personnel needs, 3) research base, 4) public, and 5) parental support. The scale used to judge each criterion is: high, moderate, mixed, or low. Where the preponderance of evidence, based on existing research and practice, suggests one of these ratings per criterion, it is assigned.

Results are interesting to examine. Low cost and low personnel preparation needs are important pluses for any policy option. Yet, lack of real cost must be balanced by acceptance of the initiative in the legislature and among the public of interested stakeholders who typically are parent groups. Moreover, the presence of a strong research base is also a critical consideration in adopting a policy option. Thus, the options that emerge as most viable in this chart are the funding for specialized schools, summer and academic year opportunities outside of school, and educational acceleration.

The table illustrates the low cost of acceleration options with respect to funding and personnel preparation costs and in comparison to other alternatives, its superior evidence base, and its high acceptance among parents. Only in the general community does acceleration rate lower, receiving mixed results based on stakeholder group data. Yet it is the only option that has a superior research base. When states analyze the options for serving gifted learners, they cannot ignore the positive benefits that acceleration options can confer as shown through the research highlighted in other chapters in this volume.

Conclusion

The development of appropriate policies in gifted education at local, state and national levels provides the glue that holds gifted education together. Ensuring that these policies have been developed with an eye to core criteria and reflecting up-to-date research is crucial to improving practice. Moreover, greater coherence among program policy elements will enhance the overall operation of gifted programs, and sound evaluation of the impact of policy will advance the field. The prominent role of acceleration policies and practices in this process is a crucial aspect of ensuring measurable outcomes and research-based options for our brightest learners.

Table 2: Decision Matrix for Gifted Education Policy

Criteria for Choice(s)	Cost	Personnel Needs	Research Base	Public Acceptance	Parental Support
Explanation of Criteria	*This criterion examines the dollar cost for funding adequately each option within a state as judged by a per pupil allotment figure.*	*This criterion examines the personnel needed to carry out the initiative as judged by the cost associated with hiring and training for the initiative.*	*This criterion examines the research base that supports the initiative, as judged by its extensiveness and longevity of evidence of success.*	*This criterion examines the degree to which the general pubic accepts the initiative as judged by willingness to have tax dollars go to support it.*	*This criterion examines the degree of parental support that an initiative enjoys, as judged by parental approval, involvement with the initiative, and parental support for it monetarily.*
Options at state/local levels for funding considerations in gifted education					
School-based gifted programs *This option offers gifted services to a wide range of gifted students and promising learners through grouped opportunities for advanced learning at all levels. Services may be provided for up to 10% of the population by school. Menus of curriculum opportunities are selected, based on school preferences for specific models, approaches, etc.*	High	High	Mixed	Low	High
Personnel preparation for gifted *This option offers up to 12 hours of graduate coursework or its equivalent to teachers who will be working with gifted learners in their schools. Training would be conducted by higher education personnel from each state. High school personnel working with honors courses, AP, and IB would participate. Emphases would be on nature and needs, curriculum and instruction, program development and guidance, and counseling the gifted. States would provide the basic funding with ongoing professional development funding provided by districts on an annual basis*	Low	High	High	High	High
Specialized residential state schools in STEM/Math and Science *This option would provide one school in every state, devoted to the top students in math and science at the high school level, who would be eligible to attend for the last two years. Students selected would receive free tuition and room and board at the residential site selected for the school.*	Low	Low	Moderate	High (in states where schools exist)	High
Summer programs/academic year out-of-school programs *This option would fund summer and academic year activities for gifted learners that would include online opportunities. Programs would need to be sponsored by consortia of higher education and school district entities. Competitive RFP's for the funds would be offered in each state.*	Low	Low	High	High	High
Educational acceleration *This option would provide for all types of acceleration on a state-wide basis, ensuring that students receive vouchers to fund AP and IB test experiences. IBO cost would also be absorbed by the state. Agreements between higher education and K-12 schools would be effected to ensure younger students' matriculation to relevant coursework at appropriate ages and stages of development.*	Low	Low	Very High	Mixed	High
Status quo *This option would keep gifted education a discretionary option at local levels for the most part, continuing the patchwork quilt model currently in place. States and universities may or may not provide appropriate options for the gifted based on funding and political considerations. Gifted services would be carried out as each district is capable and desirous to do.*	High	Mixed	Mixed	Mixed	High

Adapted from Gallagher, J.J. (2006). Driving change in special education. *Baltimore, MD: Brookes.*

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Whole-Grade Acceleration: Grade-Skipping and Early Entrance to Kindergarten or First Grade

Ann Lupkowski-Shoplik, Susan G. Assouline, and Nicholas Colangelo
The University of Iowa, Iowa City, Iowa

Abstract

A systematic decision-making process for whole-grade acceleration recognizes the importance of accurately and meaningfully assessing the factors to consider for whole-grade acceleration. Central to the process is the consideration of the student's academic ability, aptitude, and achievement. Additionally, the support of the school and parents helps ensure a successful experience with acceleration. Using a tool such as the *Iowa Acceleration Scale* (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009) provides the structure for this decision-making process. Several states have established comprehensive acceleration policies that provide examples of how acceleration can be implemented systematically in schools.

Thank you. The outcomes of accelerating him past sixth grade to seventh grade... have been incredibly positive for [our son] both academically and socially ...if he knew to do so, I'm sure he'd thank you for your encouragement as well.

Parent of accelerated sixth grade student

I want to thank you again for giving me very powerful tools to advocate for my daughter ...I am confident that eventually the tide will turn in this country regarding acceleration. I foresee that schools will start nominating students for acceleration, instead of every request coming from the parents. I also wanted to let you know that there are teachers out there who advocate strongly for their students on this issue. [My daughter's] homeroom teacher for fourth grade this year... was very strongly in favor of acceleration and spoke eloquently and strongly at our meeting, in addition to taking many actions in the preceding weeks to help with the process.

Parent of accelerated fourth grade student

Introduction

The educational intervention of academic acceleration takes many forms, including early entrance to school, grade-skipping, moving up to a higher grade for a specific subject, self-paced instruction, mentoring, curriculum compacting, and Advanced Placement (Southern & Jones, 2004a; this volume). It is helpful to think about these forms of acceleration as falling into two general categories, subject-based acceleration and grade-based acceleration (Colangelo, Assouline, & Gross, 2004; Rogers, 2004). Subject-based is also referred to as content-based acceleration and offers advanced content and skills prior to the grade or age for which that content is typically presented. Examples of subject-based acceleration include single-subject acceleration in a specific area such as math; curriculum compacting; or Advanced Placement coursework. Grade-based acceleration reduces the number of years that a student spends in the K-12 system (Rogers, 2004). Examples include whole-grade acceleration, which is commonly referred to as grade-skipping; and grade telescoping, which occurs when a group of advanced students accelerate through more than one year's curriculum in one year. A special case of grade-based acceleration is early entrance to kindergarten or first grade. The focus of this chapter is on grade-based acceleration. Because grade-based acceleration is the most visible form of acceleration (Southern & Jones, 2004a; this volume), it is often the center of concern or controversy around the topic of acceleration.

In this chapter, we examine the decision-making process for whole-grade acceleration, including the importance of assessing academic ability, aptitude, and achievement. We also discuss the school and parent perceptions of general attitude and support for the process. Additionally, this chapter addresses early entrance to school, a special application of whole-grade acceleration. Brody and Muratori (this volume) address early entrance to college, another type of whole-grade acceleration. The final section includes practical suggestions from our clinical and school-based experiences with acceleration, as well as information from school districts and states that have implemented acceleration and early entrance to school systematically.

Prevalence of Grade-Based Acceleration

Despite the extensive body of research (see Rogers, this volume) supporting the effectiveness of whole-grade acceleration and perhaps because of the controversy surrounding the notion of skipping a grade, including entering school early, the prevalence rate for this academic intervention is low (Wells, Lohman, & Marron, 2009). Wells et al. (2009) analyzed data from two large data sets: the National Educational Longitudinal Study (NELS) and the Educational Longitudinal Study (ELS). The NELS data included a representative national sample of 24,599 United States eighth graders, with base year 1988 and a follow-up study in 1992, when students were in twelfth grade. The ELS data included a national sample of 16,252 U.S. tenth graders in 2002 and a follow-up study of these students in 2004 when they were in twelfth grade. Using age to determine which students were grade accelerated, students were considered to be accelerated if they were two years younger than the normal age for students in that grade, or if they were one year younger than usual but were born on or after January first of the appropriate year. Using these criteria, 1.4% of the NELS sample (336 students) and 0.6% of the ELS sample (100 students) were considered accelerated. Accelerated students in the Wells et al. study included both those who actually skipped a grade at some point in their educational career, as well as those who entered kindergarten or first grade early.

Wells et al. (2009) found that the 1988 cohort had a larger percentage of accelerated students than the 2002 cohort, perhaps indicating that grade acceleration declined in popularity over time. This shift could have occurred because schools are now offering more options such as enrichment or single-subject acceleration, or because parents and schools have moved away from using grade-skipping as an educational option. Or, since the sample sizes of accelerated students in the data sets were relatively small, it could simply reflect sampling error. It is clear that grade-skipping was not an option that was used very often in United States schools during the time periods studied. There is an additional irony to this observation: beginning in the early 1980s through the present day, the Talent Search Model of discovering and developing academic talent (Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003; Olszewski-Kubilius, 2004; this volume), a university-based gifted center model that features acceleration (Assouline & Lupkowski-Shoplik, 2012), has burgeoned.

Deciding Whether or Not to Accelerate a Student: *The Iowa Acceleration Scale (IAS)*

There are likely many reasons for the low prevalence of whole-grade acceleration in schools, including a basic lack of awareness of the effectiveness of the intervention, concern about the impact on a student's social-emotional development, as well as concern about the lack of a systematic procedure for making this decision. It may even be the case that the lack of a systematic approach to applying this highly effective intervention contributes to the reason for the low prevalence rates. Feldhusen, Proctor, and Black (1986) and Feldhusen (1992) noted the importance of evaluating an encompassing set of factors with respect to whole-grade acceleration. Around the same time period, Assouline, Colangelo, Lupkowski-Shoplik, and Lipscomb (1998), systematized a protocol for the decision-making process around whole-grade acceleration. This protocol, the *Iowa Acceleration Scale* (*IAS*; Assouline et al., 1998) was grounded in the clinical work of the Belin-Blank Center and the field experiences of teachers and administrators in schools in Iowa. The *IAS* was developed as a practical tool to guide parents, students, and educators to work together to make the decision regarding whether or not to accelerate. Since 1998, the *IAS* and the subsequent editions, the *IAS-2* (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt 2003) and the *IAS-3* (Assouline, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009) have proven to be systematic and defensible ways to generate recommendations and guidelines for whole-grade acceleration (Assouline, Colangelo, Ihrig, Forstadt, & Lipscomb, 2004). One of the important considerations in whole-grade acceleration, and an especially strong feature of the *IAS-3* (Assouline et al., 2009), is systematizing the decision-making procedures in order to improve the probability that adequate information is gathered and objective decisions are made (Assouline et al., 2003; Piper & Creps, 1991).

Most people, educators and non-educators alike, react emotionally when the topic of grade-skipping is brought up (Colangelo et al., 2004). It seems natural to be extremely cautious and to remember one or two negative events concerning other accelerated students. As well, many assume that the "safe" intervention is to do nothing (Colangelo et al., 2004). The *IAS* was designed to assist school personnel and parents in thinking in a more organized manner about each of the various aspects of the acceleration decision rather than allowing an emotional reaction about a single event that they may have only heard about, not necessarily witnessed, to direct the decision. It uses the large body of research indicating that acceleration is a viable option for many academically talented students, and it helps parents and educators to feel confident that they have indeed considered all of the important factors in making the decision.

The *IAS-3* (Assouline et al., 2009) was developed after decades of clinical and fieldwork with students considered for whole-grade acceleration. The *IAS-3* manual describes the purpose and items in detail; a considerable portion of this current chapter relies on the literature review for the *IAS-3* and our clinical experiences with students who have been accelerated. The *IAS-3* includes items that are rated and categorized into five subtotals that include the most important issues for consideration by educators and parents. The subtotals are: (1) Academic Ability, Aptitude, and Achievement; (2) School and Academic Factors, (3) Developmental Factors, (4) Interpersonal Skills; and (5) Attitude and Support.

The Role of Academic Assessment in the Decision-Making Process of Whole-Grade Acceleration

Included in Feldhusen's (1992) set of comprehensive factors is the need to evaluate the match between the learning task and the learner's readiness for the task. The learner's readiness for the learning task is best understood through assessment of ability, aptitude, and achievement; these indicators are integral to the decision-making process about acceleration.

Are assessment and testing identical? We agree with Sattler (2008) and view testing as one of four components of an assessment. Assessment is the umbrella term for comprehensive and systematic gathering of information about a child so that an informed decision can be made. Testing is the most standardized and technical component of assessment (See also Matarazzo, 1990). The other three components, according to Sattler, include interviews, observations, and informal procedures. Piper and Creps (1991) suggest that in making placement decisions, grades, observations, and interviews may be more vulnerable to bias than standardized testing procedures and they emphasize the value of observation in one-on-one testing. The *IAS-3* is not a test; it is an assessment, which includes testing, interviews, observations, and informal procedures (e.g., review of records, documentation of interventions). In the following sections, we discuss the testing components of the *IAS-3* assessment process.

Tests Needed for the *IAS-3*

At the beginning of the 21st century, there were nearly 3,000 commercially available tests (Murphy, Impara, & Plake, 1999), and with respect to test validity, reliability, and method of administration, there are thousands of combinations of effectiveness. Nevertheless, several tests have emerged as more valid and reliable than others, and these have become the standard tests used by the majority of educators and psychologists when assessing children. The latter collection constitutes the basis for our recommendations regarding the testing of ability, aptitude, and achievement for whole-grade acceleration decisions.

Many educators use the terms ability, aptitude, and achievement interchangeably; however, we find the continuum developed by Linn and Gronlund (1995), which uses exposure to subject content, to be an effective scheme for distinguishing among the types and purposes of tests. Achievement tests are based upon the student's exposure and expertise with specific school-related subject content at grade level. Aptitude tests measure general problem solving in specific content areas. Ability tests are least dependent upon learning specific content. The *IAS-3* (Assouline et al., 2009) requires the decision-making team to have information from all three types of tests.

Assessment of Ability

Ability (intelligence) tests evaluate a student's general ability to succeed in a school setting. Formal measures of intelligence (Intelligence Quotient or IQ tests) constitute a critical aspect underlying acceleration decisions using the *IAS-3*. An individualized intelligence test that is professionally administered continues to be a very effective predictor of academic success in elementary and secondary school settings (Assouline, 2003; Sattler, 2008; Siegler & Richards, 1988).

Once an accurate IQ measure is obtained, a related issue that needs to be addressed is how high the score must be to warrant acceleration. Early in the twentieth century, Hollingworth (1942) determined that students with an IQ of 130 or above could complete curriculum at a substantially faster rate than could average students. Gallagher (1985) suggested IQ equal to or greater than 130 (approximately the 98th percentile) as the required performance level at which acceleration is *recommended*. Terman and Oden (1947) and Davis and Rimm (1994) determined the figure to be an IQ of 135 or higher, and Feldhusen et al. (1986) used the IQ of 125. Users of the *IAS-3* are required to administer an individualized intelligence test or the most current form of the *Cognitive Abilities Test* (presently Form 7; Lohman, 2011). Based upon the clinical experience of the authors, the *IAS-3* recommends that in order for students to be recommended for *consideration* of whole-grade acceleration, they must earn an IQ that is at least one standard deviation above the mean (i.e., >115). It should be noted that this minimal IQ is what is recommended to *begin* the discussion about placement and is not a recommendation for making a final decision.

Assessment of Aptitude

A test of general ability can be an excellent indicator of need for a more rapid pace, which can be provided through whole-grade acceleration; however, measures of general ability do not provide specific information concerning subjects or content areas. Furthermore, the decision-making team, comprised of various educators and the parents, need some indication regarding the student's likelihood of success in the higher grade. Stanley (1984) advocates that a comprehensive profile of students' strengths be determined through a measure of their aptitude in specific areas. This may be accomplished through the use of specific aptitude tests or through *specialized*, i.e., above-level, use of achievement tests. With respect to acceleration, focusing on assessment of aptitude by using an above-level achievement test is an ideal measure by which to determine the level of work for which the student is ready. Performance at or above the 50th percentile on above-grade-level material (i.e., a test that is two or more grades above the student's current grade level) indicates that the student has exceptional aptitude in a subject area—that student is performing similar to an average student who is two years older, which would suggest a strong likelihood for success in the higher grade. High scores on aptitude tests or above-level tests indicate the student is ready for more advanced work, and in the case of very high scores, even further testing may be warranted to determine the appropriate level of instruction.

Early work by Stanley in the 1970s introduced the idea of above-level testing by offering tests designed for older students to bright, younger students (Assouline & Lupkowski-Shoplik, 2012; Lupkowski-Shoplik et al., 2003; Olszewski-Kubilius, 2004; this volume). For young students who perform exceptionally well on grade-level tests, there is often a "ceiling effect," where their scores cluster in the 95th to 99th percentiles. These students earn high scores because they responded correctly to all, or nearly all, of the items on a grade-level test; however, this doesn't truly reveal their capabilities nor their readiness for advanced material at a younger age than their grade-level peers. Additionally, we don't know if these high-scoring students have similar aptitude levels or if they are very different from each other. This is because the testing industry has found it inefficient to include enough difficult items on grade-level tests to differentiate among students at the higher tail of the normal curve, and because, statistically, it is impossible for the norms to exceed the 99th percentile. Above-level testing serves to "spread out" these talented students' scores, to determine where their specific academic aptitudes are. Taking an above-level test gives a better picture of a student's aptitude for academic material he or she may not have been taught yet in school. Further, Robinson and Weimer (1991) state that bright children need to be tested on a measure that leaves room for advanced performance; this is what aptitude and/or above-level testing provide. This testing gives the child study team an additional piece of important information about the student's capabilities. Examining the student's profile of aptitude across the various subject areas helps the child study team to evaluate the likelihood the student will perform well in all classes in the new grade, if he or she is accelerated.

Assessment of Achievement

Achievement testing used to evaluate high-ability students varies along two principal dimensions: administration (individual vs. group) and level (grade-level vs. above grade-level). Achievement testing can be used to determine whether a student's actual skills match the potential demonstrated in ability testing. Results from standardized achievement tests can provide information for planning future programming, including acceleration. A level of excellent performance on an achievement test is an indicator that the student has mastered the material for that grade-level and is ready to learn a higher level of material. Performance at or above the 90th percentile on grade-level material constitutes that level of mastery and excellence. Often, there are concerns that students will experience gaps in basic skills if they are accelerated. A grade-level test can assuage those concerns.

For the purposes of the *IAS-3*, a grade-level standardized test such as the *Iowa Assessments* (Iowa Testing Programs, 2012) is an assessment of achievement. Many candidates for acceleration will have multiple achievement test results on record. Students in the upper grades may have several years of test scores in school files. When looking at scores from prior years, there are a few things to consider:

- Consistency among subtest scores within a given year; and
- Consistency between subtest scores from year to year (does the student's percentile ranking remain at or above the 90th percentile from year to year?).

When a student scores at or above the 95th percentile in an area of a grade-level achievement test, the student has not only mastered the grade-level content, but has "hit the ceiling" of the grade-level test. This means he or she has gotten (almost) everything right on the test, and the test does not really measure his or her capabilities. In this case, the student is an ideal candidate for above-level testing, which will serve as a diagnostic tool for possible acceleration.

Test results from high-ability students typically show that these students can learn and process information quickly and accurately. Because of this, tying them to a lock-step instructional program is inappropriate (Rogers, 2002, 2004, 2007; VanTassel-Baska, 1991). Gallagher (1985) found that high-ability students are usually precocious early readers, often reading at levels two to six years above their age peers. Such an extreme degree of reading superiority may gradually narrow, but not disappear, over time (Jackson & Klein, 1997). Students whose exceptional talent is demonstrated across multiple subject areas are better candidates for whole-grade acceleration than are those whose talents are demonstrated in certain areas only. The latter are more qualified for single-subject acceleration in their strength areas (e.g., math; Rogers, 2002; VanTassel-Baska, 1991).

Integrating Ability, Aptitude, and Achievement Test Scores

Statistical analysis of ability, aptitude, and achievement scores suggests that the constructs of each are similar, but not identical (Lipscomb, 2003). The correlation between achievement and ability scores is strongest in a student's elementary years. Snow and Yalow (1988) attribute this phenomenon to the growing importance of other developmental processes in children's academic lives. By creating a single score for the ability, aptitude, and achievement required for consideration of acceleration, the *IAS-3* accounts for this divergence. In the *IAS-3*, a student must earn an IQ that is at least one standard deviation above the mean. Evaluation of the IQ is integrated with evaluation of a student's aptitude and achievement, and there must be a prescribed minimum score in order for whole-grade acceleration to be a possible recommendation. Table 1 presents the application of scores from ability, aptitude, and achievement measures for a second-grade student (whose pseudonym is David).

As indicated in Table 1, at this point in "David's" brief educational experience, he was not recommended for whole-grade acceleration. His Verbal Comprehension Index Score from the Wechsler Intelligence Scale for Children (WISC-IV; Wechsler, 2003) was at the 98th percentile, which is in the superior range, and also was commensurate with his performance on measures of reading aptitude and achievement. However, there were other indicators that suggested that single-subject acceleration was the most logical decision at this point in time. These testing results emphasize a critical point with respect to acceleration: the intervention should result in *continued excellent academic performance*. In other words, the intervention is based upon evidence that the student is ready for a faster pace, has achieved extremely well compared to grade-level peers, and has the aptitude to have excellent performance in the next grade.

Attitude and Support

Table 1 and the discussion above reveal that testing provides much of the objective information needed to make a decision about skipping a grade or entering school early. Although there might be a great deal of objective evidence indicating a student is indeed a good candidate for acceleration, school personnel and parents may still hesitate to move the student up a grade. They might ask themselves the question, "Is this really the best option for us to do at this time?" To assist in answering such a question, it is critical to have a positive attitude and support from three main and important groups: the student, his or her parents, and the educators. To do anything out of step usually requires a modicum of courage. A positive, supportive perspective from these three groups helps provide the courage to move a student up a grade.

Attitude and Support from the Student

Cultivating a student's willingness and enthusiasm for whole-grade acceleration is essential to the ultimate success of the process (Lubinski, 2004; VanTassel-Baska, 1991). In fact, one of the "Critical Items" included in the *Iowa Acceleration Scale-3* (Assouline et al., 2009) is the student's attitude toward acceleration. If the student does not want to accelerate in school, the student should not be required to accelerate. Other al-

Table 1: Ability, Aptitude, and Achievement Results and Interpretation for Whole-Grade Acceleration for "David"

"David"

Fall, Grade Two, Seven-years, Five-months. This student was referred to a private psychologist. Parents were responding to a recommendation from the teacher that the child be evaluated to determine readiness for whole-grade acceleration given the student's very strong verbal abilities. During second semester of kindergarten, David was moved to first grade for reading.
During first grade, he stayed with his first-grade classmates for all subjects.

Assessment Measures[1]	Subtest and/or Index Scores	Interpretation of Information	Impact on Decision to Accelerate to Grade Two	Other Considerations
Ability Scores from Wechsler Intelligence Scales for Children (WISC-IV); Full Scale Score comprised of four Index Scores: VCI, PRI, WMI, and PSI	Full Scale IQ: Standard Score of 118; 88th percentile **Above Average**	Overall IQ is **Above Average** **Verbal Comprehension Index** (VCI) is Superior; Superior Verbal Ability and aptitude for reading; Note reading and fluency are above average in achievement and aptitude; comprehension is high-average in achievement and aptitude Other indices (PRI, WMI, and PSI) are Average	**Do Not Whole-Grade accelerate at this time** With a Full Scale IQ of 118, the student meets initial critical item of Full-scale score of 115; however, three of the four index scores are all average PSI measures fluency with processing information; given PSI was Average, skipping a whole grade is not advised at this point in time; doing so may lead to unnecessary frustration	Consider single-subject acceleration in reading; Focus on further developing comprehension skills; (See VanTassel-Baska & Johnsen, this volume)
WISC-IV Verbal Comprehension Index (VCI)	Standard Score of 132; 98th Percentile; **Superior**			
WISC-IV Perceptual Reasoning Index (PRI)	Standard Score of 108; 70th Percentile; **Average**			
WISC-IV Working Memory Index (WMI)	Stardard Score of 104; 61st Percentile; **Average**			
WISC-IV Processing Speed Index (PSI)	Standard Score of 103; 58th Percentile; **Average**			
Aptitude Scores from Wechsler Individual Achievement Test (WIAT-III) – **above level**	**Reading** Standard Score = 129 (97th Percentile) compared to third graders (two grades above current level) Not applicable in **Math** and **Written Language**	**Reading** tests need to be above-level based upon grade-level reading (see below) as well as excellent verbal reasoning **Math Grade-level Achievement** was average; therefore, no need to give above-level; **Written Language** grade-level not administered	Students who are grade-skipped should be able to continue to perform excellently at the higher grade in all subject areas	
Achievement Scores Wechsler Individual Achievement Test (WIAT-III) – **grade level**	**Reading** Standard Score = 134 (99th Percentile) **compared to first graders**	**Math Grade-level Achievement** was **average;** therefore, no need to accelerate **Written Language** not administered; however parent and teacher report **Average performance**	Students who are grade-skipped should have excellent achievement on grade-level	Do not accelerate in math or written language

[1]*Note: All scores for the WISC-IV and the WIAT tests are reported as Standard Scale Scores; Average = 100, which is the 50th percentile.*

ternatives for academic challenge need to be considered. The student also needs to be included in the discussion about acceleration; including the student in that discussion becomes more and more important as the student grows older. To fully present the potential impact of acceleration, it is helpful to include the student in conversations with adults who are knowledgeable about acceleration so they can consider together the possible advantages and disadvantages of acceleration. Students may also need to be reminded that the whole purpose of a proposed grade skip is to find a way to challenge them academically. In addition to considering acceleration as an option, the student should also learn about other alternatives that are potentially available, such as moving up in a single subject, participating in independent study or distance learning programs, completing mentorships or special projects, etc. In our experience, most students enthusiastically embrace the idea of acceleration. In some cases, they even initiate the process (Assouline et al., 2009).

Students also benefit from participating in outside-of-school activities that are intellectually stimulating and challenging. These activities are positive in that they help a student gain confidence and experience as well as the opportunity to interact with students who are older, which would be a valuable experience for any student who skips a grade.

Southern and Jones (2004a) address the multiple dimensions associated with the various forms of acceleration, including timing, which can refer to the timing of the intervention as well as the age at which a student is accelerated. Although an important consideration, especially in terms of fostering the accelerated student's integration with the new peer group, there is a lack of research associated with this dimension.

Attitude and Support from the Parents

The nature and extent of involvement of parents in the lives of their children are extremely important to school success. Unfortunately, one prevalent myth is that parents of gifted children are over-involved (e.g., the "tiger mom"), are ego-involved and want to hurry their children through their childhood, or are pushing their children into situations for which they are not yet ready (VanTassel-Baska, 1991). Our experiences with families, however, support the view that most parents have a positive impact on their gifted children and simply want what is best for their child (Bloom, 1985; Colangelo, 1998; VanTassel-Baska & Olszewski-Kubilius, 1989). The classic study on the development of talent in teenagers (Csikszentmihalyi, Rathunde, & Whalen, 1993) has also documented the important role of the parents in the lives of talented students.

The discussion about whole-grade acceleration can trigger a higher level of involvement from parents (Colangelo, 1997; Sosniak, 1997). The importance of this is reflected in a study by Cox, Daniel, and Boston (1985), who interviewed 52 award-winning scholars and artists, one-third of whom were accelerated during their school careers, and found that virtually all of them reported parents who expressed interest in their children's education (parent educational background notwithstanding). The respondents also credited their parents with allowing them to develop a sense of direction without pressuring them to succeed. The value of involving parents in decision-making about acceleration as soon as possible is supported by Piper and Creps (1991), who describe a pattern in which parents often enter the process with strong views one way or the other. However, once involved in the process, parents' views become less extreme and they are more willing to accede to professional judgment about their child. (In recognition of these points by Piper and Creps, all editions of the *IAS* have required that parents be included as part of the decision-making process.)

Oftentimes, parents are the first to recognize that their child is out of sync with age-mates and begin seeking appropriate alternatives to the standard educational program. When the parents are put in the role of initiating an investigation about acceleration for their child, they have the challenging task of becoming the 'expert' on acceleration and presenting this information to professionals. Resources such as the *IAS-3,* the Acceleration Institute (http://www.accelerationinstitute.org/), *A Nation Deceived,* and the present volume are tools for parents who are seeking the information and want to present it to school personnel in a succinct, useful manner. Other useful tools for parent advocacy can be found at the National Association for Gifted Children website (www.nagc.org).

Attitude and Support from the School System

Many educators are reluctant to use early admission and acceleration practices, despite decades of research that consistently demonstrate positive changes in academic achievement and a lack of negative impact on social and emotional growth (Siegle, Wilson, & Little, 2013; Southern & Jones, 2004a; Southern, Jones, & ., 1989). Research by Rambo and McCoach (2012) indicated that teachers gave more weight to potential negative outcomes of acceleration than they gave to positive outcomes. Similarly, Southern and Jones

(1992) found that teachers who knew that a student had been accelerated were more likely to blame difficulties on the acceleration than on normal variations in behavior.

Teachers, in general, indicate a reluctance to accept student placements that are not age-normal, even though they also agree that many high-ability students need intervention to ensure academic challenges. Some teachers of students who are being considered for whole-grade acceleration even feel a sense of failure, as though they have been unable to teach those students (Piper & Creps, 1991).

Anecdotally, it has been reported that school personnel actively discourage parents from pursuing acceleration as an option. Southern and Jones (2004b) give an example of one district that provided guidelines to parents considering early entrance to kindergarten that included the statement, "Remember you are not simply making a decision about next year, you are making a decision about the rest of your child's life" (p. 20). They describe other school district policies that indicate that early admission is often sought because of the parents' needs, not those of the child. Making these types of statements is intimidating and demeaning to parents. Additionally, these statements imply that parents who seek early entrance to school are not doing it because of concerns for their child, but because of their own personal concerns (Southern & Jones, 2004b). In a study of school counselors, Wood, Portman, Cigrand, and Colangelo (2010) found that a very small number of counselors reported any formal training on acceleration, yet most of them had been asked to provide feedback on acceleration decisions in their schools. The school counselors indicated they gathered information about acceleration via informal means, such as talking with colleagues and attending meetings. It is likely that personnel participating in decisions about acceleration do not always base their responses on the available research, but rather on their personal experiences and beliefs.

Not all educators display such reluctance, discomfort, or a lack of knowledge with grade-skipping. We have observed that educators most familiar and involved with gifted education (e.g., coordinators of gifted programs) are best informed and have the most positive attitudes about grade-skipping as an appropriate program option for gifted students. This is a primary reason why we recommend that the gifted education coordinator serve as the team leader for the *IAS-3* process.

One recent study specifically examined the attitudes of teachers and administrators concerning acceleration (Siegle, et al., 2013). The participants were from a selected group—educators attending a week-long summer workshop on gifted education—so it is presumed that they were already somewhat informed of the needs of academically talented students and the potential benefits of acceleration. Most educators participating in this study were not concerned with potential negative effects of acceleration on academic performance. They believed that acceleration meets the academic needs of high-ability students, and it is neither insufficiently nor overly challenging. As a group, educators tended to support the concept of acceleration and to be aware of the research supporting it. However, their responses to the survey indicated these teachers believed that administrators and parents would not support acceleration. The authors concluded that perhaps the educators' reluctance to accelerate students in their schools has less to do with their own perceptions about acceleration than their perceptions of what others believe. If that is indeed the case, as Siegle et al. (2013) indicated, the key to changing acceleration policies and practices may be to show administrators and others who have the power to make those changes that many parents and teachers actually do support it.

Once a child has been grade skipped, some educators are more successful than others in working with the accelerated student. High-ability students often recall teachers who were demanding of them, and yet supportive, as significant contributors to the development of their academic talent (Cox et al., 1985; Csikszentmihalyi et al., 1993). Teachers who are self-confident and who are able to apply their knowledge about high-ability children are generally most effective with such students (Whitlock & DuCette, 1992). In our work with the *IAS-3*, we have found that the attitude and knowledge of the receiving teacher is critical to the positive adjustment of the accelerated student. In recognition of this, the *IAS-3* procedures require that the receiving teacher(s) be part of the decision-making team.

Early Entrance to Kindergarten and First Grade: Acceleration with Young Children

A unique type of whole-grade acceleration is early entrance to kindergarten or first grade. Early entrance to school may provide an excellent accelerative option for academically talented young children. Decades of research support the claim that bright youngsters who are carefully selected for early entrance perform very well, both academically and socially (Diezmann, Watters, & Fox, 2001; Robinson, 2004; Robinson & Weimer, 1991). However, there is great hesitation on the part of many educators to encourage a student to enter school early. We consider the pros and cons of early entrance to school within the context of the research on the topic.

Why Consider Early Entrance?

Early entrance to kindergarten or first grade is the least disruptive form of whole-grade acceleration, both academically and socially. It minimizes social disruptions, since young children have not yet had the time to form close friendships with their classmates (Assouline et al., 2009; Robinson, 2004; Robinson & Weimer, 1991). Entering school early minimizes the gaps in knowledge that might occur if a student skips a grade later (Robinson & Weimer, 1991). Finally, in contrast to any other form of acceleration, issues of academic credit are not a problem if a child enters school early.

Allowing an academically talented youngster to enter school early may provide the best match between the curriculum and the child's academic abilities (Robinson & Weimer, 1991). Bright children who enter school early are less likely to be bored with school. In an appropriately challenging program, students are less likely to "breeze" through school, learning bad habits (such as not studying because the work is too easy) that may lead to underachievement and/or perfectionism in the future (Saunders & Espeland, 1991).

What Are the Drawbacks of Early Entrance?

In spite of these significant advantages, there are still some negative aspects to entering school early. First, this decision must be made when a child is quite young, before the child has had much experience with schooling or with peer relationships. The child's lack of experience and the limited information about the child's performance in school make the decision more difficult. Clearly, the consequences of this decision are long-term; it is difficult to change our minds and reverse course (Brody et al., 2003; Robinson, 2004).

Educators are especially hesitant to have students enter kindergarten at a young age, perhaps because of a fear that the consequences of such a decision will not be known for years, and even a seemingly positive short-term adjustment might be followed by later problems. For example, preschool teachers are unlikely to believe that gifted preschoolers should be allowed to begin kindergarten at a younger age (Sankar-DeLeeuw, 2002). In addition, few public schools have made specific efforts to screen young students for early entrance to kindergarten (Cox et al., 1985; Robinson & Weimer, 1991). In fact, 16 states do not allow early entrance (Council of State Directors of Programs for the Gifted & National Association for Gifted Children, 2013).

Reluctance to consider early entrance to school was clearly illustrated by a survey sent to a large number of principals, gifted coordinators, school psychologists, and teachers. Most respondents reported that early entrance to school and grade-skipping were potentially harmful to students. Even gifted coordinators, a subgroup that was most in favor of acceleration, viewed acceleration as potentially hazardous (Southern et al., 1989). As mentioned above, some school district policies have specifically been written to discourage early entrance to kindergarten or first grade (Southern & Jones, 2004b). In contrast, some school districts and states have developed specific guidelines for making decisions about early entrance to school (see discussion about Colorado and Ohio, below.)

There are many practical concerns with early entrance to kindergarten. For example, the physical development of younger children causes them to require more sleep; therefore, children may become tired before older classmates. Four-year-olds simply may not have the stamina of older children. Additionally, these young students may demonstrate slower physical development that, while age appropriate, may lag behind that of older classmates (Schiever & Maker, 2003). This may be a disadvantage when writing, cutting, drawing, or participating in many of the other activities in a typical kindergarten day. All of these concerns are reasons that school personnel and parents are likely to be cautious about having an individual child enter school early. These concerns seem valid, but what have we learned from the research?

Research on Early Entrance

Like the research on grade-skipping, the research conducted on early entrance to kindergarten and first grade portrays a positive picture for these young students. For example, in her meta-analyses on acceleration, Rogers (1992; 2004; current volume) reported that early entrants' academic performance was at the same level or better than their older classmates; accelerated students performed better on standardized achievement tests, teacher-developed tests, grades, teacher ratings of student performance, and attitude toward learning. Kulik and Kulik (1984) and Kulik (2004) reported similar findings in their meta-analyses on acceleration.

When reporting the results of these research studies on early entrance, it is important to differentiate between two types of studies. First are the studies that compare unselected students (those who have not been specifically identified as talented students in need of early entrance, but are young compared to most of the students in their class; for example, students with a summer birthday) to regular-age kindergarten students. The second set of research studies involves comparisons between carefully selected early entrants (bright youngsters who deliberately enter school early as a means of finding appropriate challenges) to regular-age students. The research indicates that unselected younger children tend to show more immaturity and behavior problems than older classmates (e.g., Gagné & Gagnier, 2004; Maddux, 1983). In contrast, results from studies comparing carefully selected early entrants to regular-age students portray a positive picture for the early entrants (Robinson & Weimer, 1991).

Social adjustment is a major concern of educators who are considering early entrance for a young student. In their research, Proctor, Black, and Feldhusen (1986) reported that all but a small percentage of the early-entrance students were as socially well-adjusted as their older classmates. Reporting similar findings, Rogers (2002) found minimal differences between early entrants and regular-age classmates on social/emotional indicators; in the meta-analysis reported in the current volume, Rogers found slight but positive effects for early entrance to kindergarten on social indicators.

An extremely thorough study on early entrance to kindergarten was conducted by Gagné and Gagnier (2004). They asked kindergarten and second-grade teachers who had at least one early entrant in their classroom to rate all of their students on four dimensions: conduct, social integration, academic maturity, and academic achievement. Regularly admitted peers (for this study, September 30 was the cutoff for regular-age entrance to kindergarten) were divided into four groups: October 1-December birthdays (the Oldest Cohort), January-March birthdays, April-June birthdays, and July-September 30 birthdays (the Youngest Cohort). These four cohorts were compared to the Early Entrants cohort, whose birthdays were later than the September 30th cutoff for regular-age entrance to kindergarten.

Early Entrants were judged to be significantly better adjusted than the Youngest Cohort. The level of adjustment for Early Entrants did not differ from that of the other three cohorts, except for academic achievement, and the Early Entrants' mean achievement was significantly higher than that of all four cohorts of regularly admitted peers. Almost two-thirds of the Early Entrants were judged by their teachers to have adjusted relatively well or very well to the school enrollment. Girls obtained a significantly higher average profile score than boys. In grade two, the early entrants outperformed the regular-age students. "...As a group, early entrants show no evidence of being more at risk for adjustment difficulties than their regularly admitted peers" (Gagné & Gagnier, 2004, p. 18). The authors concluded that early entrants did not differ much from their regularly-admitted peers. However, when their data were examined qualitatively, they did find a significant percentage of early entrants (37%) with perceived adjustment problems. Although they recognized that the methodology employed in this study probably led to an overestimate of adjustment problems, Gagné and Gagnier (2004) still recommended that school administrators be cautious about admitting good but slightly doubtful candidates to kindergarten early. They suggested waiting until later to have these "doubtful" candidates skip a grade because of concerns about the political fall-out of even one unsuccessful early entrant.

Rather than encouraging school personnel to continue hesitating to use acceleration as an appropriate intervention for academically talented students, we suggest using an objective decision-making tool, the *Iowa Acceleration Scal*e, to help minimize the chances of inappropriately recommending acceleration as an educational intervention and to also document the rationale for the decision that is made. School personnel making decisions about early entrance to kindergarten and first grade should be reassured by findings from research studies that show remarkable achievement gains for accelerated students (Rogers, this volume).

Making the Decision: Helpful Information

Because few schools have a systematic process for screening potential early entrants (Cox et al., 1985; Colangelo, et al., 2010; IRPA, NAGC, & CSDPG, 2009; NAGC, 2013), and few preschool teachers believe that early entrance to kindergarten is appropriate for young children (Sankar-DeLeeuw, 2002), most often it is the parent who brings up the possibility that a child should begin formal schooling before his or her fifth birthday. The anecdotal information provided by parents of four- and five-year-old gifted children is reliable and useful for identifying and programming for talented students (Assouline & Lupkowski-Shoplik, 2011; Kuo, Maker, Su, & Hu, 2010; Louis & Lewis, 1992; Roedell, 1989; Roedell, Jackson, & Robinson, 1980). Parents are good judges of the capabilities of their young children. Parents often recall anecdotes about a child's early reading ability (for example, a three-year-old child read the back of the shampoo bottle while taking a bath, and that was when her parents realized she could read) or mathematical abilities ("When he was still in preschool, he could add problems like 15,921 + 40,857 correctly" Assouline et al., 2009, p. 121), and these anecdotes can be useful in making the decision to enter school early. Generally, these anecdotes illustrate the following characteristics of gifted preschoolers:

- Early verbal ability, such as early emergence of complex sentences and advanced vocabulary (Kuo et al., 2010; Roedell, 1989), and early reading (sometimes as early as age two or three) (Cukierkorn, Karnes, Manning, Houston, & Besnoy, 2007; Gross, 1992a; Jackson, 2003);
- Strong mathematical skills (for example, doing addition and subtraction at the age of three; Gross, 1992b; Assouline & Lupkowski-Shoplik, 2011);
- Long attention span (Kuo et al., 2010; Silverman, 2000);
- Extraordinary memory (Cukierkorn et al., 2007; Louis & Lewis, 1992; Silverman, 2000);
- Abstract reasoning ability—ability to generalize (Silverman, 2000) and make connections between areas of learning (Roedell, 1989);
- An early interest in time (Assouline & Lupkowski-Shoplik, 2011; Kuo et al, 2010; Lupkowski & Assouline, 1992; Silverman, 2000).

In addition to using the anecdotal information provided by parents, before making the decision to have a student enter school early, we advise administering individual intelligence, aptitude, and achievement tests. Also, as previously mentioned, the test administrator can gather important behavioral information by observing the child in a one-on-one setting (Assouline & Lupkowski-Shoplik, 2011; Robinson & Weimer, 1991; Roedell, 1989).

When evaluating candidates for early entrance to kindergarten, the tests should allow an adequate ceiling, so that very high levels of functioning can be measured (Robinson & Weimer, 1991). When using the *IAS-3* to make a decision about early entry to school, an individual intelligence test plus aptitude and achievement tests in mathematics and verbal areas are required. Appropriate assessments for these youngsters include the *Stanford Binet-Fifth Edition* (Roid, 2003) and the age-appropriate Wechsler scales to measure intelligence. Useful measures of achievement include the most current version of the *Peabody Individual Achievement Test* (Markwardt, 1997), the *Woodcock-Johnson Tests of Achievement* (Schrank, Mather, & McGrew, 2014), and the *Wechsler Individual Achievement Tests* (Wechsler, 2009). Children who earn intelligence test scores at least one standard deviation above the mean and whose achievement test scores place them above the 50th percentile when compared to students in the grade level they will be entering are reasonable candidates to consider for early entrance. (See the *IAS-3* Manual, Assouline et al., 2009, for a thorough discussion of recommended tests.)

Finally, it is essential that educators and parents review the curriculum used in the school the child may be entering. Kindergartens vary greatly in their curricular orientations and format for delivery. Some are academic and require students to participate in a formal study of letters and numbers, while others have many opportunities for free play, socialization, and exploration. Students in schools with rigorous academic programs will not need as much acceleration as those in less challenging general education programs. In addition to standardized test results, it is also helpful to look at a child's work samples. These samples can then be compared to work completed by successful students already in school to help determine if the young student is indeed ready to enter school early.

Students Entering School Early: Social/Emotional and Physical Development

In addition to carefully evaluating the students' intelligence, ability, and achievement levels, other areas to consider are social and emotional development as well as small and large motor skills. Although it is not necessary to expect early entrants to be the most social students or the most athletic students in class, it is still in their best interests to ensure that they are capable of fitting in with the other students socially and physically. Teachers and parents might need to adjust their expectations for young students. For example, an early entrant might require more help with cutting activities or other small-motor activities than other older students.

Some authors have suggested that early entrance to kindergarten should be limited (except in certain cases) to students whose birthdays will be three months or less after the cut-off date for regular entrance (Robinson, 2004). In addition, we recommend that the best candidates for early entrance to kindergarten have already had experience in a preschool program where they had opportunities to learn to take turns, to learn about school routines, to share an adult's attention with other children, and to sit still for periods of time (Neihart, 2007; Robinson & Weimer, 1991). Additionally, it is important to look at the practices in the local community. If it is common for parents to hold their children back and have them start kindergarten at age six, the age difference between the four-and-one-half-year-old early entrant and the six-year-old "red shirt" student is significant. This may be a good reason to consider other alternatives for the bright young student during the primary years.

"Asynchronous development," in which a child is more advanced in one area compared to another, is a real issue for these young students (Morelock & Feldman, 2003; Roedell, 1989; Silverman, 2002). For example, a bright early entrant may easily grasp the academic material presented in first grade, but may not be as well-developed physically as the other children in class. The youngster may become extremely tired before the end of the school day, or she might not have the small-motor coordination of her older classmates (Assouline et al., 2009). Adults should not expect a child who has advanced verbal or mathematical abilities to demonstrate equally advanced behavior in all areas. Thus, the receiving teacher needs to be sympathetic to a young child who can handle advanced material intellectually, but may require extra help or patience in other areas.

Legal Issues

Parents need to be aware of the laws in their state regarding early entrance to school. In Pennsylvania, for example, individual districts set policies regarding early entrance to kindergarten or first grade, and some public schools have stated policies that prohibit entrance to kindergarten before the age of five. However, in that state, any student who successfully completes first grade, regardless of age, is then permitted to start second grade in a public school. Some families choose to place their bright young student in a private or parochial school that is agreeable to permitting early entrance to school, keep that child in that school until completing first grade, and then transfer the child to the public school beginning in second grade.

The Council of State Directors of Programs for the Gifted (CSDPG) and the National Association for Gifted Children (NAGC) periodically produces reports listing the status of gifted education in the United States. As described in the 2012-2013 report, 16 states specifically do *not* permit early entrance to kindergarten in public school (CSDPG & NAGC, 2013). Other states instruct the local education agencies to look systematically for students who would benefit from early entrance to kindergarten. Two of these states, Colorado and Ohio, are highlighted below.

An Example of Early Entrance to Kindergarten Practices: Colorado's Approach

The state of Colorado uses a carefully defined process for evaluating potential early entrants to kindergarten and first grade, thanks to House Bill 08-1021, passed in 2008 (Colorado Department of Education, 2008). This bill permits Administrative Units (AUs) the option to count in their enrollment and receive state education funds for highly gifted students who enter school early. Each AU has the option to permit early access, but they are not compelled to do so. If an AU authorizes early access, it must include an early access addendum in the gifted education comprehensive plan and follow the rules established by the State Board of Education. The documentation presented to school personnel and parents carefully explains that these rules are for a small, select group of students ("only a few highly advanced gifted children") and provides information about alternatives to early entrance to school. (See http://www.cde.state.co.us/gt/resources for more details.)

By law, the AU plan for early access includes the following items:

- **Communication:** The administrative unit is required to inform parents, educators and community members concerning the entrance criteria, process, time frames, portfolio referral, tests, and final determinations.
- C**riteria in a body of evidence:** Information about the child is gathered in a portfolio. Aptitude and achievement testing is conducted, either by the district's school psychologist or a private psychologist. Other information includes readiness of social behavior and motivation, and a support system provided by the teacher, administrator, and family. Data also may be gathered from preschool classroom performance, embedded curriculum assessments, interviews, checklists and/or rating scales. Lists of recommended instruments are provided by the state.
- **Process:** The determination team receives, reviews, and analyzes data; discusses the child's strengths and readiness for early access to kindergarten or first grade; collaboratively decides if the child will benefit from early access to kindergarten or first grade; and informs the parents of the decision.
- **Timelines:** Timelines are established and made known to parents, educators, and community members. These include deadlines for application for Early Access consideration, testing dates, decision dates, etc.
- **Personnel:** Questions to be addressed concern: Who will be trained in the early access process,

who will be the main contact for parents, who makes the decisions about early access, and what personnel will be involved with the ongoing support system?

- **Monitoring:** A collaborative monitoring system helps to create a positive support system for the child. Parents and educators check in at least every five weeks for academic, social-emotional and Advanced Learning Plan (ALP) updates. Instruction is continued or adapted based upon data gathered during the monitoring process.
- **Dispute resolution:** A dispute resolution process is available that applies to gifted education and programming decisions. Parents are given the opportunity to express concerns and the designated AU personnel consider the dispute and make final decisions regarding the issue.

For students to have early access or early entrance to educational services, they must be formally identified as gifted following state guidelines. Districts who enroll students qualifying for early access receive full state education funding for those students. Since they are identified as gifted, an ALP is developed for each student for the school year of enrollment.

Children are required to reach the age of four by the beginning of the school year to be considered for early entrance to kindergarten and to have reached the age of five to be considered for early entrance to first grade. Information gathered in the "criteria in a body of evidence" phase includes items such as a parent checklist, in which parents might be asked to indicate their child's strengths and give examples of what they have observed at home (has an excellent memory, is extremely curious, prefers playing with older children, etc.). Other information gathered includes individual intelligence and achievement testing, observations of the child in a natural setting, children's work samples, preschool teacher input, and any other appropriate anecdotal evidence.

Colorado's plan is comprehensive (in that it considers the whole child), communicates information clearly to school district personnel and families, and emphasizes coordination among preschool and kindergarten educators and administrators. At the beginning of the 2014-2015 school year, 65% of Colorado school districts had a plan in place for early access to kindergarten or first grade (J. Medina, Director of Gifted Education, Colorado Department of Education, personal communication, October 14, 2014).

One of the concerns before beginning this process in Colorado was that schools would be inundated with requests from parents; however, data to date show these concerns to be unfounded (J. Medina, personal communication, October 14, 2014). The state policy indicates clearly that this is not for every gifted four- and five-year-old, but it is available for highly gifted students who need the academic challenge. These students are defined as academically gifted, socially and emotionally mature, in the top two percent of the gifted peer group, motivated to learn, and ready for grade acceleration. Administrators and educators also emphasize that, if a particular student is not recommended for early access, he or she might still need acceleration at some future point in his or her academic career and/or need gifted services. (See http://www.cde.state.co.us/gt/resources for more details.)

Making the Decision Not to Enter School Early

Even if all indicators point to early entrance, there may be good reasons not to have the young child enter the world of formal school early. For example, if the child attends an excellent preschool program, where the teacher is willing and able to offer individualized activities to the child that will challenge him or her intellectually, it might be best to stay in that environment rather than to enter a less-than-optimal kindergarten classroom, where all children experience the same curriculum, regardless of skill level (e.g., all students start by learning the letter "A"). This student might be better off staying in the supportive atmosphere of a good preschool and entering first grade as a five-year-old (Assouline et al., 2003a).

Finally, if the decision is made to have a student enter school early, this may not be the only intervention needed for the exceptionally talented student. Highly gifted children may need some form of ability grouping and may also need additional acceleration in later years (Gross, 1999).

Ohio: A State with a Systematic Process for Considering Grade Acceleration or Early Entrance

The Ohio State Board of Education adopted a model acceleration policy for advanced learners in 2006 (Ohio Department of Education, 2014) and school districts were required to implement an approved acceleration policy by the 2006-2007 school year. The Ohio Department of Education provides all the necessary tools for developing and implementing such a policy on their comprehensive website. They provide procedures for the referral, evaluation, and placement of advanced learners in accelerated settings, including early admission to kindergarten, grade acceleration, acceleration in individual academic content areas, and early graduation from high school (personal communication, E. Hahn, December, 9, 2014).

The Ohio Department of Education website (http://education.ohio.gov) contains many sample documents that could be used by school district personnel. For example, the form, "Academic Acceleration for Advanced Learners Referral Form Example: Early Entrance" (https://education.ohio.gov/getattachment/Topics/Other-Resources/Gifted-Education-(1)/Resources-for-Parents/Academic-Acceleration-for-Advanced-Learners/example-of-a-referral-form.pdf.aspx) contains questions for parents to consider when they are requesting that their child be considered for early entrance to kindergarten or first grade. Parents respond to questions in the areas of ability, achievement, aptitude, and behavior, as well as school and academic factors, developmental factors, interpersonal skills, and attitude and support. These questions mirror the factors listed in the *Iowa Acceleration Scale* and help parents and school personnel to consider all of the important aspects of a decision about early entrance to school. Also contained on the website are sample acceleration case studies, including accelerating a fifth grader in a rural school, skipping second grade, accelerating an athlete, and a case of radical subject acceleration in math. These examples help to bring the research to life and show educators and parents that others have already successfully investigated and followed through on a decision to accelerate.

The Ohio Department of Education has specifically approved The *Iowa Acceleration Scale-Third Edition* as the only assessment process for evaluating candidates for early entrance to kindergarten and whole-grade acceleration for students in kindergarten through ninth grade. The committee that evaluates students referred for potential acceleration must be comprised of: the principal, a current teacher of the student (unless the student is referred for potential early admission to kindergarten), a receiving teacher, a parent or guardian, and a gifted education coordinator or gifted intervention specialist.

The website also includes sample Written Acceleration Plans (WAP) that list strategies to ensure a successful transition, strategies to ensure continuous progress following the transition period, and a specific staff member assigned to monitor the implementation of this plan. These samples include examples of whole-grade acceleration, subject acceleration in math, subject acceleration in science, and early high school graduation.

Another useful item found on the Ohio Department of Education website is the Pathways to Acceleration graphic (https://education.ohio.gov/getattachment/Topics/Other-Resources/Gifted-Education/Resources-for-Parents/Academic-Acceleration-for-Advanced-Learners/Pathways-to-Acceleration-1.pdf.aspx; see Figure 2), which illustrates the steps taken by a school district as personnel consider a candidate for early entrance to kindergarten or first grade or a grade skip.

Other Resources for Making Decisions about Grade-Skipping

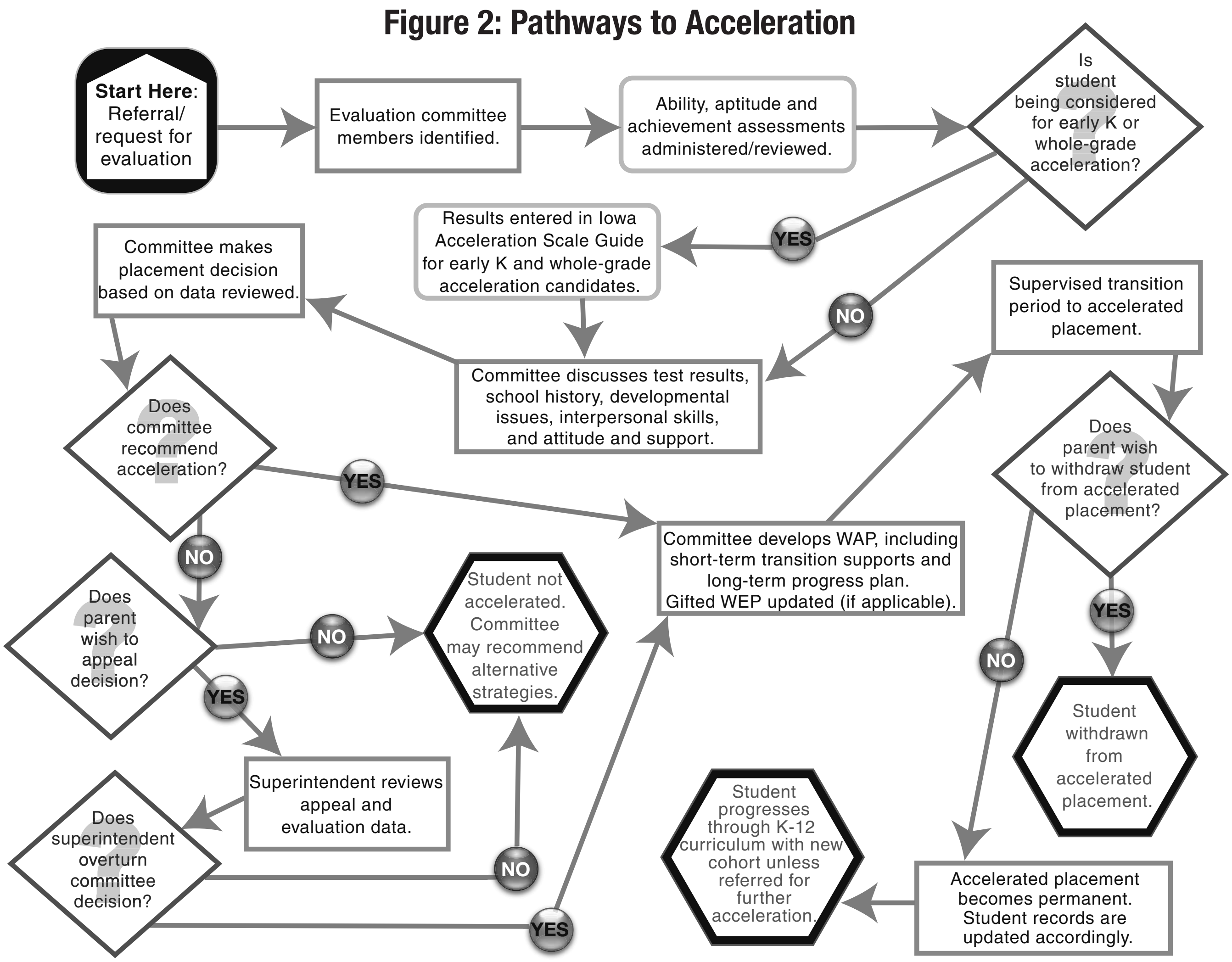
Acceleration Institute

The Acceleration Institute was originally established in 2006 as the Institute for Research and Policy on Acceleration or IRPA. A project of the Belin-Blank International Center for Gifted Education and Talent Development at the University of Iowa, it is dedicated to the study and support of educational acceleration for academically talented students. The Acceleration Institute website, www.accelerationinstitute.org, provides updated information about acceleration, including current resources, policy, and research. The website presents a series of questions and answers directed at parents and educators as well as stories about individual students' acceleration experiences in video and written formats. Additionally, the website contains links to IDEAL Solutions for STEM Acceleration, a PowerPoint presentation on acceleration, and the *Guidelines for Developing an Academic Acceleration Policy*. The VanTassel-Baska chapter on policy in this volume also provides helpful guidelines for creating policies in gifted education that include acceleration.

Implications for School Personnel: Insuring a Successful Acceleration

Our practical experience with many schools and accelerated students has taught us there are several important steps to take to insure that the probability of student success is maximized. These steps include:

1. **Become informed.** Understand the research findings on acceleration and be prepared to share them with your colleagues. Many educators simply have not had the opportunity to learn about acceleration in their formal training. Help them to understand that, not only is acceleration a well-researched topic, but also there are many tools that can help us to make a good decision for



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an individual student. Becoming informed is critical to being a well-prepared team leader. Team leaders gather all of the appropriate test scores and conduct pre-team meetings with all of the people who will be involved in the team meeting so that any questions that they may have can be addressed and answered before the meeting.

2. **Prepare your team for the meeting.** The team leader's goal is to set up the meeting so the participants can focus on the decision instead of by being distracted by other issues. Make sure there are no questions or biases that should be addressed before the meeting. Most people have implicit theories about acceleration that aren't necessarily based on the research. Give them a chance to ask you questions that otherwise might derail the process before the meeting occurs.

3. **Provide information.** Share articles and other resources about acceleration. The Acceleration Institute website (www.accelerationinstitute.org) has many resources that will be helpful in preparing for discussions. In addition, this volume, *A Nation Empowered*, is packed with useful information.

4. **Collect all profile information.** Having all of the test scores is particularly important to the process. It is also important to review information from prior assessments or meetings. Do not go to the meeting with only part of the necessary information.

5. **Talk with the student about the acceleration.** It is critical that the student understands the process and wants to be accelerated. Having the student meet with team members to discuss the possible acceleration and to think about ramifications of the decision will help the student to be better prepared. Although we don't recommend that the student participate in the team meeting, we do strongly encourage that an educator meet with the student prior to the acceleration and for a specified time period after the acceleration. Older students (e.g., high school students) should be active in the discussion about the immediate and long-term impact of the decision.

6. **Schedule the meeting.** This is an important component and the discussion can take 60 to 90 minutes. Therefore, be sure to schedule sufficient time for a comprehensive discussion.

7. **Preplan other options**. If the team decides that it is not in the best interest of the student to skip a grade, there should be other options available (e.g., subject-matter acceleration). Think through these alternatives and consider what might be required for successful implementation. For example, a student who takes math with older students might need transportation to a different building this year or in the future. If you have already thought through some alternate plans before the meeting, that information will be helpful to the decision-making team. The goal is not to get distracted during the meeting by tangential issues.

8. **Select a receiving teacher.** The receiving teacher is critical to a successful acceleration and must be a part of the decision-making process. The receiving teacher will be working with the accelerated student on a daily basis; if he or she has serious doubts about the acceleration, he or she can inadvertently interfere with the student's success. Being a part of the decision-making process helps the teacher understand acceleration as an intervention. Additionally, participating in the discussion about acceleration early gives the teacher an advanced opportunity to learn about the student's strengths and readiness to work in the accelerated grade.

9. **Support the receiving teacher.** This might be the receiving teacher's first experience with acceleration, so he or she might have doubts about how well the intervention might work. Even if the receiving teacher has a great deal of experience, the teacher will need support; therefore, it is important to develop a monitoring plan and meet periodically with the receiving teacher once the acceleration occurs.

10. **Follow-up with parents, teachers, and student.** After a student has been accelerated, it is important to follow up soon after to see how the student is progressing. It is also helpful to schedule a formal meeting about six weeks after the acceleration occurs to check on the student's progress, answer any concerns, and make any needed modifications.

11. **Recognize caveats to the process.** If a bright student skips a grade or enters school early, he or she may still require additional adjustments in the educational program. The student might need to skip another grade at a later time, accelerate in a specific subject, or otherwise participate in options for additional enrichment and/or acceleration. Additionally, if the student is not a good candidate for acceleration at this time and/or there are some concerns that need to be addressed, the decision making process can be revisited later.

Conclusion

In this chapter, we discussed the decision-making process for whole-grade acceleration, including the special concerns for early entrance to school. While no educational intervention is 100% effective for all students, whole-grade acceleration for students who are ready, and for whom the process has been carefully considered, can be not only an effective and sound intervention, but better than the alternative (i.e., doing nothing). We have the evidence and the mechanisms to make whole-grade acceleration and early entrance to school a low-risk/high-success intervention for qualified students.

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Long-Term Effects of Educational Acceleration

Jonathan Wai,
Talent Identification Program, Duke University, Durham, North Carolina

Abstract

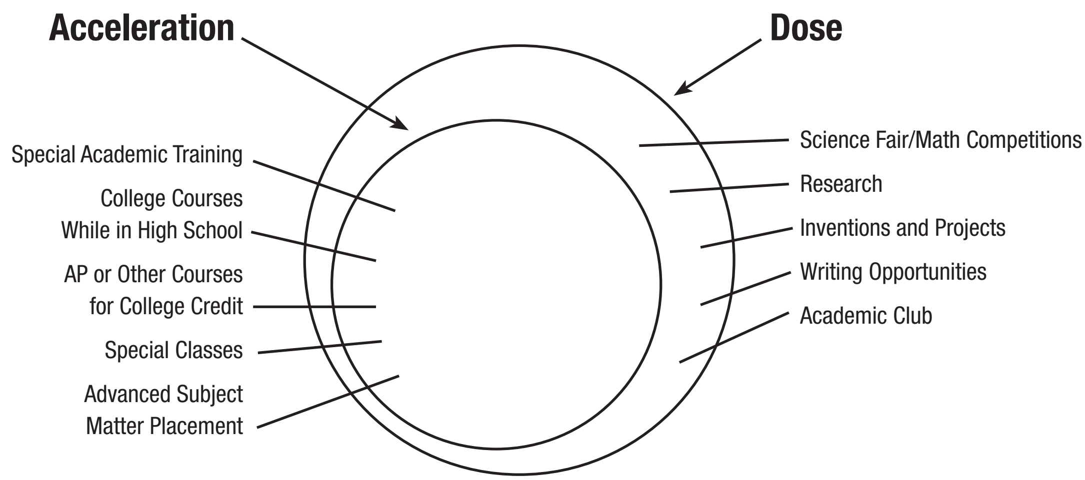
Educational intervention comes in many forms. Educational acceleration is an important class of interventions that comprise the appropriate educational dose for an individual. Dosage implies that one specific intervention may not be as relevant as the right mix, number, and intensity of educational interventions for any given person. This chapter reviews findings from the Study of Mathematically Precocious Youth (SMPY), a longitudinal study of thousands of intellectually talented students followed for many decades to the present. The long-term educational-occupational impact and positive subjective impressions about educational acceleration from academically advanced participants reported in these studies supports the importance of educational acceleration and, more broadly, an appropriate educational dose. The longitudinal research findings reveal that an educational program designed to move students at a pace commensurate with their rate of learning is educationally appropriate and necessary. Exceptionally talented students benefit from accelerative learning opportunities, have few regrets about their acceleration, and demonstrate exceptional achievements. What matters for each student is a consistent and sufficient educational dose across a long span of time, what we think of as life-long learning, or learning at a pace and intensity that matches a student's individual needs. All students deserve to learn something new each day, and if academically talented students desire to be accelerated and are ready for it, the long-term evidence clearly supports the intervention.

Introduction

When you want to improve your physical health, you don't have to eat one specific type of food or exercise in a specific way. Rather, you need an appropriate mix of healthy foods and exercise — no one thing is required. A variety of foods and exercise exist and different combinations of exercise and foods, which match the individual's needs and preferences, are in some sense interchangeable in the quest for a healthy lifestyle. What matters is that the individual gets the appropriate combination of healthy food plus exercise that match his or her preferences and needs. Could this common idea from health translate into the world of education? Consider the cases of two hypothetical high school students, Suzie and Greg. Suzie is engaged in her Advanced Placement (AP) courses, conducts research after school, recently joined the chess club, and is in a special math class. Greg recently skipped a grade, is taking a college course while still in high school, is an avid competitor in science fairs, and after school is working on an invention that he thinks will help cure a rare disease. How should we think about the educational interventions in which Greg and Suzie are involved? Furthermore, how might participation in these interventions influence their long-term educational decisions, career paths, and achievements later in life? First, let's consider the concept of educational acceleration.

Educational acceleration has been formally defined by Pressey (1949, p. 2) as "progress through an educational program at rates faster or at ages younger than conventional." Both Suzie and Greg are involved in educational interventions that offer cognitive and academic stimulations that fit this definition of acceleration. For example, Suzie is taking AP courses and is in a special math class, whereas Greg has skipped a grade and is taking a college course in high school (see Southern & Jones, 2004; this volume). However, they are also both involved in educational opportunities that fall outside the formal definition of acceleration, and might be considered educational enrichment (e.g., pull out classes or special camps). Acceleration combined with enrichment has been recommended by gifted educators as best professional practice when serving the needs of talented students (National Mathematics Advisory Panel, 2008; Rogers, 2007). Conducting research, competing in science fairs, working on an invention, or participating in an academic club are all

Figure 1: Illustration of How Educational Dose Encompasses More Than Acceleration



From Wai et al. (2010). Illustration of how educational dose encompasses more than acceleration. Interventions in the smaller circle, such as college courses while in high school, are examples of what is traditionally considered as educational acceleration. Interventions outside the smaller circle, such as science fair/math competitions, are examples of educational interventions beyond acceleration. Copyright © 2010 by the American Psychological Association. Reproduced with permission.

examples of activities outside the traditional definition of acceleration.

Although involved in very different activities, both students are intellectually stimulated and engaged, and that is the key to individual development of talent. It is likely that they each have educational experiences tailored to their needs, which also could be considered an appropriate 'educational dose' (Wai, Lubinski, Benbow, & Steiger, 2010). Figure 1 shows how educational dose encompasses more than the targeted forms of acceleration. For example, interventions in the smaller circle (e.g., special academic training and college courses while in high school) are examples of what is traditionally considered to be educational acceleration. However, interventions outside the smaller circle but within the larger circle (e.g. science fair/math competitions, research) are examples of educational interventions beyond acceleration. Therefore, accelerative options are central to the concept of dose, which refers to "the density of advanced and enriching precollegiate learning opportunities beyond the norm" (Wai, et al., 2010, p. 861); however, they are complemented by other educational opportunities. Therefore, these different types of educational interventions combine to provide a stimulating and challenging educational program for academically talented students.

Some educational opportunities are much more effective than others and many individual types of educational acceleration (see Rogers, this volume; Southern & Jones, this volume) have been found to have a positive effect on learning (e.g., Benbow & Stanley, 1996; Colangelo, Assouline, & Gross, 2004; Heller, Mönks, Sternberg, & Subotnik, 2000; Kulik & Kulik, 1984; Southern, Jones, & Stanley, 1993), and oftentimes educational acceleration is needed to challenge academically talented students appropriately. In addition to being challenged and engaged, students may also gain in maturity. Accelerated students can use the time they have saved for various options, including career advancement, creative accomplishment, or personal use (Park, Lubinski, & Benbow, 2013; Pressey, 1955; Terman, 1954).

Long-Term Effects of Educational Acceleration from the Study of Mathematically Precocious Youth

The Study of Mathematically Precocious Youth (SMPY) is a longitudinal study of thousands of students in the top one percent of intellectual talent (Lubinski & Benbow, 2006) comprised of various groups at different levels of cognitive ability (e.g., Cohorts 1 and 4: top 1%; Cohort 2: top 0.5%; Cohort 3: top 0.01%; and Cohort 5: intellectually talented top math/science graduate students). These groups, most of whom were originally identified in the 1970s, 1980s, and 1990s around age 13 based on their Scholastic Assessment Test (SAT) scores, have been followed longitudinally from those early years to the present. Collectively, the SMPY studies provide a long-term evaluation of the impact of educational acceleration on educational and occupational criteria as well as offer a retrospective evaluation of how students felt about the intervention. For example, did the accelerated students have positive or negative views about their educational experiences?

Nearly all the studies reviewed here have identified students based on an above-level assessment process known as the Talent Search Model (Olszewski-Kubilius, this volume). Talent searches identify students through a two-step process (Assouline & Lupkowski-Shoplik, 2012). Step one begins with the performance on a grade-level standardized test, which is typically administered in the school. Students *who score in the top 3 to 5% on a grade-level standardized test* are invited to take college entrance exams, specifically the SAT (College Board, 2014) and the ACT (ACT, Inc., 2014). The number of junior high aged students who take these exams in the 7th and 8th grades is now over 100,000 per year, and their score distributions are very similar to college-bound high school seniors. The average talent search participant can assimilate a typical high school course in three weeks, and those scoring in the top 0.01% can assimilate double this amount or more (Benbow, & Stanley, 1996; Stanley, 2000).

An important caveat is that research on the effectiveness of accelerative opportunities as presented in these studies is quasi-experimental at best (Campbell & Stanley, 1963; Cook & Campbell, 1979) because such opportunities have not been withheld from students for ethical reasons. Since the SMPY studies began in the 1970s, more accelerative and enrichment opportunities have become available (Wai et al., 2010) both inside and outside school and on-site and online. When students reflect on choices they made in the past, it is important to remember that they can evaluate only the path they took, not the path untraveled. All the studies described here should be considered within this context.

SMPY Findings Reviewed In This Chapter

This chapter reviews key findings from six longitudinal studies from SMPY surrounding the long-term educational-vocational and social-emotional impact of acceleration. The first four studies were reviewed by Lubinski (2004), and that chapter provides a wider historical context. Many of the empirical findings reviewed in this chapter were anticipated to some degree by early scholars (e.g., Allport, 1960; Hobbs, 1951; Hollingworth, 1926; Paterson, 1957; Pressey, 1949; Seashore, 1922; Terman, 1954; Thorndike, 1927; Tyler, 1974), and for many decades there has been a large body of empirical work supporting educational acceleration for talented youths (Colangelo & Davis, 2003; Lubinski & Benbow, 2000; VanTassel-Baska, 1998). Although neglecting this evidence seems increasingly harder to do (Ceci, 2000; Stanley, 2000), putting research into practice has been challenging due to social and political forces surrounding educational policy and implementation (Benbow & Stanley, 1996; Gallagher, 2004; Stanley, 2000). This chapter will focus on the key findings from Lubinski (2004) and updated findings from two recent SMPY studies that provide the strongest evidence for the long-term impact of educational acceleration, and more broadly the concept of educational dose. Finally, educational implications will be considered and some conclusions will be drawn.

Study 1: A 10-year longitudinal study of the top 1 in 10,000 in mathematical and verbal reasoning (SMPY Cohort 3).

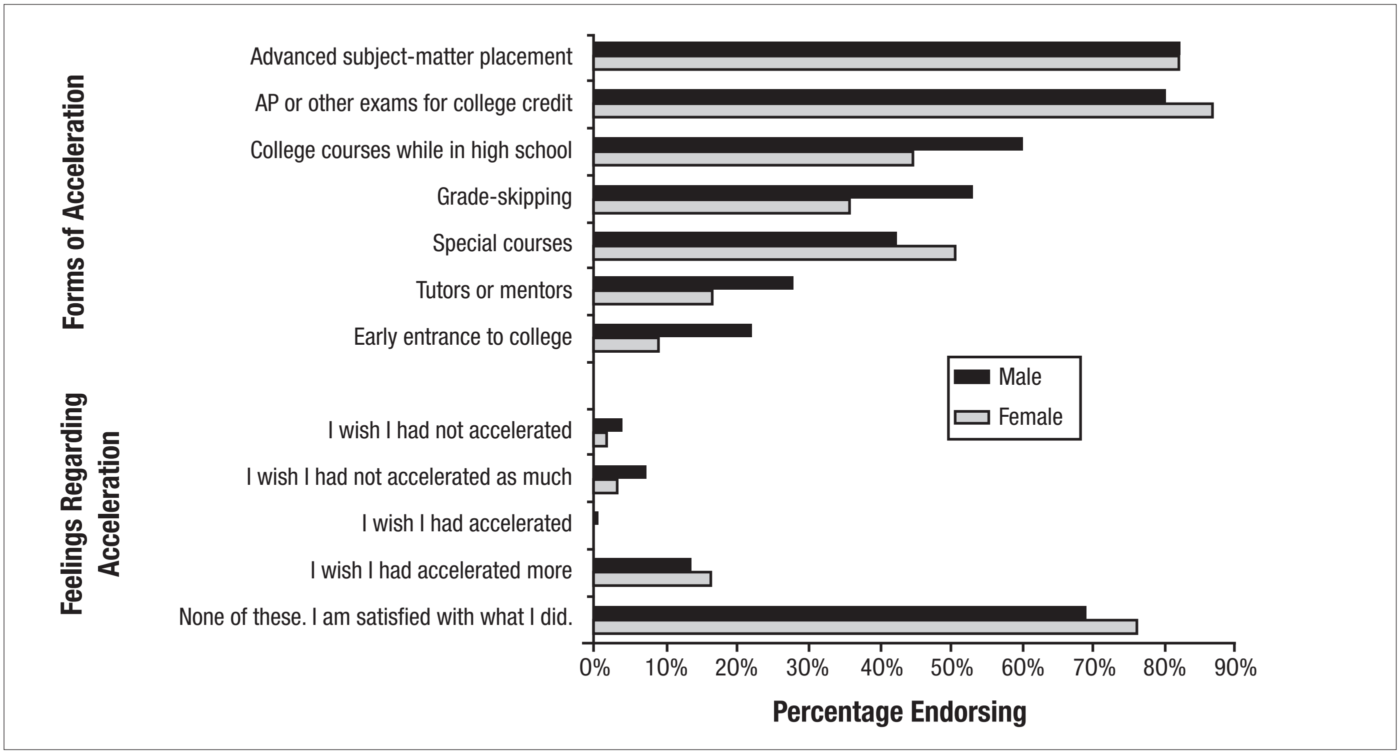
Lubinski, D., Webb, R. M., Morelock, M. J., & Benbow, C. P. (2001). Top 1 in 10,000: A 10-year follow-up of the profoundly gifted. *Journal of Applied Psychology,* 86, 718-729.

This study examined the profoundly gifted SMPY group (N=320, identified in the 1980s at age 13) in the top 0.01%, a group with an average IQ of 180. Figure 2 shows the different types and the high degree to which this group took part in acceleration. Remarkably, approximately 80% of this group had advanced subject matter placement and AP or other exams for college credit; approximately 40% grade skipped and took special courses; and approximately 15% entered college early. When asked about their feelings regarding acceleration, 70% said they were satisfied by their choices, 13% wished they had accelerated more, and only 5% wished they had not accelerated. Figure 3 illustrates participants' subjective views about the impact of acceleration on various educational and personal life aspects. Participants rated academic progress and interest in learning as the highest and social life and getting along with same age peers as the lowest, but all categories showed essentially no effect to favorable effects, indicating their views about the impact of acceleration on their experiences were generally favorable.

Study 2: A 20-year longitudinal study of the top 1% in reasoning ability identified at age 13 (SMPY Cohorts 1 & 2).

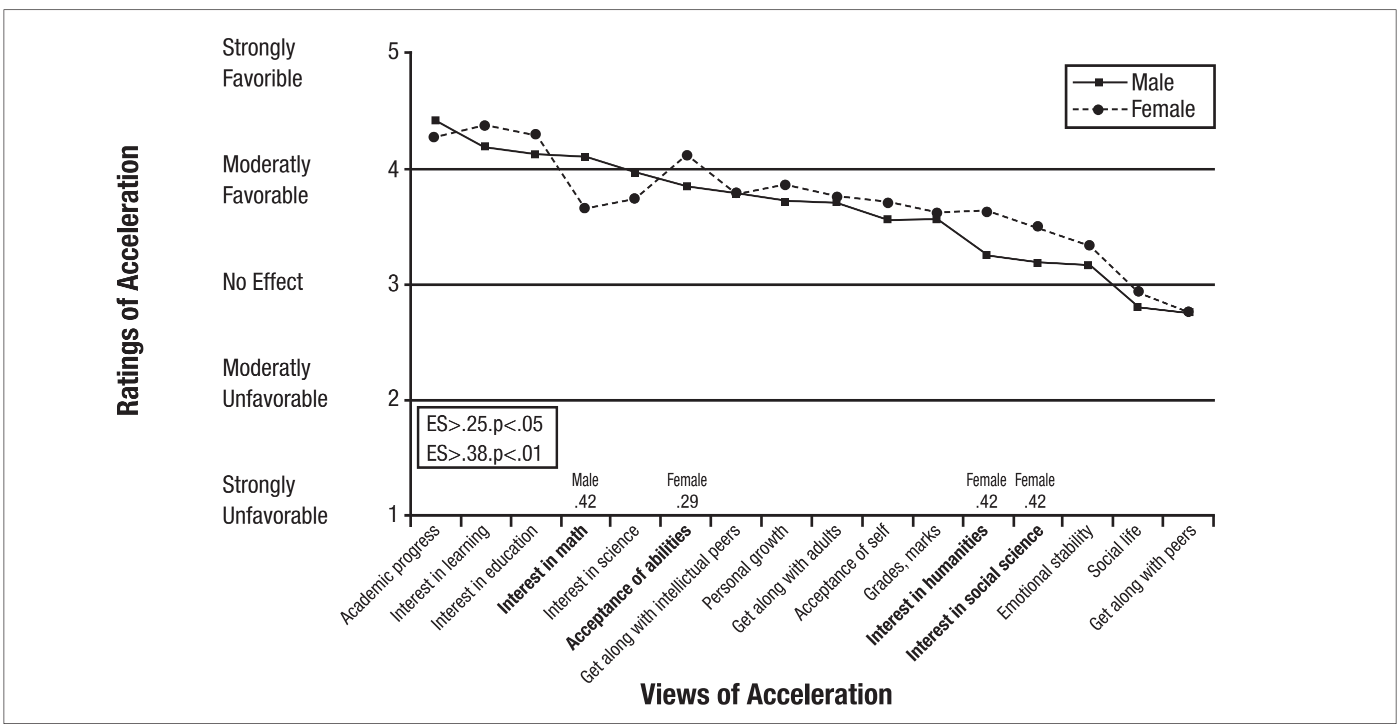
Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability: Their status 20 years later. *Psychological Science,* 11, 474-480.

Figure 2: Participation in Accelerative Programs and Satisfaction of SMPY Cohort 3



From Lubinski, Webb et al. (2001). Participation in accelerative programs and satisfaction of SMPY Cohort 3. Copyright © 2001 by the American Psychological Association. Reproduced with permission.

Figure 3: Subjective Views Regarding Acceleration



From Lubinski, Webb et al. (2001). Copyright © 2001 by the American Psychological Association. Reproduced with permission.

This study surveyed SMPY participants identified in the top one percent of ability, who had accelerated earlier in life (N = 1,975). Participants were asked at age 33 about the influence of acceleration on their educational planning, career planning, and social development. Of the participants, 70% viewed acceleration as having a "somewhat positive influence," "positive influence," or "strongly positive influence" on their educational planning. Respondents also indicated that acceleration had a positive influence on their career planning; less than 10% of participants thought that it had a negative impact on their career planning. However, the results concerning the impact of acceleration on their social development (the ability to form friendships) were essentially neutral.

Participants were also asked how supportive they were of grouping students according to ability level (also known as homogeneous grouping):

> *"A number of educational policy makers have proposed the following: eliminating homogeneous grouping for instruction (i.e., grouping students according to their abilities and skills, as in reading groups and honors classes) and, instead, teaching students of all ability levels in the same group. How supportive are you of this proposal?"*

The question was worded negatively for a bias against homogeneous grouping, and it is important to keep in mind that in the 1970s the range of accelerative options was limited. However, despite these caveats, 80% of the study participants were "somewhat" to "very" unsupportive of eliminating grouping based on ability level.

Study 3: Three decades of longitudinal data on the Advanced Placement (AP) program (SMPY Cohorts 1 through 5).

Bleske-Rechek, A., Lubinski, D., & Benbow, C. P. (2004). Meeting the educational needs of special populations: Advanced Placement's role in developing exceptional human capital. *Psychological Science,* 15, 217-224.

This study focused on the educational and socio-emotional impact of AP participation (N = 3,700). It includes each of the SMPY groups already examined in the first two studies along with an additional group in the top one percent (Cohort 4, N = 173, identified at ages 12-14 between 1992 and 1997, primarily from the state of Iowa). Cohort 5 is also introduced in this study (N = 709, identified during their first and second years of graduate school in 1992). Cohort 5 consists of an intellectually talented group of math/science graduate students from premier training programs throughout the U.S. These students were not identified via the talent search testing in middle school, but were identified while they were in graduate school. They provide a useful comparison group to the cohorts identified via the talent search.

AP Participation. Both SMPY participants and graduate students were highly involved in AP. With the exception of Cohort 1, for which there was limited AP availability, 76% to 86% of the other groups took at least one AP course, with the average number of AP courses taken ranging from 3.3 to 3.8, which is quite impressive considering the fact that these AP courses were taken before they were as widely available as they are today. The percentage of participants who took at least one AP course and indicated that it was their favorite ranged from 22% to 49%.

This study provides more evidence supporting the fact that intellectually talented students benefit from specialized learning environments such as AP courses. These courses help to meet their unique intellectual and social/emotional needs while they are still in high school. AP courses provide gifted students with the appropriate developmental placement needed by all students for optimal learning: a curriculum that progresses at a pace commensurate with their rate of learning.

High School Likes and Dislikes. The study authors reported participants' high school likes and dislikes in relation to AP involvement. Students were positive about working hard and being intellectually challenged. SMPY participants (Cohorts 1 through 4) and math/science graduate students (Cohort 5) showed quite similar patterns. Both groups liked academic and intellectual activities and disliked the lack of such activities. Sixty percent cited academic and intellectual activities and 49% cited social life and extracurricular activities as things they liked about high school. Regarding high school dislikes, 45% cited lack of intellectual stimulation or engagement and 30% cited social isolation and peer pressure. The intellectual engagement participants enjoyed ranged from associating with other highly intelligent classmates, taking AP classes, having a solid education, and working hard. The lack of intellectual engagement they disliked ranged from not having similarly-able or motivated classmates, the slow pace of instruction, not being taught enough, and not being challenged intellectually.

For students in all groups studied, students who took one or more AP courses were more likely than those who did not to list academic and intellectual activities as something they liked about high school. Among both groups, students involved in AP were less likely than those not involved in AP to list a lack of intellectual stimulation or engagement as something they disliked about high school.

Degree Attainment. For Cohorts 1 and 2, longitudinal data on the attainment of higher degrees was available at age 33. For participants who took at least one AP course in high school, 70% had obtained a master's degree or higher. For participants who did not take an AP course, this number was 43%. And even after controlling for mathematical reasoning ability, students who were involved in AP were more likely to obtain an advanced educational degree. The authors concluded, "Thus, through self-selection or something intrinsic to the AP program itself, AP involvement is a positive predictor of educational success and satisfaction for intellectually talented youth" (p. 219).

Comparisons to Normative Data. Relative to same age, typically-developing peers, SMPY students were quite different on various educational and social preferences. For example, 85% of a normative sample of 1,560 Indiana high school students cited friends and socializing as a high school like, with only 40% of that sample liking educational aspects (Erickson & Lefstein, 1991). This is the reverse pattern from the SMPY samples reviewed here who liked educational aspects more than social aspects of high school. Nineteen percent of Indiana students cited the opposite sex and dating as a favored aspect of high school, whereas less than two percent of SMPY participants did so. Thirty-five percent of Indiana students cited homework or term papers and six percent cited tests and exams as a high school dislike, whereas less than seven percent of SMPY participants cited exams, homework, or studying as a high school dislike. A small percentage of SMPY participants cited early mornings (two percent) and long school days (one percent) as a dislike, whereas for Indiana students these percentages were much higher at 23% and 20% respectively. Overall, this illustrates that SMPY participants, in comparison to their same age, typically developing peers, tend to be more focused on academics and their intellectual development.

Study 4: A comparison of top math/science graduate students with same-age SMPY participants tracked over 20 years (SMPY Cohorts 2 and 5).

Lubinski, D., Benbow, C. P., Shea, D. L., Eftekhari-Sanjani, H., & Halvorson, M. B. J. (2001). Men and women at promise for scientific excellence: Similarity not dissimilarity. *Psychological Science,* 12, 309-317.

This study reported data from SMPY participants in the top one percent of ability (Cohort 2) with same-age intellectually talented math/science graduate students (Cohort 5). The SMPY group (females = 528, males = 228) were compared to top math/science graduate students (females = 346, males = 368). The findings reported here refer to the educational experiences of graduate students and talent search participants. Roughly 90% took part in some form of acceleration. The different types of acceleration experienced ranged from AP involvement (approximately 90% for talent search participants, which is more than comparable graduate students [66%]); advanced subject matter placement (approximately 60%); college courses in high school (approximately 33%); and grade-skipping (approximately 12%). Overall, approximately 79% reported a positive experience and less than three percent reported a negative influence of their acceleration experience. Generally, the findings for both graduate students and talent search participants were quite similar, with only a few comparisons being statistically significant[1]. However, twice the percentage of talent search students were grade skipped, twice the percentage of graduate students were presidential scholars, and fewer talent search females participated in a math/science contest during college.

Study 5: A 40-year longitudinal study examining the effects of grade-skipping (SMPY Cohorts, 1, 2, & 3).

Park, G., Lubinski, D., & Benbow, C. P. (2013). When less is more: Effects of grade-skipping on adult STEM accomplishments among mathematically precocious youth. *Journal of Educational Psychology,* 105, 176-198.

This 40-year longitudinal study (N = 3,467) investigated the impact of grade-skipping (or whole-grade acceleration), one of the most effective educational opportunities (see Lupkowski-Shoplik, Assouline, & Colangelo, this volume; Rogers, this volume). Participants across three SMPY groups who had skipped one or more grades were compared to those who had not grade skipped but were statistically matched on a number of important characteristics, to determine whether there were differences many years later on the earning of STEM (science, technology, engineering and mathematics) doctorates, publications, and patents. Across all these educa-

1. Group differences were significant for only three of the 19 educational experiences: math-science contest or special program before college $\chi 2(3, N = 1{,}251) = 20.6, p < .001$; math-science contest or special program during college, $\chi 2(3, N = 1{,}173) = 11.1, p < .05$; and favorite high school class being in math or science, $\chi 2(3, N = 1{,}223) = 87.7, p < .001$. No differences were significant between male and female graduate students, but talent search females differed significantly from the other groups for the first two items above, and both talent search males and females differed significantly from the graduate students as a whole. See Lubinski, Benbow et al. (2001) for more detail.

Table 1: Percentages of Participants Earning Outcomes Across Each Cohort and for all Cohorts Together

	Percentage Earning Outcome				
Cohort and group	**N**	**Doctorates**	**STEM PhDs**	**STEM Publications**	**Patents**
1972 Cohort					
Matched Controls	358	15.1	3.6	6.4	2.2
Grade Skippers	179	27.4	10.1	12.8	4.5
1976 Cohort					
Matched Controls	231	23.8	14.3	21.2	8.2
Grade Skippers	116	31.0	18.1	25.9	9.5
1980 Cohort					
Matched Controls	68	33.8	17.6	23.5	10.3
Grade Skippers	68	45.6	29.4	38.2	17.6
All Cohorts					
Matched Controls	657	20.1	7.9	13.4	5.2
Grade Skippers	363	32.0	16.3	20.9	8.5

The last two columns list the percentage of participants in each category with one or more peer-reviewed publication in a STEM field or patent, respectively. From Park et al. (2013). Copyright © 2013 by the American Psychological Association. Reproduced with permission.

tional and occupational outcomes, some of which can be considered creative achievements, grade skippers, in comparison to matched controls, showed a large advantage. Concerns about accelerated students "burning out" were not supported by the research findings, Students who skipped one or more grades began and finished their STEM graduate degrees earlier and produced more publications at a younger age.

The non-accelerated students in this study also were very successful, earning advanced degrees, publishing scientific papers, and securing patents at an impressive rate. However, the accelerated students were even more accomplished than the comparison group. This illustrates the long-term impact of one potent form of educational acceleration. Grade-based acceleration, when used appropriately with very highly-able mathematically talented adolescents, can have positive effects on long-term productivity in STEM fields, 30 to 40, or more, years after the educational intervention.

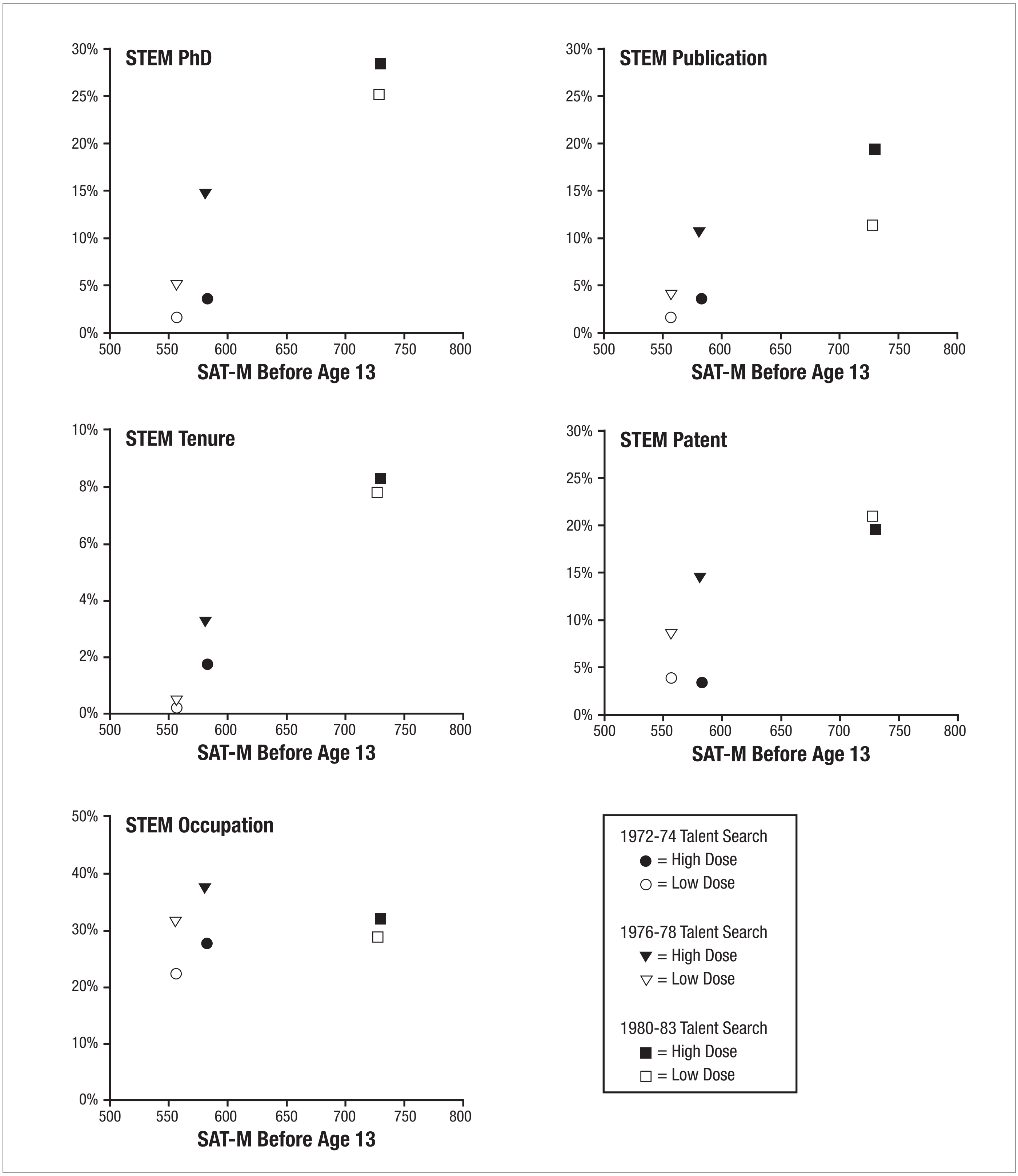
Study 6: A 25-year longitudinal study examining the effects of educational dose among intellectually talented students and top math/science graduate students (SMPY Cohorts 1, 2, 3, & 5).

Wai, J., Lubinski, D., Benbow, C. P., & Steiger, J. H. (2010). Accomplishment in science, technology, engineering, and mathematics (STEM) and its relation to STEM educational dose: A 25-year longitudinal study. *Journal of Educational Psychology, 102*, 860-871.

This 25-year longitudinal study incorporated the various academic interventions of educational acceleration, enrichment, and stimulation into the concept of "educational dose." As described at the beginning of this chapter, educational dose is "the density of advanced and enriching precollegiate learning opportunities beyond the norm that students have participated in" (Wai et al., 2010, p. 861). The research reported here takes into account accelerative opportunities (including grade-skipping, college courses while in high school, AP courses, or advanced subject matter placement) as well as other appropriately challenging enriching educational activities, such as science or math competitions, special classes, research, inventions and projects, and writing opportunities.

Table 1 illustrates the various components of acceleration and enrichment activities investigated in this study in three of SMPY's talent search groups (N = 1,467) as well as the math/science graduate student group (N = 714). As described previously, Table 1 includes accelerative as well as other STEM-related educational opportunities and shows how the two types of educational activities can complement each other to fully develop a student's talents.

Figure 4: STEM Educational Dose and STEM Outcomes



STEM = science, technology, engineering, and mathematics; SAT-M = math section of the Scholastic Assessment Test. From Wai et al. (2010).

For this 25-year longitudinal study, each different type of pre-college educational opportunity was summed to determine the educational dose level. Referring back to hypothetical students Suzie and Greg introduced earlier, both were involved in four different learning opportunities, so they each had a dose level of four. This study focused on STEM learning opportunities and outcomes. Two groups were formed within each Cohort: those with a relatively higher educational dose of STEM opportunities and those with a relatively lower educational dose. These two groups within each SMPY sample were then compared on STEM outcomes 25 years later—PhDs, publications, university tenure, patents, and occupations. Figure 4 illustrates these findings. Cohort 1 is represented by circles, Cohort 2 by triangles, and Cohort 3 by squares. The higher dose group is indicated by filled shapes and the lower dose group by unfilled shapes. The y-axis shows the proportion attaining each outcome, and the x-axis shows SAT-Mathematics scores at age 13. Along the x-axis, SAT scores differ for the cohorts because they were initially selected at the top one percent (Cohort 1), top 0.5% (Cohort 2), and top 0.01% of ability (Cohort 3). As can be seen within each panel, even though SAT scores were similar across groups, the group with a higher educational dose was more likely to attain each of these outcomes. The earning of STEM PhDs, publications, patents, and university tenure were all much higher for the higher scoring groups, and the percentage in a STEM occupation was higher for the lower scoring groups with a higher STEM educational dose. The same general analysis was performed within the math/science graduate student group, and a similar pattern of findings emerged. This illustrates the long-term impact of educational acceleration, and more broadly the concept of educational dose. This longitudinal study indicates the number of pre-collegiate STEM educational opportunities that mathematically talented adolescents experience is related to subsequent STEM accomplishments achieved over 20 years later. This is evidence for the powerful impact that educational experiences have on students' later accomplishments.

Summary of Empirical Findings

The first five studies from SMPY reviewed in this chapter independently as well as collectively demonstrate the long-term impact of the various forms of educational acceleration. The sixth study combined all these individual educational opportunities into the concept of educational dose, finding that participants with a higher dose of educational acceleration and enrichment, even when controlling for ability, were more likely to have earned creative educational and occupational achievements many years later. Some of the studies also reviewed evidence showing that, overall, students who had accelerated viewed their educational histories positively, and many said they would have accelerated more, not less. These studies combine to show the powerful impact of educational acceleration in the lives of these talented students, with accelerated participants reporting satisfaction with their experiences as a whole. The key findings of these studies are listed in Table 2.

Educational Implications and Conclusions

The educational implications of these studies are quite clear. They collectively show that the various forms of educational acceleration have a positive impact. The key is appropriate developmental placement (Lubinski & Benbow, 2000) both academically and socially. Each student is different, and decisions on whether a student should engage in acceleration should be made thoughtfully based on evidence (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, and Forstadt, 2009) and tailored to their individuality (Wai, Lubinski, & Benbow, 2009b). However, the long-term studies reviewed here show that adults who had been accelerated in school achieved greater educational and occupational success and were satisfied with their choices and the impact of those choices in other areas of their lives. Additionally, for some of these students, educational acceleration might help them to mature as well as to save valuable time, which could be allocated for career advancement (see McClarty, this volume), creative accomplishment, or personal use (Park et al., 2013; Pressey, 1955; Terman, 1954). Some accelerative opportunities, such as grade-skipping or early entrance to college, are likely more potent in boosting educational and occupational outcomes compared to others, and saving such time (see Hertzog & Chung, 2015, for longitudinal findings mirroring SMPY for early entrance to college).

However, overall, it may not be any one educational intervention that matters, but the appropriate dose or stimulation that matters (Wai et al., 2010). The groups examined in these studies grew up in a time where there were relatively fewer opportunities for educational acceleration and enrichment compared to present-day opportunities. Consider the vast number of online educational options that are now available to students, from massive online open courses (MOOCs) to the Khan Academy. Students have many ways to be stimulated intellectually and avail themselves of accelerative opportunities both inside and outside the classroom. Because one size does not fit all, no one intervention is going to be right for everyone. What matters is that each student re-

Table 2: Key Findings From the SMPY Longitudinal Studies

Study 1	Academically talented students who accelerate in school view the impact of acceleration on their life experiences quite positively.
Study 2	At age 33, the vast majority of participants who had been accelerated in school viewed acceleration as having a positive influence on their educational planning as well as on their career planning. They viewed the impact of acceleration on their social development (the ability to form friendships) as essentially neutral, indicating it had neither a positive nor a negative impact.
Study 3	Participation in Advanced Placement (AP) courses was a positive predictor of educational success and satisfaction for intellectually talented students.
Study 4	Roughly 90% of the exceptionally talented students studied took part in some form of acceleration. The vast majority reported a positive experience with acceleration.
Study 5	Grade-based acceleration, when used appropriately with very highly-able mathematically talented adolescents, can have positive effects on long-term productivity in STEM fields, 30 years or more after the educational intervention.
Study 6	Even when controlling for ability, participants with a higher dose of STEM educational acceleration and enrichment were more likely to have earned creative educational and occupational achievements *more than 20 years later*. This is evidence for the powerful impact that pre-college eduational experiences can have on students' later accomplishments.

ceives a consistent and sufficient educational dose across his or her educational experience, which will thus essentially comprise what we might consider to be life-long learning (Lubinski, Benbow, & Kell, 2014).

It is important to emphasize that appropriate developmental placement is important for all students (Humphreys, 1985). Educational acceleration is essentially appropriate pacing and placement that ensures advanced students are engaged in learning for life. Every student deserves to learn something new each day (Stanley, 2000). The evidence clearly supports allowing students who desire to be accelerated to do so, and does not support holding them back.

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Applications of Acceleration

Professional Development for Teachers and School Counselors: Empowering a Change in Perception and Practice of Acceleration

Laurie Croft and Susannah M. Wood
The University of Iowa, Iowa City, Iowa

Abstract

Acceleration in its various forms (such as early entrance to kindergarten, combined classes, curriculum compacting, and whole-grade acceleration) has had a robust history of research support and positive outcomes as a programmatic option for gifted and talented youth. However, teachers and counselors who may be consulted by parents regarding possibly accelerating their student may not have access to accurate information on acceleration. Without this knowledge, teachers and counselors both may default to anecdotal or erroneous information. These educators benefit from professional development (PD) that encourages them to reflect on their existing attitudes about acceleration, as well as review research-based findings about the practice, so that they can provide accurate consultations and student interventions. This chapter explores elements of optimal professional development, including access to independent learning and professional learning communities. The chapter concludes with a proposed model for professional development around the topic of acceleration and includes resources for educators.

Introduction

Jordan A., with curly brown hair and hazel eyes, is a six-year-old in first grade. His birthday is October 2, making him one of the oldest children in his class (his district has a cut-off date of October 1 for entry to kindergarten at 5, or entry to first grade at 6). As well, he's already almost 4 feet tall, weighing just under 50 pounds, making him one of the bigger children in the class.

Jordan could put together large puzzles before he even turned 1; by the age of 3, he was offering his sister ideas on her homework from her 2nd grade class. He was reading and writing by age 4, and while he enjoyed playing with the friends his older sister and brother would bring home, he showed no interest in playing with the other preschool-aged children in his class. By age 5, he was calling addition and subtraction "easy peasy"; by the time he was 6, he told his mother that he knew what multiplication was (and he did!).

Jordan ran away from his preschool one day in the spring, unhappy that they always did the "same things," and he was so excited to start real school, like his sister and brother. Within the first few weeks of kindergarten, however, he had grown very quiet about his class, the other kids, and his teacher. Just before Halloween, Jordan was in a serious automobile accident and had to miss weeks of school; he was hospitalized with several broken bones. As he improved, he continued reading, writing, and playing computer games related to math—and anything that featured dinosaurs. He seemed happy to see his teacher when she visited with cards from the other kids, and he seemed pleased when he was able to return to school in January after winter break.

Within a month, however, he seemed more and more unhappy and complained of headaches and stomachaches that kept him home from school. His parents took him to see his doctor, who assured them that Jordan had no lasting effects from the accident that would cause these symptoms. Nevertheless, this bright and articulate boy just didn't seem like himself.

The Need for Professional Development Focused on Acceleration

Jordan's story provides challenges for teachers and school counselors alike, as well as a strong rationale for facilitating the professional development of these educators in their roles related to the concept and practice of acceleration, as Jordan appears to be a candidate for acceleration. Without intervention, the school risks Jordan's withdrawal and underachievement due to boredom and lack of challenge. Acceleration in its various forms (such as early entrance to kindergarten, combined classes, curriculum compacting, and whole-grade acceleration) has had a robust history of research support and positive outcome as a programmatic option for gifted and talented youth (e.g., Colangelo, Assouline, & Gross, 2004). However, there is no guarantee that either teachers or school counselors in a given school have been exposed to the concept and practice of acceleration, its research underpinnings, or school district or state policies regarding acceleration. Yet both sets of professionals may be called upon not only to intervene in a case such as Jordan's but also to provide consultation with parents and other people in Jordan's life around the need for the practice of acceleration. Because parents and other educators may endow these professionals with perceived power and expertise due to their roles in the schools, they may also believe that the gifted education teacher, general education teacher, and school counselor have a solid foundation and working understanding of acceleration. This may include knowledge of interventions that would be appropriate for a student like Jordan, and ways to provide accurate consultations around the issue when asked. In addition, as the case of Jordan illustrates, teachers and school counselors will no doubt be working together to help Jordan and his family, both in terms of academic intervention as well as social and emotional concerns.

For many gifted students, the social and emotional issues and concerns that may bring them to see the school counselor may actually be alleviated if their need for mental stimulation is met, thus avoiding academic boredom and possible underachievement. Research suggests, however, that school counselors may never have received accurate information about gifted and talented students during their preparation programs, let alone information that will help them decide which students would benefit from acceleration (Peterson & Wachter Morris, 2010; Wood, Portman, Cigrand, & Colangelo, 2010). Teachers may only receive "cursory glimpses" concerning differentiation and acceleration in a theories course as part of their pre-service training (Dixon, Yssel, McConnell, & Hardin, 2014, p. 114). Without specific knowledge about the academic needs of gifted students, teachers and counselors both may default to anecdotal or erroneous information, often informed by popular stereotypes and years of experience in traditional classrooms and schools, in order to inform their practices of intervention and consultation (Wood et al., 2010). Thus, it becomes paramount that these practitioners receive the information they need to provide accurate consultations and student interventions. The primary venue of gaining new knowledge and skills for practicing professionals is through professional learning opportunities, commonly referred to as professional development (PD).

Professional Development and Acceleration

The availability of a shared body of knowledge is essential for professionals (Coleman, Gallagher & Job, 2012); without specialized knowledge and skills, educators will have inadequate understandings of the distinct and asynchronous ways in which gifted children learn and develop. Decades of research have posited that effective PD is the "critical component of improving the quality of education" (Jones & Dexter, 2014, p. 368), enhancing overall quality of professionals in the schools, including effective interaction with students, instructional practice, and student learning (Desimone, Porter, Garet, Yoon, & Birman, 2002; Borko, 2004; Caena, 2011; Guskey, 2002; Organization for Economic Cooperation and Development [OECD], 2009; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Yoon, Duncan, Lee, Scarloss, & Shapley, 2007; Yuen, 2012). Research also suggests that PD related to gifted education is essential (Croft, 2003; Dettmer & Landrum, 1998; Dettmer, Landrum, & Miller, 2006; Gallagher, 2001; Karnes, Stephens, & Whorton, 2000; Reis & Westberg, 1994; Tomlinson et al., 1994; VanTassel-Baska et al., 2008), yet the *2012-2013 State of the States in Gifted Education* (National Association for Gifted Children [NAGC] & Council of State Directors of Programs for the Gifted [CSDPG], 2013), reports that only one state requires more than a minimal reference to gifted education for preservice teachers and just two states require professional learning related to gifted education for general education teachers. Similarly, only two states require coursework in gifted education for those earning credentials as school counselors. Seventeen states do require that professionals working in gifted programs have credentials/endorsements, but only five require annual staff development for teachers of the gifted. Only 14 states rank "training for general education teachers in GT instruction" (NAGC & CSDPG, 2013, p. 107) as one of the four most essential areas in need of attention; even in those states, the topic of acceleration might or might not be included in that training.

In 2003, NAGC and The Council for Exceptional Children, The Association for the Gifted (CEC-TAG) emphasized the importance of "a continuum of educational opportunities to ensure that a sufficient variety of options are available to assist each child to develop one or more apparent or emergent area of strength" (Callahan, Cooper & Glascock, p. 3). By 2006, the two organizations had collaborated to develop knowledge and skill standards essential for the professionals working with gifted children (Johnsen, 2012), and in 2013 the standards were updated (NAGC & CEC-TAG, 2013). "Acceleration" jumps out as the first entry in the Glossary (p. 8), and each of the seven standards alludes to the need for professional collaboration to ensure "advanced, conceptually challenging, in-depth, distinctive, and/or complex content" (p. 3). Standard 5: Instructional Planning and Strategies explicitly states "gifted education professionals possess a repertoire of evidence-based strategies to differentiate and accelerate the curriculum for individuals with gifts and talents" (NAGC & CEC-TAG, 2013, p. 5). Standard 6: Professional Learning and Ethical Practice elaborates:

> Gifted education professionals ... participate actively in professional learning communities that benefit individuals with gifts and talents, their families, colleagues, and their own professional growth. They view themselves as lifelong learners and regularly reflect on and adjust their practice, and develop and use personalized professional development plans. They plan and engage in activities that foster their professional growth and keep them current with evidence-based practices.... (p. 7)

The national *Pre-K – Grade 12 Gifted Programming Standards* (NAGC, 2010) explicitly references acceleration, but the *State of the States in Gifted Education* (NAGC & CSDPG, 2013) reflects limited acceptance of acceleration from responding states:

- 9 have a policy that explicitly permits acceleration;
- 1 explicitly prohibits acceleration;
- 32 allow local education agencies (LEAs) to determine local policy related to acceleration, but only 11 of those have state policy that requires the LEA to take a position;
- 8 permit early entrance to kindergarten;
- 16 prohibit early entrance to kindergarten;
- 18 allow LEAs to permit early entrance to kindergarten, but only 7 require the LEA to take a position;
- 29 permit dual enrollment, allowing high school students to enroll in college-level courses, but in 22 of these states, families must pay for the accommodation.

Positioning Acceleration in the Context of Professional Development

Teachers. Teachers in today's classrooms experience an array of demands; various types of acceleration are not a priority for most schools or districts. Trying to prepare the next generation of students to thrive in a diverse society, succeed in a rapidly growing global economy, and engage with constantly evolving technological innovations, educators simultaneously are trying to adapt to the demands of high-stakes accountability requirements. According to Valli and Buese (2007), "Teachers' work has increased, intensified, and expanded in response to federal, state, and local policies aimed at raising student achievement" (p. 520). Because they "need the skills to help all students succeed, no matter the student's learning difference, disability, or command of the English language" (M. Miller, 2009, p. 4), teachers have increased needs for professional learning opportunities. Because PD is envisioned as key to meeting educational reform objectives, and to school system and district needs for school improvement (Caena, 2011; Education Resource Strategies, 2013; Garet, Porter Desimone, Birman, & Yoon, 2001), teachers of the gifted find limited support for PD about acceleration or other gifted topics even when they perceive its importance for students such as Jordan.

School Counselors. Similarly, with the call to meet the academic, career and personal-social needs of all K-12 students, the roles of the professional school counselor are many and diverse. School counseling responsibilities can range from facilitating classroom guidance, conducting small groups, working with child study teams, collaborating with parents, and gathering data supporting their individual and programmatic interventions. The complexity and variety of their responsibilities require school counselors to seek professional development in order update their current skills, develop new skills around areas of demand or special student populations, and to avoid accusations of malpractice (Carey & Dimmitt, 2005; Herlihy, Gray, & McCollum, 2002; Howell, et al., 2007; Studer, 2005). However, other than the continuous call for clinical supervision which is not normally provided to school counselors post-graduation (Herlihy, Gray, & McCollum, 2002; Perera-Diltz & Mason, 2012; Studer, 2005), not much is known about school counselors and their professional learning. In their study of 206 Utah school counselors and their professional development, Howell and authors found that the primary reason school counselors sought PD was to "improve knowledge and skills" followed by the reasons of "recertification" and "personal enrichment" (Howell et al., 2007, p. 14). Participants also listed barriers to PD commonly cited in the literature, including balancing PD with other responsibilities, financial support for PD (Sutton & Page, 1994), and identifying PD opportunities that fit their role and function as counselors (Splete & Grisdale, 1992). Providing dedicated time and professional development opportunities appropriate for their role and function is often challenging for school counselors. School counselors must first acknowledge that serving all students, including gifted and talented students, is part of their role and function before they explore professional development around acceleration.

Current research and policy tends to drive the type of PD that is available to school counselors (Rhyne-Winkler & Woolen, 1996). In order to meet the current educational demands in the United States driven by the era of accountability, the American School Counselor Association (ASCA) provides specialist training in the areas of: 1) bullying prevention, 2) data and programming, 3) leadership, and 4) law and ethics (see http://www.schoolcounselor.org/). Because school counselors face barriers such as funding their own professional development and trying to find time to leave their offices due to the demands on their time (Howell, et al., 2007), organizations like ASCA are beginning to provide an increasing number of online PD such as webinars and reading for continuing education credits. Given the obstacles that prevent school counselors from finding and receiving PD, it can be difficult to make an argument for in-service training in gifted and talented generally, and acceleration specifically. When questioning where professional development around acceleration may fall in their requirements for PD, school counselors can refer to the ASCA position statement on gifted and talented students and programs. It states that school counselors "seek to keep current on the latest gifted and talented programing research and recommendations to employ best practices to meet the needs of identified students and collaborate with other school personnel to maximize opportunities for gifted and talented students" (ASCA, 2013, para. 6).

Similar to teachers of the gifted, school counselors need in-service PD around acceleration, its research underpinnings, current practice and policy. Because gifted students can be considered a special population, school counselors can look at PD around acceleration as increasing their awareness of the unique development and academic needs of gifted students, expanding their knowledge of academic interventions for this special population, and diversifying their skills in meeting these needs (Levy & Plucker, 2008). School counselors will be familiar with the awareness, knowledge and skills paradigm that is used to teach concept of multiculturalism in counseling preparation program (Sue & Sue, 2013). By conceptualizing gifted students as a unique population that may require differentiated skills in academic planning, school counselors can make the argument for participating in professional development opportunities that focus on increased awareness and knowledge about gifted students, their characteristics, developmental needs and talent development. Professional development in these areas could, and perhaps should, include the topic of acceleration as an educational intervention.

Effective Professional Development: Approaches that Facilitate

Understanding of Acceleration

The *No Child Left Behind Act* (NCLB, 2002) established criteria for high-quality PD. These criteria included features such as the following: (a) sustained, intensive, and focused on specific content areas; (b) alignment with state academic content standards, student achievement standards, and assessments; (c) demonstration of success in enhancing teacher knowledge of content areas and in improving teacher awareness of research-based instructional strategies; and (d) utilizing evaluations for impact on teacher effectiveness and concomitant student achievement (Yoon et al., 2007). Many recent studies of effective professional learning (e.g. Caena, 2011; Darling-Hammond et al, 2009; Desimone et al., 2020; Garet et al., 2001; Penuel et al., 2007; Pedder & Opfer, 2013; Yates, 2007) have described core and structural features of successful programs, again emphasizing a focus on academic content areas and how students best learn that content (pedagogical content knowledge), with an emphasis on constructivist strategies. As well, they suggest that effective PD is participant driven and situated in the workplace, characterized by active and collaborative learning by participating educators, preferably organized as cohorts from the same school, grade, and/or department. Coherence, that is, consistency with overall district and/or school PD, building on and leading to additional learning experiences is another recommended feature. Current research has stressed the alignment of PD with subject-area standards and has advocated PD characterized by extended duration, in terms of both hours and overall span

Table 1: What do Teachers and School Counselors Need to Know About Acceleration?

1. Acceleration works. An extensive research base supports acceleration for gifted students (e.g., Colangelo, Assouline, & Gross, 2004; Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, current volume).
2. There are well-researched methods (e.g., Assouline et al., 2009) for systematically evaluating a candidate for acceleration and guiding teachers, counselors, administrators, and the student through the process.
3. Acceleration can be provided in a variety of ways, including content acceleration (where a student might study advanced content in only one subject), grade-skipping, curriculum compacting, and dual enrollment in high school and college. Therefore, acceleration can be tailored to the academic and social needs of the individual student.
4. Acceleration supports the social/emotional development of students by placing them with other students demonstrating similar academic abilities and interests.
5. Acceleration provides academic challenges and stimulation, which are needed for continuous development of students' abilities.
6. Acceleration is an inexpensive educational option.

of time, optimally including ongoing interactions among participants and experts.

Access to Professional Development

Some of the features mentioned above, however, work against an emphasis on acceleration as a topic for PD. An implicit goal reflected in much of this PD literature is "building collective teaching capacity….especially critical in closing the achievement gap" (Education Resource Strategies [ERS], 2013). Research has suggested that the emphasis on closing the achievement gap has slowed the academic growth of talented students (Xiang, Dahlin, Cronin, Theaker, & Durant, 2011). Certainly, greater understanding of both content and pedagogical knowledge is crucial for advanced learners, underpinning, for example, Advanced Placement coursework. That emphasis can be an important asset for other types of acceleration, including continuous progress, supervision of self-paced instruction; subject-matter acceleration, curriculum compacting, and telescoping curriculum (see Colangelo, Assouline, & Gross, 2004). Support for and facilitation of other acceleration options, however, is predicated on local beliefs and attitudes related to acceleration as a process, sometimes prohibited by policy; in general, gifted education is "an area somewhat limited in dedicated professional development time because of other school and district initiatives" (Little & Housand, 2011, p. 20). Acceleration requires a look beyond grade-level achievement standards and assessments, unlikely to be coherent with other district or school initiatives. Valli and Buese (2007), for example, determined that between 2001-2005, faced with high-stakes accountability, schools that had facilitated acceleration as a part of their comprehensive practice of differentiation eliminated the option, because "in schools at risk of inadequate yearly progress, bringing sufficient numbers of students … to proficiency became differentiation's primary goal" (p. 534).

While much recent research has explored PD within the context of school improvement (Evans, 2014), alternative approaches to professional learning suggest options for educators who want to better understand, and to help colleagues understand, the importance of acceleration for talented students. Teachers experience many of the same barriers to accessing formal PD as do school counselors: financial costs, a lack of extra hours in the day, and an unwillingness to miss opportunities to interact with their students are fundamental concerns (Cameron, Mulholland, & Branson, 2013). Nevertheless, as Guskey noted, "most teachers engage in staff development because they want to become better teachers," and PD "presents a pathway to increased competence and greater professional satisfaction" (1986, p. 6). Teachers as individuals are responsible for enhancing professional performance, and individual teachers will be responsible for planning, implementing, and evaluating the success of acceleration on student learning (Caena, 2011; Roberts & Roberts, 1986). Independent teacher learning provides educators of the gifted the pathways to understand topics such as acceleration that are critical to the talent development process (Jones & Dexter, 2014; Yates, 2007); Joyce and Calhoun (2010) validate independent learning, suggesting it is "vastly underused" but has "tremendous promise," explaining "some types [of PD] focus on the individual as a person and provide avenues for people to grow according to their own lights" (p. 12).

Independent Learning

Independent learning revolves around "activities that teachers engage in on their own initiative and accord" (Jones & Dexter, 2014, p. 371). Learning can be informal, with teachers seeking information and/or assistance from colleagues or experts when needed. Independent does not necessarily equate to solitary learning, however, and several educators can share information and collaborate to develop greater understanding about specific issues such as acceleration. Interaction can be face-to-face or virtual. Websites such as that of the Acceleration Institute (www.accelerationinstitute.org), an integral part of The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development (Belin-Blank Center); Hoagies Gifted Education Page (www.hoagiesgifted.org/); or the Davidson Institute for Talent Development (www.davidsongifted.org/) can provide specifics about the research basis for types of acceleration, as well as other practices in gifted education.

Additional technological options, from Twitter, Facebook, and YouTube, to the Belin-Blank Center's gifted-teacher listserv, can enhance a sense of connectivism, representing a cycle of first learning independently and then with others (Jones & Dexter, 2014). Little and Housand (2011) extensively explore online professional learning, noting that "online learning opportunities have the potential to open many more possibilities for teacher professional growth around working with gifted learners" (p. 20). Informal learning communities evolve in an effort to understand and facilitate a strategy essential for student well-being; they often meet several of the criteria for effective PD. These educators perceive a need, situated in their classrooms or associated with their professional roles; they direct the learning, collaborating as needed, and they construct understandings coherent with their specific roles (Borko, 2004), even if their goals might not align with broader organizational objectives (Lovett & Gilmore, 2003; Robinson, Myran, Strauss, & Reed, 2014).

Professional Learning Communities

Other general forms of more formal or organized independent professional learning that have proven successful include the use of professional learning communities (PLCs). Teachers who join a PLC demonstrate that they are "reflective practitioners, taking responsibility for learning to improve the quality of professional performance" (Caena, 2011, p. 4). Members of PLCs share a sense of collective responsibility, as well as a commitment to inquiry and individual learning. Research has shown that in successful PLCs, members have "shared expert knowledge, gained ideas, and examined beliefs in ways uncommon in most schools" (Caskey & Carpenter, 2012, p. 56). Caskey and Carpenter also describe the success of Critical Friends Groups, a specific articulation of PLCs that build on protocols designed to maximize reflection, empowerment, autonomy, and collaborative translation of theory and research into practice; more information is available at the National School Reform Faculty (NSRF) website (www.nsrfharmony.org/). Lovett and Gilmore (2003) explore similar features of the Quality Learning Circle, emphasizing the teachers' choice of topic or theme for study, and interactions with one another as well as with the whole group.

A Proposed Model of Professional Development Around Acceleration

VanTassel-Baska et al. (2008) noted "much of the educational reform agenda in the United States and other countries hinges on positive teacher change in the use of research-based pedagogy" (p. 298). Without question, the use of the various types of acceleration to facilitate the academic progress of gifted and talented learners hinges on greater understanding and acceptance of acceleration as an option. Thus, the current authors argue that the *most important* features of PD about the topic of acceleration are the identification of teacher and counselor attitudes and perceptions around its practice, explicit examination of those attitudes, and internalization of new attitudes, knowledge, and skills that facilitate its implementation.

Attitudes

Teachers and counselors committed to understanding issues of acceleration—and to helping others develop their own understanding—need to begin with an honest appraisal of pre-existing beliefs about gifted learners, and about the efficacy of acceleration for talented students. Professionals in schools hold complex belief systems that are separate from the knowledge systems underpinning their work. Their beliefs stem from thousands of hours spent as students. These largely unexamined beliefs, which are highly resistant to change, affect their behaviors as educators.

Teachers and counselors hold implicit beliefs about the nature of learning; about student characteristics and responsibility, in the context of perceptions of student ability and effort in the classroom; and about their own professional actions required to maximize student success (M. Miller, 2009;

Nespor, 1987; Pajares, 1992). Robinson et al. (2014) suggested that these unexamined beliefs can be a threat to PD goals, and some studies in the field of gifted education (McCoach & Siegle, 2007; Miller, E.M., 2009) have found that PD does not always result in changes in teacher attitudes about gifted education, or specifically about acceleration. Therefore, effective PD for acceleration should begin with a pre-assessment of teacher knowledge, skills, and attitudes.

Pre-assessment

Since the 1980s, one instrument was systematically validated and has been used by schools and researchers alike to examine attitudes toward giftedness (e.g., McCoach & Siegle, 2007). The Gagné and Nadeau (1991) *Opinions About the Gifted and Their Education* instrument uses 35 items to measure attitudes across six factors. The factors include Support for Special Services, Objections to Special Services, Opposition to Acceleration, Perceptions of [gifted student] Rejection and Isolation, Social Value [of gifted learners], and Opposition to Homogeneous Grouping.

Szymanski and Croft (2013; 2014) have validated an instrument that includes more systematic exploration of attitudes toward types of acceleration, cultural and ethnic diversity in gifted programming, and other issues in gifted education. *The Determining Attitudes Toward Ability* (DATA) uses 27 items to measure six factors, including Social and Emotional Needs, Focus on Others [rather than on gifted learners], Grade-skipping [whole-grade acceleration], Problems with Acceleration, Identification Issues, and Curriculum and Policy [related to gifted education]. Each subscale provides a snapshot of attitudes about a subcategory, and results can reveal combinations of attitudes that are contradictory, for example, support for Curriculum and Policy that facilitate gifted programming, but opposition to acceleration. This instrument will reveal strengths and needs in the broader context of gifted education and in the specific contexts of acceleration issues, including a focus on whole-grade acceleration.

Professional Learning Plan

The results of the pre-assessment will allow individuals or cohorts of professionals to determine the attitudes they need to examine, as well as their objectives for learning, including necessary knowledge and skills. Figure 1, A Proposed Model of Professional Development Around Acceleration, incorporates concepts that have evolved about PD, from the classic Guskey "Model of the Process of Teacher Change" (1986), to the Clarke and Hollingsworth "Interconnected Model of Teacher Growth" (2002), and the informal Benedict et al. "Special Educator Expertise" (2014).

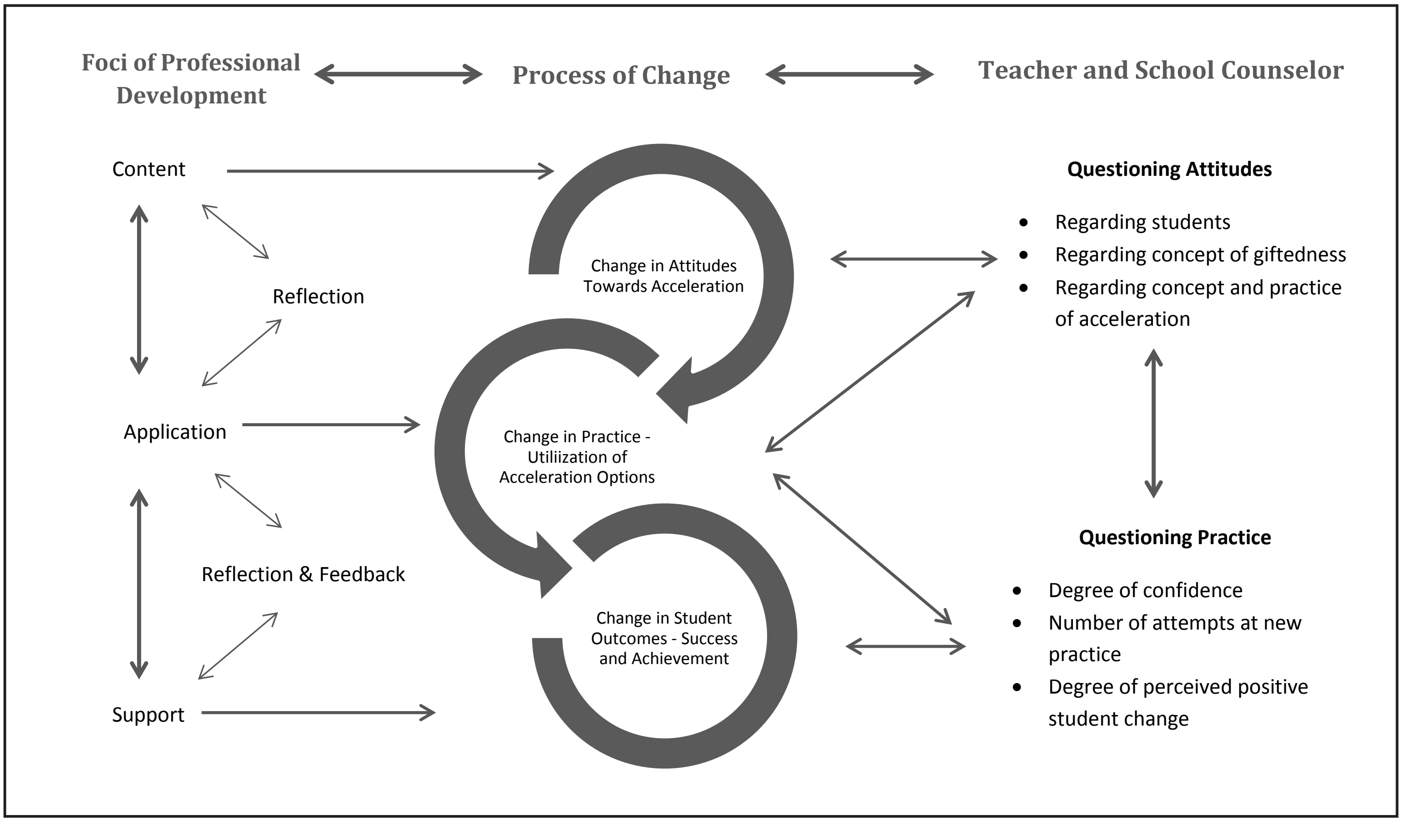
Figure 1 illustrates the complex interactions that facilitate professional growth for teachers and counselors, regardless of the specific model of PD utilized, from independent learning to a collaborative process. Professional growth is not a linear process, but a representation of each individual's unique journey. When professionals identify an unexpected need for one or more students, they search for responses that seem both feasible and appropriate, within a context of existing personal and cultural attitudes. Professional learning is accompanied by thoughtful questioning and reflection, what Yuen (2012) calls "co-exploration: the repeated, thoughtful, and heart-felt discussions of our strategies for teaching, our purpose, and other strategies we could employ" (p. 388). The examination of options leads to a change in practice. This change could include utilization of a new but appropriate response to student need, and/or increased reflection based on informal and formal feedback from student(s), parents, other teachers and administrators. If the response facilitates positive outcomes for the student(s), then the professional(s) are likely to internalize new attitudes and add the response to their existing repertoire of strategies.

In Jordan's case, his teacher, counselor, or parent suspects that he is unhappy because he is unchallenged in his current academic setting. In addition, Jordan has no true friends among the other children in his kindergarten class, perhaps because his abilities and interests are quite different from other children his age. Someone who cares about Jordan asks about acceleration, and the professionals dedicated to meeting the boy's needs realize they require more information. Drawing on models of independent professional learning, a child-study team can assume the characteristics of a professional learning community or Jordan's teacher or counselor can create an individual professional development plan (see, for example, Besnoy, 2007, or Karnes & Shaunessy, 2004).

Resources

With Jordan's needs as a catalyst for professional learning, the educators can turn to both *A Nation Deceived* (Colangelo et al., 2004) and the current volume for a powerful collection of research-based evidence about acceleration. Background information and chapters relevant to Jordan's situation may create a sense of cognitive dissonance with any negative attitudes about acceleration, leading to discussion and reflection. In addition to undertaking focused research or a book study, participating educators can review resources available through the

Figure 1: A Proposed Model of Professional Development Around Acceleration



Acceleration Institute (www.accelerationinstitute.org/). The site provides videos and written records of personal stories about acceleration from students who have benefited from the practice, as well as multiple links to additional resources. Educators may also refer to Table 2 for a list of resources.

The *Iowa Acceleration Scale* (IAS; Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009) is a resource that allows a child study team to systematically assess a student such as Jordan for whole-grade acceleration. The *IAS* provides background information, as well as a template for collecting student data that "minimizes any potential bias for or against whole-grade acceleration" (p. ix). The tool allows educators to review Jordan's ability, aptitude, and achievement, as well as personal factors, including interpersonal skills, which could impact Jordan's success. The *IAS* will help Jordan's child-study team determine if whole-grade acceleration is the best option, or if other types of acceleration might be a better match for his needs. Additionally, IDEAL Solutions for STEM Acceleration is available to inform decisions about acceleration in mathematics and other STEM subjects. IDEAL Solutions is a web-based system found at www.idealsolutionsmath.com. Jordan's teachers, counselor, and parents will be able to evaluate his academic progress and sense of well-being, and they will be able to support him if he encounters unexpected challenges. Implementing successful acceleration in the school and district will reinforce the educators' commitment to the practice, as well as their sense of success as professionals.

Continued Professional Learning and Advocacy

Many teachers of the gifted, especially those from smaller districts, are lone voices advocating for the needs of advanced learners; they may have no local cohort to call for or support situated collaborative learning about a student such as Jordan's need for accelerative options. By providing a united, collaborative front in support of acceleration, teachers and counselors working with students like Jordan may be able to gain more traction in their argument for acceleration with other stakeholders who have more power over policy and logistics. For example, in a study conducted by Siegle, Wilson, and Little (2013), educators who attended a week-long summer workshop on gifted education participated in a

Table 2: Where can Teachers and Counselors Learn More About Acceleration?

Resource	Website	More Information
National Association for Gifted Children (NAGC)	www.nagc.org	Annual convention usually includes multiple sessions about how to do acceleration and the latest research on its effectiveness Webinars and publications on acceleration
State gifted conference	Your state gifted education organization	Yearly conference may include sessions on accelerative options Consultations and networking with other gifted educators
Hoagies Gifted	www.hoagiesgifted.org	A wealth of information pertaining to almost all areas of gifted education. Educators can find resources related to accelerative options including differentiation and grouping
The Davidson Institute for Talent Development	http://www.davidsongifted.org/	A national nonprofit organization that supports profoundly gifted students under the age of 18 Includes an Educators' Guild, which is a free online community for educators
Belin-Blank Center, College of Education, University of Iowa	www.belinblank.org	Online graduate courses on acceleration MOOCs and webinars on acceleration Summer programs for teachers Talent Search Advanced Placement courses for students and training for teachers
Acceleration Institute	www.accelerationinstitute.org	Website devoted to providing resources about academic acceleration Special sections for educators, parents, researchers, and policymakers A project of the Belin-Blank Center, College of Education, University of Iowa
The Belin-Blank Center's gifted-teacher listserv	To subscribe to the Gifted Teachers e-mail list, send an email to LISTSERV@LIST.UIOWA.EDU and, in the text of your message (not the subject line), write SUBSCRIBE GIFTED-TEACHERS First-Name Last-Name	Educators of the gifted can ask questions or send suggestions and resources to other educators
A Nation Empowered report, Volumes 1 and 2	www.nationempowered.org	A significant update to the 2004 watershed publication, *A Nation Deceived* (www.nationdeceived.org)
Iowa Acceleration Scale	http://www.accelerationinstitute.org/resources/IAS.aspx	A tool designed to help school personnel and families make a research-based decision about whole-grade acceleration Available from Great Potential Press
IDEAL Solutions for STEM Acceleration	http://www.idealsolutionsstem.com/	A web-based system informing decisions about academic acceleration in STEM subjects Individualized recommendations aligned with national standards

survey focusing on their thoughts and perceptions on acceleration. Participants in this study reported not being personally concerned with potential negative effects of acceleration on academic performance; they did indicate, however, that they believed that administrators and parents would not support acceleration. The authors concluded that the educators' reluctance to accelerate students in their schools was more likely attributed to their perceptions of what others believed about acceleration rather than their own beliefs and attitudes. Thus, educators who have a solid foundation of knowledge regarding acceleration can act as advocates not just for the student in question, but to provide solidarity behind a proposal to accelerate a student if administrators question it. Stakeholders who believe in this powerful accommodation can provide a united front in support of Jordan's acceleration (Siegle et al., 2013).

Successful implementation of one type of acceleration is likely to spur interest in other options, and the cycle of professional learning may continue. When a school or district experiments successfully with one type of acceleration, stakeholders may develop an interest in advocacy for acceleration, and may turn again to the Acceleration Institute website for the *Guidelines for Developing an Academic Acceleration Policy* (IRPA, NAGC, & CSDPG, 2009). Professionals can participate in Webinars or academic credit options to further guide their learning. The school or district may adopt PD related to types of acceleration as a component of a coherent systemic plan "to ensure that [all] their students' learning experiences are maximized" (Benedict et al., 2014, p.149).

Conclusions

As demands on teachers and counselors evolve, requiring them to prepare students for new challenges confronting the world, professional development has been identified as essential for school improvement. In addition to improving school systems, PD also facilitates overall support for individual student success. Meaningful professional learning experiences also enhance teachers' and counselors' job satisfaction and sense of professional identity.

The individuals working with students are among the most important catalysts for student learning and well-being in school; ongoing and meaningful learning is one of the most important ways to reinforce and enhance teachers' and counselors' sense of professionalism and ability to meet the needs of their students. Jordan is but one case example of a student who can benefit from acceleration that is facilitated by well-informed counselors and teachers who are willing to act on his behalf. Professional development in gifted education topics that include acceleration as an intervention is the glue that holds together appropriate opportunities for such students.

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Content Acceleration: The Critical Pathway for Adapting the Common Core State Standards for Gifted Students

Joyce VanTassel-Baska, College of William and Mary, Williamsburg, Virginia and Susan K. Johnsen, Baylor University, Waco, Texas

Abstract

The new Common Core State Standards (CCSS) in English Language Arts and Mathematics present a daunting challenge to our schools at a time when they may be least prepared to take it on, especially given lack of funding for teacher salaries, declining morale, and competing agendas. In this chapter, we examine how the new CCSS can be used as a framework for creating accelerative opportunities for gifted learners, illustrate the adaptations that need to be made in both language arts and mathematics, and provide a deeper understanding and appreciation for the systematic use of content acceleration as a part of gifted programming plans at local and state levels across the K-12 spectrum of academic preparation.

Introduction

The positive impact on gifted students of routinely applying content acceleration to multiple subject areas, grade levels, and types of learning environments has been well-documented over the past 40 years by researchers interested in seeing the effects of advancing gifted learners in their areas of academic strength (see Colangelo, Assouline & Gross, 2004; Olszewski-Kubilius, 2002; Lubinski & Benbow, 2006). Moreover, the research has been documented under different learning conditions that include fast-paced classes, intensive summer experiences, online learning opportunities, as well as more traditional classroom settings in which advanced coursework is taught.

In response to the inconsistencies across state standards and the United States' poor performance on international assessments, the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO) released the Common Core State Standards in Mathematics and in English Language Arts (NGA & CCSSO, 2010a; NGA & CCSSO, 2010b; NGA & CCSSO, 2010c). Informed by research and designed by teachers, administrators, and content experts, the Common Core State Standards (CCSS) are intended to prepare K-12 students for college and the workplace and incorporate knowledge and skills required for the 21st century, including critical thinking and problem solving, communication, collaboration, and creativity and innovation (Partnership for 21st Century, 2009). These new standards in English Language Arts and Mathematics present a daunting challenge to our schools at a time when they may be least prepared to take it on, especially given the lack of funding for teacher salaries, declining morale, and competing agendas. Yet the standards offer the best hope for coherent high-level schooling for all of our students. As educators move into a new era of national standards, it is critical that attention be paid to the adaptation of these new standards with respect to the realities of gifted students and their learning needs at advanced levels.

Creating appropriate learning opportunities in a flexible scope and sequence is essential for the effective accommodation of the CCSS. In considering this need, the National Association for Gifted Children (NAGC) has created guidebooks for teachers on how to accomplish such accommodations in the areas of language arts and mathematics (See Hughes-Lynch, Kettler, Shaunessy-Dedrick, & VanTassel-Baska, 2014; Johnsen, Ryser, & Assouline, 2014; Johnsen & Sheffield, 2013; VanTassel-Baska, 2013). These books provide the rationale for addressing the needs of gifted students within the context of the CCSS and offer specific examples so needed by teachers to advance the learning material to appropriate levels in those subject areas and to apply accelerative strategies as a natural part of the process of curricular progression.

The threefold purpose of this chapter is (a) to present a clear explanation of how the new CCSS can be used as a framework for creating accelerative opportunities for gifted learners; (b) to illustrate the adaptations that need to be made in both language arts and mathematics; and, (c) to provide a deeper understanding and appreciation for the systematic use of content acceleration as a part of gifted programming plans at local and state levels across the K-12 spectrum of academic preparation.

Acceleration: The Basic Differentiation Technique for Curriculum for Gifted Students

We have observed physical therapists go about their work with patients in a rehab facility. While the time spent was often engaging the patients in practicing the skills needed for healthy return to functioning, often a significant amount of time was spent assessing where the patient was, what they were capable of doing and not, as well as defining the next level of appropriate challenge for them to tackle. Therapists often would ask the patient to try an exercise and then they would adjust based on how the patient responded, either by raising or lowering the challenge level. They would often remark that what you do in rehab should be difficult; if it were easy, you wouldn't need to be practicing the skill anyway.

Similar to the process used by physical therapists, who tailor the therapy to the client, teachers also strive to engage the learner by assessing what they already know, providing challenging grade-level work, and adjusting as needed to ensure that real learning can occur based on the level prescribed. If teachers' underlying assumptions about learning for gifted students embraced this approach, use of acceleration would become a natural part of their repertoire for working with these learners. Not all such instruction need be individualized; small cluster groups of gifted learners could go through a similar routine with a skilled teacher who knew the subject area under study well, had adapted the CCSS standards to allow for advanced level challenge, and was skilled in differentiating instruction for the gifted learner. Learners could be grouped and regrouped for instruction, based on the continuous assessment of strengths and needs.

In both language arts and mathematics, basic skills underlie much of the curriculum. If students are ready for advanced work, they must demonstrate the extent to which relevant basic skills have been mastered. In language arts, the relevant skills are those of reading, writing, speaking, and listening. Advanced language arts skills boast an emphasis on analysis of text, use of advanced literature based on reading level, and integrated project work. In mathematics, those skills emphasize key concepts, procedural skills, fluency in calculations, and applications within and outside the classroom. At the advanced skill levels, the emphasis on multi-step problems, non-algorithmic problem solving and accelerated learning constitute the level of rigor employed at the process level in all content aspects. Thus the need to ensure that gifted learners are sequenced in skill sets at appropriate levels becomes paramount to their growth pattern and enjoyment of school-based learning. In language arts, an assessment of reading level is a critical first step in deciding where on the CCSS continuum of developmental reading skills a student should be and how it would impact the choice of texts to use in advanced discussions. In mathematics, the level of skill acquisition in problem solving techniques as well as underlying basic knowledge within a domain such as geometry would dictate the level of work for which advanced students are ready. The sections that follow attempt to portray the integration of acceleration techniques by adapting the Common Core Standards.

What Are the New Standards and How Are They Distinctive?

The Common Core State Standards in Mathematics (CCSS-M) and in English Language Arts (CCSS-ELA) provide consistency around a level of acceptable proficiency for students and guidance to educators involved in curriculum design and assessment of students' acquisition of knowledge and skills. According to the Common Core State Standards Initiative (NGA & CCSSO, 2010a, 2010b, 2010c), the CCSS-M and the CCSS-ELA differ from previous standards, including those that advanced the state of the art in both content areas in the 1990s, in distinct ways. The CCSS-M (a) focus on fewer topics so that students deepen their knowledge and gain a strong foundation; (b) are organized into coherent progressions from grade to grade and across topics; and (c) emphasize rigor in conceptual understanding of key concepts, procedural skills and fluency in calculations, and applications inside and outside the classroom. The CCSS-ELA (a) stress the comprehension of more complex texts and their academic vocabulary; (b) build knowledge through content-rich nonfiction; and (c) require careful analysis of evidence from literary and informational texts. While the CCSS-ELA standards do not include a specific reading list, they do include certain types of content such as classic myths and stories from around the world, foundational U.S. documents, and seminal works of American literature and the writings of Shakespeare.

Both sets of standards overlap with one another and the Programming Standards developed by the NAGC. All of the standards ask educators to develop comprehensive, cohesive programming and use specific strategies such as critical and creative thinking, problem solving and inquiry models (NAGC, 2010). The clear benefit to gifted students in the new standards is the emphasis on higher level thinking in the language arts area (e.g., analysis and interpretation) and in higher level problem solving in mathematics (e.g., multiple pathways to answers). However, the Common Core State Standards (CCSS) are not as clear about how to differentiate for gifted students who might pass through the standards before the end of high school or who might need different pacing within a content strand or domain. States and local districts must identify the key content and cognitive processes in the standards within and across grade levels and provide classroom teachers with ways for accelerating the standards for gifted students.

Review of Research on Differentiation for the Gifted Students in ELA and Math

Current research on differentiation of the language arts curriculum for gifted learners has centered on the importance of an integrated approach that attends to both accelerative and enriched approaches (see Hughes-Lynch et al., 2014; VanTassel-Baska, 2013). Research-based guides have been developed in both math and ELA to provide models for school districts to employ in the implementation of the new Common Core Standards that stress the importance of higher-level thinking and problem solving (see Johnsen et al, 2014; Hughes-Lynch et al., 2014). The development of these guides has been buttressed by the research base in each subject area.

Research studies have demonstrated that differentiated language arts curriculum, using advanced texts accelerated by two years, enhances critical reading behaviors including textual analysis (VanTassel-Baska, Zuo, Avery, & Little, 2002; VanTassel-Baska, 2010). Studies have also documented that growth in literary analysis and persuasive writing have consistently resulted from the use of differentiated materials that feature advanced reading selections in multiple genres (VanTassel-Baska, Avery, Little, & Hughes, 2000; Feng, VanTassel-Baska, Quek, Bai, & O'Neill, 2005). The achievement of low income students has been studied, suggesting that the use of advanced materials and strategies in language arts demonstrates longitudinal growth for these students as well in both reading comprehension and critical thinking (VanTassel-Baska & Stambaugh, 2006). Other studies have documented enhanced fluency as a lower-level outcome of strategy differentiation (Reis, Eckert, McCoach, Jacobs, & Coyne, 2008). In a study of gifted student preferences for differentiation, Kanevsky (2011) found that students enjoy challenging and efficient learning opportunities that demonstrate real learning, suggesting the need for strategies that focus on real world issues and themes.

In mathematics, grouping by ability with curricular modifications and acceleration have proven to be viable tools to differentiate content for gifted students (Brody, 2004; Lee, Olszewski-Kubilius, & Peternel, 2010). Mathematically advanced students who are grouped by ability and receive curricular adjustments in elementary school show significant math gains (Gavin, Casa, Adelson, Carroll, & Sheffield, 2009; Tieso, 2005). Curricular adjustments incorporate above-level curriculum and open-ended problems with opportunities for creative applications (Gavin et al., 2007; Gavin et al., 2009; Mann, 2006). Moreover, gifted students who participated in individualized and self-paced instruction in mathematics showed significant increases in math performance (Ysseldyke, Tardrew, Betts, Thill, & Hannigan, 2004).

Because of the sequential nature of mathematics coursework, students taking algebra at an earlier age have the opportunity to enroll in more advanced courses in the future and college courses in math at greater rates than those who did not (Robinson, Abbott, Berninger, Busse, & Mukhopadhyay, 1997; Spielhagen, 2006). Young children who are advanced in math typically continue to be advanced relative to their age peers, and may even develop future math skills faster than expected (Robinson et al., 1997). Students who are accelerated not only perceived accelerated math courses as more challenging but also reported increased motivation and greater confidence as a result of being in these classes (Lee et al., 2010). There is no evidence that acceleration in mathematics or other subjects including English language arts has a negative effect on students' social and emotional development although not all studies of acceleration focus on effects beyond those that are cognitive (see Rogers, this volume).

Creating Accelerative Opportunities within the Common Core Standards

Content acceleration can be achieved in many ways. One approach is through reorganizing curriculum within and across grades and courses. Individual learners may be assessed for their level of mastery and accelerated through the grade level material as appropriate. Another approach is to calibrate learning material to be provided at two years level of advancement, consistent with documented achievement levels of gifted learners. The use of above-level assessments provides another strategy for accelerating content. Above-level diagnostic assessments allow us to see how advanced students may be in a given area of learning and provide matching material to meet their needs for challenge. We also can create different pathways for secondary courses, based on aptitudes and interests of students. In math, students may want to prepare for the AP Statistics and Probability course because of their interest in conducting social science research in an internship at a local museum during their senior year. In language arts, gifted students may want to take the AP class in French as a preparation for advanced study at university in that subject area through a dual enrollment program. The following sections describe how this reorganization may be accomplished in language arts and mathematics.

Reorganizing the Curriculum in ELA

To create accelerative opportunities, educators need to understand how the standards are organized within and across grade levels. The CCSS integrate standards within themes, concepts, or topics in an orderly progression (i.e., the "traditional" curriculum scope and sequence of topics and skills, now referred to as learning progressions). The CCSS-ELA curriculum framework (NGA & CCSSO, 2010a) identifies the important understandings for each strand (reading, writing, speaking and listening, and language) at specific grade levels. Students must demonstrate the skills in each of the strand-specific sets of College and Career Readiness Anchor Standards, which include key ideas and details, craft and structure, integration of knowledge and ideas, range of reading, and text complexity.

Reorganizing the Curriculum in Mathematics

The CCSS-M (NGA & CCSSO, 2010b) are organized by grade levels, standards, clusters, and domains. *Standards* define specific knowledge and skills at different grade levels, *clusters* summarize groups of related standards, and *domains* group larger sets of related clusters. For example, at the third-grade level, within the *domain* of "Number and Operations in Base 10" (3.MD), the student is expected to "Use place value understanding and properties of operations to perform multi-digit arithmetic" (*cluster heading*). Specific *standards* within the cluster heading include "using place value understanding to round whole numbers," "fluently add and subtract within 1000," and "multiply one-digit whole numbers by multiples of 10" (NGA & CCSSO, 2010b, p. 24).

The domains, clusters, and standards are related to one another not only at the same grade level but also at different grade levels, forming learning progressions and interconnections across concepts (Johnsen, et al., 2014). For example, the domain of "Numbers and Operations in Base Ten" at the elementary level builds the foundation for the domain of "Ratios and Proportional Relationships" at middle school, and the "Number and Quantity" domain at high school. The clusters are also connected from one level to the next. In examining the clusters, it is easy to see how one cluster builds the foundation for the next cluster. For example, "understanding place value" would be important to "using place value understanding and properties to add and subtract," and "performing operations with multi-digit whole numbers" is foundational to "performing operations with multi-digit whole numbers with decimals to hundredths" (see Table 1). Specific standards further distinguish the characteristics of the clusters. For example, the characteristic of "understand place value," which is a common cluster heading in grades one and two, is delineated within the standards. In grade one, the students should understand that "two digits of a two-digit number represent amounts of tens and ones" and in grade two, students should understand that "three digits of a three-digit number represent hundreds, tens and ones." Horizontal alignment also occurs between domains, clusters, and standards. For example, in grade four, similar mathematical operations are integrated within these domains: "Operations and Algebraic Thinking," "Number and Operations in Base 10," "Number and Operations-Fractions," and "Measurement and Data," allowing for the compacting of the curriculum.

How to Accomplish Differentiation of the CCSS-ELA

Based on the research evidence, a necessary differentiation in the ELA Common Core is in the judicious selection and use of above-level reading material for the gifted at all stages of development (see Standard 10 in NGA & CCSSO, 2010a, p. 10). In general, all text selections should be matched to gifted students' Lexile levels, commonly one to two grade levels above the designated grade level band, and/or the students' level of complexity of language and thought. An excellent resource that has consistently been used in the gifted community to locate such texts is *Some of My Best Friends Are Books*

Table 1: Sequence of Clusters for the Domain of "Number and Operations in Base 10"

Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Work with numbers 11-19 to gain foundations for place value	Extend the counting sequence	Understand place value	Use place value understanding and properties of operations to perform multi-digit arithmetic	Generalize place value understanding for multi-digit whole numbers	Understand the place value system
	Understand place value	Use place value understanding and properties of operations to add and subtract		Use place value understanding and properties of operations to perform multi-digit arithmetic	Perform operations with multi-digit whole numbers with decimals to hundredths
	Use place value understanding and properties of operations to add and subtract				

(Halsted, 2009). Furthermore, it is important to ensure that in the informational text standards, there is stronger attention to primary source documents than to those that are secondary. The use of original speeches, seminal documents, and artifacts such as diaries and letters is encouraged and should be reflected in the examples provided for advanced learners. In the literary text standards, the use of classical texts is favored over the use of children's and adolescent literature that may have little lasting value. The use of varied genres encourages a wider scope of reading, and the employment of poetry, myths, fables, and short stories contributes to exposure to, and appreciation of, multiple forms of literature. Moreover, the use of genres that favor short selections requires greater depth of reading for sufficient analysis by students, even those who are advanced readers. Consideration of reader preferences for certain genres, authors, and specific works should also be considered in the selection of texts. Activity archetypes may be held constant across ability levels when more individualized reading selections are made. Independent reading of advanced learners should focus on their interests but be balanced with challenging choices that provide a broad scope of reading materials. (See Table 2.)

Proficiency in reading for the gifted may best be judged through an assessment of reading comprehension and critical reading behaviors, not fluency, as many of these readers come to school already fluent beyond current age and grade placements. Consequently, the use of silent reading time, mandated in many school settings, should be targeted toward these skills through the use of center-based activities, book discussion groups, and reflective writing based on a recent reading.

Once Standard 10 has been addressed for gifted learners, then the translation of the CCSS may be differentiated further through adding greater complexity, depth, and creativity to any given task demand through attending to the explicit translation of other reading standards. In language arts, there is an alignment of the literature strand and the information text strand, using the same skill sets to be applied to both types of texts. Moreover, the alignment of writing with reading is achieved through the use of standards that combine these areas of emphasis. Further integration across the language arts standards is encouraged through project and presentation standards in speaking and listening.

Foundational skills are sequenced within each ELA strand in predictable ways. In the Strand 3 literacy standard, for example, which "asks students to analyze how and why individuals, events, or ideas develop and interact over the course of a text," the suggested sequence moves from providing support for students to make connections among these variables in text (K-2) to describing such connections (3-5) to analyzing the nature of the connections as interactions (6-10) to examining author intent in the use of these variables (11-12). For gifted learners, the sequence can be compressed and compacted by asking students to describe the nature of the connections and interactions at early primary, beginning to analyze the interactions by intermediate levels, deepening the analysis of relevant textual interactions by middle school, and studying author intent in the interactions of character, plot, and themes by high school. Rather than spreading out the nature of the learning in this standard across 12 years, it is conceivable that many students can master it in half the time designated and have the skill of analyzing textual variables incorporated into their repertoire by high school. It is also possible to add a writing standard ("Conduct short research projects") and a listening/speaking standard ("Engage effectively in a range of collaborative discussions on topics and texts") in order to address two more ELA standards in the same lesson, thus saving instructional time and integrating standards effectively within the subject area.

How to Accomplish Differentiation of the CCSS-Mathematics

Understanding vertical and lateral alignments becomes critical when accelerating students who are gifted in mathematics. If a student has already acquired the expectations for one grade level, he or she can progress to the next level's expectations. As an example, students who know how to "compose and decompose numbers from 11 to 19 into ten ones and some further ones" in kindergarten (NGA & CCSSO, 2010b, p. 12), should be learning how to "compare two two-digit numbers based on the meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <," (NGA & CCSSO, 2010b, p. 16), or to "compare three-digit numbers based on meaning of the hundreds, tens, and ones digits" (NGA & CCSSO, 2010b, p. 19) and so on. By studying the standards and clusters of standards, teachers can incorporate above-level concepts into their teaching to address gifted students' needs. Looking across domains within a grade level, the teacher can also compact the curriculum by combining similar concepts such as using the four operations with whole numbers (see the domain of "Operations and Algebraic Thinking") to solve problems involving measurement (see the domain of "Measurement and Data"). As mentioned in the CCSS-M documents, "What students can learn at any particular grade level depends upon what they have learned before" (NGA & CCSSO, 2010b, p. 5). The authors of the standards caution users to remember that the learning progressions are based on state and international comparisons, not necessarily on research. Therefore, it is important that teachers identify clusters and related standards that meet the needs of individual students based on assessments.

Acceleration should occur not only across grade levels and courses but also within learning activities (Johnsen, 2014; Johnson et al., 2014). Since gifted learners are often able to reach proficiency more quickly, they may not need as many examples to learn a particular concept or procedure. Students with similar rates of learning can be grouped together homogeneously within and/or across grade levels and receive instruction matched to their abilities so that they are challenged consistently. For example, as mentioned previously, grouping by ability and modifying the curriculum have been successful strategies for differentiating content for mathematically gifted students (Brody, 2004; Lee, Olszewski-Kubilius, & Peternel, 2010) and have resulted in significant gains in mathematics for such students (Gavin et al., 2009; Tieso, 2005).

Open-ended mathematical problems incorporating abstract concepts, higher order thinking skills, more than one operation or variable, multiple domains, and novel situations are engaging for gifted learners and allow them to think more deeply and to persevere in solving the problem (Johnsen & Sheffield, 2013). These problems need to be authentic, represent professional work and offer opportunities for students to create new problems. For example, gifted students can use national databases from the American Statistical Association to pose new problems and conduct statistical investigations or can analyze data collected about interventions in their local school to improve performance on tests (see Johnsen et al., 2014). These open-ended problems also provide opportunities for the integration of mathematics into multiple disciplines (e.g., measuring plant growth in science or projecting population growth in social studies). (See Table 2.)

Engaging students in problems and learning activities that are of interest to them is important to their long-term development of mathematical skills and to their enjoyment of mathematics (Gavin et al., 2009). Students may choose the ways they want to solve problems, select their own research projects, and participate in extracurricular activities such as clubs, competitions, talent search activities, and mentor-based studies.

Foundational to all of these differentiation strategies is the need for varying time based on students' rates of learning. Less time might be needed for one unit of study and more for another; more time might be needed for conducting research projects and probing complex problems while less time might be needed for building fluency. Assessments provide the means for identifying students' strengths and needs, including the need for acceleration. Acceleration allows them to pursue their interests in math and in other subjects. Different forms of above-level assessments are discussed in the next section. Table 2 summarizes the general and specific strategies for differentiating the standards.

Table 2: General and Specific Strategies for Differentiating the Standards

Content Area	Strategies
General (Across Content Areas)	• Reorganize curriculum within and across grades and courses. Assess individual learners for their level of mastery and move them ahead through grade-level material as appropriate. • Calibrate learning material to be provided at two years level of advancement, consistent with achievement levels of gifted learners. • Use above-level diagnostic assessments to determine how advanced students may be in a given area of learning and provide material to meet their need for challenge. • Create different pathways for secondary courses, based on aptitudes and interests of students. • Vary time based on students' rate of learning. Less time may be needed for one unit of study and more for another; more time might be needed for research projects and probing complex problems while less time might be needed for building fluency. • Group by ability while providing curricular modification and acceleration.
English Language Arts	• Use advanced texts accelerated by one to two years. • Select differentiated materials featuring advanced reader selections in multiple genres. • Employ strategies that focus on real world issues and themes. • Use original speeches, seminal documents, and artifacts such as diaries and letters. • An emphasis on abstract concept development through thematics. • The use of advanced projects as assessment evidence of proficiency.
Mathematics	• Incorporate *above-level* curriculum and open-ended problems with opportunities for creative applications. • Offer opportunities to participate in individualized and self-paced instruction. • Utilize open-ended problems incorporating abstract concepts, higher order thinking skills, multiple operations or variables, multiple domains, and novel situations. • Include authentic problems that represent professional work, and offer opportunities for students to create new problems.

Using Above-Level Assessments

Once educators recognize how the CCSS are organized within and across grade levels and understand some instructional strategies for differentiation, they can select assessments that would examine the full range of knowledge and skills a gifted student might have acquired within or outside of the school setting. In examining these assessments, educators might ask themselves:

1. Does the assessment address all of the important standards and student outcomes for gifted students? (Is it comprehensive?)
2. How will I use the assessments in planning instruction and monitoring the gifted students' learning progress? (Is it continuous?)
3. How will I use the assessments to determine if they relate to the curriculum I am teaching and its effectiveness with gifted students? (Is it coherent?)

To address these purposes for assessments, educators will want to use different types of assessments: pre-assessments, ongoing assessments, and summative assessments. Pre-assessments help teachers identify the existing knowledge and skills for each individual student and determine how to group students based on their needs. Ongoing or formative assessments are used throughout the learning process to plan the next steps for instruction and student learning activities and provide students with feedback they can use to improve the quality of their work. Summative assessments occur at set points and provide information about students' achievement and the effectiveness of the curriculum and instruction.

Depending on the content, the format of the assessments might vary, with some requiring the student to select a response (multiple choice, short answer), while others require students to make an extended response (solve a problem, describe in detail) or create a product or presentation. For example, in reviewing the CCSS-M content, educators might use an extended response to assess if students can read and write numbers to 1000, but a product assessment to see if students might be able to formulate problems involving measurement and conversion of measurements. In either of these cases, the assessments would incorporate standards above a particular grade level to ensure that the full range of a gifted student's knowledge was assessed. For example, the assessment in first grade would have students compare not only two two-digit numbers based on their understanding of place value but also two three-digit numbers, explaining what each place might represent (e.g., 10 times as much as it represents in the place to its right).

In ELA, the assessment of the standards noted in this chapter might be accomplished in different ways. Standard 3 may be assessed through the use of an extended essay that examines student understanding of textual variables at work in a written piece they had not read, or it also could be assessed by a research product or presentation on a new text they had read. Standard 9 might best be assessed through a project that requires students to read and analyze three texts of their choosing on a relevant topic that is controversial and have them evaluate the perspectives presented and the author's intent in writing the piece. For each of these approaches, a rubric would need to be developed, tailored to the key elements of the higher-level aspects of the standard being assessed.

Different Pathways for Secondary Opportunities

Gifted learners will need to consider accelerated options not just within the confines of a K-12 education. They will need to plan for their futures using a model that considers the role of college or university and beyond. This planning may be quite different, depending on the subject area(s) of greatest interest to the students and the area(s) in which they exhibit their strongest abilities.

Along with the acceleration of content and the use of above-level assessments, educators will want to consider accelerated pathways to allow gifted students to reach calculus and other college-level courses by their junior or senior years, which is important for preparing them for STEM fields in college (Assouline & Lupkowski-Shoplik, 2011; Colangelo, Assouline, & Gross, 2004). Appendix A in the CCSS-M describes four different pathways at the high school level: a traditional pathway, a compacted traditional pathway, an integrated pathway, and a compacted integrated pathway (NGA & CCSSO, 2010c). The traditional pathway consists of two algebra courses and a geometry course. The compacted version of the traditional pathway, where no content is omitted, is where students complete the content of the seventh- and eighth-grade courses in the seventh grade, and the high school algebra course (Algebra I) in the eighth grade. This accelerated trajectory allows advanced students to reach calculus or other college-level courses by their junior or senior year. The integrated pathway consists of a sequence of three courses, with each including number and quantity, algebra, functions, geometry, statistics, and probability. The compacted version of the integrated pathway is similar to the compacted version of the traditional pathway. The seventh- and eighth-grade math is combined into a single compacted course in the seventh grade. At the eighth-grade level, the students take the high school Mathematics I course (*Note*: See NGA & CCSSO, 2010c for an overview of each pathway organized by course, conceptual category, clusters, and standards.). When these accelerated classes are taught by experienced teachers who are aware of gifted students' needs, these students are more likely to take rigorous college courses, complete advanced degrees, and feel academically challenged and socially accepted (Colangelo, Assouline, & Gross, 2004; Gross, 2006; Kolitch & Brody, 1992; Swiatek, 1993).

While trajectories for high school work in mathematics may be seen as alternative routes to different objectives at the levels of college and career in STEM fields, the use of advanced secondary courses in the English Language Arts have not been so carefully described by individual course-taking models. For students gifted in language and interested in related careers, the traditional accelerated route would take them into the two Advanced Placement English courses early (by Grades 9-11) or lead them to consider the International Baccalaureate (IB) English program options. This may lead to early entrance to college or to a senior year of independent research with a college mentor. A less traditional route might be to accelerate a course of study in a second language area as well, taking Advanced Placement courses in the language of choice by grade 10 with opportunities for studying a third language in the last two years of high school.

Since language arts is a collection of subjects and skill sets, it may be judicious and practical for gifted students to focus more sharply on one or two of those skills that have strong interest for them or that are tied to career paths of interest. A third option might be to focus on the development of advanced writing ability or advanced speaking, channeled into theater or debate opportunities, in small seminar settings through dual enrollment opportunities offered co-terminus with AP or IB.

Other Strategies for Differentiation

While this chapter focuses on the use of accelerative techniques for purposes of ensuring that the new CCSS are appropriate for gifted learners, there are also other differentiation strategies that might be employed in concert with acceleration to enhance the learning of gifted students. The use of greater complexity within the advanced use of literature coupled with the use of integrated themes and greater depth in the project work recommended would be additional ways to differentiate the language arts standards. In mathematics, the use of open-ended problems and the employment of challenging, co-disciplinary projects provide additional avenues for successful differentiation. What is critical in the use of the new standards, however, is the use of acceleration as the initial and main tool for differentiation to ensure that the content and process base is sufficiently elevated.

The following questions and processes illustrate a template for thinking that may be used to create appropriate differentiated task demands at a given grade level for gifted students in the English/language arts area:

Questions to ask in the design process

1. **What reading selections (literature and informational text) will illustrate appropriate *advanced level* texts for gifted learners to use as the standards are addressed?**

   Process to be followed:

   - Locate advanced texts (two grade levels above, on average) that also match the demands of the standards.
   - Deconstruct the text through higher-level questions and activities.
   - Design corresponding writing, speaking and listening activities.

2. **What level and type of complexity needs to be added to ensure challenge for the gifted?**

   Process to be followed:

   - Move to an upper-level standard in the same strand (acceleration) to attain a focus on multiple texts.
   - Focus on higher order skill sets including analysis, synthesis, evaluation, and creation.
   - Add variables to study.
   - Design corresponding writing, speaking, and listening activities.

3. **What aspects of creativity can be designed into the task demands that provide open-endedness in product modality and/or response?**

   Process to be followed:

   - Provide choice in activity sets, products to be developed and questions to be answered.
   - Ask students to design a real-world model and articulate how it works visually and verbally.
   - Design corresponding writing, speaking and listening activities.

4. **What approach to the task demand will ensure depth of thinking and understanding of important concepts and ideas?**

   Process to be followed:

   - Focus questions and activities on an abstract concept or theme found in the selected texts.
   - Ensure that questions probe connections of the concept to other texts and stimuli.

Content Acceleration as a Central Feature of Gifted Programs

Adaptation of the CCSS for gifted students represents an important approach to acceleration within the context of programs in mathematics and language arts in schools. Other areas of the curriculum, especially science, also should be adapted in similar ways. The field has demonstrated how this might be done in the area of science with the new next generation standards (see Adams, Cotabish & Ricci, 2014). There is also a need to accelerate learning in the social studies curriculum, world languages, and the visual and performing arts in order to ensure challenge for the gifted.

Additionally, the use of content acceleration at the core curricular level presages the need for other forms of acceleration to be used as students traverse through school. For example, the consistent use of content acceleration in elementary and middle school in any area opens up the need for more advanced programs at the high school level, including the increased use of Advanced Placement and dual enrollment in 4-year colleges or universities. Content acceleration also suggests the need to employ alternative delivery systems for coursework, including online and summer opportunities that introduce fast-paced learning opportunities to students who are ready for them. For students who are advanced in all subject areas, grade-skipping may be quite appropriate at key stages of development (see Lupkowski-Shoplik, Assouline, & Colangelo, this volume). Natural transitions may occur at many grade level points. One model of grade-skipping would use the natural transitions at first grade, sixth grade, and ninth grade, given the organizational pattern employed in schools for moving into the levels of elementary, middle, and high school. For many gifted learners, transitioning one grade above at these stages, based on diagnostic data, provides an important part of the differentiated learning experience.

Conclusion

The CCSS are intended to prepare K-12 students for college and the workplace and incorporate knowledge and skills required for the 21st century such as critical thinking and problem solving, communication, collaboration, and creativity and innovation. The new standards stress rigor, depth, clarity, and coherence, drawing from national and international studies. While the new standards are strong, they are simply not sufficiently accelerated to accommodate the needs of gifted and advanced learners. Modifications must be made. This chapter has focused on research-based strategies for accelerating the standards that include using above-level curriculum and self-paced instruction in mathematics and advanced texts in ELA accelerated by two years and advanced reading selections in multiple genres.

The new CCSS in English Language Arts and Mathematics present a daunting challenge to our schools at a time when they may be least prepared to take it on, especially given lack of funding for teacher salaries, declining morale, and competing agendas. Yet it also offers the best hope for coherent high-level schooling for our students. The gifted community must join this effort and transform our work to demonstrate to all that high-level standards need high-level translations in the classroom if all students are to fulfill their learning potential. For gifted learners, who need accelerative interventions, this will require differentiation of the Common Core Standards in a comprehensive, articulated way.

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Talent Searches and Accelerated Programming for Gifted Students

Paula Olszewski-Kubilius
Center for Talent Development, Northwestern University, Evanston, Illinois

Abstract

The Talent Search Model has taken on a very specific meaning in the field of gifted education referring to university-based programs that identify and assess gifted children with above-grade-level testing and provide subsequent educational services matched to their tested abilities. The components of talent search programs include diagnosis and evaluation of domain and level of ability, guidance regarding educational placement, particularly the use of accelerative strategies, and the provision of a variety of talent development opportunities including summer, weekend, and online programs. There is a significant body of research to support the practices associated with talent search and specifically the use of accelerative strategies such as whole-grade acceleration, subject area acceleration, curriculum compacting, fast-paced classes and early entrance college programs.

Introduction

"Talent search" has taken on a very specific meaning in the field of gifted education. It refers to programs that identify and assess gifted children with above-grade-level testing and provide subsequent educational services matched to their tested abilities. The programs are run by universities (see the Center for Talent Development of Northwestern University, the Talent Identification Program of Duke University, the Center for Talented Youth of Johns Hopkins University, the Belin-Blank Center of the University of Iowa, and the Center for Bright Kids), and all have a 25 to 30 year history. There is a significant body of research to support the practices associated with talent search, including several forms of acceleration.

The first "talent search" was instituted by Dr. Julian Stanley at Johns Hopkins University in an effort to measure and identify extreme mathematical aptitude among junior high school students (Assouline & Lupkowski-Shoplik, 2011a; Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003). Stanley found that using the SAT, a test designed as a college-entrance exam for college-bound 11th and 12th graders, worked very well for the purpose of measuring exceptional mathematical aptitude among younger students. The talent searches of the 1980s identified so many academically advanced students whose highly specialized needs were not being met and provided such an easy, cost efficient method of identification that the idea grew enormously over the next two and a half decades. Currently, talent searches exist nationwide as well as in Canada, Australia, The Peoples' Republic of China, Ireland, and Spain and the services have been augmented to include use of the ACT Assessment; a wide variety of types of educational programs; newsletters and other informational resources; workshops for parents; training for educators; and the inclusion of assessments for other abilities (e.g. spatial) and for younger (i.e. elementary school-aged) children.

The Rationale for the Talent Search Model

The Talent Search Model is built upon the idea of "above-grade-level" testing. A basic premise underlying talent search is that because children develop at different rates, they should be allowed to take tests at the level of their abilities, not at the level that school officials or testing companies deem appropriate for their age. Students who are scoring very well on typically used standardized achievement tests, above the 95th or 97th percentile for their school grade, are eligible for the talent search. For these students, performance on grade-level achievement tests indicates a high level of mastery of the grade-level curriculum. However, these tests cannot tell how

Table 1: Components of Talent Search

Diagnosis and Evaluation	Educational Placement and Guidance	Talent Development Opportunities
• Assesses areas of ability (math, verbal, spatial) • Measures level of ability • Yields estimate of learning rate	• Recommendations for types of in-school accommodations, both accelerative and enrichment-oriented • Recommendations for appropriately matched outside of school educational programs • Recommendations for curriculum modifications such as compacting and telescoping • Recommendations for specific types of accelerative options such as grade or subject acceleration, early entrance to high school or college, early access to AP	• Weekend programs • Summer programs • Contests and competitions • Magazines • College and career counseling • Recognition and awards ceremonies • Distance education courses • Individualized academic and psycho-social testing and evaluation • Access to experts in gifted education • Opportunities to meet with other families of gifted children • Parent education programs • Workshops for educators • Coursework and degree programs for educators

far beyond or above the grade curriculum children are functioning because they do not have an adequate "ceiling," that is, enough difficult items. Tests such as the *Scholastic Assessment Test* (SAT) or the *American College Testing Program* (ACT) provide more accurate measurement of gifted students' abilities because they are designed to be used with older students.

In addition, talent search programs have yielded important research that has significantly increased our understanding of giftedness and the development of talent. Talent search testing has shown that adult achievements, including creative accomplishments, can be predicted from test performance on above grade-level tests taken in middle school (Benbow, Lubinski, Shea & Eftekhari-Sanjani, 2000; Lubinski, Benbow, Webb & Bleske-Rechek, 2006); that knowledge of patterns of abilities such as stronger performance on a test of mathematical versus verbal reasoning (or vice versa) are related to future college majors and areas of achievement and can be helpful in directing children to appropriately matched courses of study (e.g. STEM, Lubinski & Benbow, 2007; Wai, Lubinski & Benbow, 2009); that there is no threshold for ability and differences even within the top 1% of mathematical or verbal ability translate into differences in achievements (Lubinski & Benbow, 2006; Wai, Lubinski & Benbow, 2005); and that the "dosage" of educational opportunities available to students subsequent to talent search testing is important and contributes to adult achievement (Wai, Lubinski, Benbow, & Steiger, 2010).

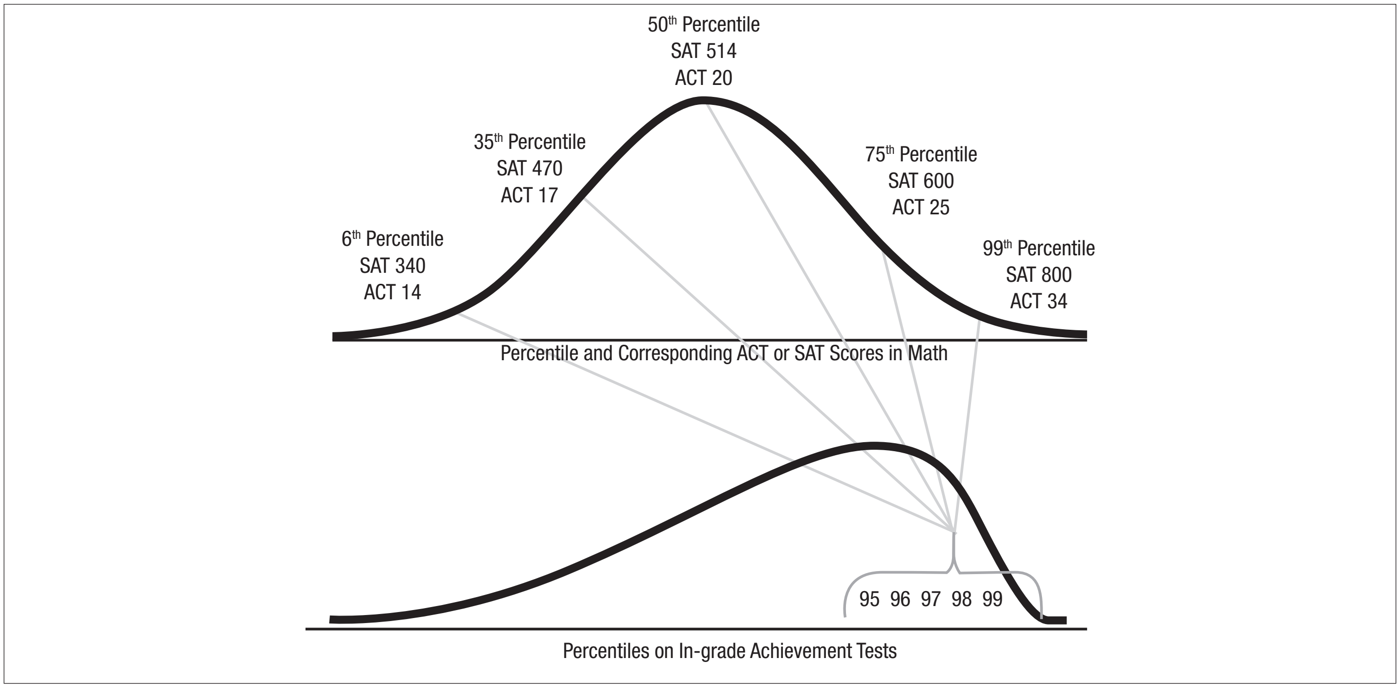
The Components of Talent Search

Currently, talent search is more suitably viewed through three different "lenses": as a tool for diagnosis/evaluation, as a guide for educational placement, and as a structure to provide talent development opportunities (Olszewski-Kubilius, 1998a; Olszewski-Kubilius & Thomson, 2014; Corwith & Olszewski-Kubilius, 2012a). See Table 1.

Diagnosis/Evaluation

Talent search is a diagnostic tool–one that discovers areas (e.g. math, verbal) and levels of ability thereby enabling educators to match students to programs that are appropriate in pace of learning and level of content. Consider, for example, two seventh-grade students who both score at the 97th percentile on the mathematics composite of their in-grade-level achievement test. When they take the SAT-Math, however, one student earns a score of 600 (75th percentile compared to college-bound 12th graders) and the other earns a score of 340 (6th percentile compared to college-bound 12th graders). See Figure 1 for a graphic representation of the discriminatory power of above-level testing. These students look very sim-

Figure 1



ilar to one another on the basis of the in-grade achievement test and would be treated similarly educationally by schools and teachers. In reality, they are quite different and need very different educational placements and programs.

The child who scores 340 on SAT-Math already has a high level of mastery of his/her grade-level mathematics and is functioning in mathematics like a child in an advanced grade. This child would benefit from enrichment in mathematics and acceleration to the next grade for mathematics instruction. The child who scores 600 on SAT-Math is functioning mathematically like a child four to five years older and likely knows a great deal of pre-calculus mathematics without having taken a formal course (see Assouline & Lupkowski-Shoplik, 2011b for additional examples). For this student, an individualized mathematics program that includes a very accelerated grade placement and a much more rapid pace is appropriate. For both of these children, however, the typical curriculum is probably insufficient–insufficient in scope, or pace, or both.

In addition to discerning areas and levels of ability within areas, talent search programs give educators a useful estimate of learning rate or the extent to which typical school instruction will be inappropriately slow-paced and/or conversely, the rate at which instruction should be accelerated in order to be appropriately challenging for a particular student.

During the 2012-2013 academic year, approximately 50,000 seventh through ninth grade students took the SAT with a talent search organization (See Appendix E). During the period of 2009-2011, more than 107,000 students in grades seven and eight took the ACT through a talent search organization and 21,698 students in grades three through six took the ACT test Explore, which was developed for eighth graders, through one of the talent search organizations (G. Johnson, personal communication, March 2014).

Of the children who participate in talent search, a substantial percentage score extremely well—above the means for the students for whom the test was designed. See Table 2. These data indicate that above-level testing is not too difficult for qualified participants and significant proportions of students who score at the top of grade-level achievement tests have knowledge and abilities similar to students three to five years older. Consequently, these students are ready for more challenging coursework.

Educational Placement and Guidance

The information yielded from talent search testing is very useful for educational placement and guidance in several key ways. Different scores may be required depending upon the focus of the course and the degree of acceleration or pacing of the program or course. For example, scores on the ACT

Table 2: Percentage of Talent Search Testers Scoring Above Means for Older Normative Groups

Explore	English	Reading	Math	Science
Fourth Graders (n=2956)	46%	29%	13%	21%
Fifth Graders (n=9435)	72%	52%	34%	46%
Sixth Graders (n=8248)	86%	68%	61%	67%
Mean for Eighth Graders nationwide (2010-2011)	14.4	14.6	15.5	16.6
Note: Data based on national talent search participants in 2010-2011				
ACT				
Seventh Graders (n=93,518)	21%	24%	8%	13%
Eighth Graders (n=13,723)	49%	52%	41%	40%
Mean for Seniors (2011)	20.6	21.3	21.1	20.9
Note: Data based on national talent search participants in 2009-2011				
SAT				
Sixth Graders (n=1771)		16%	18%	
Seventh Graders (n=4598)		32%	33%	
Eighth Graders (n=5635)		52%	52%	
Mean College Bound Seniors		496	514	
Note: SAT data is based on 2013-2014 participants in the Northwestern University Midwest Academic Talent Search				

or SAT reading might be used for entrance into an accelerated high school biology course that involves a lot of advanced vocabulary and critical reading, whereas SAT and ACT math scores might be used for a mathematically-based high school physics course. Similarly, a summer program course that compresses a full year high school course into three weeks will require higher entrance scores than a distance learning course that is advanced in content but runs over a nine month period (i.e., is accelerated in level but not instructional pacing).

Patterns of performance on different subtests can be helpful to parents and educators in terms of future courses of study and college majors for their students. Park, Lubinski, and Benbow (2007) followed a large sample of talent search participants longitudinally and found that "ability tilt," that is whether SAT-Math scores were higher than SAT-Verbal scores or vice versa, predicted whether their adult accomplishments were in the verbal domains or the STEM domains. The adult accomplishments included earning advanced degrees and tenure track positions in STEM versus the humanities and producing literary publications or scientific articles or obtaining patents. Spatial ability scores, currently not widely assessed in talent search programs, are also predictive of interest in and entry into STEM fields, especially engineering and physics, as well as adult accomplishments in these fields.

Scores on above-grade-level tests such as are used in talent search (SAT, ACT, and Explore) can discern levels of ability that are also important for decisions about an appropriate degree of acceleration for individual students. Researchers have asserted that one third of the entire range in ability resides in the top 1% of ability (Lubinski & Benbow, 2006). A

Table 3: Northwestern University Midwest Academic Talent Search Program Recommendations Based on SAT or ACT Scores

Range 1	Range 2	Range 3
• 230-440 on SAT-CR • 200-460 on SAT-M • 1-19 on ACT-Eng or ACT-Read • 1-18 on ACT-Math	• 440-580 on SAT-CR • 460-600 on SAT-M • 19-25 on ACT-Eng or ACT-Read • 18-23 on ACT-Math	• 580+ on SAT-CR • 600+ on SAT-M • 25+ on ACT-Eng or ACT-Read • 24+ on ACT-Math
Program options should include:	**Program options should include:**	**Program options should include:**
1. Long-range academic planning following course sequence 1 in area of strength 2. Early access to advanced school courses 3. Supplemental enrichment courses in-school and outside of school in summer, weekend, or distance education programs 4. AP, IB and dual enrollment programs in high school 5. Early career and college counseling	1. Long-range academic planning following course sequence 2 in area of strength 2. Fast-paced courses in area of strength in school or through outside of school summer, weekend, or distance education programs 3. Early access to college-level work via AP, dual enrollment, or summer programs 4. Early career and college counseling, including access to mentors and internships	Options 1 to 4 from Range 2, plus: 5. Individualized program of study, using "test-out" approach in areas of strength 6. Consider whole-grade acceleration or early admission to college 7. Individualized work with a mentor to pursue advanced study in an area or areas of interest and strength.

study comparing the adult achievements of talent search students whose SAT-M scores placed them in the top quartile of the top 1% of ability to students whose scores placed them in the bottom quartile of the top 1% revealed striking individual differences in terms of achievement including rates of earned doctorates in STEM fields, patents, and tenured positions at top research institutions (Wai, Lubinski, and Benbow, 2005). To respond to that variation, Northwestern University's Center for Talent Development has developed recommended accelerated course sequences within each of the content areas and a set of program recommendations matched to a student's talent search scores (see Table 3). Another example of programming recommendations matched to talent search scores is the Pyramid of Educational Options by Assouline and Lupkowski-Shoplik (2011b). The bases for these recommendations are individual differences in gifted students' reasoning capabilities and learning rates—based on differences in their above-level scores. These differences must be matched to educational programs that are appropriate in level, scope, and pace and sequentially and systematically, develop a student's talents and interests over time.

Table 3 illustrates how talent search scores relate to accelerative practices in two important ways. One is that they help to determine how far above grade level a child is able to work intellectually and should be placed for instruction. Accelerative practices such as grade-skipping, early entrance to middle or high school or college (including radical acceleration of three or more years) and subject area acceleration can be used to place a child at a more appropriate level for instruction. Second, they help to determine the degree of acceleration that needs to occur for the pacing of instruction within programs and classes. Accelerative practices such as fast-paced classes, which compress a year's worth of high school level coursework into 3 weeks; curriculum compacting or diagnostic-prescriptive teaching that use testing to eliminate already known material; and telescoped classes in which, for example, four years of high school math is compressed or compacted into two years, can be used to proved a more appropriate pace of instruction. The data presented in Table 2 suggest that many of the students who participate in talent search are candidates for some form of acceleration.

Talent Development Opportunities

When children participate in a talent search program, they are able to access a whole host of outside-of-school opportunities, including award ceremonies, summer programs, after-school or Saturday programs, distance learning programs, and weekend workshops and seminars. In addition, they receive information in the form of newsletters and magazines on other opportunities such as contests, competitions, and scholarships, as well as expert advice on issues such as acceleration, social-emotional aspects of giftedness, college majors and career paths. Typically, students who participate in talent search as seventh or eighth graders continue to be notified about opportunities and receive information until the completion of high school. Talent search is more properly viewed as the gateway to many other important, educationally advantageous opportunities for students and the effects of these opportunities on students can be enormous.

Some of the most compelling research about the efficacy and impact of gifted programming on the achievement of gifted students comes from follow-up studies of talent search participants. For example, Wai, Lubinski, Benbow, and Steiger (2010) examined the paths and accomplishments of a group of individuals who had been identified as mathematically talented in middle school by virtue of their performance on the SAT-M. All of the study participants retrospectively reported their participation in advanced classes such as STEM AP courses and dual enrollment programs as well as in enrichment activities both in and outside of school such as science fairs and math competitions, clubs, summer programs, etc. Individuals with "notable STEM accomplishments" such as getting a doctorate in STEM and choosing a STEM career, having STEM publications, and securing tenure in a STEM field, had a richer STEM educational dose consisting of a larger number and variety of precollege STEM experiences. Differences in ability between high- and low-dose groups were small and could not account for the differences in STEM accomplishments. The finding was replicated with students who had attended top STEM graduate programs in the U.S., suggesting that motivation also could not account for the differences. Similarly, Subotnik, Tai, Almarode & Crowe (2013), in an investigation of the impact of attendance at specialized STEM high schools, found that students who participated in talent search and subsequent summer programs were as likely to pursue STEM degrees in college (i.e. twice the national rate for all college students) and STEM careers as students who attended specialized STEM high schools, suggesting that talent search participation offers an equally viable, alternative path for students who are talented in science and math and interested in STEM careers.

The research above adds to the growing body of evidence that educational opportunities play a significant role in the development of gifted children, leading them towards continued paths of achievement into early adulthood. University-based talent search programs provide these opportunities to many gifted students.

Research on Acceleration and the Talent Search Model

As a result of talent search programs, various kinds of accelerative program models for gifted students have been developed. These include fast-paced summer classes in which 120 hours of honors level high school coursework is compressed into 60 to 75 hours, programs that compress four years of high school study in mathematics or language arts into two years, and programs that accelerate students one to two years in particular subject areas.

SAT or ACT scores necessary for acceptance into the fast-paced summer programs typically are comparable to the average scores of college bound, high school seniors. Thus, programs select middle school-aged children whose reasoning abilities are advanced by four to five years. Entrance scores are adjusted for the particular demands of the course; math and verbal scores may be used, for example, for courses that are thought to require aptitude in both areas such as an advanced, mathematically-based physics or chemistry course. Scores may be adjusted upwards for courses that are very advanced and/or very compressed. The available research evidence suggests that these practices are valid (see Olszewski-Kubilius, 1998b and Olszewski-Kubilius & Thomson, 2014 for reviews).

Using performance on standardized achievement tests matched to the content of summer classes, Olszewski-Kubilius, Kulieke, Willis and Krasney (1989; Olszewski-Kubilius & Thomson, 2014) found that SAT cutoff scores used to select students into fast-paced summer literature classes (in which 120 hours of honors level, high school instruction was compressed into 75 hours) were appropriate. Additionally, these authors found that achievement in self-paced summer mathematics classes was also high and comparable to high school students who took year-long mathematics courses.

Bartkovich and Mezynski (1981) found that students who scored a 600 or above on SAT-Math were able to successfully complete two high school level mathematics classes in just 50 hours of in-class instruction during the summer, as determined by performance on standardized mathematics tests. Similarly, middle school students whose average SAT-M scores were above 600 evidenced high levels of achievement in a special program in which four years of high school mathematics was compressed into two and a half years (Benbow, Perkins, & Stanley, 1983).

Lynch (1992) found that junior high-aged students who completed year- long high school science classes, such as biology, chemistry or physics, within a three week summer program scored above the 70th percentile on average on standardized tests in these subjects compared to high school students who had the typical one full year of instruction. Similarly, Kolitch and Brody (1992) reported that almost all of the talent search students they studied who had accelerated themselves by taking high school or college level mathematics classes early earned grades of A or B and excelled on the Advanced Placement calculus examination, The results of these studies all suggest that acceleration, whether in terms of instructional pace and/or level of the course, is an appropriate and successful practice for gifted students who are selected on the basis of talent search scores.

Talent search students who accelerate their coursework in special programs do not experience adverse consequences in their educational careers. There is no evidence that students burnout (Kolitch & Brody, 1992; Swiatek, 1993; Swiatek & Benbow, 1991a) as students remained interested in studying mathematics and continued to take rigorous courses throughout high school and college. Learning mathematics at an accelerated rate, such as in a fast-paced class, does not result in superficial learning nor does it negatively affect subsequent learning (Brody & Benbow, 1987; Kolitch & Brody, 1992; Mills, Ablard, & Lynch, 1992; Swiatek, 1993; Swiatek & Benbow, 1991a); students who took fast-paced summer classes self-reported success in later classes, which was also confirmed by reports from their teachers. Learning at a faster pace is not detrimental to long-term retention of the subject matter (Benbow, Perkins, & Stanley, 1983) as evidenced by strong performance on standardized achievement tests taken long after the class is completed. Also, accomplishing high school coursework through fast-paced classes did not negatively affect college placement; talent search participants who used supplemental programs to accelerate were placed at an appropriate and advanced levels in mathematics in college (Kolitch & Brody, 1992) unless they requested a special, alternate placement.

Talent search students who chose to accelerate do not differ on various personality characteristics, locus of control, and other psychosocial measures compared to equally able students who chose not to (Brody & Benbow, 1987; Richardson & Benbow, 1990; Swiatek, 1993). Also, they participated in extra-curricular activities to the same extent as students who did not accelerate, except, as expected, for students who were radically accelerated (Swiatek, 1993). Talent search students who opted for acceleration during high school overwhelmingly reported satisfaction with their choices; they viewed acceleration as having been a positive influence on their academic progress, interest in learning, and peer relationships (Benbow, Lubinski, & Suchy, 1996).

In summary, the research evidence suggests that talent search scores can provide a valid indication of level of developed reasoning ability and learning rate within specific domains and that these can be matched to educational programs adjusted for pacing and level of advanced content. Whereas the research base on these issues is more substantial in the mathematical area (see Benbow, 1992, for a review) than the verbal area, the findings challenge widely held ideas about the amount of instructional time that is needed for mastery of content material and the typical approach to using age for placement in courses and grade-level for the determination of curriculum content.

Short- and Long-Term Effects of Talent Search Accelerative Programs

An important question about accelerative programs is their influence on students both in the short and long term. The studies reported below were direct assessments of the effects of talent search accelerative programs and involved comparisons between groups of participants and nonparticipants or between participants who took different courses or were in different kinds of programs.

Fox, Brody and Tobin (1985) and Brody and Fox (1980) assessed the impact of three different kinds of educational programs (an accelerative summer mathematics program, an in-school accelerated mathematics program and a career awareness program) completed during middle school on students' subsequent course taking in high school. Comparisons were made between the three intervention programs and to control groups of students with similar tested abilities who were not in any program. Girls who participated in the accelerated mathematics summer program continued to be accelerated at grade 9 compared to control boys and girls, but that advantage was lost by grade 11. By grade 11, the summer program girls were on par with boys who had not been in a program but were more accelerated in mathematics compared to girls who had not been in a program. The authors concluded that their results indicate that the summer program helped talented females to keep up with talented boys who are more likely to accelerate without any intervention.

Barnett and Durden (1993) compared students who had participated in talent search testing only to students who had participated in the talent search and subsequently in special summer programs. While both groups of students exhibited patterns of high achievement and both completed a high school program of rigorous courses, compared to the talent-search testing-only group, the students who participated in summer programs took more advanced courses and AP exams at an earlier age, were more likely to take the more rigorous AP Calculus BC exam, took College Board Achievement

Tests more frequently and earlier, and took more college classes while still in high school. In summary, the summer students showed a pattern of continuing to choose accelerative options to a greater extent as they continued through school than did the talent search only students.

Similarly, Olszewski-Kubilius and Grant (1996) compared talent search participants who took mathematics classes during the summer to students who took fast-paced courses in other subjects. They found that females who studied math accrued more benefits than did students who took other courses. The mathematics females earned more honors in math during high school as well as took more advanced mathematics classes. An interesting finding of this study was that benefits extended beyond mathematics for female subjects as participation in a summer mathematics program was associated with taking more AP courses in any subject. The generalization of effects beyond the specific subject studies in the summer program may be the result of a general increase in confidence to succeed in other rigorous academic settings.

Research suggests that students who participate in a fast-paced mathematics class subsequent to participation in talent search are more likely to attend a more selective undergraduate institution (Barnett & Durden, 1993; Swiatek & Benbow, 1991a) and to enter college early (Swiatek & Benbow, 1991a). Other effects include that females are more likely to major in a STEM field in college (Olszewski-Kubilius and Grant, 1996), attend graduate school (Swiatek and Benbow, 1991), and have higher educational aspirations (Olszewski-Kubilius & Grant, 1996).

A major concern with any type of accelerative educational option is the effect on student's self-esteem or self-concept. A large body of research suggests that students who place themselves in more academically competitive environments can experience declines in their perceptions of their academic abilities as a result of social comparison (Marsh & Hau, 2003; Marsh, Hau, & Craven, 2004), which can ultimately lower their educational aspirations and academic effort (Marsh & Yeung, 1997). This is called the "Big Fish, Little Pond" phenomenon. However, recent research on talent search students suggests that those that participate in accelerated summer programs did not experience significant declines in either their academic self-concepts or their educational aspirations (Makel, Lee, Olszewski-Kubilius, & Putallaz, 2012).

Researchers in gifted education assert that there are many psycho-social benefits to exposure to challenging academic environments such as accelerated courses and programs, including benchmarking of progress and goal setting, acquisition of coping skills and resiliency in response to academic challenge, and reinforcement of critical mindsets and attitudes about effort (Dai & Rinn, 2008). These benefits may accrue even in situations where acceleration was not successful. Lee, Olszewski-Kubilius, & Peternel (2010) found that minority students who were unsuccessfully accelerated in math in middle school, still saw advantages to learning new material earlier than their peers, were not discouraged from pursuing further academic challenges by having to repeat a class, and most later succeeded in earning good grades in their advanced math course. Future research needs to clarify how personality and other aspects of accelerated educational environments affect academic self-concept, but there is currently little evidence to suggest negative social and emotional effects of talent search accelerative programming.

In summary, participation in special accelerative programs subsequent to talent search can have many positive effects and these extend to high school and college course-taking and educational aspirations. These effects, particularly potent for talented females, may be due to increased interest in the subject and enhanced motivation. However, it is more likely that achieving success in a class that is challenging, both because of the pacing and advanced nature of the content matter and placement with intellectual peers, does much to bolster confidence, raise one's expectations and alter mindsets. The fact that students continue to use accelerative options attests to perceived value and benefits of these programs.

The effects of participation in talent search programs can also be less direct. Students who participate in talent search often are surprised at their performance on the SAT or ACT. They and their families become aware that their abilities in an area are exceptional. This may influence their choices of classes and extracurricular programs within school and result in a more rigorous educational program that can have profound benefits for students. Benbow and Arjmand (1990) differentiated a group of high and low academic achievers, based on college performance, within a group of students initially identified as mathematically talented through talent search. They found that schooling variables, or the precollege curricula and experiences in mathematics and science prior to college, were the best predictors of differences in achievement between the two groups. Educational opportunity in terms of both in school and outside of school-gifted programs has found to be a distinguishing factor affecting achievement in early adulthood (Wai, Lubinski, Benbow & Steiger, 2010). Opportunities must be available to students but also taken by them. Exposure to an academically rigorous educational program over a period of years is also associated with the development of cognitive abilities measured by the SAT and results in greater gains on SAT scores from junior high to high school (Brody & Benbow, 1990), thereby potentially enabling more students to qualify for advanced secondary and college programs.

There is ample research evidence to support the validity of the accelerative instructional models that have resulted from the talent searches. There is also evidence about the positive impact of the Talent Search Model and talent search educational programs on students. Clearly this is one of the most successful accelerative models within the field of gifted education. Unfortunately the model is often perceived as appropriate only for access to supplemental summer programs and has had little impact on programming within schools (Olszewski-Kubilius & Lee, 2005). Talent search scores can be used effectively to select students for in-school accelerated learning programs. A good example of this is the Academically Talented Youth Program, which operates at several sites in Michigan. In this program, students are identified via talent search scores for accelerated programming in high school that enables them to complete high school coursework in English or mathematics in 2 or 3 years, starting in middle school, and begin college studies early (McCarthy, 1999). Students are released from their home schools to go to a local college or university to receive their math and/or language arts instruction and schools and districts agree to honor and accept high school credits earned in the program.

Implications of the Talent Search Programs and Research for Schools

1. Domain specific assessments, particularly those that assess several broad areas of ability (e.g. math, verbal, spatial) and have sufficient ceiling to detect above-grade-level ability and achievement; therefore, these measures should be used by schools no later than middle school. The information from such assessments should be employed by schools: to design programs and services for students; to place individual students into appropriately advanced and accelerated programs; to provide longer-term academic planning for students; and, to guide students and parents towards appropriate outside of school programs and courses.

2. Level of ability and individual differences within a gifted sample -- especially in the top 1% of ability – represent meaningful information about readiness for academic challenge and need to be responded to educationally. These differences have implications for instructional pacing within courses and level of acceleration within subject areas for individual students. Educators must be familiar with and be able to implement a variety of acceleration models that fit content areas and match student needs (e.g., curriculum compacting, fast-paced classes, telescoping, subject area acceleration, full grade acceleration, dual enrollment).

3. Continuous educational programming focused on talent development is critical, particularly the amount and variety of experiences that are matched to a student's interests and level of ability. These can include opportunities for both acceleration and enrichment, both through school and outside-of-school programs. Educational dose is related to whether students continue on talent development paths and to their adult accomplishments.

4. Schools and districts must actively develop policies that support acceleration (e.g. early entrance to all levels of schooling), allow for earlier specialization of course-taking in areas of talent, award credit for courses taken outside of school walls, and support individualization of school programming for gifted students.

5. Access to above-grade-level testing and subsequent educational programming is important for all gifted students, especially those who have been historically under-represented in gifted programs, such as minority and low-income students (Lee, Matthews, & Olszewski-Kubilius, 2008). Talent search programs offer fee waivers and scholarships for students who need them. More importantly, talent search programs have developed "preparatory" type program models that work with students who have had limited educational experiences to get them ready to take talent search tests such as Project Excite (Lee, Olszewski-Kubilius, & Peternel, 2010). This model can be implemented by schools to ensure that all qualified students have their abilities appropriately assessed and access to supplementary accelerative, talent development educational programs.

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Acceleration and STEM Education

Lori M. Ihrig, The University of Iowa, Iowa City, Iowa
Katherine M. Degner, St. Ambrose University, Davenport, Iowa

Abstract

Developing STEM talent means that appropriate and necessary opportunities for high-ability STEM students—that extend beyond STEM exposure and literacy—must be created. Years of research supports acceleration as an effective method of challenging academically talented youth; acceleration is crucial to the development of high level STEM talent so that individuals exhibiting that talent can assume leadership positions. This chapter highlights four excuses for not accelerating gifted students in STEM coursework during their K–12 schooling experience and provides research-based responses supporting the use of acceleration in a program for those students.

Introduction

In 1965, Delores Elaine Keller wrote, "Recognizing that, in a democracy, one must do all within one's power to take care of the undernourished, underdeveloped, and underprivileged, it is equally as important that under such a system some attention be given to those individuals whose intellect is undernourished, underworked, and understimulated. ... Since high ability students exist, it is the duty of instructors to provide the opportunities for these students to think" (pp. 108–110). Despite the passing of 50 years since Keller advocated for high-ability students to have access to these opportunities, her words still ring true. More progress must be made in changing public conceptions of the needs of high-ability students and developing opportunities at a high level. This is true in all content areas and is particularly critical in science, technology, engineering, and mathematics (STEM) given the increasing demands on the STEM workforce and the necessity of leaders in all disciplines to have deep and robust understandings of the nature of STEM disciplines.

Decades of research has informed us that acceleration is an effective method of challenging academically talented youth (e.g., Colangelo, Assouline, & Gross, 2004). Research focusing on students with exceptional talent in STEM, including the longitudinal studies conducted by the Study of Mathematically Precocious Youth (see Wai, this volume), has demonstrated that students talented in STEM thrive on accelerative opportunities. Yet, educators and the general public seem reluctant to consider allowing these students to move ahead academically. Four primary excuses are frequently given for not accelerating students in STEM. These excuses were adapted from Assouline and Lupkowski-Shoplik's (2011) collection of excuses that have a negative impact on the development of math talent. Students and their families are inaccurately told:

- Excuse 1: Acceleration in STEM may cause academic harm.
- Excuse 2: The new standards are advanced and we differentiate curriculum.
- Excuse 3: We already have enrichment.
- Excuse 4: This student is bright, but not gifted enough for acceleration.

These four major excuses, and their related excuses, are listed in Table 1. The decades-long habit of holding back high-ability STEM students must be replaced with the habit of providing appropriate opportunities for them to develop to their full potential. The remainder of this chapter will elaborate the reasons why this is so important.

The ratio of STEM to non-STEM degree earners in the United States is among the lowest in the world (National Science Board, 2007). As a result, there has been a national call to develop the potential of students with high ability in STEM disciplines (National Academy of Sciences, 2007; National Science Board, 2010). This appeal was reiterated and emphasized in the President's Council of Advisors on Science and Technology report (Holdren & Lander, 2012) that notes,

Table 1: Excuses for Not Accelerating Students in STEM

Excuse 1: Acceleration in STEM may cause academic harm.
• High-ability students are not ready to study abstract disciplines such as algebra or chemistry until high school. • Acceleration leads to detrimental gaps in understanding. • Students who move through curriculum quickly will run out of classes before they finish high school. • Accelerated students will burn out.
Excuse 2: The new standards are advanced, and we also differentiate curriculum.
• The *Common Core State Standards in Math* weave advanced concepts throughout the school years–beginning in elementary school–making additional advanced coursework unnecessary for elementary and middle school students. • The *Next Generation Science Standards* are rigorous and internationally benchmarked–making additional advanced coursework unnecessary for elementary and middle school students. • We have provided our teachers with professional development in differentiating curriculum.
Excuse 3: We already have enrichment.
• Our elementary gifted program provides enrichment opportunities. • We have extracurricular STEM clubs and a science fair for all of our students.
Excuse 4: The student is bright, but not gifted enough for acceleration.
• While she demonstrates high-ability, she did not earn 100% on the pretest so she does not qualify for accelerated programming. • He does not solve math problems quickly. • She always does well on exams, but does not complete homework assignments.

"the need to add to the American workforce over the next decade approximately one million more STEM professionals than the U.S. will produce at current rates" (p. 1). However, only 40% of students who enter college seeking a STEM degree realize their aspirations (Hurtado, Chang, Eagan, & Gasiewski, 2010; Holdren & Lander, 2012).

Those who work with high ability students may attribute the problem of college attrition to students who lack STEM ability or burnout. However, in *They're Not Dumb, They're Different,* Tobias (1990) reported that very capable science majors chose to leave for other disciplines in large part because their science courses lacked intellectual engagement, primarily emphasized memorization of isolated facts, and ignored the history and nature of science. She wrote:

> *They hungered—all of them—for information about how the various methods they were learning had come to be, why physicists and chemists understand nature the way they do, and what were the connections between what they were learning and the larger world. (p. 81)*

Moreover, in a working paper on STEM persistence between the first and second years of college, Griffith (2010) found that when women and minority students earn higher grades in non-STEM courses during their first year of college, they are less likely to remain in their STEM major. This fact is particularly devastating when viewed in conjunction with the knowledge that minority students are underrepresented in gifted education (U.S. Department of Education, 2008). What excuses do we provide gifted young women and minorities for excluding them from opportunities for acceleration that would prepare them for success in their first years of college?

One implication of denying high-ability STEM students appropriate acceleration is that they are not adequately challenged in their formative K–12 years, and they are deprived of the opportunity to experience struggle. In addition to their intellect being undernourished, underworked, and understimulated, their unchallenging educational experiences may be inadvertently promoting a fixed mindset of intelligence where high-ability students see their intelligence as a quantity and think they were born with a set amount (Dweck, 2008, 2010). Students with a fixed mindset believe that if you are smart, then tasks should come easily and naturally. And because these students value looking smart, they opt out of challenging experiences where they might struggle. When we deny high-ability STEM students appropriate opportunities for academic challenges, including acceleration, we not only hold them back, but we may be building and reinforcing a concept of intelligence with repercussions that extend well beyond slowing them down.

Research on STEM Acceleration

In the following sections, the four excuses—and their many permutations—are reframed as questions, concerns, and rationales expressed by oftentimes well-meaning, but potentially ill-informed parents, educators, and policy-makers. Each section explores evidence that trumps the excuses that are commonly used to justify denying high-ability STEM students opportunities to develop to their fullest potential.

Excuse 1—Acceleration in STEM may cause academic harm

Well-meaning school personnel might say, "We are concerned that the abstract concepts of advanced STEM courses are developmentally inappropriate for a child of this age." Our understanding of children's abilities to comprehend and work with abstract concepts is grounded in the research of Jean Piaget and his theory of cognitive development (Schunk, 1991). Piaget concluded that children pass through a fixed sequence regarding the ability to handle abstract thinking. Development begins with an initial stage where infants are creating concrete understandings of the world, for example "Balls are for throwing." Subsequently, development continues and culminates in a stage where teens and adults are acquiring ability to think abstractly—such as thinking about systems with dependent variables. For example, understanding acceleration as meters per second per second (m/s/s).

The work of Piaget and other developmental theorists has important implications for STEM educators working to make sense of the conceptual barriers students may encounter when developing robust and accurate understandings of abstract concepts. However, developmental theories are taken out of context when applied to high-ability STEM students and used as a rationale for limiting their access to advanced concepts and courses. Piaget (1972) states:

> The rate at which a child progresses through the developmental succession may vary ... Different children also vary in terms of the areas of function to which they apply formal operations, according to their aptitudes and their professional specialization. Thus ... it is best to test the young person in a field which is relevant to his career and interests. (p. 1)

Developmental theories address patterns, but developmental theorists argue that there can be exceptions. Simply put, high-ability students may be able engage in abstract thinking at young ages. In fact, Daniel Keating found evidence to support the idea that mathematically talented students achieve the level of formal operational thinking at a younger age than typical students (Keating, 1975; Keating & Schaffer, 1975). Without child and domain-specific evidence, claiming that a high-ability student is too young for a course that requires abstract thinking is an unfounded excuse.

Educators might also ask, "Won't accelerated students have detrimental gaps in their understanding because they skipped material?" Evidence supports the answer, "No." In a review of findings from over 40 years of research produced by the Study of Mathematically Precocious Youth, Benbow (2012) asserts:

> Greg Park, as part of his dissertation, compared students who were accelerated by at least a year with students who were not accelerated (Park, Lubinski, & Benbow, 2011). The two groups were matched on a dozen relevant variables. Park found that those who were accelerated had achieved more career-wise with more creative production by their mid-40s than had those who were not accelerated. Given the sophistication and extent of the matching procedure, acceleration had to be the most likely cause for the differences in achievement. Numerous other studies have come to the same conclusion (e.g., Rogers, 2007; Swiatek & Benbow, 1991a, 1991b). However, the other studies were less rigorously designed than Park et al. (2011). This supports the National Mathematics Advisory Panel's (2008) conclusion that, as a policy, acceleration should be a means for meeting the expressed needs of mathematically talented students." (p. 23)

In science, Lynch (1992) studied the academic achievement of gifted students (ages 12–16) who participated in a three-week science program. Students in this summer program took biology (n=353; average age 13.6 years), chemistry (n=339; average age 14.2 years), or physics (n=213; average age 14.8 years) classes taught by Advanced Placement Program teachers. These younger, high-ability students performed better on College Entrance Examination Board achievement tests than high school students assessed in their junior or senior year who had taken the courses for a traditional full academic year. Moreover, although the students in the accelerated program ranged in age from 12–16, there was no significant correlation between age and science achievement for chemistry or physics; however, there was a positive correlation between age and achievement in biology. In this six-year project, follow-up studies documented that those students who were accelerated in science through their experiences in the summer program still performed well in the accelerated science classes they took at their high schools. Lynch concluded, "[A]cademically talented youngsters can master the secondary sciences approximately two years before they are normally offered in American schools, and in about half the time typically spent in school" (p. 147). These studies point to the short- and long-term benefits of STEM acceleration. If there were detrimental gaps in the understandings of accelerated STEM students, they would show up in later measures as students progress through their schooling and careers. They do not (Lubinski & Benbow, 2006).

Yet another concern is, "If high-ability STEM students are accelerated, they will run out of STEM courses before they graduate high school." This concern may have been legitimate decades ago, but with the alternatives that currently exist beyond typical high school offerings, it is no longer reasonable. Programs that offer online Advanced Placement courses—such as the Iowa Online Advance Placement Academy (see www.belinblank.org/ioapa)—create advanced learning opportunities for students to participate in without having to leave their school. Alternatively, students who outgrow the opportunities within their district may be appropriately served by early entrance to college programs, such as the Early Entrance Program at the University of Iowa (formerly called the National Academy of Arts, Sciences, and Engineering) and other programs described by Roberts & Alderdice in this volume. Programs such as these support high ability students who enter college before completing their senior year of high school. Denying students accelerated opportunities because advanced coursework is not available is a misleading excuse.

Other educators assume that, "If we accelerate gifted STEM students, they will burn out," but researchers have found that this is simply not the case. For example, in her presentation of research on gifted learners in science, VanTassel-Baska (1998) discussed how young students' experiences in working with "talented faculty and a highly able peer group" had a positive impact on students. She also described the importance of mentors to providing "high-end learning opportunities in science at all levels" (p. 3). High ability STEM students crave challenges prior to their college years. In fact, early interest in STEM is a predictor of persisting in a STEM major and earning a STEM postsecondary degree (Tai, Liu, Maltese, & Fan, 2006). Preparing students for success in pursuing postsecondary STEM degrees necessitates appropriate mathematics and science coursework in high school (Lynch, 2011).

Moreover, the concept of "educational dose" was introduced as a part of two 25-year longitudinal studies of adult STEM accomplishments (Wai, Lubinski, Benbow, & Steiger, 2010). Educational dose refers to "the number of precollegiate educational opportunities beyond the norm that students participate in" (p. 870). Students who experienced a higher educational dose (e.g., STEM AP classes, college classes while in high school, participation in science competitions, or research experiences) had greater STEM accomplishments by the time they were 40, such as STEM PhDs, tenure, patents, publications, and occupations. Findings from other studies converge to support the argument that acceleration leads to increased levels of achievement, not burnout (Makel & Putallaz, 2014; Rogers, 2007; Swiatek & Benbow, 1991). Protecting high-achieving STEM students from burnout is a baseless excuse for denying students opportunities.

Excuse 2—The new standards are advanced, and we also differentiate curriculum

If the adoption of new standards is employed as a rationale for denying high-ability STEM students opportunities for acceleration, then the way mathematics and science standards are designed and implemented to meet the needs of gifted students must be carefully examined. The following sections will examine Common Core Math Standards and the Next Generation Science Standards in turn.

Educators might say, "We don't need to accelerate students in math because we have adopted the Common Core Math Standards, which has advanced math concepts throughout." The authors of the Common Core State Standards for Mathematics (CCSSM) (National Governors Association Center for Best Practices [NGA Center] & Council of Chief State School Officers [CCSSO], 2010a) identify three key shifts in the way mathematics should be taught to students in grades K – 12:

1. Greater focus on fewer topics
2. Coherence
3. Rigor

While these key shifts in mathematics education are meant to raise the bar in mathematics instruction for all students, this does not mean that merely implementing the Common Core State Standards for Mathematics eliminates the need for acceleration and more advanced work for some advanced students. As stated by Johnsen, Ryser, & Assouline (2014):

> Although the CCSSM standards are strong, they were not developed with the mathemati-

> cally advanced learner as the focus; therefore, they are not sufficiently advanced to accommodate the needs of most learners who are gifted in mathematics (Johnsen & Sheffield, 2013; VanTassel-Baska, 2013). The CCSSM developers noted that some students may traverse the standards before the end of high school (NGA & CCSSO, 2010b), which will require educators to provide advanced content for them. (p. 7)

The implementation of such standards, however, may help identify a way in which to accelerate gifted students throughout the mathematics curriculum. Johnsen et al. (2014) acknowledge that a more focused K–12 mathematics curriculum clearly identifies what concepts children understand. This focus on particular mathematics topics across the elementary school mathematics curriculum should make acceleration through the K–8 mathematics curriculum more coherent (National Association for Gifted Children [NAGC], 2014). Additionally, NAGC applauds the standards of mathematical practice outlined in CCSS-M for placing a renewed emphasis on the importance of thinking and reasoning, alongside computational mathematical knowledge.

The CCSS-M highlights the importance of mathematical reasoning and sense-making for all students. However, Kettler (2014) finds that as early as upper elementary school, there is a distinct difference between the critical thinking skills of gifted elementary school students compared to their average-ability counterparts. Because of the sophistication of critical thinking skills already being used by gifted elementary school students, to continue to expect them to learn reasoning and sense-making in mathematics does not afford them the same opportunities for challenge and growth as their peers. In other words, what is challenging and stimulating for the typical elementary student will not be adequately challenging for the mathematically advanced student in elementary school.

For this reason, acceleration through the mathematics curriculum for gifted elementary school students should not only be content focused, but also it should be focused on the mathematical reasoning students are expected to exercise in their mathematics classes. A recent survey confirmed previous findings that elementary school mathematics teachers in the United States view themselves as competent in the area of teaching mathematically gifted elementary students. However, many of these same teachers do not think mathematically gifted students should be taught in a classroom separate from their peers. Participants in this study indicated that they felt that students could be adequately challenged in mathematics through differentiation (Shayshon, Gal, Tesler, & Ko 2014). This is in contrast to findings from surveys of mathematically gifted students who indicate they are bored and under-stimulated in general education mathematics classrooms (Archambault et al., 1993).

The introduction of new academic standards is meant to raise the bar of expectation in the mathematics classroom for all students. However, raising the bar for all students except for the mathematically talented students is to give them much of the same experience they had before the adoption of CCSS-M—they are under-challenged, and therefore are likely to lose interest in an area in which they have great talent.

Similar to the previous excuse, educators might also state, "We don't need to accelerate students in science because we adopted rigorous standards for all students with the Next Generation Science Standards." Indeed, the Next Generation Science Standards (NGSS) are self-described as rigorous standards. However, this claim begs the question, "Rigorous for whom?" In an article published by members of the NGSS Diversity and Equity Team (Lee, Miller, & Januszyk, 2014), the authors describe how the NGSS subtitle "All Standards, All Students" informed their work while assisting with the development of the standards. "The NGSS Diversity and Equity Team takes the stance that the standards must be made accessible to all students, especially those who have traditionally been underserved in science classrooms" (p.224). The Team was charged to "highlight diversity and equity issues in relation to the NGSS specifically as the NGSS present both learning opportunities and challenges for all students to attain rigorous standards" (p. 226). The NGSS were designed with the explicit intent of *extending the cognitive expectations* traditionally reserved for gifted students *to all students*; however, the NGSS were *not designed to expand the rigor and cognitive expectations for high-ability students.*

In the statement "the standards must be made accessible to all students," the word *accessible* can also be understood to mean providing gifted learners with access to accelerated opportunities. As argued by the Diversity and Equity Team in the NGSS appendix materials, "The NGSS are intended to provide a foundation for all students, including those who can and should surpass the NGSS performance expectations" (NGSS Lead States, 2013, p. 1). Caution is required in taking this statement at face value. Access to appropriate intellectual opportunities for high-ability students may not be granted by the grade-level standards delineated for students. And they should not have to patiently languish while they wait for rigorous opportunities:

> ... the Next Generation Science Standards performance expectations should not limit the curriculum. Students interested in pursuing science further (through Advanced Placement or other advanced courses) should have the opportunity to do so. The Next Generation Science Standards performance expectations provide a foundation for rigorous advanced courses in science or engineering that some students may choose to take. (NGSS Lead States, 2013, p. xxiii)

The NGSS does address the need for teachers to differentiate instruction for high ability learners. Yet in a case study devoted to illustrating effective classroom strategies employed by an elementary teacher, they begin by claiming "Although the NGSS provide academic rigor for all students, teachers can employ strategies to ensure that gifted and talented students receive instruction that meets their unique needs as science learners" (NGSS Lead States, 2013, p. 1). There is a pervasive need throughout the NGSS to ardently claim that the NGSS is rigorous for all students, a claim that disparages high-ability students who will only experience rigorous content if they have the opportunity to encounter NGSS standards designated for higher grades. While the NGSS are considered rigorous in comparison to the minimum competency state standards they were developed to replace, it is a dubious claim that the needs of all high-ability students are met by rigorous grade-level NGSS.

Another excuse offered is, "Our teachers meet the needs of high ability STEM students because they have been trained in differentiation." Teachers must engage in some key research-based practices to meet the needs of all students, including high-ability students. However, as Tomlinson (2005) notes, effective practice is necessary, but insufficient, in meeting the needs of gifted learners.

> Although it is the case that there is no such thing as effective curriculum and instruction for gifted learners in the absence of effective curriculum and instruction, it is not the case that the story ends there for most gifted learners. Given the cognitive capacity of students who are highly able, it is likely that they will—at least at some times and in some contexts—require curriculum and instruction that is more challenging than we would expect of less advanced learners, at least if we expect the advanced learners to continue to grow. (p. 162)

From a base of high quality curriculum and highly effective instruction, teachers can successfully differentiate instruction so that advanced learners can continue to learn. However, differentiation has limits that can only be attended to by acceleration. This is because successful differentiation requires teachers to attend to:

- **Appropriateness of Pacing.** For very bright students, accelerated pacing through differentiation does not feel accelerated: it is a comfortable pace. Tomlinson (2005) states, "There is considerable evidence that pacing ... is one way of ensuring that good curriculum and instruction is appropriately adapted to address the needs of some highly able students" (p. 163). In fact, even if the pace is increased in the regular classroom, it might still be too slow for the talented student. Making these adjustments, to properly accelerate pacing of instruction, is challenging for teachers with a classroom of students who have varying abilities.
- **Degree of Challenge.** As the educational community has long known from the work of Vygotsky (1978), learning takes place when learners are working beyond what they are capable of achieving on their own, but within what they can achieve with the help of more knowledgeable others. Without appropriate challenge, high-ability students are not learning. Encountering challenge ensures that gifted students "learn to tolerate and tackle challenging work, and ultimately appreciate the role of challenge in helping them grow into their possibilities" (Tomlinson, 2005, p. 164).
- **Developing Passion.** Differentiating curriculum for high-ability students to develop in areas of interest and strength means providing students with choice to engage in complex work of high personal relevance. This work should require the development of advanced skills, the use of creativity, and critical feedback from more knowledge others (Tomlinson, 2005, p. 164).

More knowledgeable others play a significant and crucial role in differentiating instruction for high-ability STEM students. Following a review of how schools are meeting the needs of gifted math students, Dimitriadis (2012a) concludes, "The education of mathematically gifted children is not an easy matter that can be addressed simply by separating students into ability groups and giving more difficult work to more able ones. Gifted mathematicians are exceptional students who have special needs, and because of this they need teachers' attention and continuous support through focused instruction and work at higher cognitive levels in order to develop their potential to the fullest extent" (p. 73). Skillful accelerated differentiation mediated by a teacher is illustrated in the NGSS case study where a teacher compacts curriculum to make time for students to study middle school standards as fourth graders (NGSS Lead States, 2013). However without such acceleration, high-ability students are engaging in activities and they are meeting rigorous standards, but they are not learning something new (see Southern & Jones, this volume).

While it is possible for teachers to provide opportunities for acceleration within the context of differentiating traditional curriculum and instruction (as the NGSS case study illustrates), the reality is that teachers face "increased pressure to meet state testing goals [which] appears to directly affect teachers' instructional and assessment behaviors, as they increasingly provide students with experiences that closely resemble, if not directly mimic state tests" Brighton, 2002, p. 30). These changes in teachers' behaviors may partially explain the results reported from the 2011 National Assessment of Educational Progress that the average science scores were "higher than the 2009 scores for all but the highest-performing students" (National Center for Education Statistics [NCES], 2012, p. 7). However, in mathematics—where subject matter whole-grade acceleration is more common than teacher constructed differentiation of grade-level curriculum and instruction—the number of students scoring at both the advanced and proficient levels are significantly higher than in 2011 (NCES, 2013). The difference may also be accounted for by data on the amount of time students spend engaging in mathematics and science instruction. While almost all elementary classrooms have daily mathematics instruction, science is taught daily in only 20% of classrooms. And even though mathematics is being taught daily, students are receiving between 22 and 35 more minutes of reading instruction than mathematics instruction each day from teachers who do not feel very well-prepared to teach mathematics (Banilower et al., 2013).

The limited amount of time available to teach STEM disciplines in the elementary classroom, and teachers' low sense of preparation to teach mathematics, decreases the likelihood that teachers have the time and expertise to effectively differentiate for high-ability STEM students. For example, in a study of different models for providing instruction to high ability elementary mathematics students in England, Dimitriadis (2012b) found that "the existence of a special programme—even if it is well-organized by an expert, the choice of challenging work and the good preparation of the teacher are not enough to meet the needs of gifted mathematicians within classrooms, and to help them to extend themselves" on mathematics assessments (p. 254).

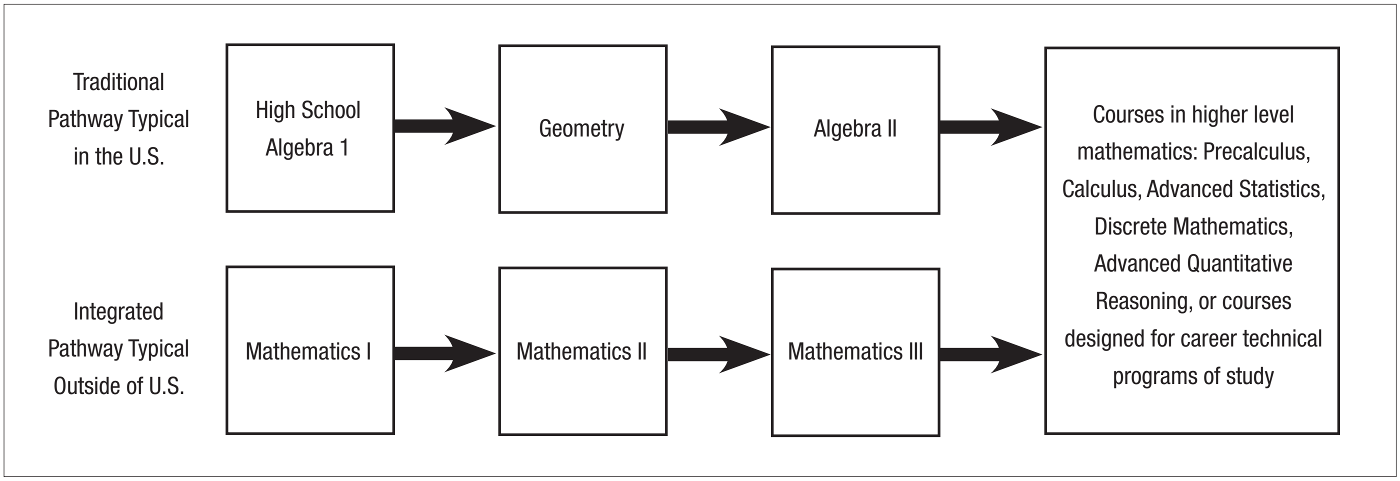
For middle and high school students, Appendix J of the NGSS lists example course maps. However, none of the example trajectories are for gifted learners, nor are differentiation recommendations for high ability students made within the maps. Adams, Cotabish, and Ricci (2014) argue, "As in mathematics, advanced and talented science students need access to advanced classes earlier and more often than typical learners" (p. 60). The authors of *Using the Next Generation Science Standards with Gifted and Advanced Learners* (Adams et al., 2014) recommend the following opportunities for acceleration be made available for high-ability STEM students:

- allowing students to take two science courses simultaneously;
- allowing students in schools with block scheduling to take a science course in both semesters of the same academic year;
- offering summer courses that are designed to provide the equivalent experience of a full-year course;
- creating different compaction ratios, including 4 years of high school content into 3 years beginning in ninth grade;
- creating hybrid courses; and
- allowing students to participate in programs such as the AP Cambridge Capstone Program (pp. 60–62).

The Common Core State Standards for Mathematics (NGA Center, & CCSSO, 2010b) explicitly describes models for acceleration for high-ability mathematics students. In Appendix A: Designing High School Mathematics Courses Based on the Common Core State Standards, the following pathways are described. (See Figure 2.):

- Traditional—two algebra courses and one geometry courses
- Integrated—three integrated courses, each with number, algebra, geometry, probability, and statistics concepts
- Compacted Traditional—seventh and eighth grade math content completed in seventh grade and Algebra I completed in eighth grade
- Compacted Integrated— seventh and eighth grade integrated math content completed in seventh grade and high school Mathematics I completed in eighth grade

Figure 1: Traditional and Integrated Course Pathway Models



Adapted from The Common Core Standards for Mathematics (NGA Center, & CCSSO, 2010b, p.4).

Differentiation is a well-intentioned accommodation and it may meet the needs of some advanced learners. However, a matter-of-fact denial of opportunities for acceleration for high-ability STEM students— based on the ideal of differentiation—is an unpromising justification.

Excuse 3—We already have enrichment

While other sections of this chapter focused on different aspects of an excuse in turn, the sections for Excuses 3 and 4 will address each excuse holistically. The same scholarship underlies the variety of forms each of these excuses can take.

"While in elementary and middle school, can't we meet the needs of our gifted STEM students through our gifted program, STEM club, and science fair?" As discussed in *Developing Math Talent* (Assouline & Lupkowski-Shoplik, 2011) the nature of many elementary and middle school gifted programs are pull-out programs, which create opportunities for extended learning or enrichment, for gifted learners. Many pull-out programs are structured so that students leave their regular classroom one or two times a week to attend a 45–60 minute enrichment class. The enrichment curriculum may be writing biographies, problem-solving activities, making a video on the school or town's history, preparing for a science fair, etc.

Among many criteria for identification for an enrichment program, there is generally a global cutoff score on a standardized test that a student must achieve to be considered for enrichment. For example, in one district's online handbook for their Extended Learning Program, the process of identification states that the student's *Measures of Academic Progress®* (MAP®) assessment reading and math scores must be at or above the 97th percentile. When using the *Cognitive Abilities Test™* (CogAT®) for identification of students for enrichment programs, cut-off scores are often used. Nonetheless, using such cut-off scores is not a recommended practice:

> ... extreme discrepancies in abilities are much more common among the most (and least) able students than among average ability children. Therefore, procedures for identifying academically talented students that either deliberately or inadvertently rely on a single composite score that averages across ability domains will exclude many children who reason well in particular symbol systems. Even students with strong ability to reason in two symbol systems can have scores in the third area that bring down their composite score. Consistently high scores across multiple domains is not a necessary feature of giftedness. True, those who exhibit high scores in all domains tested are very able. But they are not the only gifted students who warrant special attention. (Lohman, Gambrell, & Lakin, 2008, p. 279)

The practice of using composite cut-off scores for selection and offering only general enrichment programming for high-ability students means that enrichment programs differ from acceleration programs in some key goals for students with high STEM abilities. In fact, some students with exceptional abilities in STEM might be completely left out of their elementary school's gifted programs.

The ideological differences between enrichment and domain specific acceleration are reflected in the identification and selection process for enrichment programs, where selection criteria often target general ability. Ideological differences are also reflected in the curricula of enrichment and acceleration programs. Although enrichment-based programs provide many opportunities for gifted students, they are simply not structured to do what high-ability STEM students need to reach their highest potential, provide "systematic progression through challenging curriculum, which is part of a predetermined scope and sequence" (Assouline & Lupkowski-Shoplik, 2011, p. 4). Research has demonstrated that, to increase achievement of mathematically gifted students in a pull-out program, the program "should be subject specific and should address the need for more focused attention and continuous support for gifted mathematicians... through teachers specifically trained for this purpose" (Dimitriadis, 2012b, p. 257). While general enrichment programs promote valuable goals, they do not meet curricular needs of students with high abilities in mathematics and science.

Moreover, gifted programs based on cut-off scores are disadvantageous to high-potential minority students. Identification and selection for enrichment programming using pre-established cut scores fails to heed the recommendations of assessment experts to use assessment data in a more inclusive manner (Lohman et al., 2008). Inclusive talent identification processes use group specific norms (i.e., the top 10% of race group) to identify high-ability learners. This selection process takes a step towards supporting high-potential STEM students who lack the affordances of many high-achieving STEM students. Lohman asserts that "high-potential students display the aptitude to develop high levels of accomplishment offered by a particular class of instructional treatments," but they can only access these opportunities if inclusive identification procedures are employed (p. 334).

STEM clubs and science fairs, like general enrichment, provide students with valuable activities. But the majority of STEM clubs and science fairs are considered enrichment programs and also do not provide students with "systematic progression through challenging curriculum, which is part of a predetermined scope and sequence" (Assouline & Lupkowski-Shoplik, 2011, p. 4). Without accelerated programming that is grounded in inclusive identification, appropriate pacing, suitable challenge, and development of passion in STEM content, general enrichment fails to provide gifted STEM students with the experience and opportunities students who need to reach their highest potential. Without inclusive identification and supported acceleration, STEM fields are losing high potential and high-ability diverse students who report leaving postsecondary STEM majors because they lack appropriate coursework (Lee & Luykx, 2006). Moreover, in a working paper on STEM persistence between the first and second years of college (Griffith, 2010) when women and minority students earn higher grades in non-STEM courses during their first year of college, they are less likely to remain in their STEM major. This fact is particularly devastating when understood in conjunction with the knowledge that minority students are underrepresented in gifted education (U.S. Department of Education, 2008) and are, therefore, less likely to enroll in universities and declare STEM majors in the first place. While the enrichment activities of gifted programs and science fairs are valuable activities, they do not serve to advance the level of understanding of high-ability and high-potential STEM students.

Excuse 4—Bright, but not gifted enough for acceleration

The fourth excuse takes a variety of forms, but each of these forms has a similar message: "Some of our students are certainly bright, but because they are unable to work quickly or demonstrate mastery of the grade-level content, they don't need advanced programming." This argument rests on a few troubling premises. The first is perfectionism. Requiring students to solve problems quickly with 100% accuracy is an unreasonable expectation. This argument does not account for the fact that mastery of a subject and the ability to engage in more challenging material does not require speed and perfect accuracy. Gifted students in mathematics may make simple computation errors because: they are working quickly, they carry out computations in their heads to challenge themselves, or they lack routine computation skills even though they have abstract conceptual understanding (Assouline & Lupkowski-Shoplik, 2011).

Hewitt and Flett (1991) described three models of perfectionism, one of which is rooted in the perception that the people in the perfectionist's life have exceptionally high standards. This belief can have the negative consequence of resulting in anxiety. Holding standards of perfection for students to have access to opportunities for appropriate and necessary challenge has the potential to feed into unhealthy and unproductive perfectionism. Moreover, by requiring and expecting perfection from high-ability STEM students in order for them to qualify for challenges, we are fostering a harmful conception of intelligence, known as a fixed mindset. The implications of a fixed mindset view of intelligence were described by Dweck (2010):

> ...when students view intelligence as fixed, they tend to value looking smart above all else. They may sacrifice important opportunities to learn—even those that are important to their future academic success—if those opportunities require them to risk performing poorly or admitting deficiencies. Students with a growth mindset, on the other hand, view challenging work as an opportunity to learn and grow. ...Students with a fixed mindset do not like effort. They believe that if you have ability, everything should come naturally. They tell us that when they have to work hard, they feel dumb. Students with a growth mindset, in contrast, value effort; they realize that even geniuses have to work hard to develop their abilities and make their contributions. (pp. 16–17)

Promoting a growth mindset among our high-ability female and minority math and science students has an effect on their sense of belonging in STEM disciplines and STEM college courses (Hill, Corbett, & St Rose, 2010). Fostering a growth mindset promotes both achievement and persistence in STEM (Dweck, 2008). A growth mindset is critical for gifted STEM students and necessary for them to face the challenges required to develop to their fullest potential.

The second troubling premise that this excuse rests on is the argument that students who lack engagement in school are not deserving of academic challenges. There are significant implications for high-ability STEM students who lack engagement in school (e.g., students who do well on exams but do not complete their homework, who come from families who are not involved in school, who have high rates of absenteeism) and leaving these students unsupported and unchallenged is unethical. In a longitudinal study of 5,000 eighth-grade students from 24 middle schools across the country, the top performing middle school students who demonstrated low engagement had lower grade point averages, more failing grades, and more absenteeism than their peers who demonstrated moderate to high engagement. These students, despite their high ability, were less likely to graduate high school in four years and were less likely to enroll in college—only 30 percent of the high performing middle school students who demonstrated low engagement enrolled in college compared to 82 percent of equally high performing students who demonstrated high engagement (ACT, 2012; ACT, 2013; ACT, 2014).

High-ability students who see themselves as scientists and mathematicians are more likely to persist in STEM professions, regardless of self-efficacy in STEM courses (Andersen & Ward, 2013). Gifted STEM students are not seeing their STEM courses as related to tasks they will actually engage in with STEM careers; therefore they do not see their performance in these courses as related to their future successes as scientists and mathematicians. Lack of perceived relevance and a lack of challenge combine as reasons high-ability STEM students may be unmotivated to complete their homework assignments.

Barring gifted STEM students from opportunities for acceleration, based on their lack of engagement, does little to serve their need to be challenged to reach their potential. Appropriate challenge during the school day has the potential to increase students' engagement in school by alleviating boredom and passive participation in uninspiring activities. Instead of using lack of student engagement as an excuse to limit high-ability students' opportunities for acceleration, educators should consider what interventions they can implement to mitigate students' lack of engagement—such as acceleration and/or enrichment opportunities depending on students' abilities. Requiring perfection, speed, and homework compliance are unsupported excuses for denying high-ability students opportunities for acceleration.

Tools Used to Make and Support Decisions About STEM Acceleration

Over the past 60 years, research has abundantly documented the success of accelerating students demonstrating high ability in STEM subjects. Many resources based on this research have been developed to guide educators and parents in making appropriate decisions for specific students. Sample resources are listed below.

1. **The Talent Search Model** (e.g., Olszewski-Kubilius, this volume) provides detailed information about which students would benefit from acceleration in STEM. University-based talent search programs offer above-level testing to identify exceptionally talented students who may then participate in accelerated summer and online courses, as well as resources and support for students, families, and educators.
2. **The Diagnostic Testing->Prescriptive Instruction Model,** first developed by Julian Stanley (1978), provides a systematic method for identifying exceptionally talented students and providing content at an appropriate level

and pace for them. The talent search programs (above) use the DT->PI model as a basis for many of their courses. It was originally developed for use in accelerated math classes. See Assouline & Lupkowski-Shoplik (2011) for a detailed description of how schools use the DT->PI model.

3. I**DEAL Solutions for STEM Acceleration** is an online tool that assists parents and educators in making decisions about academically talented students. Teachers can gain research-supported recommendations regarding students' readiness for acceleration in STEM subjects. Recommendations are aligned with national standards. The goal is to assist school personnel with accelerated placement in STEM subjects so they can feel confident that their placement decisions are supported by research. For more information, see www.idealsolutionsstem.com.

4. **Belin-Blank in-school testing.** The Belin-Blank Center for Gifted Education at the University of Iowa (B-BC) offers in-school testing for academically talented students and helps school personnel to make placement decisions and develop appropriate educational options for students talented in specific subjects. School personnel select test dates that are convenient for them and administer appropriate above-level tests, based on recommendations provided by B-BC staff members. See www.belinblank.org/inschooltesting.

5. **The Iowa Algebra Aptitude Test** (Schoen & Ansley, 2005) is one example of a test used to answer the question, "Is a student ready for algebra?" This test is typically given to seventh or eighth graders, but it has also been used extensively with younger students who may be ready for math acceleration.

6. **Distance learning programs** provide talented students with the opportunity to study advanced courses without needing to leave their home schools. A number of online programs specialize in working with academically talented youth, including: the Iowa Online Advanced Placement Academy (IOAPA; www.belinblank.org/ioapa), Gifted Learning Links (http://www.ctd.northwestern.edu/program_type/online-programs), CTY Online (http://cty.jhu.edu/ctyonline/), and www.GiftedandTalented.com.

Conclusions and Recommendations

"The long-term prosperity of our Nation will increasingly rely on talented and motivated individuals who will comprise the vanguard of scientific and technological innovations; every student in America deserves the opportunity to achieve his or her full potential" (National Science Board, 2010, p. V). This chapter explored excuses used to deny high-ability STEM students opportunities—excuses rooted in naïve conceptions of gifted learners and acceleration—and presented the evidence that trumps the excuses. Gifted STEM students are a diverse group of learners whose academic needs vary. Adams et al. (2014, p. 59) declare that "preparation of high-level STEM students should not be rushed. Appropriate pacing for our top students should include not only acceleration, but also time for our top students to experience the joy of investigating rich concepts in depth and applying innovative scientific reasoning and justification to a variety of scientific, mathematical, engineering, and other problems."

Accelerative options are not rushing, they are a means of matching the curriculum to the needs of the student, and they should be thoughtfully selected from the menu of available options (types of acceleration are discussed in detail in Southern & Jones, this volume). Inclusive above-level testing through a Talent Search Model is a research-supported practice that provides educators with the necessary evidence to make informed recommendations concerning appropriate educational placements (Olszewski-Kubilius, this volume). Additionally, tools such as IDEAL Solutions for STEM Acceleration and the Diagnostic Testing -> Prescriptive Instruction model provide the research-based structure for making appropriate decisions that match the curriculum to students' abilities and achievements.

Developing STEM literacy is a worthy goal, but it does not address the intensity of study in STEM needed by top students to be mentally engaged and challenged by their STEM coursework. This is an important distinction—if exposure and literacy are the primary STEM educational goals, then acceleration is unnecessary. However, if developing STEM leadership by mentally engaging and challenging top students in STEM is also an educational goal, then acceleration is critical. Working towards such a goal requires the dedication of educators who make research-based decisions about acceleration—educators who are committed to creating appropriate opportunities for the intellectual nourishment and stimulation of high-ability STEM students, instead of excuses.

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State Residential STEM Schools: A Model for Accelerated Learning

Julia Link Roberts, The Center for Gifted Studies, Western Kentucky University, Bowling Green, Kentucky
Corey Alderdice, Arkansas School for Mathematics, Sciences, and the Arts, Hot Springs, Arkansas

Abstract

State residential STEM schools provide unique challenges and opportunities to participating students. The students leave home at a younger age than is typical, but they are immediately included in a community of other young, like-minded scholars. These schools provide formal and informal academic and social support systems as well as challenging high school and college coursework. In addition to providing access to high-level research opportunities, they offer connections between the schools and selected local resources. The authors review 16 STEM schools across the United States, report research findings, and discuss the pros and cons of attending one of these specialized state residential schools; additionally, they describe outreach programs and other ways in which the schools have an impact on both teachers and the broader population of gifted students in their home states.

Introduction

Acceleration can be accomplished in various formats, and two of those involve engaging advanced learners in opportunities earlier than their age-mates and beginning college before others of their age group. State residential schools for mathematics and science offer such opportunities for acceleration. They provide environments for young people who are ready for advanced learning and thrive when such accelerated coursework is offered whether it is with college courses, Advanced Placement courses, or other types of accelerated coursework.

Mission

Although the mission statements of the state residential schools vary, three shared goals are to enhance economic development for the state, provide advanced educational opportunities for students, and assist in teacher training and development to extend the benefits of the programs throughout the state. A stated, or perhaps unstated goal, is to stop the brain drain and keep outstanding young people from exiting the state. The economic development advantage comes from encouraging students who are ready for advanced educational opportunities in science, technology, engineering, and mathematics (STEM) disciplines to pursue those studies at an early age. The long-term goal is to have graduates of residential STEM high schools become emerging leaders in the state as they pursue STEM careers. In order to address the goal of providing advanced educational opportunities, the instructional and learning experiences at the state residential schools typically exceed the STEM curriculum that most high school day programs can offer.

In addition, legislators in a few states established outreach, teacher professional development, distance education, and content creation goals within the mission statements for their residential schools. For example, the strategic plan of the North Carolina School of Science and Mathematics extends the mission to provide academically talented students across North Carolina innovative educational opportunities in science, technology, engineering, and mathematics that prepare them to become leaders and innovators in STEM fields. The strategic plan also expands the school's commitment to improve educational opportunities for students and educators from across North Carolina through distance education and other extended programs.

Finn and Hockett (2012) seek to arrive at a working definition of the nation's "exam schools," or selective public high schools of which the residential math and science academies are a subset. Based on six criteria, the researchers identified 165 schools in the United States serving thousands of students each year with the following characteristics: is public in nature and predominately supported with tax dollars; facilitates a graduating 12th grade class; is a self-contained organization; offers accelerated curricula leading toward college readiness; utilizes selective admissions processes to assess students' academic potential and/or academic record; and, finally, observes that the process for selection is inherently competitive whereby more students display an interest in enrollment than the program can accommodate.

In order to identify this particular subset of schools, two additional criteria frame the following discussion by the efforts of 16 programs. Residential schools of mathematics and science must carry these two traits. First, by including a required residential component, programs are able to draw students from across their state in ways that local or regional magnet programs cannot while ensuring equity in access to all students. Second, these particular programs feature coursework, learning objectives, research, and other experiences directed toward the advanced study of science, technology, engineering, and mathematics.

Fifteen states have residential schools with a focus on mathematics and science. The first of these schools was the North Carolina School of Science and Mathematics, which opened in 1980. Other states with residential schools for talented students who are interested in pursuing careers in STEM are Alabama, Arkansas, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maine, Mississippi, Missouri, Oklahoma, South Carolina, and Texas. A few of the schools include the arts or humanities as their titles indicate - for example, the Indiana Academy of Science, Mathematics, and the Humanities and the Arkansas School for Mathematics, Sciences, and the Arts. The Louisiana School for Math, Science, and the Arts (see lsmsa.edu), the 16th school described in this chapter, offers STEM education in the context of a liberal arts education.

Table 1 explores the 16 institutions, the year the program opened to students, location (including affiliated universities), programmatic model, student enrollment for academic year 2013-14, and website URL. Enrollment in the programs ranges from relatively small (64 residential students at the Kansas Academy of Mathematics and Science) to quite sizable (680 students in 11th and 12th grades at the North Carolina School for Science and Mathematics).

Literature Review

Evaluation in the residential STEM schools is ongoing and important to directors of state residential STEM schools. However, results may be treated in a proprietary way "because these schools were created for specific purposes, often drawing top students from local school districts, and because the level of support for them within a specific state is fluid, sometimes becoming quite volatile" (Cross & Miller, 2007, p. 99). Research on residential STEM schools has been limited (Cross & Frazier, 2009; McBee & Fields, 2014; Pfeiffer, Overstreet, & Park, 2010; Roberts, 2007).

"Specialized science high schools offer an environment, both academic and social, in which interested students can explore the scientific world with both support and challenge" (Almarode, Subotnik, Crowe, Tai, Lee, & Nowlin, p. 309). Olszewski-Kubilius (2009) listed having intellectual peers, the opportunity for models of authentic scientific work with mentors and in internships, and the academic challenge as advantages of special STEM schools.

Coleman (2001) studied a state residential specialized high school and reported, "The findings suggest that it is possible to have a social system that differs from that found in most high schools" (p. 167). Coleman emphasized the importance of friendship, and he asserted that "the system of relationships among the students with all its complexity can be characterized by six terms: openness, fluidity, acceptance, busy, pressure, and shock and amazement" (p. 169).

McBee and Fields (2014) stated, "The research on social and emotional development for students attending special schools for the gifted has been loosely organized around two questions. The first is essentially the question of harm" (p. 627). Rollins and Cross (2014) found "no evidence to support the notion that the residential school experience was harmful to student psychological development" (p. 337).

Wai, Lubinski, Benbow, and Steiger's (2010) longitudinal study indicated that involvement in numerous advanced pre-collegiate learning opportunities was linked to later accomplishments in STEM. Almarode et al. (2014) found "49.8% of the selective STEM school graduates completed an undergraduate STEM degree" (p. 321) compared with 22.6% of all U.S. students entering college who complete a STEM undergraduate degree (National Science Board [NSB], 2012). They reported, "A student's feelings of intellectual capacity in high school and the stability of interest in STEM related areas are strongly and positively associated with their persistence and earning an undergraduate degree in STEM" (NSB, 2012, p. 327).

Table 1: Basic Information About State Residential STEM Schools

School	Opening Year	Location	Model	Residential Enrollment	Website
Alabama School of Mathmetics and Science	1991	Mobile, AL	Autonomous	240	www.asms.net
Arkansas School for Mathematics, Sciences and the Arts	1993	Hot Springs, AR	Autonomous	230	www.asmsa.org
Craft Academy for Excellence in Science and Mathematics	2015	Morehead State University, Morehead, Kentucky	University	60 in 2015 and 120 in 2016	www.moreheadstate.edu/craft-academy
The Gatton Academy of Mathematics and Science in Kentucky	2007	Western Kentucky University, Bowling Green, KY	University	126*	www.wku.edu/academy
Georgia Academy of Aviation, Mathematics, Engineering and Science	1997	Middle Georgia State College, Cochran, GA	Autonomous	83	www.mga.edu/games
Illinois Mathematics and Science Academy	1986	Aurora, IL	Autonomous	649	www.imsa.edu
The Indiana Academy for Science, Mathematics, and Humanities	1990	Ball State University, Muncie, IN	Autonomous	307	www.bsu.edu/academy
Kansas Academy of Mathematics and Science	2009	Fort Hays State University, Hays, KS	University	49	www.fhsu.edu/kams
Louisiana School for Math, Science and the Arts	1983	Northwestern State University, Natchitoches, LA	Autonomous	320	www.lsmsa.edu
Maine School of Science and Mathematics	1995	Limestone, ME	Autonomous	130	www.mssm.org
Mississippi School for Mathematics and Science	1987	Mississippi University for Women, Columbus, MS	Autonomous	231	www.themsms.org
Missouri Academy of Science, Mathematics and Computing	2000	Northwest Missouri State University, Maryville, MO	University	140	www.nwmissouri.edu/masmc/
North Carolina School of Science and Mathematics	1980	Durham, NC	Autonomous	680	www.ncssm.edu
Oklahoma School of Science and Mathematics	1990	Oklahoma City, OK	Autonomous	144	www.ossm.edu
South Carolina Governor's School for Science and Mathematics	1988	Hartsville, SC	Autonomous	220	www.scgssm.org
Texas Academy of Mathematics and Science	1988	University of North Texas, Denton, TX	University	374	tams.unt.edu

** 160 students are scheduled to be enrolled in 2016 and 200 students in 2017.*

Models for the Schools

Two different models are represented among the residential schools with a focus on mathematics and science. The first model is that of a free-standing school that offers a variety of advanced courses that may be high school or college level. The second model is a school that is located on a university campus, and students take only university courses. Both types of experiences offer ongoing opportunities to learn at more advanced levels than would available at most sending schools. A variation of the free-standing school is one that is located on or near a college or university campus.

Autonomous School Model

Most of the state residential schools with a STEM focus are schools with separate campuses. They offer a variety of accelerated coursework, including honors courses, Advanced Placement courses, college classes, and other specialized learning opportunities. These schools have their own faculties, who are content specialists, as well as their own campuses. Most of these schools offer their students opportunities to engage in extracurricular activities, research, and service learning.

University Model

State residential schools that are located on a university campus utilize the services and the facilities that are already available to university students. University faculty members teach the college classes in which students enroll, and students graduate from high school with a minimum of 60 hours of college credit. The only limits to learning are the range of courses at the university, a range that is usually quite broad. Students also have opportunities to participate in extracurricular activities, conduct research in laboratories with faculty members, and engage in service learning both on campus and beyond. Julian Stanley, an early and leading advocate for the creation of the residential STEM schools, extolled this alternative model first developed at the Texas Academy of Mathematics and Science on the campus of the University of North Texas as, "academically sounder, less politically vulnerable, and more cost-effective" (1991, p. 471).

A blend of these two models is the free-standing school located on or adjacent to a college or university. The program maintains its identity as a free-standing school, yet shares the advantages of having college classes readily available. Another advantage is that resources such as speakers, musical and educational events, as well as specialized facilities are readily available throughout a partnership with the STEM school and the university.

Facilities are varied across program type and location. During the initial period of program creation in the early 1980s and 1990s, states and host communities often made location decisions based on available facilities. The university model employed by six of the institutions reduces the need for constructing auxiliary services such as cafeterias, athletic facilities, and even operations plants. To that end, the shared resources between program and university create a more cost-effective model for deployment. Several independent institutions are located adjacent to university campuses and have varying degrees of connectivity, including Indiana (Ball State University), Mississippi (Mississippi Women's University), and Louisiana (Northwestern State University). This approach provides a greater level of autonomy to the school while still making some academic and cultural resources beyond the norm available. Truly independent campuses must shoulder the cost of all facilities.

Identification and Student Selection

A common observation of residential STEM schools is that they are primarily concentrated in the Midwestern and Southeastern regions of the United States. With fewer urban centers and considerable numbers of rural school districts and students, these academies present an opportunity to consolidate resources into a single venture to address the academic needs of highly motivated and gifted young people. To reach these populations, institutions employ a variety of professional recruiters, admissions counselors, and senior administrators to guide the admissions and enrollment management components of the programs. The overall success of the school relies on identifying, marketing, recruiting, selecting, and encouraging matriculation of talented and motivated students.

Students selected for the state schools have a high interest in engaging in the study of STEM subjects, and they have the opportunity to do so with age-mates who are also idea-mates. They are future professionals in STEM careers and offer great capacity for leadership in both the state and nation. These schools are open to students across the state. Some legislation specifies that a certain number of students must be selected annually from each region of the state, while others have no such restrictions yet strive for statewide representation.

Admissions and Recruitment

Though these schools are selective in nature, it is important to first note that a student must elect to participate in the selection process. While few barriers exist to applying for the residential program, it is critical to recognize that the residential program may not be the right opportunity for every gifted student. Jones (2009) categorizes this process as an imaginary admissions funnel of factors that steadily trim the potential pool of applicants from thousands of high school students each year. These factors include students' interest in having a "regular" or "normal" high school experience, comfort with their current academic trajectory, substantial opportunities at their local school, a fear of failure, limited athletic opportunities, and a host of other factors. Each applicant's family must consider how the offerings of the residential program contribute to the overall academic, social, emotional, and wellness needs of the student (Jones et al., 2002). The students who persist through the application process have not only articulated an interest but also demonstrated that they possess a combination of aptitude and potential for both academic and social success in these academies.

Finn and Hockett (2012) identify a constellation of both quantitative and qualitative methods that selective admissions public high schools use to generate the most appropriate pool of students for matriculation each year. The most strongly emphasized components of the application process include students' prior academic record, application essay responses, and teacher recommendations. The residential STEM academies universally required applicants to demonstrate academic and social maturity through analysis of transcripts, essay responses, and teacher recommendations (Jones, 2009, p. 483).

Compared to other selective programs, the residential schools greatly value national college entrance exams such as the ACT and SAT. The appropriateness of this requirement is twofold: first, students will be expected to excel academically in college-level or even collegiate environments in the case of the university-model programs; second, when selecting students from a wide array of schools, districts and geographic regions throughout the state, standard exams help to provide a comparative analysis of students' areas of strength and deficiency compared to their peers. Jarwan and Feldhusen (1993) found the SAT and ACT as well as the grade point average in high school courses taken prior to admission and selection to be the best indicators of a student's potential for success in a residential STEM school.

Educator Involvement in Identification and Selection

Jarwan and Feldhusen (1993) underscore the importance of involving teachers in the selection process. Their articulation of value focuses on involving residential faculty in order to leverage their experiences and expertise. This involvement can be a factor in reducing attrition and developing support plans for students. These faculty members are highly familiar with the ongoing expectations and needs of students once they enroll in the specialized schools.

Though dual enrollment between the sending school and the residential program is the less-often-seen approach, even the residential academies for which no relationship exists between present and former school note that their work serves as an extension of the students' previous schools. Admissions and enrollment management officers at the schools benefit greatly from active participation by local teachers, counselors, gifted and talented coordinators, and other staff in the identification and selection process.

Transitional students. The residential programs rely on local educators to provide challenging learning opportunities that prepare students for higher-level learning. In addition, academies leverage these local advocates as "talent scouts" who are acutely aware of students' academic and other needs, to promote specialized, residential schools. Local teachers can be thought of as "talent scouts" who are more attuned to a young person's potential for acceleration. These high-achievers can be categorized as transitional students. The transitional student is one who has already been exposed to advanced learning. This student has engaged in learning about STEM, and family members have been both financially and personally able to cultivate a passion for science. As a result of this environment, they have taken Advanced Placement or other honors classes as freshmen and sophomores; achieved exemplary ACT, SAT, and PSAT scores; and possess high levels of confidence in their abilities. Residential academies, in turn, create a learning environment that moves beyond the limited financial, staff, and content resources that prevent local schools from meeting their needs through a specialized, advanced curriculum and other co-curricular programs. By removing the learning ceiling, these schools create a transitional pathway to college-level learning and research experiences while providing students with a variety of supports for success. Pfeiffer et al. (2010) summarize the role of public state-supported residential academies as providing "a small and select group of America's 'best and brightest' high-school students with extensive and in-depth exposure to STEM content and learning and research opportunities" (p. 29).

Transformational students. While the transitional student population most closely aligns with the public conception of residential STEM schools, it is critical that school leadership, faculty, and admission officers cast a wider net in their pursuit of talent development. Though the student population shares many commonalities, they need not be homogeneous. Diversity in enrollment encompasses a variety of student populations, including low-income, ethnic, racial, and twice-exceptional students, as well as those from homes where English is not the primary language (Roberts, 2010). These students often experience an "opportunity gap" between resources that are readily available to them and the potential they possess to embrace vigorous learning. These young people are categorized as transformational students. Clearly, they pose both the most challenging yet intrinsically rewarding component of the schools' work. Bright and eager students who seek out or are directed toward these institutions from under-performing schools, low-income families, or ethnicities underrepresented in STEM may have lower ACT scores and limited prior coursework in STEM subjects, yet they possess both a passion and tenacity that makes school leadership believe they can achieve great things when given appropriate support. For these students, the goal of continual progress throughout formal education on the path toward professional careers in STEM has the potential to be life altering. However, these students require online summer learning and other orientation experiences that scaffold new information around their previous academic experiences, additional social-emotional support as they transition to a radically different learning space, and classroom support as they often face their first true academic challenges, as well as self-comparison to a new group of peers whom they may consider to be more talented or able.

Both the transitional and transformational students can be identified through the admissions process, which are similar for the 16 institutions. Most admissions procedures mirror that of undergraduate admissions. Emphasis is placed on ACT or SAT scores, grades in middle and early high school, responses to essay questions, letters of recommendation from teachers, as well as assessments of activities and leadership. Few institutions conduct formal interviews of candidates, though most programs host a series of open house or on-campus visits that allow potential students and their families to interact with current faculty, students, staff, parents, and alumni.

Why Apply and Why Not to Do So

Students elect to pursue admission to a residential school for mathematics, science, and technology for a variety of reasons. While advanced courses, research experiences, global travel, potential for college scholarships, and other factors may be of interest to both students and parents, one of the greatest draws for these precocious young adults is often the opportunity to both live and learn alongside peers who are not only age-mates but also idea-mates.

Leaving family members as well as established social networks that have been built over elementary, middle, and early high school is a point of concern for many prospective students (Jones, Fleming, Henderson, & Henderson, 2002). Desiring to participate in a prestigious program, experiencing unhappiness at home, and seeking academic rigor in any subject are other common traits among students enrolled at residential STEM schools. For students enrolling in the early college model, leaving behind the traditional concept of high school to study on a university campus can be daunting.

Dorsel and Wages (1993) assessed the impacts that enrollment in this boarding school environment has on gifted and talented children, their families, and students' educational advancement. Of particular note were feelings about missing important events in their home communities, chances of gaining acceptance to top colleges, and the students' overall development as both student and scholar. Parents, however, tend to remain positive. Cross and Frazier (2009) observed that students often categorize their decision as one of sacrifice. Students identified loss of a connection to family, connection to friends at home, driving privileges, part-time jobs, social status, church community, stability, awards, leisure time, non-academic pursuits, and even their youth as poignant factors in hesitancy to apply. To some extent, a student's decision is not so much a loss but a blending of one set of opportunities with another.

Students from rural schools with few other students ready for acceleration or students whose academic interests might be considered more niche, such as video games like Minecraft and League of Legends, comic books, or differential equations and quantum mechanics often find—in many cases for the first time—peers who share the same enthusiasm about learning, a love of a particular video game, interest in a specific genre of media, or any other pursuit. For parents, these connections made during campus visits are often a moment of relief where they begin to move from simply envisioning their child being away from home to picturing growing young adults finding themselves in a connected community. Relationships built by students with their peers are critical during the emotional peaks and valleys that accompany both adolescence and this academic experience:

> In the authors' experience, during serious events at residential academies, it became apparent that students were the most powerful group of counselors the school had. On most topics, the students seek out other students for advice and comfort. The

> interdependence initiated as a defense mechanism against the strain the academic rigor establishes a foundation for student acceptance, role modeling, and peer stewardship. (Cross & Frazier, 2009, p. 37)

Falls (2009) observed that learning communities in STEM must foster co-curricular activities to cultivate a sense of community among the participants. While the research is in the context of undergraduate students in a university environment, Falls noted that academic support and residential experiences are the underpinnings of community. Perhaps the most compelling trait of community is open acceptance. Students enrolled in a residential STEM school will encounter a variety of family structures, religious backgrounds, and cultural beliefs. Finding a group of peers who challenge each other to grow, champion their successes, celebrate their differences, and console each other in times of difficulty are not only important facets of the residential academies but also some of the non-academic traits that present the greatest draw to these programs.

Especially in the case of young women, dynamic and supportive relationships facilitated through intentional environments carry the potential to increase girls' persistence in studying STEM majors at the university level (Lee, 2002). With enrollment at most residential STEM schools, the focus is relatively balanced between male and female students (Jones, 2009); the choice to matriculate at such a school means inclusion into a sizable network of other young women who are equally interested and committed to further exploration of math and science. Having this support group of both peer and adult mentors can be a critical influence in overcoming stereotypes of women in STEM (Sayman, 2013).

Underrepresented Populations and Access to STEM

Beyond improving quality of learning and acceleration opportunities for students, residential schools of mathematics, science, and technology play active roles in the national discussion on increasing the number of young people from underrepresented populations who choose to pursue a STEM degree. President Obama's Council of Advisors on Science and Technology (PCAST, 2010) observed in a report:

> The underrepresentation of minority groups and women in STEM denies the Nation the full benefit of their talents and denies science and engineering the rich diversity of perspectives and inspiration that drive those fields. Diversity is essential to producing scientific innovation, and we cannot solve the STEM crisis the country faces without improving STEM achievement across gender and ethnic groups. Moreover, all students deserve the opportunity to experience the exciting and inspiring aspects of STEM. (p. 3)

A recent study from the U.S. Department of Education assessed the number of STEM degrees awarded at the undergraduate level between 2001 and 2009. In that period, only seven and a half percent of degrees granted were to Black students and seven percent to Hispanic undergraduates—a figure substantially lower than the groups' respective percentages of the U.S. population at 12.6 and 16.3 percent (National Center for Education Statistics, 2011).

While residential schools of mathematics, science, and technology cannot alone address these gaps, Almarode, Crowe, Subotnik, and Tai (2013) researched the impact of participation in a selective STEM school on students completing undergraduate degrees in a STEM major or concentration. Specific analysis of graduates of residential schools between 2004 and 2007 found that 51.7% of these alumni went on to earn an undergraduate degree in a STEM subject—a substantial increase over the 22.6% of the general U.S. undergraduate population earning the same type of degree. The findings also highlight that participation in a research experience, a hallmark of the residential school experience, nearly doubled the likelihood of female students continuing onward to earn a STEM degree.

Increasing access for students in underrepresented populations has the potential to create additional points of entry for students in STEM careers that often go unrealized. The American Psychological Association (2013) commissioned a study exploring the motivation of students attending such schools. The researchers found that respondents who reported a growth in interest in a STEM discipline during their high school experience—often a combination of research, peers, academic support, unique courses, and other traits unique to STEM-emphasis schools—were over five times more likely to earn an undergraduate degree in a STEM discipline.

Jones (2010) provides insight into the recent diversity of students enrolled in residential STEM schools and notes that the programs still have room for improvement in reaching these critical populations of talented and motivated students. While diversity is predominantly defined by ethnicity, institutions experience varying expectations regarding representation of gender, state geography, and socio-economic status of applicants.

While all statewide programs strive to achieve an acceptable level of geographic representation, the North Carolina School for Science and Mathematics is the only program held to a rigid geographic mandate of equal representation among the state's federal legislative districts. Cross and Dixon (1998) noted that services to talented students in rural areas often prove challenging due to proximity to programs, lack of choices, and school structures. Consolidating resources to provide accelerated experiences to a geographically diverse cohort of students is an effective approach to address the needs of students capable of achieving at the highest levels.

Enrollment among male and female students is generally balanced at the institutions. Much attention has been given to the lack of representation of women, minorities, and persons with disabilities serving as professionals in the STEM disciplines (NSF, 2013). Jones (2010) noted that enrollment gaps clearly exist for African-American and Hispanic students similar to national trends on interest in STEM subjects. Among African-American students, only the Alabama School of Mathematics and Science and Maine School of Science and Mathematics admitted a percentage of students on par with or greater than statewide representation. Many states experienced gaps in representation of greater than 20 percent. Programs fared better with representation of Hispanic students, though admitted Asian students at disproportionally higher levels.

Acceleration Options

Numerous acceleration options are available in the state residential schools. Stanley (1987) summarizes the need for advanced academic opportunities fueled by a cohort of peers equally positioned and enthusiastic about acceleration:

> Few mathematically and scientifically talented high school students are so fortunate. Most need an enhanced educational framework in which to learn mathematics and science far better than they could in nearly any high school. In addition, they need systematic, prolonged interaction with large numbers of their true intellectual peers. (p. 770)

Placement based on prior learning and advanced coursework allow for accelerated learning. Research, mentorships, and global experiences are other acceleration options often available at these residential STEM schools.

Placement Based on Prior Learning

One acceleration option involves placement in classes according to demonstrated knowledge and skills. For example, students are placed in trigonometry, precalculus, Calculus 1, Calculus 2, or discrete mathematics as their beginning mathematics class at the school, based on their prior coursework as well as performance on a placement test. Often the student's placement is a function of mathematics courses available at the sending high schools or access to summer programs or independent study.

Advanced Courses

The curriculum at these specialized high schools includes accelerated coursework, classes that are taken at a younger age than most students, and courses that would not be available at many high schools. Different schools offer various classes that may include College Board Advanced Placement, honors, or university courses. Dual credit courses provide credit that students may take with them as they enroll in a college or university as they complete their experience at the two- or three-year STEM school.

Research Opportunities

Engaging in research is one of the outstanding opportunities available to students at the specialized STEM schools. In most instances, the research projects represent an accelerative opportunity to work on advanced topics, well beyond those studied in the regular school program. In some schools, conducting research is required while in others it is an elective option. However, due to high interest in learning in STEM areas, a large percentage of students opt to engage in research.

Research skills may be built into the coursework, or research opportunities may be extracurricular. Faculty research grants may include students in the residential school in the project, like the Genome Project at The Gatton Academy. Research also may be supported during the summer between the students' junior and senior years.

Whether during the academic year or beyond, faculty who serve in the capacity of mentors become valuable teachers for students, and that role is often informal. The mentorship may be created around research, but it certainly is not limited in that way. Faculty may become mentors for students who are planning to pursue their area(s) of interest. Mentors also provide advice about career opportunities and college choices. Their guidance can be very influential.

As an accelerative option, students see first-hand the roles and expectations of a professional researcher. In addition to experiences in the lab, the support and guidance of a mentor is critical in gaining access to opportunities to present findings at national conference and symposia. Beyond acknowledgment of students' work, the portfolio of research opportunities bridges acceleration for both academic and professional roles.

Often, students at the STEM residential schools enter their research results in the Siemens Competition in Math, Science and Technology or the Intel Science Talent Search, the two premier STEM competitions for high school students. Others have opportunities to publish their research results, and some present at state, regional, and national conferences.

Learning Communities: Support for Higher-level Learning and Personal Development

The residential nature of these schools means that institutions take on a considerable number of obstacles and opportunities when engaging the whole student beyond the classroom. Programs must construct robust support staffs of administrators, residence hall supervisors, activities coordinators, leadership development staff, social-emotional counselors, and residential mentors who shepherd the living-and-learning component of the experience.

Because parents' consent for students to enroll in institutions that are often hours away from their local community, there are rightful expectations that students will be guided and supported by a caring and attentive staff with specialized training in the needs of accelerated students. A considerable component of public investment in residential STEM schools is directed to the housing, board, experiential learning, activities, and staff associated with the on-campus experience. The high expectations and expenditures underscore the critical role of the residential component for student development and success.

Service Learning

Programs also seek to foster a relationship between their institutions and their local communities. In developing leadership skills and empathy in students, most schools encourage and many require students to complete certain service requirements. In some cases, these experiences are focused inward through work-service in campus offices, the cafeteria, or with the janitorial staff. In other instances, community service programs focus on tutoring younger students, community engagement, or broader platform organizations such as Habitat for Humanity, the American Cancer Society, and United Way.

Cofer (1996) observed that service learning with specific connections to the study of science among high school students resulted in increased enjoyment of science classes. Wyss and Tai (2012) explored the role of service learning in inspiring students to pursue STEM degrees. While their findings were inconclusive, the researchers do note that service learning is an important resource in exploring potential career options. Wagner and Compton, in their book *Creating Innovators* (2012), explore a selection of students who bridge problem-solving, intrinsic motivation, and interdisciplinary learning with STEM in pursuit of social entrepreneurship. Though Wagner does not reference STEM schools, many of the most cogent narratives the book explores reflect students who utilize STEM to address global issues. The innate desire to cure disease, design solutions, and apply technologies for the greater good are common goals of residential STEM students and connect academic, research, and service learning within the programs.

Trade-Offs

Leaders of the residential STEM schools are aware that students contemplate a series of trade-offs in accepting offers of admission. Staff members responsible for student engagement develop a variety of academic, social, emotional, and leadership development programs that are meant to cultivate well-rounded students. Traditional clubs and organizations like Beta Club, Key Club, National Honor Society, Future Business Leaders of America, and the National Speech and Debate Association are common activities that are co-curricular or complementary to school values. Though not universal, the majority of the schools field athletic teams in a variety of seasons as part of the traditional high school experience, while also recognizing the importance of sports to wellness, physical fitness, teamwork, and leadership development.

Academic competitions such as Science Olympiad, FIRST Robotics, and the National Science Bowl are built on core learning while serving many of the same aims as sports. It is not uncommon for these pursuits to rival or exceed the enthusiasm by the student body, with spirit weeks, pep rallies, recognition banners, or other totems reserved for state football and basketball championships in traditional public schools.

Guest lectures and site visits to centers of business and industry also create tethers to future professions as well as internship opportunities. In recent years, "Tech Treks" that take students to Silicon Valley provide a chance to see the applications of mathematics, computer programming, and other forms of cutting-edge science in the real world while connecting current students at residential STEM schools to alumni working in these fields who are now emerging and even leading professionals.

Both within the residence hall and beyond, staff at residential academies understand that a successful experience is tied to more than just the quality of the academic and classroom offerings. A successful two- or three-year experience at a residential, state, STEM academy rests on a robust academic experience as well as a safe living and learning environment with idea-mates and appropriately challenging academic opportunities threaded throughout students' time at the school.

Research and Collaborations

While research and inquiry are important academic pursuits for students enrolled at residential schools of science and mathematics, collaborations with other groups and agencies beyond university campuses and researchers promote real-world learning.

The Gatton Academy of Mathematics and Science in Kentucky has worked to establish connections between STEM and global critical languages. The STEM+Mandarin program was developed in partnership with The Chinese Flagship program, Confucius Institute, and Department of Modern Languages at Western Kentucky University. What began as students completing high school graduation requirements in a foreign language not commonly available to Kentucky students quickly grew to become a unique opportunity for Gatton Academy's students.

Illustrating the program's most accelerated approach, students pursue study of Mandarin Chinese at double the pace of a traditional university semester. A combination of additional recitation sections, specialized support, and cultural discussions help place students on a path to high proficiency in the language by the time they complete an undergraduate degree. Because of the substantial academic commitment involved in the courses, students are able to substitute the courses for up to two of the STEM electives required in the core curriculum. While not a route for the majority of students, young people with an interest in international research projects, global research and development, or social entrepreneurship have found the opportunity to be a meaningful extension of their core interest in science.

The preparation students receive has also created opportunities for study abroad, internships, and other language immersion programs. Several Gatton Academy students have been invited to participate in the National Security Language Initiative for Youth (NSLI-Y) program. This six-week summer immersion program combines language learning with cultural exchanges to introduce students to a new language or accelerate students with prior experience in strategic needs languages. The success of the Mandarin program at the Gatton Academy has led to the creation of a STEM+Arabic cognate for students interested in that language.

Leveraging community partnerships

The Arkansas School for Mathematics, Sciences and the Arts (ASMSA) leverages an uncommon resource that is literally in the program's backyard to promote partnership with government programs. As an urban park, Hot Springs National Park envelops the downtown Hot Springs community where the school is located. A formal cooperative agreement between ASMSA and the United States Department of the Interior was signed in 2013 that allows the program to share resources, technology, and data.

The agreement is to facilitate the involvement of ASMSA students in activities and research related to the natural and cultural resources of Hot Springs National Park. ASMSA, as a statewide residential school, plans to use the program to increase engagement of its faculty and students in park-sponsored research, educational, and outdoor recreational activities. For the National Park Service, involving more youth and young adults in the care and enhancement of public resources serves to stimulate the Park's public purpose of education, job training, development of responsible citizenship, and productive community involvement.

The National Park Service and ASMSA work in collaboration to provide interpretation and educational programs for students, faculty, and staff through the "Healthy Parks, Healthy People" initiative. The NPS also works with geoscience faculty to identify and co-advise research projects for students on Park lands. Finally, the collaboration creates opportunities for environmental and cultural stewardship of this natural resource that is central to the community's history and identity. The partnership is a point of pride for the school and leverages a resource not immediately available to peer institutions.

As part of efforts to promote entrepreneurial thought and activity among its students, the Illinois Mathematics and Science Academy (IMSA) has worked with 1871, a Chicago-based digital startup hub and co-working space, to create a space for IMSA students to develop the next generation of innovations. IMSA has a rich history of alumni pursuing entrepreneurial endeavors, with graduates involved in the founding of YouTube, PayPal, Yelp, SparkNotes, and OKCupid.

IMSA's Talent program focuses on student entrepreneurship in a context of STEM. TALENT 2.0 provides experiences to students in a combination of on-campus, off-campus, and digital learning to promote entrepreneurial experiences by IMSA and other students. The program seeks to take students through the process of idea generation to startup company. TALENT 2.0 students participate in pitch events, startup weekends and other activities alongside other teens and adults. Summer programs for students have focused on condensing the first year experience of a startup into a single week.

The goal of these partnerships is to assist these young adults in beginning to see themselves not just as students but also as emerging participants in global dialogues, public agencies, and the business community. Accelerated learning in applied contexts presents an opportunity for students to collaborate with adults, produce meaningful outcomes, and contribute as full participants in real-world learning. Partnering organizations and agencies view collaboration with residential academics, students, and staff as access points to pools for talent development and community engagement. Both groups see substantial benefits to providing spaces and opportunities for these young people to excel.

Statewide Impact

While the term "residential STEM schools" acknowledges that the primary mission of the 16 peer institutions is to provide experiences within a physical community of peers, the majority of institutions have taken active steps to develop a wide portfolio of outreach programs that are intended to promote best practices developed by faculty and staff, engage younger populations of students, and develop a stronger and more diverse admissions pipeline while benefitting populations across the entirety of their state.

Marshall (2011) reflected on the work of the National Consortium of Secondary STEM Schools, formerly the National Consortium of Specialized Secondary Schools of Mathematics, Science, and Technology. Marshall, who served as the founding president of the Illinois Mathematics and Science Academy, noted the work of NCSSS and its member schools, of which the majority of the residential academies are actively involved, is to play a critical role in the transformation of STEM education through sharing new designs for teaching and learning.

Among these goals are personalized and experiential learning; concept-centered and integrative curriculum; inquiry-based and problem-centered instruction; and generative, multidimensional, authentic, and performance-based assessments (pp. 2-3). While it is essential for the residential STEM schools to demonstrate these traits in their practice, providing experiences for students, educators, administrators, and parents are also worthwhile tools toward ensuring the widest possible variety of student populations have access to appropriate opportunities for acceleration beyond the residential experiences.

Specifically, the Illinois Mathematics and Science Academy maintains three field offices that offer a novel example of efforts to improve the quality of learning beyond the residential students served by the institution. In addition to a portfolio of professional development programs for educators at their Aurora campus, IMSA facilitates field offices in other areas of the state: Chicago, Metro East in Belleville, and the Rock Island Region. With residential enrollment primarily consisting of students from the central and northern regions of Illinois, the field offices ensure the academy is achieving its mission to improve education throughout the state. Staff members within the field offices deliver enrichment programs for students as well as additional professional development experiences for interested teachers and administrators. A goal of the offices is to promote collaboration with local organizations to offer joint mathematics and science programs. Whereas the residential program at IMSA provides an immediate impact to students enrolled, the benefit to the state through hundreds of teachers and classrooms carries value-added benefits.

IMSA's online description of the role of its field offices is a cogent distillation of the guiding principles and rationale for outreach programs at residential STEM schools.

- Deliver professional development in mathematics and science instruction that focuses on inquiry and discovery
- Provide out-of-school STEM programs for students
- Build sustaining relationships with community constituents and stakeholders
- Work to coordinate mathematics and science programs with local organizations (IMSA Field Offices section, par. 2)

While the majority of the residential STEM schools have developed outreach programs throughout their histories, the Gatton Academy of Mathematics and Science in Kentucky represents a novel inversion of the trend. The Center for Gifted Studies at Western Kentucky University has provided programs for gifted and talented students, parents, and educators for more than three decades. Beginning in the late 1990s and culminating in the Gatton Academy's first cohort of students in 2007, leadership of The Center alongside public supporters and members of the WKU community were the primary advocates for the creation of a school in that state. The ongoing work of The Center for Gifted Studies, an engaged pool of prospective students who had participated in enrichment and summer programs, and a campus community where interest in gifted and talented education was well known helped to build legislative support and a create a critical mass toward the state's investment in an academy. As the program developed over the last decade, The Center continues to function in a complementary role by sharing leadership, office space, and other resources to promote opportunities on both a statewide and national scale.

The Maine School for Science and Mathematics sponsors a one-week professional development experience for teachers in their state called the S.T.E.M. Educators' Camp. The core philosophy of the low-cost event is sharing talents, perspectives, and best practices with peers—an ideal that mirrors the way the program engages students in the residential experience. The program serves a dual purpose of building a network of advocacy for the importance of STEM as both a discipline and priority for the state.

Each of these examples notes that teacher training, professional development, and peer engagement offer the most direct route to increasing interest and achievement in a greater population of students. The residential schools expend exceptional effort to recruit highly qualified and dynamic faculty. Leveraging these staff members as public and professional ambassadors for the program helps to ensure that appropriate practices in STEM education and accelerated learning can be mapped to other traditional gifted student populations.

Distance and Digital Learning

A commonality among the residential STEM schools is their geographic concentration in the southern and midwestern regions of the U.S. With high percentages of students living in rural areas, the states that are home to such schools have often leveraged the resources and talents of these campuses to further partner with local districts throughout their states to provide supplemental accelerated opportunities for motivated students.

The decision to offer distance and digital learning courses is not only a matter of service but also a practical realization regarding the residential experience at the core of these schools. The number of applications each year for residential programs from eager students tends to outstrip available spaces for matriculation. To bridge interest with available opportunities, several schools have turned to distance and digital learning as a means of providing challenging opportunities to students not admitted, who are ready for acceleration but are not yet at the grade or age to apply, or for whom the residential experience is not appropriate for their needs or those of their families.

Cross and Burney (2005) observed that school counselors are often mindful of students' readiness and needs for acceleration and understanding that the residential STEM schools offer a "life-changing opportunity for high-ability students from isolated areas, limited circumstances, or both" (p. 153). However, Wallace (2005) noted that distance education efforts share many of the traits for accelerated learning for highly able students in the residential experiences. Beyond advanced coursework in a wide array of topics and content areas, distance education offers flexibility of study, instruction and guidance from geographically diverse faculty, and peer interactions with students from across both their state and the broader world. Wallace further asserted that these programs can better align with gifted students' desire to pursue academic challenges and rigor when they are not forced to move at a singular or predetermined pace.

When the residential program's full array of expectations and requirements may not be appropriate, online learning can provide a similar "learning community" in which the students, connected through technology, embrace their role as a learner alongside other motivated peers while also enjoying connections to a variety of adults as "significant others" who contribute to learning as facilitator, critical friend, mentor, interpreter, and discussant (McKinnon & Nolan, 1999).

As opportunities for acceleration, which are frequently courses on-par with the advanced coursework offered to residential students, instructors maintain high expectations for their digital learners. Wilson, Litle, Coleman and Gallagher (1997), who were instrumental in early programs at the North Carolina School for Science and Mathematics, observed four characteristics common among students who sought opportunities for acceleration through distance learning: appropriate prior study; a desire to learn in a digital format; the skills to work independently; and a willingness to persist when either the content, delivery format, or other factors proved difficult.

In 2008, the North Carolina School for Science and Mathematics established NCSSM Online as a means of expanding access to the opportunities of the residential program in a hybrid-learning environment. NCSSM categorizes the experience as "A learning community of highly talented students in

North Carolina that enriches their experience while attending their local high school." This large-scale effort was preceded by nearly two decades of experience in offering accelerated coursework through distance education. Students generally take between one and two courses each semester taught by NCSSM faculty through a blended learning environment. In addition to classroom assignments, students must attend an evening web-based videoconference to interact with the teacher and peers. Many courses also have a required weekend component where students visit the NCSSM campus for combined instruction and socialization with peers.

Beyond the core academic experience, many of NCSSM's signature experiences that tie advanced STEM studies to real-world research experiences are also available to students in the online cohort. Students may apply for consideration to the Summer Research and Leadership Program, Summer Accelerator Program, or Summer Research and Internship Programs. Combined with unique electives that go beyond the core curriculum, NCSSM Online students enjoy many of the benefits of their residential peers while maintaining their enrollment in community schools in 75 of 100 counties throughout North Carolina. Because the residential commitment is a considerable challenge for some students—as well as their parents who play a key role in the decision to matriculate—the online program serves as an acceptable bridge for acceleration that prevents families from making an all-or-nothing decision to address students' academic, social, and emotional needs.

The Louisiana School for Math, Science, and the Arts (LSMSA) plays a comprehensive role in bridging opportunity gaps in its host state. The school now serves as one of several providers through the "Course Choice" program. A variety of groups serve as educational providers under the program, which was envisioned by Gov. Bobby Jindal and the Louisiana Department of Education as a component of a reform package under Act 2. Though the list of providers includes national providers, Louisiana universities, and other trade-based entities, LSMSA is leveraging its historic identity in the state and experience in extended programs to address students' needs beyond the residential school.

LSMSA has a rich history of contributions to distance learning over the last three decades. The school began offering tele-learning coursework in the 1980s and later provided opportunities in collaboration with the Department of Education's Louisiana Virtual School. This updated approach seeks to blend greater access to students in underperforming districts as well as building on local curricula with expanded offerings or unavailable and advanced electives.

Though the platform is asynchronous, with a goal of allowing students access to coursework anywhere at any time of the day, the program encourages students to commit specific periods of study to the class, which includes prepared lessons, assignments, group discussions, and other components to demonstrate sufficient mastery of content. The LSMSA Virtual School offers a broader portfolio of courses than other STEM school peers. In addition to core courses and Advanced Placement classes, the school leverages its Arts mission with topical classes such as Introduction to Social Media, Social Problems, Introduction to Culinary Arts, and Digital Photography.

For the Arkansas School for Mathematics, Sciences, and the Arts, a central tenet of the institution's goals in digital learning focuses on developing content knowledge and rigorous preparation for the school's residential experience while also providing supplemental experiences to students for whom the residential experience is not the right fit. ASMSA's STEM Pathways program, offered through a collaborative grant from the Arkansas Department of Education, provides Advanced Placement and pre-AP coursework in biology, chemistry, physics, mathematics, and computer science. By offering courses targeted to high school freshmen and sophomores, ASMSA seeks to establish a tangible connection to students interested in advanced or differentiated opportunities while setting the stage for later interest and success in the residential program. To achieve this end, the Pathways program offers residential lab weekends once per month, online peer mentoring in the evenings guided by top-performing residential students, and site visits from ASMSA faculty in partnering districts.

ASMSA's expanded Arts mission also has supported the Global Languages and Shared Societies (GLASS) Initiative, which was created to address the ongoing shortage of language learning opportunities in the wake of the state's divestment in foreign language study over the past decade. This decline in students' study of languages is attributed to the removal of the state's lottery-funded scholarship program which no longer requires two credits of language learning. When faced with an ongoing shortage of available teachers in foreign languages, many districts chose to pursue distance learning through ASMSA and other partnering organizations in the state's Distance Learning Consortium. The program now offers coursework in Spanish, French, and Mandarin Chinese and hopes to expand to include Arabic, Russian, and Japanese, which are not offered locally by any Arkansas district.

The South Carolina Governor's School for Science and Mathematics launched a virtual engineering program in 2009 called Accelerate. SCSSM partnered with a cohort of sophomores in a variety of districts with a goal of engaging highly motivated and high-achieving students through a three-year program that mirrors the curriculum that leads to the accelerated completion of first-year university coursework in engineering. Students who successfully complete the experience earn up to 32 college credit hours. Classes include mathematics courses culminating in Multivariate Calculus, chemistry, computer science, engineering, composition, and an honors-level senior project with the goals of interdisciplinary and real-world learning.

The program, a collaborative effort between SCGSSM and the state's four engineering colleges, seeks to address a critical shortage of engineers in the state. This goal largely mirrors the intent of the school's peer institutions to address skill gaps in the workforce. The curriculum is offered through synchronous virtual instruction throughout the school year as well as weekend projects and summer research experiences. The Accelerate program also builds on a core ethos of the school's mission, which includes active collaboration with business and industry. Initial partners in the project such as The Boeing Company, Duke Energy Corporation, Nucor Steel, IEEE Foundation General Fund, and Westinghouse Electric Company have offered corporate support to launch the initiative.

The glimpses into these four institution's efforts underscore two consistent principles of how digital learning and distance education complement the residential schools' legislative mission while providing opportunities to other students interested in accelerated learning.

Even with a focused potential audience, limited seats for admission and highly competitive pools of applicants often mean that students who would benefit from these programs are passed over. With admissions cohorts ranging from 60 to nearly 300 students for the residential experience, residential STEM schools seek to find additional ways to justify public investment in the programs while ensuring greater access to dynamic and engaging learning opportunities. With distance learning opportunities that serve thousands instead of hundreds of students, schools have the ability to effectively scale their practices. Because students enrolled in the digital learning experiences do not always have the same overall academic profile as their residential counterparts, institutions have the opportunity to reflect on how their experiences can be mapped to diverse audiences and learning environments.

Finally, these programs allow STEM schools to pioneer new and innovative methods of student engagement beyond traditional physical classrooms. Programs like the ASMSA GLASS Initiative and SCGSSM Accelerate do not have direct counterparts in the residential program and demonstrate that populations beyond the residential students are of considerable value and interest to faculty, administrators, and public stakeholders of the program. These digital learning initiatives also underscore the growing importance of blending learning environments that reflect an ever-evolving landscape of how best to reach students and promote learning.

Concluding Remarks

State STEM schools provide opportunities for advanced students with talent and interest in science, technology, engineering, and mathematics to thrive as learning ceilings are removed. These residential schools offer opportunities for students to accelerate in their academics and to enjoy a living-learning community that encourages students to learn at advanced levels that are atypical for their age-mates. They participate in mentoring, research, service learning, and global experiences that are more usual for college students than for high school students. They learn at these high levels with others who are also talented and interested in STEM studies.

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Early Entrance to College: Academic, Social, and Emotional Considerations

Linda E. Brody and Michelle C. Muratori
Johns Hopkins University, Baltimore, Maryland

Abstract

As one of many accelerative options available today, early college entrance provides some young students who are ready for the demands of college early with the unique opportunity to move forward in their educational trajectories one, two, or even more years sooner than most of their age peers. Early college entrance has increased in popularity among high school students in search of greater challenge, as evidenced by the upsurge in early college entrance programs in the United States. This chapter provides an historical overview of early college entrance and describes the widely varying program models being implemented today. Research findings highlighting both academic and social/emotional outcomes of early entrants and the implications of this research for educators are presented.

Introduction

Students who are eager for greater academic challenge than their high schools provide may consider early college entrance as a way to access the advanced courses and stimulating academic environment that a college or university can provide. For many, the image of an early college entrant may be of a very young-looking student with no prior college experience heading to college with other students who are considerably older and more knowledgeable, an image that provokes much concern about the student's academic, social, and emotional readiness to handle the college environment. While this scenario may have been the case for many early college entrants in the past, it is much less true today.

Due to the widespread availability of other accelerative options for high school students, such as AP (Advanced Placement) and IB (International Baccalaureate) courses, academic summer programs, and online options, many students who enter college at younger-than-typical ages are likely to have already completed considerable advanced coursework and may have been in classes with older students while still in high school. Furthermore, those who accelerated in grade placement earlier in their educational careers may naturally be graduating from high school at young ages so that college is the next obvious step for them, while those leaving high school without graduating may be enrolling in one of the special early college entrance programs that have been specifically developed to meet the academic, social, and emotional needs of young college students. Other students, perhaps not ready to enroll full-time in college, may be dually enrolling in high school and college, thus continuing to have the support of their family and school community while also gaining access to greater academic challenge at a local college or university. The availability of such diverse options allows students to consider early college entrance in a way that meets their individual needs and makes it a much less radical choice today than perhaps it was in the past.

Historical Overview of Early College Entrance in the United States

Early in America's history, many students were educated at home by tutors or in other settings (e.g., one-room schools) that allowed them to learn at their own pace. Those fortunate to attend college were often able to enter when they were academically ready to pass any required entrance examinations, with the most precocious of them enrolling at young ages. As schools were created that grouped students together on the basis of chronological age, such individualized progress was less common, though whole-grade acceleration was sometimes recommended for advanced students, leading them to enter college sooner than they might have without skipping grades. Studies such as those by Gray (1930), Keys (1938), Terman and Oden (1947), and Cronbach (1996) all attest to the presence of relatively young students attending America's colleges in the past. As enrichment programs were gradually established to serve gifted students, however, acceleration was less favored, resulting in fewer students entering college at younger-than-typical ages (Brody & Stanley, 1991; Daurio, 1979).

Exceptions occurred during times in our history when young college entrants were recruited to meet particular societal needs. For example, universities were encouraged to accept younger students during World War II so that they could earn degrees before being drafted for military service. Similarly, around the time of the Korean War, the Ford Foundation provided scholarship support for students under age $16^{1}/_{2}$ to enroll full-time at any of 12 colleges or universities for two years before entering the military (Fund for the Advancement of Education, 1953). After its financial support for the university-based early entrance programs ended, the Ford Foundation turned its efforts to helping establish the College Board AP program, and also funded a study of the newly developing IB program. Today, the widespread availability of AP and IB coursework offers students access to college-level coursework within their high schools. For some students, these courses serve as a viable alternative to entering college early, while those who decide to enter college early may still benefit from having had prior exposure to content at the AP and/or IB level (Brody, Assouline, & Stanley, 1990; Curry, MacDonald, & Morgan, 1999).

The Study of Mathematically Precocious Youth (SMPY)

In 1969, when Johns Hopkins Professor Julian Stanley met 13-year-old Joe Bates, the AP and IB programs were still not readily available, nor were other accelerative options typically offered to students with advanced academic abilities and needs. Although Joe had scored above the mean of graduating high school seniors on the SAT and other college entrance exams, the high school he was scheduled to attend, as well as other public and private schools in the Baltimore area, proved unable and/or unwilling to accommodate his need for accelerated content. Consequently, Stanley intervened to help him enroll full-time at Johns Hopkins University, a very radical move at the time. After Joe and several other students who followed in his footsteps experienced extraordinary success as young college students, Stanley wondered if there were other brilliant students whose potential might be limited by unchallenging instructional programs during their middle and high school years. He established SMPY at Johns Hopkins to find such students and develop ways to help them achieve their full potential. Soon, large numbers of students with advanced mathematical reasoning abilities were being identified through SMPY's talent searches (Stanley, 1996; Stanley, 2005).

With the support of SMPY, quite a few students opted for early college entrance as a strategy to serve their need for advanced coursework, and considerable research was done to evaluate their performance (e.g., Stanley & Benbow, 1983). Although the experiences of these students tended to be quite positive, the SMPY staff knew that radical acceleration into college would not be optimal, or even possible, for most of the students that were being identified. Consequently, they experimented with other strategies to serve mathematically talented students, such as fast-paced accelerated math and science classes, and established residential academic summer programs to bring students together on college campuses. The value and importance of placing advanced students in environments where they could interact with intellectual peers was definitely emphasized as a critical component in SMPY's recommendations, and continues to be a focus of the talent search programs today (Brody & Stanley, 2005; Stanley, 2005).

Early Entrance Programs

While there was evidence that most of the SMPY students who entered college early as individual students excelled (e.g., Brody, Lupkowski, & Stanley, 1988), concerns persisted among the staff about those who were less prepared for college and who encountered academic, social, and/or emotional difficulties. Thus, Stanley became intrigued with the concept of early college entrance programs, an option that could provide able students with access to age peers who are also intellectual peers, as well as to advanced courses. He encouraged the creation of such programs (Stanley, 1991), and assisted in the development of the Texas Academy of Mathematics and Science at the University of North Texas, the Advanced Academy of Georgia at the University of West Georgia, and the National Academy of Arts, Sciences, and Engineering at the University of Iowa.

Early college entrance programs actually have a fairly long history, with the first systematic early entrance program being established at the University of Chicago in 1937. In the 1950s, as noted previously, the Ford Foundation provided financial support to establish early college entrance programs at 12 colleges and universities, and the one at Shimer College continues today. In 1966, Simon's Rock College was founded, initially as a women's college that combined the last two years of high school with the first two years of college. Over time, it became co-ed, eliminated its high school component so that students remaining for four years could earn a bachelor's degree, and affiliated with Bard College, a structure it retains today. It remains the only four-year residential early college program housed on its own campus.

In 1977, the Early Entrance Program at the University of Washington was established, a fairly radical program that admits students prior to age 15 and that continues today. Its creation was influenced by news about the success of radical accelerants at Johns Hopkins (Robinson & Robinson, 1982), but it was designed to include many safeguards and supports to help ensure the early entrants' success. The program administrators have since also established the UW Academy, a residential program for students enrolling at the University of Washington after 10th grade, thus creating an opportunity for students opting to enter the university early but a bit later in their high school career than the Early Entrance Program requires.

Spurred by increased interest among educators to offer more opportunities for academically advanced students, ongoing concerns that young college students might need more academic, social, and emotional support than other students as they transition to college, and positive reports about the success of students enrolled in some of the early programs, the 1980s and 1990s brought renewed interest in establishing additional early college programs (Boothe, Sethna, Stanley, & Colgate, 1999). Typically designed for students leaving high school prior to graduation, students enroll in these programs in cohorts, thus gaining a peer group as well as considerable programmatic support to help them succeed. Today, early college entrance programs can be found at a variety of colleges and universities around the country.

Though they share similar goals related to enhancing the academic performance and social and emotional adjustment of early college entrants, the nature of early college entrance programs can vary significantly. For example, some are intended for commuting students (e.g., the Early Entrance Program at California State University, Los Angeles), while others are residential (e.g., the Missouri Academy of Science, Mathematics and Computing at Northwest Missouri State University, where the living arrangements enhance the sense of a community of peers). Some accept students at a much younger age (e.g., the Early Entrance Program at the University of Washington) than others (e.g., the Resident Honors Program at the University of Southern California). They vary in cost (e.g., a private institution such as Simon's Rock College can be expensive unless the student is awarded a scholarship, while a state-funded program such as the Advanced Academy of Georgia is less costly, especially for those who qualify for in-state tuition, and the Bard High School Early College programs, which are partnerships between Bard College and public school systems in several U.S. cities, are free of charge to local residents). The size of student enrollment in the early college programs also differs (e.g., the Texas Academy of Mathematics and Science enrolls about 200 rising high school juniors per year, while the National Academy of Arts, Sciences, and Engineering only accepts about 10-12 students in a typical class), as well as the campus environment (e.g., Simon's Rock College utilizes a whole campus, while most residential early college programs offer separate housing but are located on the campus of a larger college or university). Some programs are open to any qualified applicant, while others have restrictions (e.g., the Program for the Exceptionally Gifted and the Early College Academy at Mary Baldwin College are for females only; the Texas Academy of Mathematics and Science is restricted to Texas residents).

Programmatic components can vary in important ways as well. Whereas certain programs are noted for their strengths in mathematics and science (e.g., the Massachusetts Academy of Mathematics and Science, which is affiliated with Worcester Polytechnic Institute), others emphasize the humanities (e.g., the Texas Academy of Leadership in the Humanities at Lamar University) or have a broad liberal arts focus (e.g., the Resident Honors Program at the University of Southern California). Some programs include special classes for their early entrants (e.g., the Early Entrance Program at the University of Washington's one-year Transition School) or offer one or more years of high school coursework as part of their program before having students enroll directly in university courses (e.g., Boston University Academy), while others are designed for students to take courses with other university students from the start (e.g., the National Academy of Arts, Sciences, and Engineering). Some programs have the authority to grant high school diplomas (e.g., Texas Academy of Mathematics and Science), while other programs suggest that students encourage their high schools to accept the college credits and issue high school diplomas (e.g., The Clarkson School at Clarkson University) or take the position that a high school diploma is unnecessary (e.g., the Early Entrance Program at the University of Washington). Table 1 provides a list of selected early college programs and highlights some of their unique characteristics. See also Muratori (2007).

State-Supported Residential High Schools

State-supported residential high schools offer an alternate model for serving advanced students. Interestingly, when the Texas Academy of Mathematics and Science was founded as a state-supported institution, a decision was made specifically to design it as an early entrance program and not a residential high school (Jones, 2011), and Stanley (1991) applauded this decision. Since then, however, as more early college programs and residential high schools have been established, the distinction between these two models has become a bit blurry.

Both serve academically talented students by providing access to advanced (e.g., college-level) coursework and a community of intellectual peers. Perhaps the major difference is that the goal of the high schools is to prepare students to graduate from high school and subsequently enroll in college as freshmen, while completion of an early college entrance program should lead to placement in college as an upper classman. However, as noted earlier, some early college programs grant high school diplomas, while many of the residential high schools offer considerable credit-bearing college courses, and other differences between these program models are inconsistent as well.

For example, early college programs are usually administered by a college or university and located on that institution's campus, in contrast to typical residential high schools, such as the Illinois Mathematics and Science Academy and the North Carolina School of Science and Mathematics, which have their own campuses and are not university affiliated. Nonetheless, the Indiana Academy for Science, Mathematics, and Humanities, which is considered a high school, is on the campus of Ball State University, and Simon's Rock College, as mentioned earlier, has its own campus and is about 50 miles away from Bard. Furthermore, the Arkansas School of Science, Mathematics, and the Arts, though a high school, is administered by the University of Arkansas system as one of its campuses.

A relative newcomer to the scene, the Gatton Academy of Mathematics and Science in Kentucky was honored by *Newsweek* as the best high school in the United States. Yet, we have included this high school on our list of early college entrance programs because it is located on the campus of Western Kentucky University, and students can graduate with as many as 60 college credits. Clearly, early college entrance programs and state-supported residential high schools are not dichotomous models, but include numerous individual examples that are hybrids of the two with their own distinguishing characteristics.

Early College High Schools

Another variation of early college entrance programs is the early college high school, which enrolls ninth graders and pairs two years of high school with two years of college for a four-year early college experience leading to an associates degree. Adopting this framework, the Bard High School Early College opened in New York City in 2001 as a collaborative initiative with the New York City public schools. This tuition-free program, supported by public funds and private donations, has since expanded to other sites in New York City, as well as Newark, NJ, New Orleans, LA, Cleveland, OH, and Baltimore, MD.

In 2002, the Early College High School Initiative was launched by the Bill and Melinda Gates Foundation. Similar in format to the Bard High School Early Colleges in coupling two years of an enriched high school experience with two years of college, in this case typically at a community college, this initiative is not primarily intended for exceptionally advanced students who lack access to advanced courses in school. Rather, it hopes to propel students who are at risk of dropping out of high school and/or avoiding college to earn at least a bachelor's degree (Kaniuka & Vickers, 2010). This model, which has grown dramatically in size and scope with high school and college partnerships being established throughout the country, has since attracted additional funding from public and private sources, and studies suggest improved high school and college graduation rates for participants (American Institutes for Research, 2013).

Part-time College Options

Part-time enrollment in college is an option that has long been available to qualified students who have chosen to pursue it. In contrast to enrolling full-time in college as an early entrant, keeping a foot in the door of the high school allows students to participate in high school activities (though some early college programs offer this as well), and to apply to college as freshmen, with or without advanced standing, which can greatly enhance their chances of being admitted to those highly selective universities that accept few transfer students. Eager to recruit talented students, many colleges are very willing to enroll high school students with strong standardized test scores and/or advanced content knowledge on a part-time basis.

Dual enrollment in high school and college took a leap forward in the mid-1980s, when states began supporting legislation that provided funding for these programs (e.g., Broughton, 1987; McCarthy, 1999). While the parameters

Table 1: Selected Programs for Early College Entrants

Name of Program	Inception Date	Program Features
Advanced Academy of Georgia University of West Georgia Carrollton, GA http://www.advancedacademy.org/	1995	• Residential program • Enter in 11th or 12th grade • All university programs available to students • Automatic enrollment in Honors College • Access to mentor program and to leadership, social, and residence hall activities
Bard College at Simon's Rock Bard College Great Barrington, MA https://simons-rock.edu/	1966	• Residential program • Enter in 11th or 12th grade • Option for accelerated 9th and 10th grades at Bard Academy • A liberal arts and sciences college affiliated with Bard College • Promotes a holistic, interdisciplinary approach and offers small class sizes • Activities range from cultural events and lecture series to student-led clubs and community service
Bard High School Early Colleges Bard College New York City, NY; Newark, NJ; New Orleans, LA; Cleveland, OH; and Baltimore, MD http://bhsec.bard.edu/	2001	• Commuter program • Enter in 9th grade • Complete high school and the first 2 years of college in 4 years • Many extracurricular activities and support services available • Only for students from the local public school system where the BHSEC campus is located
Boston University Academy Boston University Boston, MA http://www.buacademy.org/home	1993	• Commuter program • Enter in 9th grade, typically • Access to a classically-based core curriculum that leads into college courses at BU • Access to many extracurricular activities and college counseling
The Clarkson School Clarkson University Potsdam, NY http://www.clarkson.edu/tcs/	1978	• Residential program • Enter in 12th grade • Focus on meeting high school requirements and researching future college options • Access to Personal and Professional Development Program • "Family dinners" for students and staff, field trips, and special events scheduled • Option to participate in university activities
The Davidson Academy of Nevada University of Nevada, Reno Reno, NV http://www.davidsonacademy.unr.edu/	2006	• Commuter program • Free public day school on campus of UNR • Access to courses at UNR or other colleges • Serves profoundly gifted middle and high school students • No grade levels are designated • Provides a Personalized Learning Plan (PLP) • Access to many student activities

Table 1: Selected Programs for Early College Entrants (continued)

Name of Program	Inception Date	Program Features
Early College Academy Mary Baldwin College Staunton, VA http://www.mbc.edu/early_college/eca/	2011	• Residential program • Enter in 12th grade, typically • Only available to females ages 16 and 17 • Most resources of MBC available to ECA students
Early Entrance Program California State University, Los Angeles Los Angeles, CA http://web.calstatela.edu/academic/eep/index.php	1982	• Commuter program • Enter in 9th grade, typically (ages 11-16) • Provisional summer courses • Access to EEP resources: kitchen, study room, computer room and social areas; counseling • Participation in CSULA's Honors College Program • Expectation to complete degree at CSULA
Early Entrance Program Shimer College Chicago, IL http://www.shimer.edu/	1950	• Commuter program with residential option available • Enter in 11th or 12th grade, typically • Follows the Great Books core curriculum • Automatically awarded a modest annually renewable merit scholarship
Early Entrance Program University of Washington Seattle, WA https://robinsoncenter.uw.edu/programs/early-entrance-program/	1977	• Commuter program • Enter after 8th grade, typically • TS students must be younger than 15 • 2-step program: 1-year Transition School (TS) followed by early entrance into UW • Access to special support services, activities, and resources.
Early Honors Program Alaska Pacific University Anchorage, AK http://www.alaskapacific.edu/academics/early-honors/	2000	• Commuter program with residential option available • Enter in 12th grade • Program follows "Block and Session" format: intensive focus on few subjects • Can participate in high school or university clubs • EH travel courses offered • Complete a year of transferable college credit (1-year program)
The Gary K. Herberger Young Scholars Academy Arizona State University Glendale, AZ http://herbergeracademy.asu.edu/	2010	• Commuter program • Serves highly gifted middle and high school students • University coursework available based upon readiness • Program includes internships and research experience
The Gatton Academy of Mathematics and Science in Kentucky Western Kentucky University Bowling Green, KY http://www.wku.edu/academy/	2007	• Residential program • Enter in 11th grade • State-supported high school with STEM focus • Can accrue over 60 hours of college credit • STEM research opportunities and STEM + Critical Languages track available • Admits only Kentucky residents

Table 1: Selected Programs for Early College Entrants (continued)

Name of Program	Inception Date	Program Features
Georgia Academy of Aviation, Mathematics, Engineering & Science Middle Georgia State College Macon, GA http://www.mga.edu/games/	1997	• Residential program • Enter in 11th or 12th grade • Emphasizes preparation in STEM fields • Access to academic and social resources in Welch Hall • Option to participate in social committees and youth service projects • Most graduates transfer to other 4-year institutions
Kansas Academy of Mathematics and Science Fort Hays State University Hays, KS http://www.fhsu.edu/kams/	2009	• Residential program • Enter in 11th grade • Strong emphasis on math and science and research opportunities • Leadership development and civic engagement emphasized • Tuition, fees, and books paid for by KAMS • Designed for Kansas residents, but non-Kansas and international students can apply
Massachusetts Academy of Mathematics and Science Worcester Polytechnic Institute Worcester, MA http://www.massacademy.org/	1992	• Commuter program • Enter in 11th grade • Seniors complete a year of college courses at WPI • Emphasis on STEM with a rigorous curriculum in the humanities and world languages • Admits Massachusetts residents only
Missouri Academy of Science, Mathematics and Computing Northwest Missouri State University Maryville, MO http://www.nwmissouri.edu/masmc/	2000	• Residential program • Enter in 11th grade • Focus on STEM subjects • Program's philosophy based on Integrity and Quality (IQ) • Permitted to organize clubs under the guidance of a staff/faculty advisor and participate in university organizations • Community service encouraged
National Academy of Arts, Sciences, and Engineering The University of Iowa Iowa City, IA belinblank.org/academy	1999	• Residential program • Enter in 12th grade • Encouraged to earn bachelor's degree from UI • Automatic enrollment in UI Honors Program • Access to resources in Blank Honors Center • BBC staff facilitate weekly seminars and biweekly meetings with students and provide advocacy • Encouraged to participate in clubs and activities sponsored by NAASE, BBC, and UI
Program for the Exceptionally Gifted Mary Baldwin College Staunton, VA http://www.mbc.edu/early_college/peg/	1985	• Residential program • Enter in grades 9 through 11, typically • Only open to females 13 and older • Most resources of MBC available to PEGs • Social and cultural weekend and evening events planned • Leadership opportunities available (e.g., committees, peer advising)

Table 1: Selected Programs for Early College Entrants (continued)

Name of Program	Inception Date	Program Features
Resident Honors Program University of Southern California Los Angeles, CA http://dornsife.usc.edu/resident-honors-program/	1961	• Residential program • Enter in 12th grade • Expected to earn bachelor's degree from USC • Automatic enrollment in Thematic Option Honors Program • Incorporated into the larger USC community • Encouraged to participate in university- and RHP-sponsored activities • Awarded a renewable merit scholarship
Texas Academy of Leadership in the Humanities Lamar University Beaumont, TX http://dept.lamar.edu/taolith/	1993	• Residential program • Enter in 11th grade, typically • Emphasis on the humanities and on the development of character and leadership skills through volunteerism and community service • Field trips to performing arts venues and museums • High school activities offered (e.g., Prom, yearbook, clubs) • Admits only residents of Texas
Texas Academy of Mathematics and Science University of North Texas Denton, TX https://tams.unt.edu/	1988	• Residential program • Enter in 11th grade • Strong emphasis on math and science and research opportunities • Many clubs and service organizations offered • Tuition, fees, and books paid for by TAMS • Admits only residents of Texas
UW Academy University of Washington Seattle, WA https://robinsoncenter.uw.edu/programs/uw-academy/	2001	• Commuter program; Students age 17 and older can apply to reside on campus • Enter in 11th grade • Participate in Bridge Program (summer group advising, Academy Camp, and Academy courses) • Involvement in UW Honors Program

vary among the states, the intent is to provide access, and usually funding, for high school students to attend local colleges on a part-time basis to take a course their high school does not offer. The credits typically will transfer to another public college or university within the state, but most highly selective colleges and universities do not grant credit for part-time college courses taken by high school students at local colleges because they cannot assess the level and quality of instruction. This is in contrast to more generous policies with regard to granting credit for AP and IB courses based on examination scores.

Online courses

The emergence and widespread availability of online courses has opened another door for high school students to gain access to college coursework. Offered by numerous universities, talent search centers, school systems, and other organizations, online courses are utilized by high school students to accelerate through more basic coursework in order to enroll in advanced courses sooner, to study subjects of interest not available in their schools, and/or to complete college-level work without having to worry about the logistics of getting to a local college. Although online coursework presents able students with greater flexibility and, in many cases, the opportunity to move through curricula at an individualized (i.e., faster) pace, schools can benefit from this option too. For example, a school can provide students with an advanced course such as linear algebra online without having to hire a teacher. When credit is not needed, the MOOCs (Massive Open Online Courses), Khan Academy, and others offer free non-credit options as a way to facilitate learning advanced content.

Research on Early College Entrants

With such a wide range of early college options, in conjunction with the myriad factors that can impact a student's experience in college, it is difficult to generalize about the overall effectiveness of early college entrance as a strategy to serve gifted students. However, we can gain insight from the quantitative and qualitative research that has been done, as well as information drawn from biographical and anecdotal accounts of students' experiences as young college entrants. The summary that follows focuses on full-time early enrollment in college, whether pursued individually or through an early entrance program.

Academic and Occupational Success of Early Entrants

Investigations of the academic performance of students who entered college early, as well as of the long-term impact on their careers, present a fairly compelling picture of high achievement and success (Brody & Stanley, 1991; Olszewski-Kubilius, 2002). Even among students who enrolled in college with little programmatic support, findings have been quite positive. For example, Gray (1930) found that young college students suffered fewer academic failures, were awarded more honors, and gained more recognition in extra-curricular activities than did a comparison group of older college students. In addition, studies of the Ohio State (Pressey, 1949), University of Chicago (Bloom & Ward, 1952), and Ford Foundation (Fund for the Advancement of Education, 1953) accelerants in the 1940s and 1950s also supported the positive effects of acceleration on students' academic performance and other factors.

The progress of students who entered college early through the guidance of the Study of Mathematically Precocious Youth (SMPY) was studied extensively, lending much credence to early entrance to college as a strategy for meeting the needs of highly able students. Most impressively, a follow-up investigation of six exceptionally young college graduates found that, at the time the study was conducted, five of them had earned Ph.D. degrees and were working in prestigious positions, while the sixth was an 18-year-old graduate student (Stanley, 1985a). In research on larger cohorts of early entrants, the majority were found to excel throughout the college years, though there was some variability in their levels of performance (e.g., Brody & Benbow, 1987; Brody, Lupkowski, & Stanley, 1988; Stanley, 1985a; Stanley, 1985b; Stanley & Benbow, 1983; Stanley & McGill, 1986). Consequently, Brody, Assouline, and Stanley (1990) sought to identify factors that contribute to the highest levels of academic success among early entrants (e.g., earning concurrent bachelor's and master's degrees and/or honors at graduation). In their study of 65 young college students who entered a selective university, prior experience with AP coursework was found to be the strongest predictor of academic success, suggesting the importance of mastering a certain level of content knowledge prior to enrolling in college.

A recent follow-up study of SMPY participants confirms the long-term high achievement of early college entrants, and suggests that getting a jumpstart on their professional careers may have had an impact on their productivity (Park, Lubinski, & Benbow, 2013). Cohorts of students who were identified as mathematically talented middle school students in 1972-1974, 1976-1979, and 1980-1983, and who skipped grades during their school years or left high school early to go to college (presumably grade-skipping also resulted in entering college younger than is typical), were compared to a matched control group of individuals who had not accelerated in grade placement. The accelerated students, as a group, earned their degrees and published their first peer-reviewed papers earlier, and also had more citations of their work by age 50. However, this advantage was not evident among the group that had been identified the latest, i.e., in 1980-1983, when they were surveyed at age 42. The researchers suggest that the non-grade-skipping cohort to whom they were compared may have benefitted from other accelerative opportunities that were available by the time they were in high school, just as grade-skipping had facilitated the needs and fostered the achievements of the earlier cohorts (Park, et al., 2013). This later group had been advised by SMPY to take advantage of such options.

Additional evidence in support of the academic and occupational success of early college entrants comes from biographical data and anecdotal accounts that demonstrate the high levels of achievement among accelerated students, especially in their chosen career fields (Daurio, 1979). An often-cited example is Norbert Weiner, the father of cybernetics who earned a Ph.D. from Harvard in 1912 at age 17, and more recent examples include the distinguished mathematicians and Fields medalists Charles Lewis Fefferman, who earned his Ph.D. from Princeton at 20, and Terence Tao, a SMPY protégé who earned his Ph.D. at 21 from Princeton. While some critics of acceleration still point to the negative experiences of the prodigy William James Sidis, the remarkable accomplishments of so many others far outweigh his unique story.

Most of the work described above involves assessing the progress of students who accelerated on their own. Research has also been done to assess the performance of students enrolled in some of the early college entrance programs, with arguably the most extensive work being conducted by researchers at the University of Washington. An early study of participants in the Early Entrance Program there identified a fairly large number of underachievers among the radical accelerants (Janos, Sanfilippo, & Robinson, 1986), but a later follow-up study that compared those who entered this program between 1977 and 1986 with students who qualified for the program but opted to attend high school, and with non-accelerated National Merit Scholarship finalists, found most students in all three groups to be doing well several years later (Noble, Robinson, & Gunderson, 1993). In a survey by Noble and her colleagues (2007), graduates of the Early Entrance Program praised the peer and faculty support as well as the intellectual stimulation that they found there. For more research on the University of Washington's Early Entrance Program, see Janos, Robinson, and Lunneborg (1989), Noble and Childers (2008), Noble, Childers, and Vaughan (2008), Noble and Drummond (1992), and Noble and Smyth (1995).

After the UW Academy was established for able, albeit less accelerated, students to enroll as early entrants at the University of Washington, a comparison study was conducted between students in this program and the more radical Early Entrance Program. Surprisingly, the UW Academy students were less satisfied with their transition experience, a finding that led to some modifications to the program. It was hypothesized that some of the students who came to college later in their high school career may have had more difficulty adjusting to not being at the top of their class in the more competitive environment, at least until their study skills improved (Noble & Childers, 2008, 2009). A recent follow-up study of alumni from both University of Washington programs revealed that the majority of participants achieved at high levels, earned an above average income, felt satisfied with their decision to go to college early, and were generally happy (Hertzog & Chung, 2015).

Students at the Texas Academy of Mathematics and Science have also been studied, with overall positive results (Sayler, 2015). There is considerable evidence of the majority of students' earning excellent grades in rigorous courses, being accepted as transfer students with scholarships to highly selective universities, and/or being accepted to prestigious graduate programs (e.g., see Jones, 2011; Sayler & Lupkowski, 1992). In support of a theme that others have found, Schumacker, Sayler, and Bembry (1995) found the use of appropriate learning strategies and study skills to be linked to the academic success of the early entrants, especially time management, being able to select main ideas in texts, and test/class preparation.

Similarly, a study of the performance of the inaugural class of the National Academy of Arts, Sciences, and Engineering at the University of Iowa found that the early entrants felt challenged by the academic offerings and, as a group, earned a first-semester GPA higher than that of the typical University of Iowa freshman (Muratori, Colangelo, & Assouline, 2003). However, within the small class of 10 students in this particular cohort, two encountered serious academic problems, forcing them to leave the university. After selection procedures were refined for subsequent classes, the retention rate was better, but there were still a few incidences of academic probation. Seeking to understand the factors that contributed to academic success or the lack thereof, Muratori (2003) found that those who thrived academically appeared to be more focused, perseverant, and motivated than those who were less successful. From her research, she concluded, tentatively, that personal attributes are important predictors of academic success, and that (perhaps unsurprisingly) difficulties students experience prior to enrolling in college are likely to continue in college if left unaddressed (Muratori, 2003). Again, these findings are in line with what researchers have concluded about students in the other early college entrance programs.

High performance overall was also the norm for early entrants at the Advanced Academy of Georgia. In a study of the first four cohorts, Sethna, Wickstrom, Boothe, and Stanley (2001) reported that the early entrants performed above the level of the typical-age undergraduates attending the State University of West Georgia, which has since been renamed the University of West Georgia. No students withdrew or were asked to withdraw for academic reasons. Many did transfer to other institutions to complete their undergraduate studies, but the list of those is quite impressive and is perceived as a positive result of the program. There is also evidence to support the academic and professional success of students who attended certain programs abroad, for instance, the Special Class for the Gifted Young (SCGY). This well-established residential early college entrance program is housed at the University of Science and Technology of China (USTC), which is affiliated with the Chinese Academy of Sciences (Dai & Steenbergen-Hu, 2015).

In an overall summary of the research on early college entrance, Olszewski-Kubilius (2002) concluded that the evidence regarding early entrants' academic success is "overwhelmingly positive" (p. 154). However, she cautioned that poor performers may not be included in many of the studies if they leave the program before completing it. In addition, the importance of a few students' encountering academic difficulties may not be stressed enough in studies where the majority of participants do well. On the other hand, another study of students who left an early entrance program found that it was not always for negative reasons; some transferred to another college or university that was a better fit for their developing interests (Heilbronner, Connell, Dobyns, & Reis, 2010).

Social and Emotional Adjustment of Early College Entrants

Expecting every young college student to be highly successful academically and socially is unrealistic, since many regular-aged college students experience varying levels of difficulty adjusting to the college environment. However, with young college students, in particular, parents and educators worry about their readiness to be independent, their maturity to make sound decisions, and their ability to interact with other college students, even in the early college entrance programs where they are provided with additional support. Although many researchers investigating the academic success of young college students have concluded that early entrants, as a group, are not hampered by social and emotional issues (Brody & Stanley, 1991; Daurio, 1979), fears about potential social and emotional difficulties for future early college entrants seem to persist.

One concern is whether initial adjustment to campus at a young age may be especially difficult for the young students. This question was addressed in a study of the Ford Foundation-sponsored early college entrants, and some initial difficulties in adjusting to campus life were revealed. However, they were considered minor and soon overcome (Fund for the Advancement of Education, 1953). Adjustment during the first year of college was also the focus of a study of 24 SMPY participants who entered college at least two years early and attended any of 17 colleges or universities around the country, including five students who were accelerated by five or more years. Although no serious emotional issues were reported for any of the students, and social complaints were minor, primarily coming from commuting students who were too young to drive, two students residing away from home experienced some challenges. One of these students was quite homesick and subsequently transferred to a college nearer to his home where he was much happier, while the other student, who had gone to college for academic reasons but had enjoyed the social aspects of high school, returned to high school after a year of college (Brody et al., 1988).

Responding to the special concerns about students whose acceleration is particularly radical, Pollins (1983) studied the adjustment of 21 male SMPY participants who were at least three years ahead in grade placement as college students. Compared with a group matched on age and ability, she found no negative social or emotional effects of acceleration, even though the accelerants had not received any special program support other than encouragement from SMPY. This study has often been cited as evidence that early college entrants are unlikely to experience social or emotional difficulties.

The more recent research on the social and emotional adjustment of early college students has primarily taken place within the early college entrance programs. Since much of the force behind the creation of these programs was to enhance social and emotional adjustment by allowing students to be with a compatible group of age peers, validation of this goal seems necessary to the continued support of these programs. In general, research and anecdotal reports on the social adjustment of students from the Texas Academy of Mathematics and Science (e.g., Lupkowski, Whitmore, & Ramsay, 1992; Sayler, 1994, 2015; Sayler & Lupkowski, 1992), the National Academy of Arts, Sciences, and Engineering (Muratori, 2003; Muratori et al., 2003), the Advanced Academy of Georgia (e.g. Sethna et al., 2001), and the University of Washington Early Entrance Program (e.g., Janos & Robinson, 1985; Janos et al., 1988; Janos et al., 1989; Noble, Arndt, Nicholson, Sletten, & Zamora, 1999; Noble & Drummond, 1992; Noble & Smyth, 1995; Robinson & Janos, 1986; Robinson & Noble, 1992) support the notion that most participants in these programs succeed in developing satisfying social relationships. In addition, early entrance was found to facilitate personal well-being overall for students who attended the Texas Academy of Mathematics and Science (Boazman & Sayler, 2011), and to be associated with lesser anxiety for Advanced Academy of Georgia students compared to their older college peers (Sethna et al., 2001).

However, in spite of such positive findings and reports about groups of early college entrants, there are some examples in the literature of individuals who did encounter social or emotional difficulties for whom early college entrance was not an optimal choice. Even among students at the Texas Academy of Mathematics and Science, for example, where reports of satisfaction with the program are extremely high, some participants said they would not repeat their early entrance experience, citing such factors as leaving their home and school environments before they were ready, stress, and inadequate social skills to function independently (Boazman & Sayler, 2011). And, in her study of students enrolled in the first cohort of the National Academy of Arts, Sciences, and the Engineering, Muratori (2003) found that a few of them were plagued with homesickness or other socio-emotional issues that contributed to their leaving the program.

A few studies have sought to identify variables that predict social adjustment among early entrants. For example, Caplan, Henderson, Henderson, and Fleming (2002) found family environmental factors (e.g., cohesion, conflict, and expressiveness) and overall self-concept relevant to college adjustment among early entrants attending the Texas Academy of Mathematics and Science. Parental support and family values were also found to be important to successful early entrants in the Program for the Exceptionally Gifted at Mary Baldwin College (Solow & Rhodes, 2012). And after studying students' adjustment at the Advanced Academy of Georgia, Sethna and his colleagues (2001) concluded that social and emotional preparedness and academic and social maturity play a role in any early college student's success. These studies and others point to the importance of considering social and emotional factors in the selection process prior to admitting students to early college entrance programs. In fact, Muratori (2003) found that the adjustment difficulties that certain students in her study encountered might have been anticipated prior to enrollment because of challenges they were already experiencing in high school.

Consistent with the findings summarized above, and with the caveat that early college entrance programs are not appropriate for all students who might be academically qualified, researchers evaluating the Advanced Academy of Georgia program concluded as follows:

> *Clearly, early college entrance programs will not suit every intellectually talented high school student. They are one of many excellent ways to enable students to move ahead faster and better. For some mature, brilliant youngsters, however, they are manna from educational heaven. Being constantly with one's intellectual peers who are also one's age mates, feeling free to interact and express ideas without fear of ridicule . . . can be a blessed relief. (Sethna et al., 2001, pp. 19-29)*

Discussion

In a pivotal paper that described the rationale for the establishment of the Early Entrance Program at the University of Washington, Robinson and Robinson (1982) noted the difficulty of trying to meet the individual needs of advanced learners in regular classroom settings. They argued for trying to achieve, as much as possible, an "optimal match" between the learning needs of each student and the intellectual challenge presented, while also paying attention to their social and emotional development. The Early Entrance Program was founded as one solution for students whose academic potential is significantly above their classmates. Julian Stanley, who had experimented even earlier with enrolling exceptionally advanced young students in college as an alternative to age-in-grade instruction, also endorsed the optimal match concept when he called for providing a "smorgasbord" of options to serve advanced students, from which students could choose those that best met their own unique needs (Stanley, 1979).

Thanks to the groundbreaking work of these researchers and the contributions of many other researchers and educators who have followed them, there are now many challenging curricular and out-of-school opportunities available for academically talented students. There is still work to be done to meet individual needs within classrooms, to assure that acceleration is maintained on a continuum, and that equity exists with regard to access to out-of-school options. The gifted education field has nevertheless made substantial progress on these fronts; we are rich with well-researched program models and strategies, some of which are described in this chapter (i.e., early college options), others elsewhere in this volume (i.e., other accelerative strategies), and still more that can be located through online directories and other resources. Being able to choose from these options lets students follow the path that best meets their own needs, for example, allowing one exceptional student to pursue early college entrance, another to stay in high school and tackle the challenge of national or international competitions, and a third to take a reduced high school course load so that she can do independent science research with a mentor at a nearby university.

With regard to early college entrance specifically, the research supports it as a proven and effective strategy to serve advanced learners who are academically ready to move beyond their high school environments at younger-than-typical ages. The fact that it is now an option that can be pursued in a variety of ways expands its usefulness and accessibility to many more students. Counseling is still an essential component to ensure that each student's readiness matches the program to which he or she is headed and that the student is going for the right reasons (e.g., to find greater challenge rather than escape an unsatisfying situation). But we must dispel any lingering notions that early college entrance inevitably causes social and emotional difficulties. For those who choose to pursue it, however, we must ensure that they are ready academically, socially, and emotionally for the challenges it will bring, have realistic expectations about college life and the early entrance experience, and feel confident that it is the optimal choice for them.

Implications for Educators

To be ready to succeed in college, whether they enter early or at the typical time, enroll in a special early entrance program or on their own, students need to have a strong background in content knowledge, good study skills and work habits, and the confidence to interact socially in a new environment. Unfortunately, academically talented students can be less prepared than other students for the transition to college if they fail to develop adequate study skills or time management strategies in high school because their classes are too easy or fail to develop adequate social skills because they have little in common with their classmates. Furthermore, those who enroll in college at younger-than-typical ages may be at an even greater disadvantage, even in early college entrance programs, if they lack the prerequisite knowledge and skills to be able to excel in more advanced courses. With a national goal of preparing students to be college- or career-ready by the end of high school, educators need to consider what this means for their advanced students and ensure that they have access to appropriately accelerated coursework throughout their school years.

By the time students are in high school, if they have been exposed to accelerated content all along, college-level coursework is warranted, supplemented with a broad array of extracurricular activities that extend learning beyond the classroom. Educators should also be prepared to recommend the out-of-school summer programs, competitions, internships, and other opportunities that can be particularly valuable as venues for learning and that allow participants to interact with their intellectual peers. With a broad spectrum of such resources in place, early college entrance should not have to be the default simply because there are no appropriate courses or activities available as alternatives in the latter years of high school, but rather, it can be a conscious choice for some students. When students do inquire about early college entrance, educators can help them by being supportive, evaluating their readiness, describing options and alternatives, and helping them make the best decision about how to proceed in order to achieve their specific goals.

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Special Issues in Acceleration

Early to Rise: The Effects of Acceleration on Occupational Prestige, Earnings, and Satisfaction

Katie Larsen McClarty
Center for College & Career Success, Pearson, Austin, Texas

Abstract

Research consistently supports the benefits of acceleration for school-age students including advanced academic achievement and more frequent graduate degree attainment. This chapter extends the discussions that are typically grounded in academic (K-graduate school) environments by presenting an analysis of a longitudinal data set that investigates whether the advantages associated with academic acceleration persist into the workplace (i.e., careers). In other words, do the benefits persist in an environment beyond typical schooling and degree attainment?

This chapter considers two mechanisms by which acceleration may affect career outcomes: precocity (i.e., early career entrance) and productivity rates. The data analyses in this chapter speak only to the second mechanism (through comparison with older peers). Support for the first mechanism comes from the prior research (comparison with same-age peers). Prior research shows that accelerated students, who enter the workforce earlier than same-age, same-ability peers, are more successful. Original data analyses in this chapter demonstrate that, in their careers, accelerated students also have advantages over older peers – similar-ability, non-accelerated individuals who started their careers at the same time.

Accelerated students are more successful, have higher productivity rates, more prestigious occupations and they earn more and increase their income faster compared to older, similar-ability, non-accelerated peers. Therefore, acceleration provides both short-term (within educational settings) and long-term (workplace settings) benefits. Implications for educators and counselors are discussed including how acceleration as an intervention may impact initial career decisions as well as subsequent career outcomes.

Introduction

The early bird catches the worm. This common idiom expresses the idea that the best opportunities are available to those who seek them first. This philosophy has been used to support acceleration—allowing gifted and talented students to complete their schooling in fewer years—thereby allowing them to rapidly enter the workforce and make substantial intellectual contributions (Pressey, 1946; Terman, 1957). Indeed, accelerated students do enter the workforce and achieve success earlier than their non-accelerated, same-age and same-ability peers (Janos, 1987; Park, Lubinski, & Benbow, 2013). These facts are important, but not surprising. It seems intuitive that accelerated students make earlier and larger contributions when they are being compared with students of similar ability who have had less time (because they were not accelerated) to do big things. In this respect, we know accelerated students have an advantage. What we do not know, however, is whether accelerated students have an advantage over older students of the same ability who complete school at the same time and compete in the same job market.

The second mouse gets the cheese. This idiom strikes a more cautionary tone. Could acceleration mean "too much, too soon," and therefore be too risky as an intervention? Might accelerated students be disadvantaged because they skipped critical elements of schooling? That is the focus of this chapter: evaluating the impact of acceleration on career outcomes by comparing accelerated students with their same-ability, older classmates. The following sections will first review literature on gifted and talented career development including the effects of acceleration on career outcomes, and then present results of an original research study.

Career Outcomes for Gifted and Talented Students

Although much research is devoted to identifying and serving gifted and talented children with the goal of maximizing their potential and producing eminent adults (Subotnik, Olszewski-Kubilius, & Worrell, 2011), fewer research studies focus on the career accomplishments of gifted individuals and their developmental trajectories. As Jung (2012) notes, careers are where most gifted children will have "the opportunity to translate their exceptional abilities into significant achievements that advance knowledge and/or affect the lives of others in society" (p. 189). In fact, the advancement of knowledge and society has been one of the undercurrents of gifted education programs. For example, after the Soviet Union launched the satellite Sputnik in 1957, America began placing great emphasis on cultivating talent, helping gifted students fulfill their potential, and being globally competitive (Tannenbaum, 1979).

We should take care, however, not to equate exceptional potential or opportunities with a societal obligation to develop those gifts and talents and apply them directly to a chosen career (Hoyt, 1974). Meeting the expectations of others is one of the challenges gifted children face in making career choices (Emmett & Minor, 1993; Wood, 2009). Some research has indicated that gifted individuals feel they need to enter careers to please others rather than to satisfy their own interests and values (Hagan, 1982). Other important considerations in gifted students' career development include multipotentiality, perfectionism, early career maturity, and lengthy educational training.

Multipotentiality is defined as the ability to choose between a number of possible career outcomes due to high general abilities, interests, motivations, and opportunities (Rysiew, Shore, & Leeb, 1999). Many gifted children perform at advanced levels in multiple areas, which can make narrowing career options difficult. On traditional ability assessments and career interest inventories, when compared to other students at their age- or grade-level, they may show a "high-flat" profile, indicating potential in multiple areas with no differentiation of strengths and weaknesses (Sanborn, 1979). However, when above-level tests (see Olszewski-Kubilius, this volume) are used, many fewer students fit a traditional multipotential profile. In a study of gifted teenagers, slightly more than half had flat ability profiles using above-level testing, and fewer than five percent had flat profiles when also considering interests and values (Achter, Lubinski, & Benbow, 1996).

Another career challenge for gifted students may lie in a tendency toward perfectionism. This can manifest as an inability to make the "perfect" career choice, with students wanting a career that will both provide a sense of accomplishment and make a difference in society (Emmett & Minor, 1993). The pressure to find the perfect job may result in delayed career decisions or frequent college major changes (Greene, 2003).

Despite challenges in selecting the "right" career, or perhaps because of a desire to select the "right" career, gifted students start career exploration earlier than other students (Kelly & Cobb, 1991). They have more career-related information and in some instances are more certain of their career choices than similar-aged peers (Kelly & Colangelo, 1990; Stewart, 1999). When career choices are made, gifted students tend to choose careers requiring ten or more years of postsecondary training (Stewart, 1999). They obtain more postsecondary degrees and make significant contributions as adults (Kell, Lubinski, & Benbow 2013; Subotnik, Karp, & Morgan, 1989; Terman & Oden, 1959). Gifted students tend to enter management or professional occupations, hold positions of leadership, and produce an abundance of creative or scholarly works.

Although many gifted children are successful, the direct link between IQ or school achievement and outstanding career accomplishments is weak (Milgram & Hong, 1999). Some suggest intelligence is a necessary but not sufficient condition. Students need to possess a minimum level of general aptitude, but beyond that there are many more factors that influence ultimate adult achievement, including persistence, task commitment, mentors, and educational or training opportunities (Beck, 1989; Cox, 1926; Perrone, 1997; Renzulli, 1978; Simonton, 1997; Subotnik et al., 2011). This chapter is devoted to one particular educational intervention – acceleration – and its effects on career outcomes for gifted students.

Theoretical Framework

One way acceleration impacts career outcomes is by shortening time spent in formal education, allowing students to enter the workforce earlier. Career outcomes are also influenced by other mechanisms such as retirement age and productivity rate. The relationship between those factors is represented by Equation 1 (Simonton, 1988):

$$O = R(L - P) \tag{1}$$

where O is lifetime career output, R is average output rate, L is age at career end (or longevity), and P is age at career start (or precocity). Career output is a function of rate and time, where time spent in the workforce is represented by $L - P$. Acceleration should reduce P, which, all else equal, will theoretically increase O. Equation 1 therefore provides a framework for studying the long-term effects of acceleration on career outcomes.

Precocity

Long-term acceleration effects are studied infrequently because longitudinal student tracking is time- and resource-intensive. Nonetheless, three studies following gifted and talented children for 20 years or more have examined acceleration's effects on career outcomes. The oldest, Lewis Terman's *Genetic Studies of Genius,* began in 1921 at Stanford University (Terman, 1925). When Terman's 19 youngest participants (by age at college entry) were compared at age 24 with non-accelerated, similar age and IQ peers, the accelerated men were more likely to work in professional sectors (e.g., professor, physician, engineer), and less likely to hold service-sector jobs or still be in school (Janos, 1987).[1] In addition, when program administrators identified the 150 most successful men, the accelerated students were identified more often than their IQ-matched, same-age peers. These results support the notion that acceleration permits early entry into the workforce and provides opportunities to make an early impact. Accelerated students could start work earlier because they were more than three and a half years younger than IQ-matched peers, on average, at college graduation. Moreover, accelerated students who earned advanced degrees were, on average, one and a half years younger than IQ-matched non-accelerated peers. Therefore, when accomplishments were evaluated in 1940 (constant L), accelerated students (reduced P) had spent less time in school and more time in the workforce than their same-age and ability peers and were rated as more successful (increased O).

More recent longitudinal analyses yield similar results. *The Study of Mathematically Precocious Youth* (SMPY) started in 1971 at Johns Hopkins University under the direction of Julian C. Stanley (Stanley, 1996). SMPY students were identified before age 13 via talent searches (see Olszewski-Kubilius, this volume) based on their top performance on quantitative or verbal reasoning assessments. Twenty years later, accelerated SMPY students (see Wai, this volume) reflected positively on their experiences. Skipping ahead, they reported, benefited both their education and their career planning (Benbow, Lubinski, Shea, & Eftekhari-Sanjani, 2000). The students' outcomes support their self reports; by age 50, accelerated students attained more doctoral degrees than similar non-accelerated peers (Park et al., 2013). They also were more likely to have made significant contributions in science, technology, engineering, and mathematics (STEM). Accelerated students authored their first STEM publications earlier and amassed more highly cited and total publications than non-accelerated professional peers.[2] Though accelerated students began their careers earlier, they were just as satisfied as non-accelerated students with their career direction at age 50 (Smeets, Lubinski, & Benbow, 2014), a finding that would suggest no negative consequences to being accelerated.

The results from SMPY reinforce the theory that acceleration propels students more quickly into the workforce and thereby allows them to accomplish more, faster. For example, SMPY students who skipped a grade were a year and a half younger, on average, when they earned their Ph.D.s, which allowed them to enter the workforce earlier (Park et al., 2013). Even if the two groups had similar productivity rates (R), Equation 1 suggests accelerated students would have greater career output because they had more time in the workforce.

International studies echo these conclusions. Gross's (2006) 20-year follow-up of 60 Australian students with IQs above 160, found that students who accelerated two or more years were more likely to earn graduate degrees and enter professional careers. In sum, accelerated students start their careers earlier, providing them an advantage in career length that leads to greater output and achievement.

Productivity Rate

Accelerated students may also benefit from a second mechanism – productivity rate. Accelerated and non-accelerated students may differ in their productivity rate (R) because productivity rate tends to be correlated with precocity (Dietz & Bozeman, 2005; Simonton, 1988). To test this hypothesis, career length must be held constant. One option for holding career length constant is to collect outcomes from non-accelerated students a few years after the accelerated students so both groups have the same time in the workforce. However, because career outcomes can be influenced by cohort effects or competition from contemporaries in the field (Dennis, 1958), the timing of career start and end should also be controlled. A better approach, then, is to compare same-ability, accelerated and non-accelerated students who complete their education at the same time, thus holding career start and career length constant, even though students' ages differ. This is the approach presented in this chapter.

[1] There were no career differences for women.

[2] This pattern was more pronounced for men than women.

The analyses that follow are organized around one central research question: How do accelerated students' productivity rates and career outcomes compare with same-ability, non-accelerated peers when career length is held constant? Specifically, students who skipped at least one grade in elementary or middle school were compared with their older, similarly achieving, non-accelerated classmates eight years after high school exit on three outcomes: occupational prestige, earnings, and job satisfaction.

Methods

Data

This research relies on the National Education Longitudinal Study of 1988 (NELS:88; U.S. Department of Education, 2000). NELS:88 provides a longitudinal source for studying the impact of acceleration on later-life outcomes, and it is distinct from both Terman's and SMPY's longitudinal datasets because the data are nationally representative and more recent. NELS:88 students graduated high school in 1992, many of Terman's students graduated in the 1930s, and most SMPY students from the Park et al. (2013) SMPY longitudinal study graduated in the late 1970s and early 1980s. Whereas Terman's sample was focused on students in California identified first through teacher nomination and the SMPY sample draws from students who elected to participate in a national talent search program, the NELS:88 dataset contains a sample of U.S. students representative of the full population. NELS:88 was not designed to focus on advanced learners; both high- and low-ability students are included. The data therefore provide a unique opportunity to study the effects of acceleration within the general population, not just for students at the top of the ability distribution or those who benefited by being part of a talent development program (see Rogers, this volume).

To gather the data, the National Center for Education Statistics (NCES) surveyed a representative sample of U.S. eighth-grade students in 1988. Follow-up data collection occurred in 1990 (10th grade), 1992 (12th grade), 1994 (two years post-high-school), and 2000 (eight years after high school exit). For each data collection, students, parents, and educators responded to questionnaires about home, school, and work experiences. Students completed standardized assessments in reading, mathematics, science, and social studies. In addition, transcript data were collected from high schools and colleges.

Defining Accelerated Students

The complete NELS:88 contains 12,144 student records. From these, 108 students were identified (by their date of birth) as having skipped at least one grade prior to eighth grade. A typical student enrolled in eighth grade in spring 1988 would have been born by fall 1974 and entered kindergarten, at age five, in fall 1979. Grade skippers were therefore defined as students born January 1, 1975 or later, which is consistent with approaches used in prior research (McClarty, 2015; Wells, Lohman, & Marron, 2009). Eighth grade students who were born in 1975 or later likely enrolled in kindergarten early or skipped at least one grade along the way.

Defining the Comparison Group

To establish a group of non-accelerated students to which grade skippers could reasonably be compared, Coarsened Exact Matching (CEM; Iacus, King, & Porro, 2011) was used. CEM matches each accelerated student to similar non-accelerated students along several important dimensions. Matching variables included gender, race, socioeconomic status (SES), and eighth-grade achievement.

Eighth-grade achievement measures in reading, mathematics, science, and social studies were used because NELS:88 does not include measures of general cognitive ability. Eighth-grade standardized test scores provide the best available proxy. Principal components extraction (Tabachnick & Fidell, 2007) was used to create a single achievement composite for each student based on the four standardized test scores. The first principal component accounted for 78% of the variance in eighth-grade test scores and forms the basis of the achievement composite. Given that the four achievement scores were highly correlated (ranging from 0.69 to 0.72) and they loaded nearly equally on the achievement composite (ranging from 0.498 to 0.503), the composite appears to be a reasonable ability proxy.

To facilitate matching via CEM, continuous variables were coarsened into discrete categories. The achievement composite was divided into 48 equal-interval levels (based on 0.1 standard deviation units). SES was categorized into quartiles. Race was divided into two categories: underrepresented minority (including African Americans and Hispanics) and other racial group (e.g., White, Asian).

Each accelerated student was subsequently matched with non-accelerated students in the same stratum. The strata were defined by unique combinations of gender, racial group, SES quartile, and achievement composite level. Three accel-

Table 1: Accelerated, Non-Accelerated, and Matched Peers in NELS:88

	Non-Accelerated	Accelerated	Matched Peers*
N	12,036	105	105
Age	14.4	12.7	14.3
Male	47.0%	41.0%	41.0%
Minority	21.6%	21.9%	21.9%
Lowest SES Quartile	24.9%	11.4%	11.4%
Second SES Quartile	25.0%	17.1%	17.1%
Third SES Quartile	25.0%	25.7%	25.7%
Highest SES Quartile	25.1%	45.7%	45.7%
Achievement Composite	0.00	0.95	0.96

**Values are reported after weighting. There were 2,329 students in the matched set without weighting.*

erated students with missing data on the matching variables were removed from the analyses. The remaining 105 grade skippers were matched with 2,329 non-accelerated peers. Not every accelerated student, however, had an equal number of non-accelerated matches. In order for the entire non-accelerated group to match the demographic and achievement characteristics of the accelerated group, differential weights were applied. Accelerated students were weighted by 1, and non-accelerated students were weighted by W_S according to Equation 2:

$$W_S = \frac{N_A^S}{N_N^S} \tag{2}$$

where N_A^S is the number of accelerated students in stratum s, and N_N^S is the number of matched non-accelerated students in stratum s ($s = 1, \ldots, S$). Therefore, the sum of the weights for the non-accelerated students is equal to the sample size of accelerated students (105).

Table 1 presents descriptive statistics for the grade-skippers as well as the full non-accelerated sample and the matched non-accelerated sample. Accelerated students were more likely than typical non-accelerated students to be female, affluent, and higher achieving. After matching and weighting, the accelerated and non-accelerated groups were equivalent.

Outcome Measures

Outcome measures, based on the year 2000 follow-up interviews, included occupational prestige, earnings, and job satisfaction. Prestige was assessed via participants' reported job title, employment type, and job duties for their current or most recent job. NCES interviewers used that information to code responses into 42 job categories. For this study, the 42 NELS:88 job category codes were converted to occupational prestige scores based on the National Opinion Research Center's 1989 General Social Survey (NORC/GSS). The NORC/GSS Occupational Prestige Scale was originally developed to link to the occupational codes from the 1980 census. The theoretical range of the NORC/GSS prestige scale is from zero to 100 (Nakao, Hodge, & Treas, 1990). To create the scale, 1,500 people were asked to rank the social standing of 740 occupational titles by sorting them onto a nine-rung ladder. Each person rated 110 of the 740 titles. The average ranking for each occupational title was translated to the prestige score scale, where a NORC/GSS prestige score of zero would equate to an average of rung one, a NORC/GSS score of 100 is associated with an average of rung nine, and a NORC/GSS score of 56.25 would represent an average halfway between rungs five and six (Nakao & Treas, 1990).

For some occupations, a direct correspondence existed between the NELS:88 category and the NORC/GSS prestige ratings. For example, the NELS:88 occupation of 'legal support' corresponded to the prestige category of 'legal assistant.' For NELS:88 occupation codes without a direct correspondence, prestige scores were created by averaging the NORC/GSS prestige ratings associated with each occupation subsumed within the NELS:88 job category (e.g., a prestige score for the NELS:88 "legal professionals" category was calculated by averaging the NORC/GSS prestige ratings for "lawyers" and "judges").

Participants also reported their annual income for 1997, 1998, 1999, and 2000—five, six, seven, and eight years after high school exit, or the first four years following an undergraduate degree for many students. In addition, respondents indicated whether they were satisfied or dissatisfied with their current job overall and in seven specific areas: pay, fringe benefits, job security, importance and challenge of the work, opportunities for promotion and advancement, opportunities to use past training and education, and opportunities for future training and education. Responses from these seven items were summed to create an omnibus job satisfaction measure, with scores ranging from 0 (dissatisfied in every area) to 7 (satisfied in every area).

Analysis Procedures

To evaluate the impact of grade-skipping on career outcomes, each outcome (i.e., occupational prestige, income, job satisfaction) was regressed on the dichotomous grade-skipping variable (0 = did not skip, 1 = skipped), with weights applied according to Equation 2. Also, because previous studies found acceleration's effect on career outcomes was larger for men than women, additional models included grade-skipping, gender, and the interaction between the two.

Results

Accelerated students were compared with older, non-accelerated, similarly achieving students to determine whether grade skippers could compete with classmates entering the job market at the same time. Both accelerated and non-accelerated students had 12 years after eighth grade to enter and progress in the workforce. Would accelerated students still hold an advantage when career length (L-P) was held constant? Might accelerated students have a higher productivity rate (R)? These research questions were addressed through the examination of three career outcomes: occupational prestige, earnings, and job satisfaction.

Occupational Prestige

Compared with their non-accelerated peers, similarly achieving accelerated students held more prestigious jobs (B=4.86, p<.001). Accelerated students' average prestige score was 53.64, which corresponds to jobs in the executive, administrative, and managerial category. These were jobs rated in the top half of the ladder of social standing. Non-accelerated students, on the other hand, averaged 48.78 on the prestige scale, corresponding to protective service jobs (e.g., sheriffs) which were rated below the middle rung of social standing. Both groups scored above the average occupational prestige of the full NELS:88 sample (M=46.49, SD=11.87).

One reason for this prestige difference may be that accelerated students are more ambitious. Not only do they have high expectations for their academic performance, but they also seek high-status jobs. Therefore, a second model was specified including the occupational prestige of a students' expected career (as reported in eighth grade) as a covariate. The groups still differed (B=5.87, p <.001). In fact, even when bachelor's degree attainment and undergraduate college grade point average (GPA) were added as statistical controls in a third model, accelerated students still enjoyed more prestigious jobs (B=4.10, p <.001).

Earnings

Separate models evaluated earnings differences between accelerated and similarly achieving non-accelerated students in each post-college year (assuming four years of high school and four years of college). In the first year (1997), differences between the two groups were small (M=\$920) and not significant (p=.07). For each of the following years, however, the differences increased and were statistically significant (1998: M=\$1,612, p=.01; 1999: M=\$3,713, p<.001; 2000: M=\$5,112, p<.001). Earnings may also be influenced by bachelor's degree attainment, college GPA, and students' earnings expectations (as measured in eighth grade), so a second model included these variables as covariates. After these statistical controls were applied, accelerated students earned more than non-accelerated students all four years. Moreover, Figure 1 shows that the income gaps widened over time. Accelerated students not only had initially higher salaries (after controls were applied), they also saw greater year-to-year increases in earnings. Over the four-year time period, accelerated students' salaries increased \$2,024 more than non-accelerated students (p=.05).

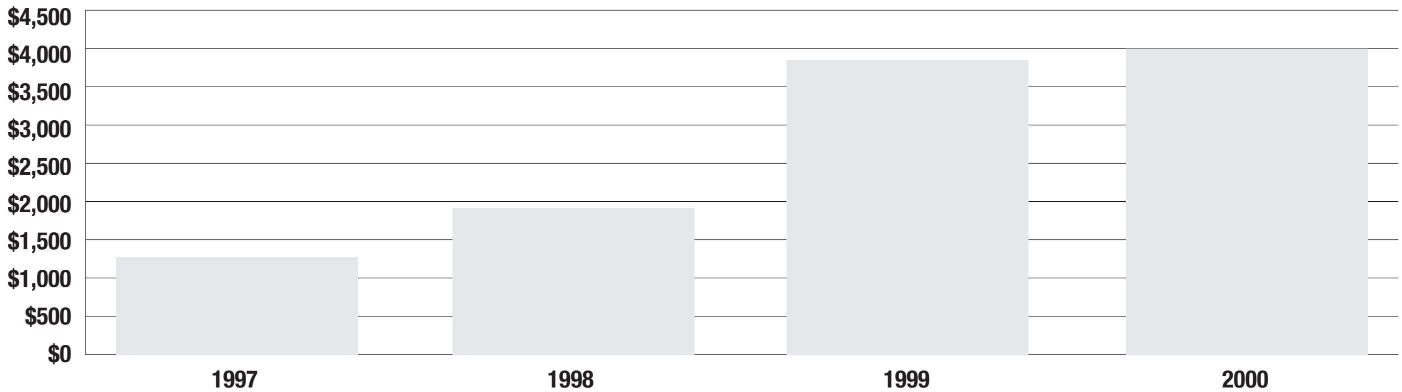
Job Satisfaction

Though accelerated students earned more and held more prestigious jobs than their non-accelerated peers, they did not differ in job satisfaction. This was true for overall satisfaction (B= -.18, p=.65) and the summed satisfaction measure (B=.01, p=.19). Accelerated and non-accelerated students also reported similar levels of satisfaction within work areas (pay: B= -.29, p=.34; benefits: B= -.21, p=.53; security: B= -.03, p=.95; importance: B= -.08, p=.83; promotion: B=.46, p=.17; use training: B=.33, p=.36; future training: B= -.33, p=.33).

Gender Effects

Interaction effects were tested for each career outcome to determine whether acceleration affected males and females differently. Interaction effects were not significant for occu-

Figure 1: Income Differences Between Accelerated and Non-Accelerated Students*



Controlling for income expectations, degree attainment, and college GPA.

pational prestige; both men and women who had skipped a grade held more prestigious jobs than similar peers who had not. With respect to earnings, accelerated men and women equally outpaced their non-accelerated peers in the first two years after college. In the final two years, acceleration benefited men more than women (1999 interaction B=4,851.5, p<.01; 2000 interaction B=7,130.0, p<.001). In 2000, accelerated men earned $9,278 more than similarly achieving non-accelerated men, but the difference between accelerated and non-accelerated women was only $2,148. The differential earnings pattern is illustrated in Figure 2. Finally, job satisfaction analyses yielded no significant main effects or interactions, suggesting that males and females, accelerated and not, all found their careers equally satisfying.

Conclusions

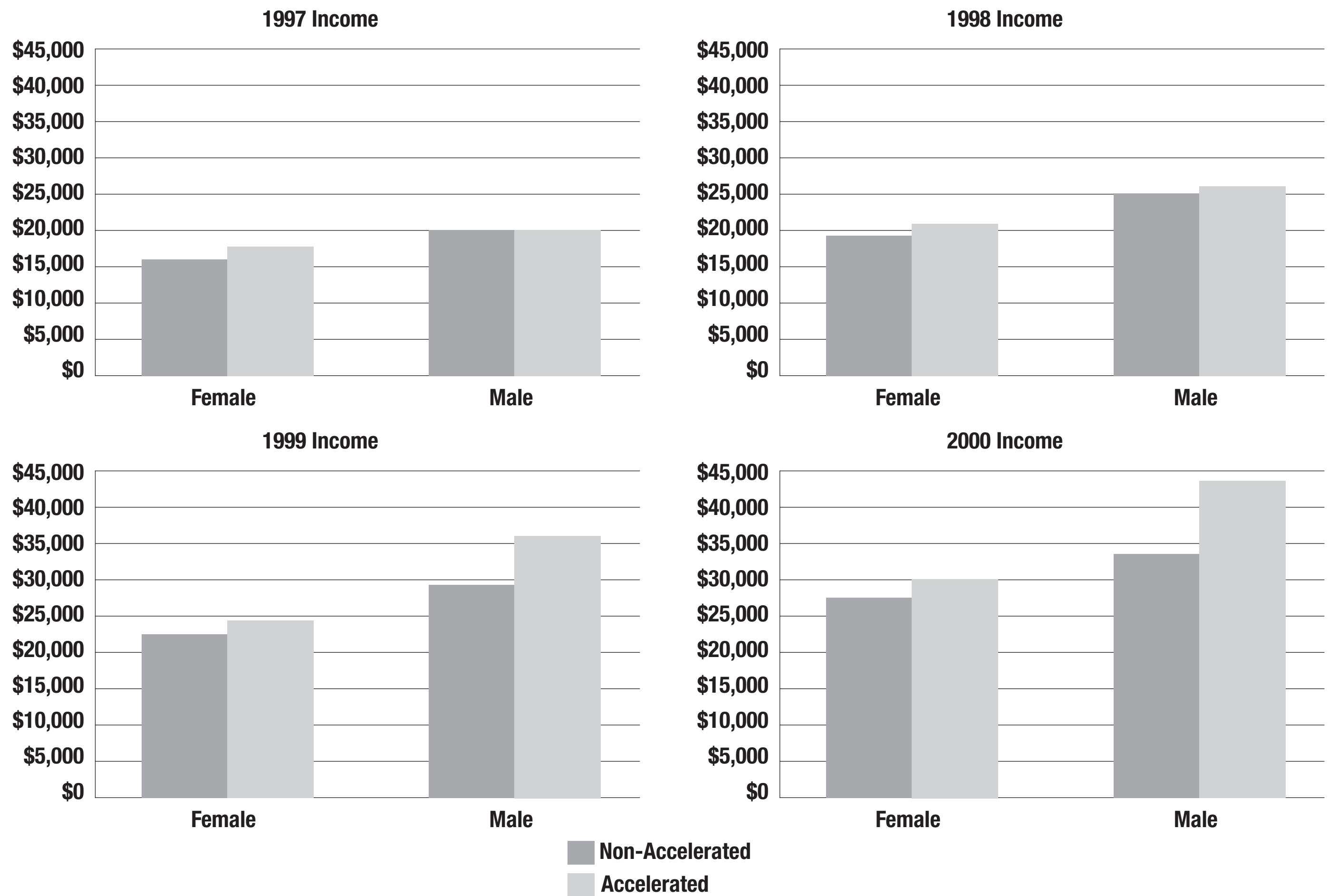
It is well established (and quite logical) that acceleration allows students to enter the workforce earlier and make earlier contributions. By gaining an early start, grade skippers can extend their career length to maximize their productive output and impact. This chapter expands our understanding of the effects of acceleration as an educational intervention on career outcomes by holding career length constant and comparing accelerated students with older, similarly achieving peers who are entering and competing in the job market at the same time.

Collectively, the findings indicate accelerated students still hold an advantage. Accelerated students acquired more prestigious jobs than non-accelerated students. This held true even after controlling for career aspirations, degree attainment, and college grades. These results reaffirm and extend prior research showing accelerated children are more likely to enter professional fields (Gross, 2006; Janos, 1987).

The occupational differences translated into higher earnings for accelerated students as well as faster rates of salary increase. These patterns speak to accelerated students' comparative productivity rates. Although there is no direct career output measure in NELS:88, there is a general relationship between wages and output such that wages increase as output increases (Feldstein, 2008). Using wages as a proxy for output, we can infer that accelerated students have higher productivity rates than similarly achieving non-accelerated students (because career start and length were held constant). This implies there are two different mechanisms that help accelerated students maximize their career output. The first is their ability to increase their career length by entering the workforce earlier. The second mechanism is their higher productivity rate. The two processes are correlated but distinct.

Why might accelerated students have a higher productivity rate? There are several plausible answers. First, high-ability students who are good candidates for acceleration may have other characteristics associated with high productivity rates in a work environment. They are typically self-motivated learners, prefer a challenging, fast-paced environment and become frustrated by repetition (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009). In addition, acceleration implies rapid and efficient progress. In school, accelerated students learn more content in less time. Furthermore, they spend less time in an environment that may not be very intellectually engaging. Although accelerated and non-accelerated students had similar achievement in eighth grade, the accelerated students reached that level with at least one fewer year of schooling. Given that "advanced ability tends to maintain its rapid pace of development" (Robinson, 1993, p. 511), this highly efficient approach to academic achievement in secondary and postsecondary school may

Figure 2: Income Differences Between Accelerated and Non-Accelerated Students, by Gender



translate to the workplace as greater productivity rates, resulting in faster salary increases.

Finally, it is important to address a popular argument against acceleration, one that rests on fears about negative social and emotional consequences (Hoogeveen, van Hell, & Verhoeven, 2005; Southern & Jones, 1992; Southern, Jones, & Fiscus, 1989). Put simply, the research literature does not support this concern (Robinson, 2004; Cross et al., this volume). Rather, accelerated students speak favorably about their experiences and feel that skipping ahead positively impacted their future planning (Benbow et al., 2000). They are just as satisfied with their careers as their younger, same-ability, non-accelerated counterparts (Smeets et al., 2014), and the results of the analyses presented in this chapter suggest accelerated students are also just as satisfied as their older, similarly achieving, non-accelerated peers.

Educational Implications

Acceleration positively impacts career outcomes for gifted and talented students. Not only does it provide long-term benefits in terms of occupational prestige and earnings, but it may also mitigate some of the challenges gifted students face in making their initial career decisions including multipotentiality, perfectionism, and extended educational training. Acceleration could therefore be a useful strategy for school counselors as well as educators (see Croft & Wood, this volume).

Although grade-level assessments are insufficient for differentiating advanced students' relative strengths and weaknesses, above-level ability assessments do provide value. Above-level ability and interest assessments taken at age 13 predicted college major ten years later (Achter, Lubinski, Benbow, & Eftekhari-Sanjani, 1999). Likewise, encouraging gifted students to skip one or more grades and encounter more challenging educational content may allow differentiated ability patterns to emerge and reduce career indecision that may be associated with multipotentiality.

Acceleration may also help gifted learners address unhealthy perfectionism or a fear of failure. Gifted students who have not been challenged and have therefore experienced success with little effort may be reluctant to try difficult things. They may doubt their abilities if they are not immediately successful (Dweck, 2006). Acceleration, however, can provide a more challenging educational environment. By working hard to master difficult concepts, students build confidence and persistence – two valuable workplace skills that are difficult to impart if learners rarely face adversity.

Acceleration also directly reduces career training time. By completing K-12 education in fewer years, students can begin college, graduate, and complete other training programs earlier. This may be particularly beneficial for women who are concerned that starting a career may interfere with starting a family (Hoyt & Hebeler, 1974). Of course, highly able learners will still benefit from targeted supports. This is true for gifted students in general who, because of their early career maturity and selection of careers requiring extensive education and training, will need career counseling, education, and assessment available at earlier ages (Jung, 2012). It is also true for accelerated students in particular, who will need to make their first career decisions at younger ages.

Acceleration is one educational opportunity available to gifted students that provides several benefits, not only for career planning, but also for career outcomes. Even when similarly achieving accelerated and non-accelerated students enter the workforce at the same time, those who have skipped ahead secure higher status jobs where they are more highly compensated, and they are satisfied with their work. Accelerated students more than keep pace with their non-accelerated, same-ability classmates throughout schooling, and they compete successfully in the job market, underscoring both the short- and long-term benefits of rising early.

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Acceleration and Economically Vulnerable Children[1]

Jonathan A. Plucker, University of Connecticut, Storrs, Connecticut
Bryn Harris, University of Colorado Denver, Denver, Colorado

Abstract

A large number of talented students live in poverty, and an even larger number live in families that are economically vulnerable. National academic achievement data provide evidence that high-ability, economically vulnerable students achieve considerably less academic success than their more economically secure peers, a trend that has developed over at least the past few decades. In this chapter, we review research on the effectiveness of various acceleration strategies when used with economically vulnerable students. Our conclusion provides recommendations on future directions.

Introduction

One of the paradoxes of the United States in the 21st century is that the country is among the richest in the world yet is also one of the poorest. Data from the U.S. Census provide evidence that over 45 million Americans live in poverty[2], representing 14.5 percent of the population. Although this poverty rate is not exceptional (similar rates were experienced in the early 1980s and 1990s, and rates were historically much higher prior to the implementation of Social Security and Great Society social programs in the 1950s and 1960s), population growth has led to more Americans living in poverty today than at least since the 1950s (DeNavas-Walt & Proctor, 2014).

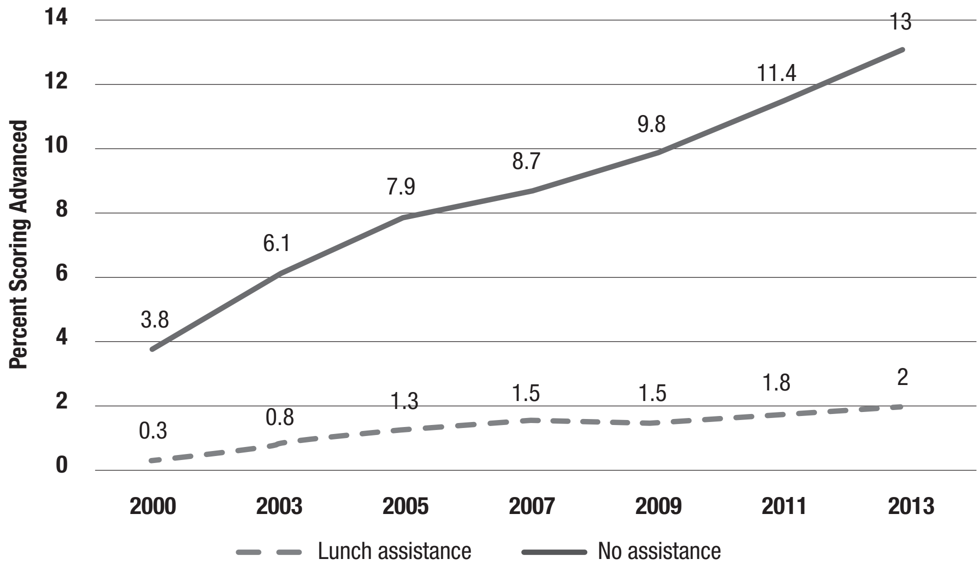
Childhood poverty rates (i.e., for children 18-years-old or younger) have dropped during the current economic recovery, currently standing at 19.5 percent, down from a peak of 21.3 percent in 2012 (DeNavas-Walt, Proctor, & Smith, 2011; DeNavas-Walt & Proctor, 2014). However, this rate still represents over 14 million children (DeNavas-Walt & Proctor, 2014), and the rate itself is one of the highest in the developed world (UNICEF Innocenti Research Centre, 2012). Nearly 10% of households (3.8 million households) experience some degree of food insecurity, defined as "access to adequate food is limited by a lack of money and other resources" (Coleman-Jensen, Gregory, & Singh, 2014, p. v). The U.S. Department of Agriculture estimates that these household data translate to over 8.5 million children experiencing some degree of food insecurity in 2013 (Coleman-Jensen, Gregory, & Singh, 2014).

At the same time, the percentage of K-12 students qualifying for free or reduced-price lunch programs has substantially increased. For the 2011-2012 school year, 49.6% of students qualified for these programs, meaning nearly half of our students live in households whose income is 1.85 times the poverty level or less. In 18 states (plus the District of Columbia), over half of the student population qualifies for lunch assistance, with over 60% qualifying in five of those states and the District of Columbia[3].

However, these statistics mask a number of important complexities related to measuring poverty and, as a result, determining its impact upon children and families. Poverty is not easy to define, and measuring it is not without considerable controversy (see an excellent discussion of these issues in UNICEF Innocenti Research Centre, 2012). Some U.S. databases rely on whether students are qualified to participate in

[1] Some of the ideas presented in this paper were first prepared for a symposium on developing the talents of low-income students, co-sponsored by the Jack Kent Cooke Foundation and the National Association for Gifted Children, in Washington, DC, on May 31, 2012.
[2] All data, unless otherwise noted, are drawn from databases representing 2013 data.
[3] See http://nces.ed.gov/programs/digest/d13/tables/dt13_204.10.asp.

Figure 1: Percent Scoring Advanced, NAEP Grade Four Mathematics



free- or reduced-price lunch programs, but the issues of using this data point as a measure of poverty are well-documented (Harwell & LeBeau, 2010). Other databases simply do not include indicators of family economic well-being, which further complicates matters.

For example, 25.2 percent of children living in households at or below the poverty line are estimated to experience food insecurity. In households with income-to-poverty ratios of 1.85 or lower, food insecurity rates are not terribly dissimilar at 21.5% (Coleman-Jensen et al., 2014). For these reasons, we use the term "economically vulnerable"[4] to describe students who deal with the myriad issues faced by individuals experiencing a lack of socioeconomic security in the United States. In the data provided below, we use lunch program qualification as a proxy for economic vulnerability, as it is the only relevant indicator available in the data sets of interest.

Another complication that is relevant to the current analysis is that much education policy – and many related policy debates - focuses primarily on race and ethnicity at the expense of economic vulnerability. This focus is understandable given the country's long, troubled history of racial and ethnic discrimination, but we note that, although some racial and ethnic groups are more likely to experience poverty than others, economic vulnerability is experienced by all racial and ethnic groups in all communities throughout the United States (Kneebone, 2014). In other words, socioeconomic insecurity is often correlated with other demographic characteristics, but those correlations do not explain all of the variance, and correlation should not be inferred to represent causation.

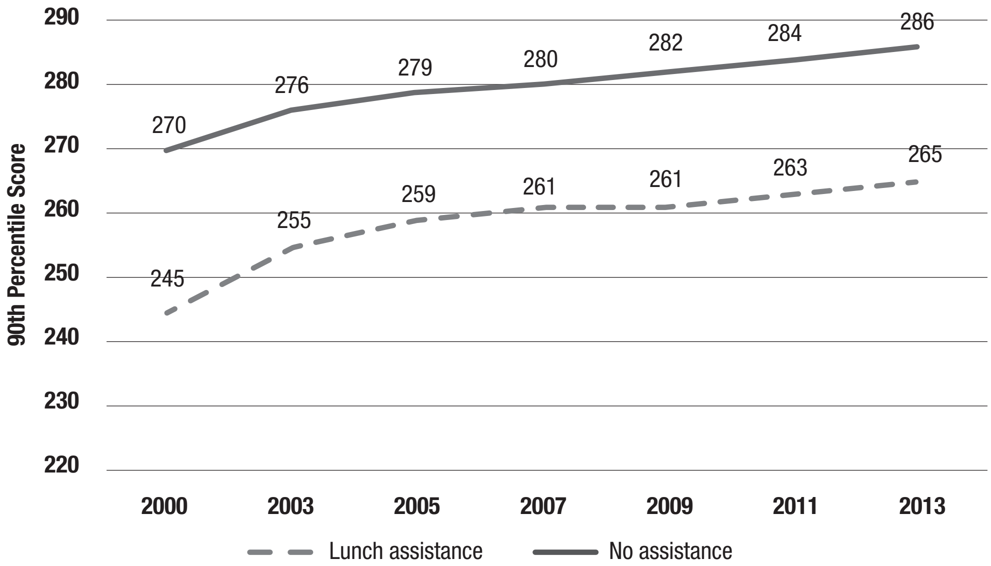
Poverty-based Excellence Gaps

Excellence gaps are differences in educational outcomes for advanced students based on demographic characteristics (Plucker, Burroughs, & Song, 2010). These excellence gaps are an indicator of how communities balance equity and excellence in education and social services, as they represent differences in academic success between privileged and less privileged groups of students. Plucker, Hardesty, and Burroughs (2013), using data from the 2011 National Assessment of Educational Progress (NAEP), examined the correlation between minimum competency gaps (the traditional "achievement gaps" that drive American education policy) and excellence gaps and found negligible statistical relationships between the size of the two gaps. These results provide additional evidence that minimum competency gaps and excellence gaps are largely distinct phenomena, and that rising tides do not necessarily lift all ships.

Most countries have lower rates of academic excellence among poorer students than wealthier students, and gaps can be observed across countries based on immigrant status (this is the closest proxy possible in some international data sets; see Rutkowski, Rutkowski, & Plucker, 2012). Plucker et al. (2010) proposed two ways to assess excellence gaps. One method is to examine the percentage of students qualifying

[4] During work on another project, Prof. James Moore suggested the use of this term, and we appreciate this recommendation and use the term throughout this chapter. However, for stylistic reasons, we do occasionally use poverty and economic vulnerability interchangeably to avoid repetition of the longer term.

Figure 2: 90th Percentile Scores, NAEP Grade Four Mathematics



for free and reduced-price lunch programs that score "advanced" on NAEP tests compared to their peers who do not qualify for lunch assistance.

Figure 1 includes data by lunch status on the NAEP Grade 4 math assessment. Although the percentage of students scoring "advanced" on these tests has increased for both groups, students not qualifying for lunch assistance have seen sharply increased performance (3.8% scored Advanced in 2000; the percentage steadily increases and in 2013 the percentage scoring Advanced was 13). The increases for students who qualify for lunch assistance and scored Advanced increased incrementally (0.3% in 2000; 2% in 2013).

However, some researchers have noted that the "percent scoring advanced" measure may mask progress being made by the lowering performing groups (i.e., a group may be increasing performance, but the average performance level may not have reached the cut-off for the advanced achievement level.) As a result, researchers often use 90th percentile scores for subgroups. Figure 2 includes the NAEP Grade 4 math data using 90th percentile scores. From this perspective, the excellence gaps are at best stagnant. After 13 years of significant improvement in scores, assistance-eligible students' 90th percentile scores in 2013 are still significantly below those of non-eligible students in 2000.[5]

These and related data led Plucker et al. (2013) to refer to the existence of a persistent, talent underclass in the United States. Available data suggest that poor American students are not performing at advanced levels and have not done so for generations.[6] With increasing attention to income inequality in the United States, educators and policymakers are beginning to examine the underperformance of talented, economically vulnerable students. What does the research say about acceleration-based interventions for developing academic talents with these students?

Research on Acceleration and Poverty

Although the benefits of acceleration are well-documented (e.g., Colangelo, Assouline, & Gross, 2004; Gross, 2006; Kulik, 2004), very few studies examine youth from economically vulnerable backgrounds and acceleration practices. Students from economically vulnerable families are more likely to come from families who have not attended college or high school; thus these parents might be more likely to encourage vocational placements after school completion and be less likely to advocate for rigorous coursework or acceleration programs in school settings. Furthermore, gifted students from economically vulnerable households could appear to be underachieving and may be less likely to be identified as

[5] *Although we restrict our examples to the Grade Four Mathematics test in this chapter, data trends on other content area tests are similar.*

[6] *One assumption underlying these excellence gap analyses is that comparable percentages of talented students exist across all subgroups of students. This assumption is historically controversial but is less contentious in current debates. But even if our assumption is incorrect, certainly we should still be finding much higher rates of academic excellence among economically vulnerable students.*

gifted (Harris & Plucker, 2014; McCall, 1999). The following section provides a review of the research conducted on acceleration models among economically vulnerable students, using the framework of 18 acceleration types as described in *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo et al., 2004).

Advanced Placement Courses

One of the most researched acceleration models is the Advanced Placement (AP) program. This program includes more than 700,000 students annually in more than 13,000 schools. Students who complete AP courses are better prepared for college course work and have the opportunity to earn college credit depending on their scores on AP exams. However, there are many barriers to success within AP programs (Hansen, 2005). For example, 43% of American high schools do not offer AP courses; this is particularly true of those that enroll a high percentage of economically vulnerable students (Iatarola, Conger, & Long, 2011). Furthermore, there continues to be a large discrepancy regarding the populations enrolled in AP courses. White and Asian students are more likely to be overrepresented, while Latino and African American students as well as those from urban, rural, and economically disadvantaged areas are underrepresented (Hansen, 2005; see also College Board, 2014).

Results from a recent large-scale study looking at gaps among AP course enrollment in Florida high schools shed additional light on this topic. The findings were most discrepant for students that were deemed "poor" and "non-poor." Non-poor students were three times more likely than poor students to take AP or IB courses in each high school subject (Conger, Long, & Iatarola, 2009).

Adelman (2006) found that the greatest predictor of postsecondary success is the completion of mathematics courses beyond Algebra II as well as participation in rigorous academic content such as AP courses. Adelman also found that socioeconomic status (SES) was a less important predictor than rigorous academic preparation. However, the author was careful to mention that children from low SES backgrounds may have less opportunity and family support to demonstrate the characteristics associated with rigorous academic preparation (Adelman, 2006). Students from economically vulnerable backgrounds may begin high school less prepared due to neighborhood characteristics, school resources, and the education received before high school (Conger et al,, 2009), and they may also encounter lower educational expectations or stereotype threat, which can be a barrier to gifted identification and placement.

There have been recent efforts to increase access to AP courses for economically vulnerable and minority students. Although the percentage of students taking these courses has increased over the past decade, other policies impacted non-poor and non-minority students during this same time frame spurring faster growth for these populations. Because of this, there is currently an even wider demographic gap between students from economically vulnerable backgrounds and those from higher socioeconomic status backgrounds than in decades past (Conger et al., 2009).

Grade-skipping

Although the research on grade-skipping among students from economically vulnerable backgrounds is limited, there are a couple of studies that should be highlighted. First, Konstantopoulos, Modi, and Hedges's (2001) study of the National Education Longitudinal Study (NELS) data from 1988 demonstrated that students who skipped grades were more likely to come from higher SES households. Kuo and Lohman (2011) conducted a similar study with the second follow-up data set from NELS-1988, and they found that females, Whites, and students from high SES households were significantly more likely to skip grades earlier in their academic career. The authors concluded that those students who grade skipped early came from families who ensured that their children were highly academically prepared when entering school and may be more likely to advocate for grade-skipping (Kuo & Lohman, 2011).

Dual Enrollment

Morrison (2008) completed a comprehensive study looking at dual enrollment students in high school and community college classes in the state of Iowa. Although the study did not specifically evaluate gifted students, his findings touch on several relevant issues. First, students enrolled in dual enrollment programs have significantly higher GPAs, and they are 1.6 times more likely to graduate from high school. The findings are even stronger for female students as their graduation probability is higher than non-dually enrolled females as well as non-dually enrolled males and dual enrollment males (Morrison, 2008). This study is especially relevant to the population at hand as children from low SES backgrounds are less likely to have parents who attended college and thus may benefit from early college experiences such as those provided by dual enrollment (Conger et al., 2009). In addition, finishing college credits early and having some of them paid for by their school district may reduce financial burden for postsecondary education for these students.

Mentorship

Extremely limited research has been conducted regarding mentorship programs with gifted students from economically vulnerable backgrounds, and almost none of the limited research addresses mentorship as used as an acceleration option. In one of the first studies of its kind, Torrance (1974) created a three-week creativity workshop for gifted youth both in poverty and from affluent families. He found that economically vulnerable children demonstrate as much gifted behavior as more affluent peers after receiving some supports, especially mentorship. In a more recent qualitative analysis of three case studies, Hébert (2010) identified a number of factors that influence success for gifted students from poverty, including receiving mentorship from school staff.

Specific populations are also more likely to benefit from mentorship (Burney & Beilke, 2008). For example, Burney and Cross (2006) found that gifted students in rural areas as well as those in low-income families benefit from mentorship for a variety of reasons. First, they state that these populations are more likely to have inadequate self-efficacy, low self-esteem, and low self-concept. The authors created Project Aspire to improve these constructs with strong results. Part of the Project Aspire model is providing substantial mentorship to these students (Burney & Cross, 2006).

On a positive note, Kitano and Lewis (2005) found that cognitive ability was a supporting factor in developing resiliency among students from poverty. This can be a powerful coping mechanism when faced with adversity. Readers are encouraged to review the work of Goff and Torrance (1999) who have provided a list of strategies to use when mentoring gifted students. However, the few available studies address mentorship of gifted students in general, not mentorship as an acceleration strategy per Colangelo et al. (2004).

Extracurricular Activities

Only one research study was located that evaluated gifted students from economically vulnerable backgrounds and their participation in extracurricular activities. Hébert (2010) identified a number of factors that influence success for gifted students from poverty, including participation in extracurricular activities. Although numerous studies (e.g., Gerber, 1996) have found the impact of extracurricular activities on academic performance to be of large magnitude, more research is needed on gifted students from economically vulnerable backgrounds. Similar to the research on mentorships, the research on extracurricular activities does not specify how participation in extracurricular activities that are accelerative in nature has an impact on students from poverty.

Early Entrance to Kindergarten

Children from economically vulnerable backgrounds are more likely to start school with less academic preparation, leading to excellence gaps before schooling even begins. For example, Lee and Burkam (2002) found that children from low SES families begin school with lower mathematics abilities than children of higher SES families.

Regarding early entrance acceleration models, a study by Leuven, Lindahl, Hessel Oosterbeek, & Webbink (2010) points to the potential importance of early access to schooling. The authors did not focus on high-ability children, focusing instead on a large group of children from the Netherlands who came from "non-vulnerable" and "vulnerable" backgrounds. The authors defined "vulnerable" as children from families with low educational attainment of the mother or father. Increasing enrollment opportunities by one month earlier was found to increase language scores and math scores of four year-olds in the study. In contrast, the non-vulnerable students did not see any test-score benefit from early enrollment. The findings indicate that some achievement gaps may be closed by almost 10 percent if early and sufficient learning opportunities are provided to vulnerable populations. These findings are promising, but we also note that the researchers found the test-score benefits were not apparent two years later (Leuven et al., 2010), a common finding in early childhood research.

Moving Forward: Implications for Research and Practice

Research Implications

As demonstrated above, little research has been conducted on economically vulnerable students and the 18 acceleration models described in *A Nation Deceived* (Colangelo et al., 2004). What little research exists focuses primarily on economically vulnerable students' lack of access to acceleration strategies; the literature is almost completely silent on how these students perform in various acceleration strategies. Additionally, studies that conflate race and ethnicity with poverty make it difficult to determine the role of each of these complex constructs in the education of these students.

Some of these under-researched areas should soon produce helpful data. For example, dual enrollment programs are proliferating across the country, and increasing amounts of research should soon be available about the impact of dual enrollment programs on economically vulnerable students, and those students' experiences with those programs.

At a 2006 leadership conference on low-income students sponsored by the National Association for Gifted Children (NAGC), panels of experts identified four areas of needed research: (1) identification of specific characteristics of various accelerative interventions that result in enhanced student success; (2) evaluation of various assessments to determine which assessments are best for this population; (3) determination of the trajectory of identified and unidentified high-ability students from economically vulnerable backgrounds; and (4) determine the "dose" (see Wai, this volume) of enrichment, both in and out of school, that is needed to effectively impact student retention in advanced academics (National Association for Gifted Children, 2006). With the four areas of needed research indicated, it is a tremendous understatement to conclude that substantially more research is still needed to fully understand the impact of acceleration (or the lack of it) on students from economically vulnerable backgrounds.

Implications for Practice

There is a stark discrepancy between the educational preparation of economically vulnerable children and those from more economically secure backgrounds. The excellence gaps among these groups of students begin early and are not easily remedied. In 2012, the Jack Kent Cooke Foundation and NAGC held a symposium on low-income, high ability students, accompanied by the publication of the report, *Unlocking Emergent Talent: Supporting High Achievement of Low-Income, High-Ability Students* (Olszewski-Kubilius & Clarenbach, 2012). Among the recommendations was providing a range of academic and social supports for low-income students, removing barriers to gifted education services, and conducting more extensive research on targeted interventions. A P-20 approach[7] to service delivery for talented, economically vulnerable students would appear to be a wise approach, given the potential for these students to get "lost in the cracks" during transitions between educational levels (Chamberlin & Plucker, 2008; Roberts, 2008).

We find the removal of barriers to be especially important, but we also caution that removing barriers to participation may be more difficult than expected. For example, some acceleration options may involve a need for transportation, yet economically vulnerable students may not have access to easy or reliable transportation beyond their neighborhood (Andersson, Haltiwanger, Kutzbach, Pollakowski, & Weinberg, 2014; Kain, 1992). An economically secure family may be able to jump in one of the family cars and make a quick, 15-minute trip to participate in a special program, but a student living in poverty may need to make a much longer, potentially unsupervised trip via public transportation taking an hour or more each way (if public transportation is even available in their community; see Kneebone, 2014, on the increasing concentration of suburban poverty).

Others have suggested that internet-based programming is one way to avoid transportation issues, which on its surface makes sense. But given recent research about economically vulnerable students often not having the necessary media literacy skills to complete online instructional activities (e.g., Leu et al., 2014), the success of online interventions may also be limited. As McWilliams and Plucker (2014) noted, if large excellence gaps exist on skills and competencies addressed in most formal classroom settings, excellence gaps in areas such as new media literacy and other 21st century skills could be expected to be even larger (see also Hardesty, McWilliams, & Plucker, 2014). Skills necessary for future success could become the domain of already-privileged groups of students, exacerbating existing excellence gaps and further solidifying the persistent talent underclass.

Conclusion

As described above, the United States is, paradoxically, an incredibly wealthy and very poor country: by some estimations, roughly half of American K-12 students are economically vulnerable. Many of these students are academically talented, yet excellence gap data suggest that economically vulnerable students lag far behind their economically secure peers in academic achievement.

On the one hand, interventions based on acceleration may be effective for promoting advanced achievement among high-ability, poor students. In particular, acceleration strategies involving distance education technology hold promise because they do not rely on resources in the students' schools, which are often poorly resourced and provide little programming for high-ability students.

On the other hand, there are reasons to question whether certain acceleration strategies would be effective with this population of talented students. Recent research provides evidence that many students attending high poverty schools do not have many of the technological skills necessary to

[7] *The P-16 educational initiative refers to the grades included, from preschool through the postsecondary undergraduate years. These efforts may be called P-20 to emphasize the importance of preparing highly skilled workers beyond an undergraduate education. Activities may include collaborations among state agencies, state legislatures, and businesses that link preschool, K-12, and higher education (Chamberlin & Plucker, 2008).*

benefit from internet-delivered programs. However, much of this research has been conducted with mixed ability populations, making it difficult to determine the extent to which the many debilitating correlates of poverty (e.g., lack of access to reliable transportation, healthcare, well-resourced schools, and technology, among many other issues) impact the use of acceleration with economically vulnerable students.

Further complicating the issues, we find little empirical evidence that the efficacy of most acceleration strategies has been examined when used with poor students. A great deal of research is needed in this area, and given the number of economically vulnerable students in the United States, this may be among the most fruitful and beneficial areas for future acceleration research.

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Acceleration Practices With Twice-Exceptional Students

Megan Foley-Nicpon & Charles Cederberg
The University of Iowa, Iowa City, Iowa

Abstract

Twice-exceptional students are defined as those who “demonstrate the potential for high achievement or creative productivity in one or more domains … and who manifest one or more disabilities as defined by federal or state eligibility criteria” (Reis, Baum, & Burke, 2014, p. 222). Due to co-existing high abilities and disabilities, a challenge is presented for educators to accurately identify and subsequently provide effective accelerative academic services for twice-exceptional students. Recognition for the importance of investigating and nurturing the talents of twice-exceptional students has increased within both research and applied educational settings, although empirical investigation efforts lag behind this recognition (Foley Nicpon, Allmon, Sieck, & Stinson, 2011). Likewise, students who receive Individualized Education Plans (IEPs) or 504 Plans may be overlooked for accelerated or talent development programming if the focus is solely on the students’ disabilities. The purpose of this chapter is to investigate the current literature as it pertains to twice-exceptionality and acceleration opportunities, and provide recommendations for educators to foster students’ talent domain development. As momentum builds among leaders in the field to include acceleration as an educational option for twice-exceptional students (Reis et al., 2014), the authors leverage this momentum to garner positive change for twice-exceptional students nationwide.

Introduction

In 2004, Nicholas Colangelo, Susan Assouline, and Miraca Gross published *A Nation Deceived: How Schools Hold Back America’s Brightest Students.* This two-volume report on acceleration opened the eyes of the nation to the benefits and complexities of acceleration as a curriculum option for high ability students. The second volume of the report detailed the research support for various acceleration practices with different populations. Sidney Moon and Sally Reis (2004) wrote the chapter on acceleration with twice-exceptional students, a potentially overlooked educational consideration for gifted students with disabilities. Moon and Reis established the foundation for our review of a decade of acceleration research advances in educational practice with this unique population of learners.

Definition of Twice-Exceptionality

Twice-exceptional students are those who “demonstrate the potential for high achievement or creative productivity in one or more domain... and who manifest one or more disabilities as defined by federal or state eligibility criteria” (Reis, Baum, & Burke, 2014, p. 222). Those with high achievement or ability are commonly referred to as “gifted,” a socially constructed label used to describe a heterogeneous group of individuals who display talent in one or more domains (Pfeiffer, 2013). As a field, there is increasing knowledge of genetic and biological markers to diagnose disabilities and psychological disorders, yet social and environmental influences remain important (American Psychiatric Association, 2013). Given these circumstances, clinicians and educators should approach working with twice-exceptional students from the perspective that being “gifted” as well as presenting with an educational, medical, psychological, or biological condition, helps describe aspects of identity that inform treatment or intervention, not one’s identity in its entirety.

In addition to the heterogeneity among students identified as “gifted,” so too exists heterogeneity across varying definitions of “giftedness” among scholars. Some educational researchers ascribe to the 1978 federal definition of giftedness that includes multiple criteria outside narrow parameters related to tested intellectual ability: *“Youth, who are identified at the preschool, elementary, or secondary level as possessing demonstrated or potential abilities that give evidence of high performance* *capability in areas such as intellectual, creative, specific academic, or leadership ability or in the performing and visual arts who by reason thereof require services or activities not ordinarily provided in school"* (An Act to Extend and Amend Expiring Elementary and Secondary Education Programs, and for Other Purposes, 1978). Others argue the giftedness construct requires a more focused definition, including a minimum cut-score of 120 on standardized ability testing (Lovett & Sparks, 2011). Those who study twice-exceptionality (e.g., Reis et al., 2014) advocate for an inclusive, broad definition that incorporates both the federal definition and more comprehensive definitions, such as Renzulli's 3-Ring Conception of Giftedness (Renzulli, 2005), which considers leadership, task commitment, and creativity. The diversity among twice-exceptional students and concurrent definitions of giftedness complicates educators' capacity for identifying and subsequently providing effective accelerative academic services for this group of learners.

Debates abound regarding the prevalence of twice-exceptionality because no formal system exists for tracking occurrence. Most recent data from the U.S. Department of Education, National Center for Education Statistics (2013), indicates that 6,419,000 students were served under the Individuals with Disabilities Education Act (IDEA) during the 2010 – 2011 school year. If one considers that approximately six percent of this population is also academically gifted, that equates to 385,140 twice-exceptional children. This number, however, is likely an underestimate because twice-exceptional students who are served through 504 plans (methods for providing accommodations for individuals with disabilities who are not served under IDEA, granted by the Rehabilitation Act, 1973) would not be factored into this total (Assouline & Whiteman, 2011). Additionally, not considering individual differences in performance can be problematic in both identification and intervention (Foley Nicpon et al., 2011; McCallum, Bell, Coles, & Miller, 2013). That is, failing to note a student's individual pattern of score discrepancies may lead educators to misinterpret the findings. For instance, McCallum et al. (2013) found the Response to Intervention (RtI) model used by the majority of school systems in the United States for identifying and providing services for students with specific learning disabilities in reading or math to be potentially inadequate for twice-exceptional students because they may not score "low enough" on curriculum-based assessments to be eligible for services. As a result, these students may not be considered for acceleration programming options or for remediation in their areas of growth.

Empirical Investigation of Acceleration Practices with Twice-Exceptional Students

In recent years, the number of empirical studies examining twice-exceptional students has increased, but continues to fall below the need for such studies (Foley Nicpon, et al., 2011). This need is grounded in the fact that without empirical evidence establishing best practices, twice-exceptional students will be identified and serviced based on non-empirical methods. Well-intentioned educators could therefore be implementing procedures that in actuality are not effective for the twice-exceptional learner. Furthermore, a focus on acceleration as a curricular option has not been common (Foley Nicpon et al., 2011; Moon & Reis, 2004), possibly because some twice-exceptional students, especially gifted students with learning disabilities, tend to be retained rather than accelerated (Reis, 1995). Yet, leaders in the field call for including acceleration as an educational option for twice-exceptional students in order to foster development of their talent domains (Reis et al., 2014).

Acceleration utilization. Findings from researchers studying acceleration options among twice-exceptional students offer insight into how acceleration is implemented in U.S. schools. Olenchak's (1995) study examining a special program for gifted students with learning disabilities found approximately 25% of their population participated in advanced educational opportunities and reported a positive self-concept and attitude toward school. Yet, these types of specialized programs are not commonly available. For example, Willard-Holt, Weber, Morrison, and Horgan (2013) found through structured interviews that twice-exceptional students perceived their school's environment as insufficient in terms of providing them assistance with achieving their learning potential.

One issue that may be critical to receiving services for both exceptionalities is the order in which the exceptionalities are identified. For example, students who receive IEPs or 504 Plans may be overlooked for accelerated or talent development programming. Crim, Hawkins, Ruban, and Johnson (2008) examined the IEPs of over one thousand students identified with a specific learning disability (SLD); of these, 112 obtained an ability score of 116 or above but *not one* received talented and gifted services or a recommendation for participation in accelerated curriculum. This suggests that if a student obtains special education services first, there is little to no chance he or she also will be considered for gifted education services. Lack of teacher awareness that students with learning disabilities can participate in accelerative educational opportunities limits twice-exceptional students' utilization of such services (Schultz, 2012).

Acceleration with students with specific types of disabilities. Substantial diversity of diagnostic background exists among twice-exceptional students. Along with identified talents, twice-exceptional students possess any one of a number of learning, psychiatric, neurodevelopmental, behavioral, or physical disabilities. Due to this heterogeneity among twice-exceptional learners, accelerative curricula should be thoughtfully tailored to address talent domains as well as the specific manifestations of the student's particular disability (Assouline, Foley Nicpon, & Huber, 2006; Assouline & Whiteman, 2011).

Despite this need for specialized education strategies, few researchers have investigated issues related to acceleration among specific populations of twice-exceptional students. For verbally gifted learners with dyslexia, Berninger and Abbott (2013) recommend focusing on a combination of building oral word reading, written spelling, and working memory skills within intellectually engaging lesson plans to help cultivate a student's verbal talents and not just their disability. Fugate, Zentall, and Gentry (2013) discovered gifted students with ADHD demonstrated higher levels of creativity than their gifted peers without ADHD, in spite of their working memory deficits. The authors suggest these students might benefit from academic programming that focuses on tasks related to divergent thinking and problem-based learning rather than long-term memory activities that rely on the recollection of facts. Harnessing creativity within an educational setting for this specific demographic of twice-exceptional students might be beneficial as a pathway to accelerated learning across multiple subject areas. Two additional case study analyses of gifted boys with ADHD (Zentall, Moon, Hall, & Grskovic, 2001; Moon, Zentall, Grskovic, Hall & Stormont, 2001) suggest that the participants' academic needs were met by access to acceleration opportunities, but at the same time, their social/emotional and behavioral needs must be addressed for them to be successful in these advanced academic environments.

Acceleration models. The specific diagnosis that has received the most attention in the literature is learning disabilities, and Susan Baum and her colleagues have completed most of the work examining accelerated curricula options (Baum & Owen, 2004; Baum, Schader, & Hébert, 2014). Their model, the *Multiple Perspectives Process Model* (MPPM; Baum et al., 2014), is a strength-based, talent-focused approach that is advantageous to twice-exceptional student growth in a number of key domains related to social, emotional, and cognitive skills (Baum et al., 2014). Educational strategies are tailored to align with twice-exceptional students' unique profiles of intelligence, cognitive style, and learning preferences. Through emphasizing and developing specific identified talents, twice-exceptional students are provided the means and encouragement to explore and express their unique abilities and interests within and outside the curriculum (Baum et al., 2014). Twice-exceptional students who are exposed to educational environments where the focus is on talent development rather than on disability remediation demonstrate increased engagement and success in school (Baum et al., 2014; Baum & Owen, 2004).

Positive relationships and mentoring opportunities with teachers are valuable in building confidence for learners to seek out and thrive in challenging academic environments (Schultz, 2012). The MPPM provides a blueprint for this process by helping educators conceptualize twice-exceptional students' needs to inform curriculum and instruction decisions. The MPPM assesses variables related to the following criteria: gifts, talents, and interests; learning differences; social and emotional readiness; and family context (Baum et al., 2014). Schools can also employ systemic supports to twice-exceptional students through offering enrichment, acceleration, and talent development services within and outside the confines of the academic curriculum. Baum and colleagues (2014) found the MPPM effective in aligning curriculum through a tiered approach based on twice-exceptional student readiness, interests, strengths, talents, and learning profiles. The first tier includes activities proposed to expose and engage students in a particular topic and can include field trips, demonstrations, and films. The second tier includes specific skill-building instruction essential to learning, including self-regulation, critical thinking, and communication skills. The third tier includes a unique approach to accurately assess the performance of the student. The benefit of this model is twofold: first, the curriculum is presented in a challenging manner; second, alternative methods for accessing advanced content are presented to better allow for choice and demonstration of learned skills (Baum et al., 2014).

Acceleration in high school settings. For many students, access to accelerative opportunities increases as they enter high school due to the proliferation of Advanced Placement (AP) and International Baccalaureate (IB) programs. For the twice-exceptional high school student, however, this access may be questionable. High school is an especially vulnerable time for these students. They may not have developed the executive functioning skills necessary for increased educational independence or the self-concept it takes to enroll in advanced coursework. They may not have the pre requisite coursework necessary for AP consideration. In her 2012 study, Schultz identified several issues pertinent to providing successful AP programming for twice-exceptional students. First, school culture was a critical factor in determining whether a twice-exceptional student was considered appropriate to enroll in an AP course. For example, many participants did not meet a particular school's selection criteria (often an inflexible, minimum GPA). This parallels the typical elementary school "one-size-fits-all" programming for the generally gifted child and offers an inappropriate, yet commonly used rationale for excluding twice-exceptional students. Second, school size was important. Smaller schools were more likely to enroll twice-exceptional students in AP courses than were larger schools. It was believed that, in smaller settings, educators were better able to identify talent domains in students who may not meet a specific cut-score requirement. Third, even if a twice-exceptional student was enrolled in an AP course, he or she did not always receive identified accommodations, despite the presence of an IEP or 504 Plan. Fourth, twice-exceptional students benefited from taking college-level courses within more structured environments, which are often provided in high school, to ease the transition to greater independence in college and university settings. In summary, Schultz (2012) described the many benefits of allowing twice-exceptional high school students to participate in advanced curricular opportunities, but highlighted the need to provide an accommodated environment to help them be successful. For example, if a student's 504 Plan states he or she should have time and a half on tests and quizzes, this should also apply in his or her AP class.

Willard-Holt and her colleagues (2013) offered additional suggestions to help high school twice-exceptional students to be successful in advanced academic settings. Specifically, these adolescents may assume greater ownership over their learning if offered more choice and flexibility in selecting topics, methods of learning, expectations for assessment, pace, and implementation of group collaboration. Another helpful accommodation to an accelerative strategy might be to allow twice-exceptional students the option to suggest projects congruent with their individual learning styles and interests while still meeting competency standards and curriculum expectations. Assisted use of technology that addresses weaknesses and promotes higher-level learning might also enable them to flourish.

Research Findings from the Belin-Blank Center's Assessment and Counseling Clinic

Starting in 2004, the Belin-Blank Center's H.B. and Jocelyn Wallace Assessment and Counseling Clinic (ACC), a comprehensive assessment, therapy, and consultation service, began specializing in twice-exceptionality. The ACC team realized a large percentage of clients represented a unique group of gifted learners who were sorely underserved in research and clinical arenas. Since that time, the ACC has incorporated research into its overarching mission of providing comprehensive services to twice-exceptional students, their families, and their educators. While acceleration has not been a central focus of this research to date, demographic data acquired from various samples provides information that can guide educational intervention.

One key finding from the ACC research is that access to accelerative options for twice-exceptional students may depend on a student's specific disability. For example, according to data from a 2005 – 2008 Javits funded project where 76 gifted students obtained comprehensive evaluations to determine whether they had a specific learning disability (SLD) or an autism spectrum disorder (ASD), participation in acceleration and/or gifted and talented programming varied (Assouline, Foley Nicpon, & Dockery, 2012; Foley Nicpon, Assouline, Amend, & Schuler, 2010; Foley Nicpon, Assouline, & Fosenburg, 2014). Of the 76 participants (grades kindergarten through 12), 41 had a primary diagnosis of ASD, 24 had a primary diagnosis of SLD, five were diagnosed with ADHD and/or Obsessive Compulsive Disorder, and the rest (six) had symptoms of ASD, but not to a level that was deemed diagnostic. As is reported in Table 1, most of the twice-exceptional students who were accelerated had a diagnosis of ASD. It is notable that close to half (42%) of this group had some form of acceleration in their academic programming, which is far greater than expected for more typical high ability students (Colangelo et al., 2004; Wells, Lohman & Marron, 2009). Additionally, the timing of the whole-grade acceleration varied. Two students moved mid-year from second to third grade, one skipped fourth grade, and one skipped sixth grade. Subject acceleration was in all areas: math, reading, English, and science, with generally equal representation across subject domains.

Participants also self-reported involvement in talented and gifted and special-education programming. Close to 60% of students referred (N = 45) participated in enrichment programming, but enrichment participation rates varied somewhat across diagnostic categories. Involvement in special education services was far less; only 15 students (20%) self-reported some type of special education or accommodation plan.

In a separate study that examined the psychosocial functioning of gifted students with ADHD (Foley Nicpon, Rickels, Richards, & Assouline, 2012), investigators gathered similar data on school services. Table 2 reveals that participants consisted of 112 gifted students, 54 of whom had co-existing

Table 1: Acceleration, Gifted and Talented, and Special Education Participation Rates in Belin-Blank Center Javits Project Participants

Diagnosis	Total Number	Whole-Grade Accelerated	Single-Subject Accelerated	Gifted/Talented Participation	Special Education Services
ASD	41	4 (10%)	16 (39%)	25 (61%)	9 (22%)
SLD	24	0	3 (13%)	12 (50%)	4 (17%)
ADHD/OCD	5	0	1 (20%)	3 (60%)	1 (20%)
Sub-diagnostic ASD	6	0	2 (33%)	5 (83%)	1 (17%)
TOTAL	**76**	**4 (5%)**	**22 (29%)**	**45 (60%)**	**15 (20%)**

ADHD. Of this group of students, 63% of parents reported their child as receiving one or more forms of acceleration and 72% of parents sought talented and gifted programming for their children. Conversely, only two parents (four percent) reported their children received special education services or accommodation plans, and these two children also participated in talented and gifted programming. Of the 58 gifted students without a diagnosis, 62% of parents reported their children received one or more forms of acceleration, which is almost identical to what was reported by the parents of gifted children with ADHD. A slightly smaller number of parents of gifted children reported participating in talented and gifted programming than the parents of gifted children with ADHD.

Examining the acceleration patterns of twice-exceptional students referred to the Belin-Blank Center's ACC produces interesting findings. First, in general, the sample of twice-exceptional children had far greater access to accelerated opportunities than what is observed in the general population (Colangelo et al, 2004; Wells, Lohman & Marron, 2009) and appeared to take advantage of it. In fact, Wells and colleagues (2009) found less than one percent of students from the National Educational Longitudinal Study (NELS) and less than 0.01% of students from the Educational Longitudinal Study (ELS) datasets were whole-grade accelerated. The ACC's percentages were significantly higher, which may be due to selection bias. That is, the ACC is housed in a comprehensive center for gifted students, known to most regional educators with a gifted specialty. It may be that this sample was more likely to be referred by those who are more familiar with twice-exceptionality and acceleration as a curriculum option. The students may participate in the Center's programs and also may be in gifted education settings where teachers recognize they are talented, but also have undiagnosed educational, behavioral, or developmental difficulties. In fact, the majority of gifted educators who participated in Foley Nicpon, Assouline, and Colangelo's (2013) national twice-exceptional needs assessment felt "somewhat confident" or "very confident" about making an appropriate referral to rule-out a potential disability in the current educational climate, gifted educators could hold the key to twice-exceptional students' access to accelerative opportunities.

A second important finding was that the majority of the participants in the ACC's samples were not receiving IEP or 504 Accommodation plans. This, again, may be due to selection bias, or because of limited awareness about twice-exceptionality outside of gifted education domains (Foley Nicpon et al., 2013). Gifted identification takes place in the schools, whereas disability identification takes place both in schools and mental health clinics (Assouline & Whiteman, 2011). Therefore, special education teachers may be less likely to refer a student with ADHD, for example, to a clinic specializing in gifted and talented evaluations because they presume the identification will take place at the child's school. Further research is required to tease out these nuances and determine how to increase access to accelerative educational opportunities for twice-exceptional students who are ready for additional challenge in their talent domains.

Researchers examining acceleration options for twice-exceptional students have demonstrated it is an effective means of challenging this group of learners, but must be accompanied by relevant accommodations related to the student's identified disability. Additionally, students may be more likely to receive services for both their talents and their disabilities if they are first identified as "gifted." Educators of the gifted are astute authorities when it comes to identifying and serving twice-exceptional learners, but educational professionals outside the field have less exposure to and experience with this population. Finally, it seems evident that accelerated programs, schools, and classes are better able to identify and serve twice-exceptional students if they maintain a supportive, flexible, and holistic approach to all students' learning.

Table 2: Acceleration, Gifted and Talented, and Special Education Participation Rates in Belin-Blank Center Javits Project Participants

Group	Total Number	Whole-Grade Accelerated	Single-Subject Accelerated	Gifted/Talented Participation	Special Education Services
Gifted with ADHD	54	6 (11%)	28 (52%)	39 (72%)	2 (4%)
Gifted with no diagnosis	58	6 (10%)	30 (52%)	35 (60%)	0
TOTAL	**112**	**12 (11%)**	**58 (52%)**	**74 (66%)**	**2 (2%)**

Recommendations

What follows are practical, research-based strategies for implementing acceleration options with twice-exceptional students. Attending to individual differences based on students' talent domains and areas of difficulty is crucial; a "one size-fits all" approach is not recommended, given the extraordinary variability in how twice-exceptionality manifests. These considerations are places to start as educators and parents develop individual education plans to meet students' needs.

Offer Professional Development Opportunities Outside of Gifted Education

Outside of gifted education, twice-exceptionality is not a known concept (Foley Nicpon et al., 2013), which may explain why not many students who first enter the special education domain are referred for gifted education (Crim et al., 2008). Knowledge and awareness of a phenomenon is necessary before adequate services can be recommended. In professional development trainings, considering acceleration in its numerous forms as a curriculum option is crucial toward creating a culture where diverse learners are given opportunities for advanced learning (Schultz, 2012). Raising awareness about the unique needs of twice-exceptional students in accelerated learning environments is a fundamental first step for providing necessary support. It also decreases the potential for teachers to explicitly or implicitly "shame" and/or exclude twice-exceptional students, and helps build a welcoming environment where they can gain confidence in their abilities and performance.

Professional training for educators can also increase their sensitivity for recognizing the gifts, talents, and interests; the specific learning differences; and the social and emotional readiness of twice-exceptional students (Baum et al., 2014). In developing this sensitivity, teachers will subsequently foster equity among students and provide the necessary accommodations all may need to succeed (Schultz, 2012). Building professional capacity to identify and meet the unique academic needs of twice-exceptional learners requires what Baum et al. (2014) describe as a tolerance for asynchrony, or helping teachers develop patience and acceptance for different student needs. Greater educator awareness for the unique needs of this population also improves capacity for cross-collaboration among gifted, general education, and special education teachers (Schultz, 2012).

Recognize Individual Differences

As already emphasized, decisions regarding acceleration options for all students should be individualized. Tools exist to aid in this process, such as the *Iowa Acceleration Scale* (IAS; Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009). The IAS is a comprehensive decision-making instrument that is ideal for educators considering acceleration for all high-ability students. What makes it applicable to the twice-exceptional population is that it affords an objective, documented analysis of the student's strengths and weakness. The IAS also provides a structure for recording data to review in the decision-making process, including guidelines for considering the relative importance of the data. It offers a numerical range of appropriateness for various models of acceleration and gives examples of students who have been successfully accelerated.

Students' psychosocial presentations are relevant to the acceleration decision-making process, independent of their "gifted" and disability designations. For example, mindset, a term coined by Carol Dweck (2006), helps explain a person's perceptions of their abilities. Students with "fixed mindsets" perceive their talents and deficits as static, whereas students with "growth mindsets" perceive their talents and deficits as malleable. A twice-exceptional student with a fixed mindset who believes she is gifted but poor at math (despite evidence to the contrary) may be reluctant to try advanced math curriculum (Pfeiffer, 2003). Alternatively, a twice-exceptional student with a growth mindset may be up for the academic challenge and acknowledge that hard work and perseverance can help her succeed in accelerated arenas. Some have argued that Dweck's theory should be modified for gifted children such that a fixed approach to one's abilities is adaptive as long as one assumes a growth approach to one's deficits (Ziegler & Stoeger, 2010). The same may be true for twice-exceptional students.

The mindset phenomenon, however, has limited empirical support among gifted students. One study with gifted students in Hong Kong (Chan, 2012) found that students with unhealthy perfectionistic styles were more likely to have fixed mindsets than those with healthy or non-perfectionistic styles. Assouline, Colangelo, Ihrig and Forstadt (2006) looked at patterns of success and failure among gifted students, and determined that successes were more likely to be attributed to effort and ability, and failures were attributed to effort and task difficulty. While not yet empirically examined with twice-exceptional students, it may be important for a clinician or educator advising a student about acceleration options to consider the student's mindset. Even though mindsets are typically stable, they can be changed through specific intervention, and assuming a growth mindset can positively influence academic effort in at-risk students (Sriram, 2013) and may do the same for the twice-exceptional learners.

Once accelerated, it is important to remember that learning pace and style will be as individualized as twice-exceptional students themselves. Findings from a qualitative examination of successful matriculation among students attending a specialized, private school, twice-exceptional students' learning trajectories were variable, depending on the student's strengths and areas of growth (Baum et al., 2014). While possessing advanced reasoning skills, many gifted students are slower processors, which may affect their rate of knowledge acquisition (Assouline et al., 2012). Slower processing is not reason enough to avoid exposure to accelerated environments, but it is necessary to accommodate. Several other twice-exceptional students may struggle with executive functioning, or planning, time-management, organization, and self-regulation skills. As noted by Russel Barkley, an internationally known authority on ADHD in children, adolescents, and adults, executive functioning is delayed in many neurodevelopmental disorders, including ADHD and ASD (Barkley, 2005, 2012). Therefore, measuring performance, or success, on factors impaired by executive functioning (e.g., not labeling a math problem, not completing all the items) does not portray an accurate picture of the student's abilities. Recognizing and planning for these individual differences is crucial to creating a welcoming classroom where challenge is offered regardless of learning style or pace.

Accelerate and Remediate from a Strengths-Based Perspective

As multiple scholars have noted (McCoach, Kehle, Bray, & Siegle, 2001; Olenchak & Reis, 2001; Reis, Burns, & Renzulli, 1992), it is preferable to provide accelerated curriculum options (including curriculum compacting; see Southern and Jones, this volume) in a twice-exceptional student's talent domain, while at the same time providing accommodations and/or remediation in their areas of growth. Accommodations can, and should be, addressed from a strengths-based perspective.

Ample evidence points to the benefits of addressing students' talent domains primarily and the students' areas for growth secondarily (Baum et al., 2014; Baum, Owen & Dixon, 1991; Olenchak, 1995; Neihart, 2008; Reis, Neu, & McGuire, 1995. As Baum and colleagues noted (2014), this stance, based in positive psychology (Seligman & Csikszentmihalyi, 2000; Seligman, Ernst, Gillham, Reivich, & Linkins, 2009), is advantageous to the psychological and academic development of all children, including the twice-exceptional. In comparison to a deficit or medical model, where disability is the primary concern (Hughes, 2009; Olkin, 2004), the talent development approach helps children focus more on what they can do well, rather than the area in which they struggle.

A specific example is Baum et al.'s (2014) MMPM model, which identifies needs and builds student growth along five factors of psychological safety, tolerance for asynchrony, time, positive relationships, and consistency of curriculum implementation. Cultivating an academic environment that discouraged "shaming" and "exclusion" helped increase twice-exceptional learners' feelings of psychological safety. Providing students the necessary time to grow talents and skills related to deficits helped decrease student anxieties about their struggles to perform at grade level. Baum et al. (2014) also found teachers who prioritized developing relationships with twice-exceptional students and provided consistent implementation of the strength-based model helped facilitate positive outcomes for twice-exceptional student acceleration. These outcomes included developing positive social skills with peers and teachers; overcoming some social, emotional, and cognitive challenges; and building expertise in areas of talent.

Provide Accommodations in Accelerated Settings

Crucial to the successful acceleration of twice-exceptional students is the affordance of accommodations in the challenging educational environment. That is, IEP or 504 Accommodation plans are legally bound in all classrooms, including accelerated ones. It is very likely that a twice-exceptional student who enters an accelerated math class may still require, for example, assistance with executive functioning skills. Even though the student understands and can successfully complete advanced algebraic equations, he still may forget to turn in work by the deadline, complete all the problems assigned, or finish all the test questions in the time allotted. Therefore, accommodations likely will still be needed, especially to foster self-efficacy and avoid embarrassment, criticism, or lowered self-esteem (Baum, Rizza, & Renzulli, 2006; Schultz, 2012). The primary goal should be to establish accommodations that allow the evaluation to be based on content acquisition and knowledge rather than on deficits related to one's disability status (e.g., not completing all items, not turning in work on time, etc.). These life skills are necessary to learn but should be independent of a grade in Advanced Placement Psychology or Honors Chemistry.

Build Parental and Educator Awareness of Public Policy

School districts may inadvertently possess educational cultures that limit the accessibility of accelerated environments for twice-exceptional students. These might be due to rigid, "one-size fits all" entrance policies, inconsistent adherence to accommodation plans, or misinterpretation of policies by relevant school professionals. Consistent across the literature, scholars recommend professional development for educators, including those of accelerated programs, to be adequately informed about the required implementation of IEP and 504 Plans. All educators must acknowledge and accept the legal obligation for special accommodations afforded to qualified students through these plans (Schultz, 2012).

Knowing relevant policy and law is imperative for parents as they advocate for their twice-exceptional child. Historically, parents have played a pivotal role in building public awareness and advocating for reform and special education legislation (Schultz, 2012; Speirs Neumeister, Yssel, & Burney, 2013; Soodak, 2004). Advocating for acceleration opportunities early affects later chances to attend Advanced Placement and for-college-credit classes (Shultz, 2012). Unfortunately, these advocacy efforts are commonly paired with significant financial burden (Speirs Neumeister et al., 2013), which may be another way twice-exceptional students are unintentionally excluded. Parents are better able to successfully advocate for their children's needs when provided with informational guides that outline their rights, relevant laws, and strategies for working with school professionals.

Conclusion

Since the review by Moon and Reis (2004) of the state of twice-exceptionality and acceleration, positive strides have been made in both research and applied educational settings. Nevertheless, a significant need persists in effectively identifying and nurturing the unique talents of the twice-exceptional. Educators possess significant potential for effectively serving these students through the curricular and instructional approaches they employ. Calling for school districts and educators to fulfill the obligations of existing laws in accelerated environments, such as providing necessary accommodations for gifted learners with disabilities, is a crucially overlooked need. Additionally, empowering parents to advocate for new public policy initiatives that usher positive outcomes for twice-exceptional learners in acceleration settings is imperative. Finally, additional empirical evidence that identifies best practice in terms of acceleration options that are most effective relative to the exceptionality is necessary. Through prioritizing services for students to concentrate more on their apparent strengths rather than weaknesses, we might better empower and promote the unique talents of this exceptional group of learners.

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Radical Acceleration

Jae Yup Jung and Miraca U.M. Gross
Gifted Education Research, Resource, and Information Centre (GERRIC)
The University of New South Wales, Sydney, Australia

Abstract

Radical acceleration, which refers to any combination of procedures that results in a student graduating from high school three or more years earlier than is usual, is an intervention that meets the educational needs of the most highly gifted students. The emerging research in the area suggests that a program of radical acceleration usually involves multiple acceleration options, and typically results in positive academic, socio-emotional, career, and life outcomes for radically accelerated students. Nevertheless, some disadvantages of radical acceleration have also been identified, and a small number of radical accelerands appear to drop out of their studies. A number of suggestions are made for possible ways to increase access to radical acceleration interventions for highly able students, improve selection criteria, minimize the number of unsuccessful radical accelerands, and optimize the practice of radical acceleration.

Introduction

Radical acceleration may be defined as any combination of procedures that results in a student graduating from high school three or more years earlier than is customary (Stanley, 1978). Generally, radical acceleration does not arise from a single three-year grade skip, but through the cumulative effect of a variety of acceleration options including early school entry, subject matter acceleration, grade-skipping, dual enrollment, special courses, mentors, Advanced Placement, exams for college credit, and early college entry, over a period of time. When thoughtfully planned and carefully monitored, it is a very useful educational intervention for the most highly gifted students who also are socially and emotionally mature (Gross & van Vliet, 2005). Educational interventions that are limited to enrichment or moderate degrees of acceleration, such as a single grade skip, may be inappropriate and unsuccessful for many highly able students, as they are unlikely to meet the needs of these students.

Research Background

There have been only a limited number of scholarly investigations on radical acceleration to date, reflecting the generally restricted use of the practice in schools and the small numbers of radical accelerands[1] who may be accessible to researchers (Gross & van Vliet, 2005; Janos, Robinson, & Lunneborg, 1989). Nevertheless, the emerging body of research on the topic, from diverse sources, has produced some useful findings. Apart from a few studies and reviews that focus specifically on radical acceleration (Charlton, Marolf, & Stanley, 1994; Gross, 1992; Gross & van Vliet, 2005), radical acceleration is addressed, to varying degrees, in the body of research on highly gifted students (Gross, 1993, 2004; Muratori, Stanley, Ng, Ng, Gross, Tao et al., 2006) and research on various early college entrance programs around the world (Hertzog & Chung, 2015; Janos & Robinson, 1985; Janos et al., 1989; Noble, Arndt, Nicholson, Sletten, & Zamora, 1999; Noble, Robinson, & Gunderson, 1993; Noble & Smyth, 1995; Noble, Vaughan, Chan, Childers, Chow, Federow et al., 2007; Robinson & Janos, 1986).

A number of research designs have been utilized in the research on radical acceleration. Many studies have adopted case study or related designs. For example, Charlton et al. (1994), detail the experiences of 14 radical accelerands and their long-term academic and social outcomes using a case study approach. Gross (1993, 2004) also adopted a case study design in her 20-year longitudinal study of 60 profoundly gifted children (of which 17 were radically accelerated), as did Galton (1869) and Cox (1926) in their retrospective studies of

[1] *The term* accelerant *is often used to describe a student who has been accelerated. However, correctly used,* accelerant *denotes an agent that instigates acceleration. The authors believe that* accelerand *is a more appropriate term to denote students who have been accelerated.*

highly accomplished adults. Similarly, Young (2010) adopted a case study design in her investigation of 12 Australian early college entrants, five of whom were accelerated by three or more grades, or accelerated by at least three years in at least one subject area.

The bulk of the research on radically accelerated early college entrants, undertaken by Janos and Robinson in the 1980s, and Noble and her colleagues from the 1990s (Hertzog & Chung, 2015), were participants of a cohort acceleration program at The University of Washington, where approximately 16 students are accelerated as a group every year. These cohort studies have tended to investigate the academic, socio-affective, and life outcomes of up to approximately 100 radical accelerands using surveys and interviews, occasionally in comparison to groups of equally able high school students, top performing college students, and regular college students. As most other early college entrance programs in the United States do not allow entry to students who are younger than the regular cohort by three or more years, the participants of such programs usually do not qualify as radical accelerands, unless they have also experienced other acceleration options during their elementary or secondary schooling (Noble et al., 2007).

By far the majority of the published studies on radical acceleration relate to students who were able to accelerate using educational interventions that are available within the United States education system. Nevertheless, there have also been studies relating to radical accelerands in China (Dai & Steenbergen-Hu, 2015; Robinson, 1992), Australia (Gross, 1992, 2004; Jung, Young, & Gross, 2015; Young, 2010), Taiwan, and Poland (Gross & van Vliet, 2005). Most of the studies on Chinese radical accelerands have focused on the cohort radical acceleration program at The University of Science and Technology of China (USTC), which enrolls 40 to 50 students each year. Some of the unique features of this program include an emphasis on solid disciplinary foundations, a strong research component, mentorship, and participation in extracurricular activities (Dai & Steenbergen-Hu, 2015). In contrast, the Australian studies have tended to focus on in-depth case studies of individual radical accelerands who have been accelerated using multiple combinations of acceleration options at a range of educational institutions (Gross, 1992, 2004; Young, 2010). While the primary outlets for the publication of studies on radical acceleration have generally been within the field of gifted education, outlets in higher education and youth studies have also been utilized, particularly with respect to studies of the radical acceleration program at The University of Washington (Janos et al., 1989; Robinson & Janos, 1986).

Who Radically Accelerates?

Although many highly able students may potentially be successful as radical accelerands, a number of reasons appear to exist for why they are not given this opportunity. Janos et al. (1989) suggest that one possible reason may be the limited general availability of acceleration options in schools, access into which may depend upon a student's performance on one or more measures of ability and achievement. Alternatively, the reason may lie in widespread concerns about the possible negative consequences of radical acceleration, such as being deprived of critical social experiences that may be needed for the creation of healthy, well-functioning, and successful lives (Brody & Stanley, 1991; Noble et al., 1993). Indeed, anecdotal accounts of the less than ideal outcomes of radical acceleration, such as the case of William James Sidis, who entered Harvard University at an early age but lived a life of seclusion as an adult, appear to have dominated public thinking on the practice (Muratori et al., 2006).

An examination of the commonly identified characteristics of students who have been radically accelerated reveals an interesting picture. First, it appears that radical accelerands may generally have highly educated parents who hold professional careers, are supportive of the practice, and are knowledgeable of its benefits (Noble & Smyth, 1995; Olszewski-Kubilius, 2002; Robinson, 1992; Young, 2010). The common personal traits of radical accelerands appear to include a high level of independence, a low level of conventionalism, and minimal tendencies for conformity when compared to equally bright high school students or top performing college students (Charlton et al., 1994; Olszewski-Kubilius, 2002; Robinson & Janos, 1986; Young, 2010). Furthermore, they generally appear to be more verbally able than regular-age college students (Janos & Robinson, 1985), highly competitive (Charlton et al., 1994; Noble et al., 1999), but also more restrained, cautious, and introverted than equally able high school students (Noble et al., 1993, Young, 2010). Some studies also suggest that radical accelerands may be well-rounded individuals who possess a wide range of social interests, and do not fit the stereotype of socially incompetent "nerds" (Gross, 2004, 2006; Noble et al., 2007). Interestingly, gender did not appear to be a factor with the radical accelerands at The University of Washington (Noble & Smyth, 1995), although male students were much more likely than female students to be radically accelerated in the Chinese radical acceleration programs (Dai & Steenbergen-Hu, 2015; Robinson, 1992).

How Highly Gifted Students Are Radically Accelerated

Evidence (Cox, 1926; Galton, 1969) exists that radical acceleration was utilized as an educational intervention prior to the 20th century. Retrospective studies of highly accomplished adults suggest that in many cases, radical acceleration was possible for gifted individuals over the course of history due to homeschooling, which allowed for an expedited progression through the curriculum, and the early introduction to an advanced and extended curriculum (Cox, 1926; Galton, 1969; Gross & van Vliet, 2005). In more recent times, the literature suggests that radical acceleration has been undertaken through a variety of pathways that involve one or more acceleration options including early entry to formal schooling, early entry into secondary school, dual enrollment, subject matter acceleration, grade-skipping, early college entry, and Individualized Education Programs (IEP; Gross, 1992, 2004; Gross & van Vliet, 2005; Muratori et al., 2006; Noble et al., 1993). For example, a radically accelerated participant in a study conducted by Young (2010) experienced a combination of homeschooling, attendance at a school with no clear demarcation of grades, subject matter acceleration, grade-skipping, and an IEP during his elementary schooling, as well as subject matter acceleration, grade-skipping, and part-time enrollment in college during his secondary schooling.

To gain access to the individual acceleration options that ultimately lead to radical acceleration, there appears to be a need to demonstrate a student's eligibility using a wide range of ability and achievement measures. The precise criteria used to evaluate a student's readiness for acceleration appear to vary substantially by acceleration option and institution. Moreover, as radical acceleration comprises the combined effect of a number of different acceleration options, it is likely that the range of selection criteria used with each individual radical accelerand will be different. Nevertheless, the commonly used criteria appear to include one or a more of the following options: (a) past and/or present ability measures, (b) past and/or present achievement measures, (c) interview responses, (d) essays, (e) samples of original work, (f) observations, and (g) recommendations from others.

At least for early college entry, a commonly used acceleration option among radical accelerands, Olszewski-Kubilius (2002) suggests that the selection criteria appear to undergo continuous refinement to reflect emerging research findings. Future refinements to the selection criteria for radical acceleration generally may nevertheless benefit from investigations of how to optimally *combine* the scores of multiple criteria for each *individual* acceleration option, and *across* the different acceleration options that lead to radical acceleration. McBee, Peters, and Waterman (2014) suggest that in situations where there are severe consequences of misidentification and small student numbers (as in radical acceleration), it may be optimal to require pre-set standards on *all* selection criteria to be met simultaneously, possibly using the *means* of multiple measures of ability and/or achievement. Nevertheless, there is no specific evidence to suggest that such an approach has been successful as a discriminating process for radical acceleration.

In large part, obtaining access to acceleration options appears to be facilitated by the pro-active efforts of parents to become familiar with the gifted education literature, and to advocate on behalf of their highly able children (Gross, 1992, 2004; Jung et al., 2015; Muratori et al., 2006). For example, Bloom (1985) noted the pivotal role of parents in seeking appropriate teachers and educational opportunities, including summer programs and early admission into college, for their gifted children. Moreover, Colin Camerer, a radically accelerated participant of the Study of Mathematically Precocious Youth (SMPY) and a professor of behavioral finance and economics at the California Institute of Technology, attributed the success of his radical acceleration program, which incorporated a number of acceleration options, to the "ongoing support and encouragement from his parents" (Gross & van Vliet, 2005, p. 158; also see Holmes, Rin, Tremblay, & Zeldin, 1984). Nevertheless, the process may be more easily navigated by the parents of gifted students if the senior administration of schools, and/or their personnel, are trained in gifted education or are at least sympathetic to the practice. As an illustration, the decision to accelerate Christopher Otway by his high school principal (Gross, 1993, 2004) was attributed to the principal's acquaintance with experts in gifted education, including Professor Julian Stanley and his colleagues at Johns Hopkins University (Gross, 1992, 2004; Gross & van Vliet, 2005). For their part, experts in gifted education appear to have a major role in the development, planning, and monitoring of appropriate programs of radical acceleration (Brody & Stanley, 1991; Charlton et al., 1994; Dai & Steenbergen-Hu, 2015; Gross & van Vliet, 2005; Muratori et al., 2006).

It is possible that the acceleration options that need to be accessed for radical acceleration may be more readily available if there is a formal acknowledgment of the practice, or of gifted education itself, by relevant government education departments. For example, it is probably not coincidental that the federal or state government education bodies in those countries that are the source of most research on radical acceleration (i.e., the United States, Australia, China) *all* endorse a formal gifted education or educational acceleration policy (Clinkenbeard, Kolloff, & Lord, 2007; Dai & Steenbergen-Hu, 2015; Jung, 2014).

Cohort Radical Acceleration vs. Individual Radical Acceleration

In broad terms, the body of research on radical acceleration may be divided into studies relating to cohort acceleration (mostly of early college entrants at The University of Washington or the USTC) and studies of highly gifted students (mostly case studies) who have been individually radically accelerated. The two contrasting radical acceleration approaches appear to simultaneously have strengths and weaknesses. For example, the cohort acceleration approach offers a ready group of age *and* intellectual peers with whom to establish strong relationships, even if the cohort may become too "insular" (Hertzog, 2015) or the level of support is somewhat "excessive" (Muratori, Colangelo, & Assouline, 2003). In comparison, research on the non-cohort radical accelerands suggests that strong relationships with older peers are possible and likely, even if the large age gap may hinder the creation of a "true" social niche for some radical accelerands (Gross, 1992, 2004; Young, 2010; Jung et al., 2015). Ideally, it may be desirable for potential radical accelerands to be offered a choice between the two approaches. Alternatively, a combined approach that separates the members of a cohort of radical accelerands for extended periods of time, may allow radical accelerands the simultaneous experience of the benefits of both cohort and non-cohort radical acceleration.

Academic Outcomes

The research appears to be consistently and overwhelmingly supportive of the positive academic outcomes of radical acceleration, whether undertaken individually or as part of a cohort. Generally, the radical accelerands who have been studied to date appear to perform substantially above the average for older students at the level of their new academic placement. For example, Gross (2006) noted that "despite being some years younger than their classmates, the majority [of the radical accelerands in her study] topped their state in specific subjects, won prestigious academic prizes, or represented their country or state in Math, Physics or Chemistry Olympiads ...[and] all have graduated with extremely high grades and, in most cases, university prizes for exemplary achievement" (p. 415-416). Similarly, of the graduates of the Early Entrance Program at The University of Washington, Noble et al. (2007) noted that seven have been either Rhodes Scholars or Goldwater Scholars (annually, 32 Rhodes Scholarships and approximately 300 Goldwater Scholarships are awarded to students in the United States; Scholarship America, Inc., 2014; The Rhodes Trust, 2014). In the early entrance program at The University of New South Wales, two out of the ten radical accelerands received the university medal, which is awarded to the student with the highest scholastic standing in a specialization at graduation (Jung et al., 2015; The University of New South Wales, 2014).

In connection to the learning environment, some radical accelerands noted the pro-academic experience of being surrounded by intellectual peers who applauded intellectual ambition and drive (Noble et al., 1999; Noble & Smyth, 1995), while others were appreciative of the removal of the pressure to underachieve for peer acceptance which they had experienced when placed with age peers (Gross, 2004, 2006). Relatedly, many radical accelerands noted enhanced motivation in terms of an increased zest for learning (Charlton et al., 1994; Gross & van Vliet, 2005) and genuine opportunities for intellectual challenge (Noble & Smyth, 1995; Noble et al., 2007). In addition, more than one study noted the intellectual maturation that was possible for the gifted young people in their new learning environments (Noble & Drummond, 1992; Noble et al., 2007; Olszewski-Kubilius, 2002).

Socio-Affective Outcomes

As is the case for academic outcomes, the general socio-affective outcomes of radical acceleration appear to be consistently positive and, at the very least, not characterized by negative outcomes (Gross, 1992, 2004; Gross & van Vliet, 2005; Janos et al., 1989; Jung et al., 2015; Noble et al.,1993, 2007; Pollins, 1983; Rogers, this volume). In studies relating to the cohort program of radical early college entry at The University of Washington, participants experienced and commented appreciatively on a social environment that was accepting of individual differences, and one in which conformity to others no longer dominated peer relationships (Noble et al., 1999, 2007; Robinson, 2004). Such an environment was conducive to the development of strong friendships with both age peers and older students, often experienced for the first time in the lives of many radical accelerands (Hertzog & Chung, 2015; Noble & Drummond, 1992; Noble et al., 2007; Robinson, 2004). As an illustration, participants in Noble et al. (2007) noted that the benefits of early college entry included "a newfound sense of social acceptance and no longer feeling ostracized" (p. 157). Of note, the socio-emotional adjustment of the radical accelerands appeared to be similar to that of equally able age peers who did not accelerate and highly achieving college students who were older (Robinson, 2004). Outside of the United States, the Chinese radical accelerands at the USTC noted the positive socio-emotional outcome of lasting friendships with their peers in the radical acceleration program (Dai & Steenbergen-Hu, 2015).

Similar general findings relating to peer relationships were noted for radical accelerands who were not part of a cohort acceleration program. Most studies that investigated non-cohort radical accelerands have noted the satisfying relationships that were possible with older and more mature classmates (Charlton et al., 1994; Gross & van Vliet, 2005; Jung et al., 2015; Young, 2010), which may be attributed to the similar stages of the intellectual and socio-emotional development of the radical accelerands and their classmates (Gross, 1992, 2004). Nevertheless, for some radical accelerands, it is possible that the large age difference may have acted as a barrier to the formation of rich and close friendships among equals (Jung et al., 2015). For example, Terence Tao, a former radical accelerand who was a Fields medalist in 2006, noted that, "I only really started finding my peer group during and after graduate school" (Muratori et al., 2006, p. 311).

Radical acceleration also appears to have positive consequences in terms of the development of important social skills and confidence. For example, a number of studies (Gross, 2004; Noble et al., 1999; Noble & Drummond, 1992; Olszewski-Kubilius, 2002) have suggested that radical acceleration may have allowed highly gifted students to become more independent, assertive, and socially mature. Relatedly, Noble and Smyth (1995) noted that many students who were radically accelerated believed that they had higher levels of self-esteem and self-confidence as a result of their acceleration experiences. Gross (2004, 2006) quantified the social self-esteem of the radical accelerands in her longitudinal study to be more than one standard deviation above the mean for their age and comparatively higher than equally able students who were either accelerated by one year or not accelerated at all.

Long-Term Outcomes

The research identifies a number of positive long-term educational, career, and life outcomes for radical accelerands. A consistent finding is that radical accelerands appear very likely to pursue graduate level study (Charlton et al., 1994; Dai & Steenbergen-Hu, 2015; Gross, 2004, 2006; Gross & van Vliet, 2005; Hertzog & Chung, 2015; Noble et al., 1993, 2007; Young, 2010). For example, Noble et al. (2007) noted that 53% of the participants (n = 51) in their follow-up study of radical accelerands earned graduate or professional degrees, while 32% (n = 30) were enrolled in graduate or professional training. Similarly, 54% of the participants (n = 103) in Hertzog & Chung (2015), the majority of whom were radical accelerands, attained graduate or professional degrees, while 87% of those who were yet to complete their education (n = 45) were progressing toward a graduate or professional degree. Outside the United States, Dai and Steenbergen-Hu (2015) noted that 91% of the radical accelerands of the USTC program (n = 497) earned masters or PhDs in China or abroad, while in Australia, 73% of radical accelerands (n = 8) in Gross (2004) and Young (2010) were undertaking, or had completed, post-bachelor study.

Radical accelerands appear to have used the time they saved from their acceleration not only to pursue graduate study, but also to make an early start on their careers (Charlton et al., 2004; Noble et al., 2007; Olszewski-Kubilius, 2002). Reflecting high vocational aspirations, the careers of radical accelerands generally appear to lie in a diverse range of high-status fields (Brody & Stanley, 1991; Gross & van Vliet, 2005; Noble et al., 2007), with a substantial number pursuing careers in academia (Charlton et al., 1994; Dai & Steenbergen-Hu, 2015). Furthermore, most appear to be employed in, and are satisfied with their work in, fields that the radical accelerands considered to be appropriate for their level of education and training (Hertzog & Chung, 2015; Noble et al., 2007). In addition, it appears that highly able students who experienced interventions that are closest to radical acceleration may be more likely than those who were more moderately accelerated to achieve prestigious career outcomes such as publications, tenure, and patents in scientific and related areas (Wai, Lubinski, Benbow, & Steiger, 2010).

In terms of other life outcomes, most radical accelerands who have been studied longitudinally appear to be satisfied with their lives, their relationships with family, their relationships with friends, their romantic relationships, and their financial situation (Gross, 2004; Noble et al., 1993, 2007). Indeed, Hertzog & Chung (2015) noted that the vast majority of the participating alumni of the 35 year follow-up study of the early college entrance programs at The University of Washington reported that they were either "very happy" or "fairly happy" with their family (93%, n = 178), friendships (88%, n = 168), work (87%, n = 167), finances (83%, n = 158), and romantic relationships (77%, n = 145).

Negative Outcomes and Issues

In parallel with the numerous positive academic, socio-affective and long-term outcomes of radical acceleration, are a number of negative outcomes and issues that radical accelerands appear to face. For example, the literature indicates that some radical accelerands may be frustrated at the need to make major career-related decisions at an early age (Janos et al., 1989; Noble et al., 2007), while others have expressed regret at the perceived loss of extracurricular opportunities such as competitive sport, debating, band, dances, and maths competitions (Charlton et al., 1994; Noble & Drummond, 1992; Noble & Smyth, 1995). Issues such as dating and driving only appear to be problematic for some radical accelerands (Hertzog & Chung, 2015; Noble & Drummond, 1992; Noble & Smyth, 1995; Noble et al., 2007; Young, 2010). It is noteworthy that most of these issues may be addressed through the communication of information on the range of services available at the accelerated placement. For example, in the college setting, where many of these issues are likely to be most salient, it may be useful to encourage radical accelerands to participate in interviews with representatives of the counseling service, career advisory service, and student organizations, to raise their awareness of the available support (Jung et al., 2015).

In addition, a number of studies have noted negative issues that are less likely to be resolvable. For example, many radical accelerands may have a reduced ability to access scholarships that they may have easily obtained prior to acceleration (Noble & Drummond, 1992; Noble & Smyth, 1995), while others may experience difficulty in enrolling in the most prestigious or selective institutions for tertiary study due to the lack of formal early college entrance programs in such institutions (Janos et al., 1989; Olszewski-Kubilius, 2002). Therefore, although many radical accelerands may consider the positives of radical acceleration to substantially outweigh the negatives (Charlton et al., 1994), all potential candidates will need to make an informed decision that carefully balances the possible advantages and disadvantages of radical acceleration. Moreover, the decision will need to fully incorporate the individual wishes of the accelerating student (Gross, 1992; Olszewski-Kubilius, 2002).

The most serious of the possible negative outcomes of radical acceleration may, nevertheless, be the incidence of students who terminate their studies for various reasons. Whereas "drop out" was a reality for some radical accelerands, its incidence appears to be quite low. For example, Noble et al. (1993) noted that between 5% to 10% of students who entered college early did very poorly or dropped out of the program at The University of Washington, while at the USTC, an average of two to three students in each cohort of approximately 40 to 50 students dropped out without a degree (Dai & Steenbergen-Hu, 2015). No attrition has been identified in the early entrance program at The University of New South Wales, which has a low acceptance rate from a comparatively small applicant pool (i.e., 10 students from 39 applicants between 1991 and 2013; Jung et al., 2015). Some of the reasons for the termination of study appear to include a lack of psychological maturity, a lack of self-regulation, an inability to achieve personal autonomy, a pre-occupation with extracurricular activities, a lack of study skills, and socio-emotional issues on the part of the radical accelerand (Dai & Steenbergen-Hu, 2015; Gregory & Stevens-Long, 1986; Gross & van Vliet, 2005; Janos, Sanfilippo, & Robinson, 1986). Unfortunately, little is known about the destinations of the radical accelerands who discontinue their studies (Noble et al., 2007).

Retrospective Thoughts on the Decision to Radically Accelerate

It is noteworthy that an overwhelming majority of the radical accelerands who have been investigated indicate that they were satisfied with their decision to accelerate and the resulting educational experiences (Janos et al., 1989; Muratori et al., 2006; Noble & Drummond, 1992; Noble et al., 1993; Noble & Smyth, 1995; Olszewski-Kubilius, 2002; Young, 2010). In fact, Gross (2004, 2006) noted that of the radical accelerands in her longitudinal study, none had any regrets about their acceleration decision or experience, and many would have preferred to have accelerated further or to have started their acceleration earlier. Similarly, Hertzog & Chung (2015) indicated that 90% of the participants from the early college entry programs at The University of Washington would have made the same decision to accelerate if the decision had to be made again. Nevertheless, the research on highly able students who qualified for radical acceleration but chose not to be accelerated *also* suggests that these students were largely satisfied with their decision and may not have discontinued their studies in any greater numbers than the radical accelerands (Janos et al., 1989; Noble et al., 1993; Robinson & Janos, 1986).

Discussion

The existing literature provides a number of interesting findings on the practice of radical acceleration. Nevertheless, in interpreting this literature, it is critical to be mindful of the need for further and more widespread research in the area. For example, with only a few exceptions, the majority of studies relating to early college entry focus on one of two early college entrance programs (i.e. the Early Entrance Program at The University of Washington and the School for Gifted Youth at the USTC), the findings of which may be specific to these particular programs. Furthermore, only a small number of detailed case studies exist of highly gifted students who have been radically accelerated. Because the populations from which the samples for these studies are drawn are relatively small, the sample sizes employed in studies of radical acceleration tend to be small. As well, the research originates from only a few countries (e.g., the United States, China, and Australia). Consequently, a number of questions must be raised about the representativeness and generalizability of these findings to all radical accelerands or those who could potentially be radically accelerated.

Future research is impacted by current practice. Specifically, if the various accelerative options that cumulatively lead to radical acceleration were to become more accessible to students, and thus a greater number of students who are in need of radical acceleration are allowed to radically accelerate, more research about the issues and impact related to radical acceleration would be possible. Some strategies that may be considered by educational decision-makers, various stakeholders, and other interest groups to increase opportunities for radical acceleration include: (a) better and wider publicizing of the positive precedents and outcomes of acceleration and radical acceleration, (b) the formalization of the acceleration options and pathways that lead to radical acceleration in school policies, and (c) better training of teachers about acceleration, radical acceleration, and gifted education in pre-service and professional development programs. The possible consequence of a greater number of radical accelerands in the general student population is that radical accelerands may become a vital student group to which more attention, including research attention, may be devoted.

Despite the limitations of the current research on radical acceleration, the existing literature nevertheless offers a number of useful insights that may form a solid foundation for future research in the area. The findings to date, with respect to the candidates for radical acceleration, the pathways to radical acceleration, the positive and negative outcomes of radical acceleration, and the retrospective thoughts of radical accelerands on their acceleration experiences, are notable for their general consistency. Moreover, longitudinal follow-up studies (Gross, 2004; Noble et al., 1993, 2007; Hertzog & Chung, 2015) have tended to replicate the previously identified academic, socio-affective, career, and longer term life outcomes of radical accelerands. The repeatedly identified findings in the current research are likely to inform the implementation and refinement of radical acceleration practices in schools that enroll highly gifted students.

Profile of Radical Accelerands

A number of studies that have investigated the characteristics of students who have been radically accelerated, under both cohort and non-cohort arrangements, and the mechanisms by which such students go about radical acceleration (Gross, 2004, 2006; Janos & Robinson, 1985; Noble et al., 1999, 2007; Noble & Smyth, 1995; Olszewski-Kubilius, 2002; Robinson, 1992; Robinson & Janos, 1986) collectively allow the creation of a tentative profile of students who are most likely to be radically accelerated. Although such a profile is unlikely to be representative of all radical accelerands, it may nevertheless provide valuable information about the members of this group.

Generally, radical accelerands appear to have:

(a) highly motivated and educated parents who are familiar with the gifted education literature and have the ability to access radical acceleration opportunities in co-operation with supportive school personnel;

(b) a high level of intelligence;

(c) personal characteristics including independence, non-conventionalism, non-conformity, introversion, cautiousness, and a competitive nature;

(d) a motivation to learn and achieve;

(e) a desire to be intellectually stimulated;

(f) a range of socially acceptable interests; and

(g) unhappy schooling experiences prior to radical acceleration.

The profile appears to be similar to the profile of highly gifted students with IQ scores of 145 or above, who generally appear to have highly educated parents of economically privileged backgrounds, extremely high educational aspirations, and social difficulties that may reflect factors such as differences in ability compared to age peers, and tendencies toward introversion (Jung & Gross, 2014). Indeed, the research suggests that of the available educational interventions, radical acceleration may be particularly useful for many highly gifted students (Gross, 1992, 2004). Nevertheless, some differences may lie in the possibly higher degree of independence, lower levels of conventionalism, and higher degrees of restraint, caution, and introversion of the radical accelerands (Charlton et al., 1994; Noble et al., 1993; Robinson & Janos, 1986; Young, 2010). Future research may therefore be necessary to confirm any differences between the profiles of highly gifted students and radical accelerands, as well as the sub-groups of highly gifted students who may be most suited to radical acceleration interventions.

Among a range of possible uses, a profile of radical accelerands may enable an assessment of the accessibility of radical acceleration options for various segments of the gifted student population. Of note, highly able students from low socio-economic status or other disadvantaged backgrounds may be a group for which access to radical acceleration may be difficult, as they may *not* have highly educated parents with the motivation, time, or ability to familiarize themselves with the gifted education literature. Furthermore, they may come from educational settings that have not afforded them advanced opportunities. To address the needs of this group, it may be desirable to make active efforts to communicate information, possibly using straightforward language or translated documents, to their parents about radical acceleration and the available avenues for its implementation. Gifted family support groups and centers of gifted education may be able to play a role in the dissemination of such information.

Avoidance of Unsuccessful Radical Acceleration

While the literature suggests that the provision of radical acceleration interventions is likely to result in positive academic, socio-emotional, career, and long-term life outcomes for the radical accelerands, these findings may also reflect, to some extent, the exclusion of unsuccessful radical accelerands who may have dropped out during the course of their studies (Olszewski-Kubilius, 2002). The non-participation of the less successful radical accelerands is particularly likely in the longer term follow up studies of early college entrants (Noble et al., 1993, 2007; Hertzog & Chung, 2015). Fortunately, the existing literature provides some tentative clues on the characteristics or indicators of radical accelerands who may be at greatest risk (i.e., a lack of psychological maturity, a lack of self-regulation, an inability to achieve personal autonomy, pre-occupation with extracurricular activities, a lack of study skills, and socio-emotional issues). Nevertheless, more research that specifically focuses on how and why students drop out from radical acceleration interventions, or are otherwise unsuccessful as radical accelerands, is desirable.

To better cater to the needs of potentially unsuccessful radical accelerands, it may be useful to introduce more regular and rigorous monitoring procedures to enable the early detection of possible problems. Ideally, counselors or psychologists should make assessments of radical accelerands prior to the implementation of any acceleration options and regularly thereafter to identify and address any issues relating to autonomy, self-regulation, and socio-emotional difficulties. Moreover, workshops on time management and advanced study skills could be made compulsory prior to the implementation of any acceleration options. In the college setting, time management and advanced study skills may be readily addressed by representatives of the academic skills center.

To address some possible concerns for radical accelerands in adjusting to the *differences* in the educational environment before and after radical acceleration, it may be desirable to encourage some *preparatory* experiences. For example, it may be possible to encourage prior meetings with teachers at the proposed placement, or to allow part-time study at the higher level through a period of dual enrollment (Jung et al., 2015; Muratori et al., 2006; Olszewski-Kubilius, 2002). If the radical acceleration results in placement at college, it may be useful for the radical accelerand to undertake courses on a non-award basis, perhaps in a vacation period prior to enrollment (Jung et al., 2015). Ideally, potential radical accelerands should be made aware that any arrangements that lead to radical acceleration will be implemented on a trial basis with the option of returning to the original placement (Gross, 1992).

The Role of Educational Practitioners

Educational practitioners may have a particularly vital role to play in the education of radical accelerands due to their position of being in daily contact with students who may be suitable candidates for radical acceleration and students who may already have radically accelerated. Indeed, all educational practitioners may benefit from familiarizing themselves with the issues pertinent to radical acceleration so that they are able to facilitate radical acceleration. This familiarization will also enable them to provide support to radical accelerands in collaboration with experts in gifted education. The following are some of the specific functions that educational practitioners may need to fulfill with gifted education experts:

(a) the identification of potential candidates for radical acceleration;

(b) the development, formulation, and planning of programs of radical acceleration;

(c) the monitoring of radical accelerands (to identify any problems, to address such problems, and to examine the need for further acceleration or educational interventions);

(d) the directing of radical accelerands to appropriate counseling and careers advisory services, as needed; and

(e) the identification of appropriate mentors for radical accelerands.

Without the support of educational practitioners, who are in a unique position of being able to provide *timely* responses to *individual* students, many highly gifted students who are suitable candidates for radical acceleration, and many radical accelerands, may fail to live up to their substantial potential.

Conclusion

There is no doubt that radical acceleration is a highly useful intervention to meet the educational needs of many highly gifted students. Empirical studies consistently demonstrate overwhelmingly positive academic, socio-affective, career, and later life outcomes for highly able radical accelerands. Nevertheless, such outcomes will need to be considered in conjunction with the possible, and arguably more minor, negative outcomes of radical acceleration. Moreover, a number of cautions are recommended to ensure the optimal implementation of the practice. It is hoped that continuing research in the area, and targeted education and communication efforts, may allow substantially greater opportunities for highly gifted students to radically accelerate and to be successful as radical accelerands in the future.

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Academic Acceleration in Europe: A Comparison of Accelerative Opportunities and Activities

Lianne Hoogeveen
Radboud University, Nijmegen, The Netherlands

Abstract

This chapter presents an overview of accelerative opportunities in gifted education in Europe based on reports, research, and professional opinions and experiences of experts and others, including students and parents. The findings show that Europe is on the right track concerning gifted education, and that acceleration is applied as an educational measure in almost all European educational systems. Improvement can and should be made, though. There are still countries where gifted students do not receive the education they deserve. Cooperation between teachers, parents, scientists and policy makers is recommended, as is more specific teacher training focused on educating the gifted. American and European research findings show that acceleration should be part of that training. Considering the passionate advocacy of those who are involved in gifted education in their country, the future looks bright.

Introduction

Writing about academic acceleration in Europe poses challenges. Some authors have described gifted education in different European countries (Freeman, 1992; Freeman, Raffan & Warwick, 2010; Györi, 2011; Heinbokel, 2012; Mönks & Pflüger, 2005). These and others have noted positive developments in gifted education in several countries, but also concluded that there remains "... an important and significant list of expectations and distinct priorities identified by the countries surveyed" (Mönks & Pflüger, 2005, p. 8). This chapter provides a short overview of the general status of gifted education in different European countries, with a focus on academic acceleration.

There is well-documented evidence that academic acceleration is a very efficient adaptation of the curriculum for gifted and talented students (Assouline, Colangelo, VanTassel-Baska, & Lupkowski-Shoplik, this volume; Colangelo, Assouline, & Gross, 2004; Hornyák, 2011; Steenbergen-Hu & Moon, 2011). However, many European teachers, policymakers and parents of gifted children seem to be reluctant to accelerate their students. This means that there are many students who are excluded from an educational adaptation that could improve their academic, social, and emotional outcomes.

Education in Europe: From Ancient Greece to Modern Europe

In order to discuss gifted education in Europe, it is essential to understand the development of general education in Europe over the centuries. Education has always played an important role in the development of countries (Green, 2013), but the goal of education has changed over time. For example, in ancient Greece, citizenship was the goal of education; the foundation of the idea of fostering intellectual excellence was laid in Plato's *Republic* (Guisepi, n.d.; Tannenbaum, 2000). Typically considered the cradle of education in Europe, this Grecian system influenced the Roman model of education.

By the fifth century, European schools were operated by the Catholic Church and most students were, or would become, members of the clergy. Goals of education were related to religious duties, for which the students learned Latin, mathematics, and singing. Schools were un-graded; a six-year-old and an adult could sit on the same bench. Clearly, academic acceleration was not an issue at that time; age-graded education was not "invented" yet.

Drill and memorization of words, sentences, and facts characterized 17th and 18th century education in Europe. Most members of the lower classes experienced no schooling whatsoever. Important educational pioneers in this era were the Czech Johann Amos Comenius (1592-1670), who insisted that effective education should take the nature of the child into account, and the English philosopher John Locke (1632-1704), who said the mind at birth was a blank tablet (tabula rasa). The goal of education was to train various mental abilities. Latin and mathematics, for example, were thought to be especially good for strengthening reason and memory. This idea remained entrenched in educational practice well into the 20th century. In France, Jean-Jacques Rousseau (1712-1778) described the development of the child–intellectually, physically, and emotionally–much like the development of a plant. He believed that the aim of education should be to aid in the natural development of the learner. Those who were influenced by Rousseau tried to create schools that provided a controlled environment in which natural growth could take place and at the same time were guided by society through the teacher. During this time, gymnasiums were established in some European countries, including the Netherlands and the German-speaking regions; these gymnasiums were schools specifically designed for excellence and talent development (Ziegler, Stoeger, Harder & Balestrini, 2013).

In the 19th century, nationalism grew strong in Europe and, with it, the belief in the power of education to shape the future of nations as well as individuals. As in ancient Greece and China, citizenship became an important role for education. European countries established national school systems (Green, 2013). By and large, European elementary schools were much like those of the 16th, 17th, and 18th centuries, in that all children attended until age 10 or 11, when schooling terminated for all but a few of the "brightest" among them. The usual subjects were reading, writing, religion, and arithmetic. The concern of some educators in the late 19th century for the welfare and development of the individual eventually began to include children that previously were considered to be uneducable. One of the first to become interested in educating students with intellectual disabilities was the Italian physician Maria Montessori (1870-1952). Montessori believed in the value of self-activity, sense training through the handling of physical objects, and the importance of the child's growth as an individual. Because the development of cognition was a specific goal for Montessori, many of the physical objects she designed for the children led directly to such cognitive ends as reading and writing (Guisepi, n.d.).

Cognitive ability became measurable at the start of the 20th century, when Alfred Binet and Theodore Simon created the first modern intelligence test. The idea of "mental level" was introduced as a way to express the cognitive ability of a child. In 1916, Louis Terman translated and adapted Binet and Simon's test for the United States, the *Stanford-Binet Intelligence Scales*. This test popularized the term "intelligence quotient," or IQ (Colangelo & Davis, 2003; Thorndike, 2007), which, until recently, has been seen as one of the most important factors in identifying giftedness.

Today, Europeans acknowledge that education is a fundamental right for everyone, which means that every European country should develop the most appropriate education in relation to the needs of all students and enable all students to develop their potential to the fullest (Eurydice, 2006; 2014). European countries do this in different ways. Despite the deepening of European integration through the European Union, individual member states maintain control over their school systems and their curriculum content (Keating, 2014). The websites of Eurydice[1] and Eurypedia[2] give detailed information about these differences. The focus of this chapter is the education of gifted students, with an emphasis on academic acceleration, in different European countries.

Gifted Education in Contemporary Europe

In 1994, the Council of Europe highlighted the special educational needs of students with exceptional potential, stating that gifted children should be able to benefit from appropriate educational conditions that would allow them to develop their abilities fully. It was stated that adequate tools are needed for this purpose. Later, in 2012, a written declaration was submitted by four members of the European Parliament (Gál, Kleva, Lochbihler, & Takkula, 2012) calling on the member states to consider offering curricular and extracurricular forms of talent support, including the training of educational professionals to recognize and develop talented students. They recommended that talent support should be a priority of future European policies.

Most European countries have special educational programs for gifted students (European Agency for Development in Special Needs Education, 2009; Mammadov, 2012; Palchyk, 2007; UNESCO, 2011). However, according to the European Agency for Development in Special Needs Education (2009), many of those countries do not provide a specific definition for gifted learners within their legislation. The majority of European countries use different identification procedures, and classification criteria are not always established or clear-

1. *http://eacea.ec.europa.eu/education/eurydice/index_en.php*
2. *http://eacea.ec.europa.eu/education/eurydice/eurypedia_en.php*

ly defined (European Agency for Development in Special Needs Education, 2009). This is, however, not the only reason that describing gifted education in Europe is a challenge.

Europe consists of 51 countries, all with their own educational system. Within some countries there are more than one (and as many as 26), educational systems. For example, Belgium has Dutch, French, and German speaking communities, which all have different educational systems. Germany has 16 states and Switzerland 26 cantons, each with their own educational system. VanTassel-Baska (2009; this volume) called the development in gifted education in the United States a patchwork quilt, and this also seems to apply to the European situation. The information that is described in this chapter is based on what could be found in documents[3] as well as in personal communications, aiming to gain an overview of gifted education in modern Europe.

Combining these different sources of information reveals that the situation concerning gifted education in Europe is not clear; what is written is not always applied and what seems to be prohibited sometimes still happens. For example, dedicated teachers and administrators may bend the rules in order to do the right thing for students. Due to limited written information (in a language that could be read by the author), changing laws and attitudes, the availability of experts, and limitations on the length of this chapter, this survey is primarily anecdotal, not exhaustive. In searching for information, experts revealed previous inaccuracies and contradictions.

Terminology and Classification

The terminology used by a country, and the model underlying that terminology, influences the approach to identification of students (Freeman, Raffan, & Warwick, 2010). Eurydice (2006) found that among the various definitions used in Europe to denote gifted students, the terms "gifted" and "talented" (or their equivalents in other languages) are the most used terms in national definitions, used separately or in combination. However, there are exceptions. Finland, Sweden and Norway have no specific term to indicate these students, although in Finland the term "gifted" is used unofficially (Eurydice, 2006) and also in Ukraine gifted and talented students are not defined as such (A. Burov, personal communication, January 2015).

The English government's Department of Children, Schools and Families differentiates between three terms: "Gifted" is interpreted as "hav[ing] exceptional abilities or potential in one or more subjects in the statutory school curriculum other than art and design, music and physical education" (Balchin, 2009, p. 50; see also Eurydice, 2006), while "talented" refers to arts, design, music, and other creative pursuits, and "very able" describes academically gifted learners with exceptionally high-level performance (Balchin, 2009). Spain is an example of a country in which terms and concepts of giftedness are not concrete (Comes Nolla, Díaz Pareja, A Luque de la Rosa & Ortega Tudela, 2009). The expression, "pupils with high intellectual abilities," is preferred to the terms "gifted" or "talented" (Eurydice, 2006), but there is little consistency in defining the expression. In Slovenia, the Law for the Primary School (Nov. 2011) defines gifted students as an independent group of students with special/additional needs (Juriševič, 2012); this expression is also used in the Estonian Basic Schools and Upper Secondary Schools Act (V. Sepp, personal communication, January 2015).

European countries like Austria, Germany, the Netherlands, Portugal and Switzerland prefer a multidimensional, dynamic model of giftedness (Almeida & Oliveira, 2010; Grossenbacher & Vögeli-Mantovani, 2010; Segers & Hoogeveen, 2012; Resch, 2014; Weilguny, Resch, Samhaber & Hartel, 2013; Ziegler & Phillipson, 2012). The Austrian Center for Talent Development and Research (ÖCBF) for example, describes giftedness as a multidimensional and dynamic concept, "encompassing a person's overall potential, which unfolds through lifelong learning and development" (Weilguny et al, 2013, p. 13-14). Eurydice (2006) indicates that new terms concentrate more on the extent to which pupils are "educable" and the significance of the environment in relation to how various kinds of ability develop. This focus emerges very clearly in the Welsh Assembly Government's (WAG) publicatin, *The Learning Country,* in which it stated, "We want all our pupils to have the best start in life, the opportunity to reach their full potential and a clear entitlement to influence the services that affect them..." (Welsh Assembly Government, 2008).

The different definitions of giftedness and talent are related to different identification criteria applied in schools. Eurydice (2006) indicates that the most common criterion is performance on aptitude tests or tests of potential ability and/or measurement of performance. In some countries or regions, a term for giftedness exists but there are no defined classification criteria. In some cases, diagnostic tests may be used if there is disagreement between parents and the school about a child's ability, regardless of the existence of clear-cut

3. Documents written in English, Dutch, German, Spanish and French, which could all be translated by the author criteria (Eurydice, 2006). In Belgium, high potential ability is reflected in the coexistence and coordination of a whole set of factors. Aptitude tests and tests to measure attainment or performance are only one stage in the more comprehensive assessment of a particular pupil. In Latvia, aptitude tests or tests of potential ability are organized at the schools' own initiative only (Eurydice, 2006), while in Hungary, schools primarily identify and serve individuals with cognitive and artistic talents. Affective and social forms of intelligence are increasingly included in the identification process in Hungary (Eurydice, 2006).

Educational Interventions for Gifted Students

The survey of the European Agency for Development in Special Needs Education (2009) indicated that the most common type of curricular adaptation/modification throughout Europe was individualized support, followed by acceleration and enrichment, often used in combination with one another. It is striking that teacher education concerning gifted learners in most countries is optional and that the needs of gifted learners are usually advocated by parents and organizations for gifted learners.

Most of the special educational programs for gifted children in Europe are implemented within the school system. Györi and Nagy (2011) correctly argue that it can be confusing to define what programs are actually meant for gifted children. One could even discuss if this is important to define. A survey conducted by Freeman et al. (2010) revealed a movement away from seeing giftedness as something fixed and gifted education for only a few high achievers. More and more people now view gifted education as an opportunity related to effort; there is also a focus on disadvantaged gifted students and support for special social and emotional needs.

Based on the information in this survey, one can place countries in four different categories: (1) countries where there are almost no programs for gifted and talented students, (2) countries where there are no official measures for those students, but where the system encourages flexibility and makes special educational measures possible, (3) countries where schools are expected to offer gifted education, but where there is much organizational freedom of schools, resulting in a varied approach dependent upon the individual school or teacher, and (4) countries with a systematic, integration-based approach toward gifted education. These classifications are not very clear-cut in practice, however, due to the range of differences within countries and regions.

In Malta, Greece and Norway, there are no official programs intended specifically for gifted students. Although the ancient Greeks in Plato's *Republic* laid the foundation of the idea of fostering intellectual excellence in Europe (Matsagouras & Dougali, 2009), it appears that commitment to the full development and understanding of gifted students is not a feature of the modern Greek school system. According to Matsagouras and Dougali (2009), educational objectives are mainly focused on the needs of the average students. Special classes or schools, enrichment programs or acceleration procedures seem to be, out of fear of elitism, unavailable at any level, in public schools and in the majority of private schools.

In Norway, the Educational Act states that, "Education shall be adapted to the abilities and aptitudes of the individual pupil." Although this construct of "adapted education" should cover special education for gifted students, it is mainly applied for students with disabilities (K. Kolberg, personal communication, August 2014). Kolberg expresses her concern considering the effect of the Norwegian policy on children who need more challenges. She cited Arnold Hofseth, who, more than 40 years ago, commented that children with talents were eagerly waiting for support in Norwegian schools. According to Kolberg, these children are still waiting, which is in line with Bakler's (2014) observation that "Giftedness is rarely acknowledged in any part of the Norwegian society. There is no mention of high intelligence or giftedness in education law or acts, and no programs for gifted children in public or private schools" (p. 1). These observations raise concerns about whether the Norwegian educational system adequately caters to its relatively small proportion of talented and gifted students (Nusche, Earl, Maxwell, & Shewbridge, 2011).

According to Persson (2010), all Scandinavian countries resist supporting gifted students, because of the pursuit of an egalitarian learning environment. In the Swedish school system there is no official policy for gifted education, and, according to Persson, there are no educational adaptations for gifted students.

Hornyák (2011) and Tirri (2006) paint a different picture of the situation in Finland. Unlike other Scandinavian countries, Finland's educational laws emphasize individuality and allow schools to plan curriculum in accordance with students' needs (Hornyák, 2011; Ruokonen, 2005; Tirri, 2006). Although Ruokonen (2005) noted no official educational policy program for identifying, supporting, or educating gifted students, Hornyák (2011) considered talent support an organic part of the national culture and of teaching practices in Finland. Educational policy stresses individuality and freedom of choice. Tirri (2006) is optimistic about education of gifted and talented students in Finland, due to the trend toward more individualized curricula. This individualism allows for more flexible decisions in acceleration; parents may decide, for example, to let their child enter school earlier. Most of Finland's upper secondary schools, and some primary schools, are ungraded, which allows students to advance in their studies at their own pace. Adjustment in time, content, process and environment for gifted and talented students is also possible in Estonia. Schools can provide an individualized curriculum to meet the needs of gifted learners (V. Sepp, personal communication, January 2015). In Scotland, the Code of Practice (cited in Sutherland & Stack, 2014) says that "... more able children or young people may require a more challenging educational provision than that of their peers," which allows for similar possibilities for gifted and talented students as in Finland and Estonia (M. Sutherland & N. Stack, personal communication, January 2015). J. Raffan (personal communication, January 2015) describes a similar situation in the rest of the UK.

Ziegler, Stoeger, Harder, and Balestrini (2013) discussed gifted education in German-speaking Europe (Germany, Austria, Liechtenstein and parts of Switzerland, Italy, and Luxembourg) and found many educational adaptations, based on separation and on inclusion. In the German-speaking communities of Belgium, Bulgaria, Denmark, Finland, Malta, the Netherlands (in primary education), and the UK, there is de facto inclusion. The organizational freedom in Dutch (Hoogeveen, 2008) and Belgian schools (Himpe, 2008) enables them to choose whether or not to offer special educational programs for gifted students. By law, schools have the obligation to offer their students a continuous learning process (Ministry of Education, Culture and Science, 1998; Ministry of the Flemish Society, 1996), which implies that acceleration is possible.

In Spain (Ley Orgánica, 2006), gifted and talented students have the right to receive adapted education, including a more flexible duration of every educational step. Comes Nolla et al. (2009) consider this legislation concerning gifted education very limiting. J. Touron (personal communication, July 2014), on the other hand, thinks that the legislation is sufficient, but that the application is a problem. However, talent support has expanded in Spain since Touron founded CTY España in 2001 (Benyhe, 2011). Oliveira and Martin (2010) mentioned a lack of clear political guidelines regarding gifted education in Portugal. Portugal has a "General Basic Law" (Ministry of Education, Bureau for European Affairs and International Relations, 1999; see also Oliveira & Martin, 2010) that refers to curriculum differentiation as a way to create equality of opportunities for different students. Some educational provisions are available for students with exceptional learning abilities, including academic acceleration and enrichment activities, with pedagogical differentiation and individual mentoring (Oliveira & Martin, 2010; F. Pereira, personal communication, August 2014).

Switzerland seems to be a good example of a country where gifted education is systematically applied. Although there are no mandatory national policies on gifted education (Mueller-Oppliger, 2014), the majority of Swiss cantons base decisions on dynamic perceptions of talent and require concrete implementations (Grossenbacher & Vögeli-Mantovani, 2010; Mueller-Oppliger, 2014). The cantons follow a systemic, integration-based approach and include all levels of the school system. Schools offer enrichment and acceleration as well as combinations of these elements (Grossenbacher & Vögeli-Mantovani, 2010).

Academic Acceleration in Europe

Academic acceleration, as one curriculum adaptation for gifted and talented students, is a complex issue in European education, in large part due to the multiple forms of acceleration Southern and Jones, 2004; this volume). The options vary in visibility, and those that are less visible might be applied by teachers without awareness of policymakers, administrators, or even students' parents. The compilation of information below was obtained from published and unpublished documents including anecdotal experiences of specialists in the field. The collection represents a snapshot of gifted education and acceleration in Europe.

Prevalence of Acceleration

With the exception of Malta and Norway, all European countries officially offer educational measures for gifted students. Most countries offer both enrichment and acceleration. There are still some European countries, however, where academic acceleration is not allowed, such as Cyprus (Eurydice, 2006; Z. Poulli, personal communication, June 2014), Greece (Eurydice, 2006; A. Gari, personal communication, August 2014; Matsagouras & Dougali, 2009) and Latvia (L. Sakijeva, personal communication, January 2015). However, it is remarkable that, while not allowed, students in Latvia do skip grades.

Although allowed in almost every European country, in most countries acceleration is infrequently applied in education. Exceptions seem to be Switzerland, Germany, Austria, and the Netherlands, where academic acceleration is part of the adaptation of education for gifted students. Experts from Norway, Sweden, France, Latvia, Hungary, Portugal, Slovenia, Croatia, Macedonia, Romania, Estonia, Ireland, and the UK explicitly state that acceleration is rare in their respective educational systems. In England and Wales, for example, students are encouraged to work at their own level within their age group class, and some curriculum compacting occurs; students are rarely advanced to the next grade ahead of their age peers. Some pupils do take the examinations set at 16 years of age, which is a year early (Raffan, personal communication, June 2014). In Scotland (Sutherland & Stack, 2014), the current focus in education is on inclusive education, which allows for academic acceleration, although school professionals will not necessarily use this terminology (M. Sutherland & N. Stack, personal communication, January 2015).

In Sweden, although acceleration is allowed, there is no formal method for acceleration in the school system. There have been some individual cases where students accelerated, but these seem to be the exception, rather than the rule (A. Enström, personal communication, June 2014). Some upper secondary schools give the students opportunities to study a beginning course (e.g. maths) at the next level (A. Enström, personal communication, June, 2014). In Ireland, though it is allowed, academic acceleration is most unusual. Children almost always progress through primary and post-primary education with their similar-age peers (D. Mahon and C. O'Reilly, personal communication, August 2014). The situation in Norway is rather confusing, because there are officially no specific programs for gifted students, but according to the European Agency (2010) and Mathiesen (2010), various kinds of acceleration and enrichment are practiced in and outside the classroom, and it is possible for a student to enter school one year early. J. T. Bakler (personal communication, January 2015) states, however, that early entrance is rarely permitted by schools. On the one hand, Norwegian students are permitted, and even encouraged by school authorities, to attend courses at higher levels or skip parts of the regular teaching. On the other hand, this is not promoted within the school or taught in teacher education programs. So students *can* be accelerated but do not have the legal right to be accelerated and are utterly dependent on the teacher and school to find it opportune. As a consequence, this measure is realized very rarely and is not utilized in any systematic way (J. T. Bakler, personal communication, January 2015).

Requirements for Acceleration

In some countries, such as Germany, Switzerland and the Netherlands, no specific conditions need to be met for a student to accelerate. Teachers and parents agree about a possible acceleration (B. Harder, personal communication, January 2015), and when an early entry is considered, sometimes the school doctor will be involved (Gronostaj & Vock, 2014). However, in Germany and the Netherlands, making the decision to accelerate leads to uncertainty and concern (Hoogeveen, 2008; Hoogeveen, van Hell, & Verhoeven, 2003, 2009, 2011; Kretschmann, Vock & Lüdtke, 2014). Therefore, there are still schools where acceleration, and specifically skipping grades, is infrequently or never applied. In contrast, acceleration is frequently employed in Switzerland (T. Wetter, personal communication, August 2014). Parents and teachers or school administrations decide together if a student should accelerate. In Luxembourg, acceleration is based on the certificate of an official Guidance Service of the Ministry of National Education or of a registered psychologist working in private practice. The certificate must include the results of a thorough psychological examination, considering all the potentially intervening factors (L. Schiltz, personal communication, June 2014). Also in Romania, a psychological examination provided by specialists is required before a child can enter school early (C. M. Cretu, personal communication, January 2015). In France, the request for acceleration can come from teachers or parents. Currently, the final decision is based on observations and a medical-psychological file (Pereira-Fradin & Lubart, 2012). Although a specialist's opinion is not required (Vrignaud, et al., 2009), parents feel compelled to provide proof, e.g., a high IQ score, of the high potential of their child. Because French schools do not identify gifted children, parents must thus see a private psychologist who evaluates the child (Delaubier, 2002). According to Vrignaud, et al. (2009), it is usually the board of teachers that applies for acceleration after a request by parents.

In Lithuania, students may be grade advanced if her or his learning achievements are significantly higher than the other students. Grade-skipping takes place at the request of parents or, from ages 14 to 18, at the request of the student and one of the parents. They need a written agreement and the approval from the student's teachers and the Child Welfare Commission of School (Ministry of Education and Science of the Republic of Lithuania, 2012). In the Czech Republic, the decision about acceleration is taken by the school head and examination by an examining board nominated by the school head (Eurydice, 2006). This is also the case in Hungary, where students may be granted permission by the school principal to fulfill the study requirements set for two or more school grades over one academic year or over a shorter time than prescribed (Public Education Act, translation of C. Fuszek, personal communication, January 2015).

Types of Acceleration

Southern and Jones (2004) stated that, "Accelerative options vary by the degree to which they are noticeable to others…" (p. 5). In discussions about academic acceleration, early entrance and skipping grades are the primary types of acceleration people seem to consider. Other types of acceleration are applied in many educational systems, but are less noticed and documented. Most European educational systems offer some kind of personalized learning for gifted students within mainstream settings. This means, as Sutherland and Stack (personal communication, January 2015) appropriately commented, subject matter acceleration should be possible. Combined classes exist in many schools and the ungraded Finnish schools allow for acceleration. Dual enrollment, early graduation and Advanced Placement were mentioned anecdotally, but were mostly not documented. For this reason, only early entrance and grade-skipping will be described below.

Early Entrance to School and Skipping Grades

Based on the documents examined and communication with experts in the field, early admission to primary school is possible in Austria, Belgium, Croatia, Estonia, Finland, France, Germany, Great Britain, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Netherlands, Norway, Poland, Portugal, Romania, Scotland, Slovenia, Switzerland, and Turkey. It is important to note that the fact that early entrance is permitted does not mean it is utilized frequently.

Grade-skipping is utilized in Austria, Belgium, France, Germany, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Norway, Portugal, Scotland, Spain, Switzerland, and Turkey. In some countries, for example the Netherlands and Turkey, grade-skipping typically takes place during the elementary school years. In other countries, including Germany, grade-skipping is mostly applied with older age groups in secondary schools (Heinbokel, 1997). In France, schooling can be accelerated according to the pupil's "rhythm of learning" (Ministère Education Nationale Enseignement Supérieur Recherche, 2005). Schooling is organized in multi-year blocks called "cycles," through which gifted children may progress more quickly than normal, eventually resulting in a grade skip. Although grade-skipping is the most accepted practice with precocious children in France (Vrignaud, Bonora & Druex, 2009), official statistics indicate that acceleration is primarily used for early entry into elementary or middle school (Vrignaud, 2006). In Italy, students may skip one year during the first eight years of school or the last year of secondary school (fourth and fifth year together). Students have access to University in Italy only if they have completed 12 years of school; as a consequence, students who skipped more than one grade during primary and secondary school can attend only a foreign university (A. M. Roncoroni, personal communication, June 2014). In Spain, acceleration consists of advancing the student one academic year (Hernandez & Ferrando, 2012). Spanish students can skip up to a maximum of three grades (Eurydice, 2006), while in Portugal students can accelerate up to a maximum of two years (Almeida & Oliveira, 2010). In Austria, while skipping grades was made possible in 1974, it was relatively unpopular and unknown until the 1980s. It has been used increasingly in the last several decades, especially in primary school (Resch, 2014).

Review of the Research on Acceleration in Europe

The most striking finding concerning research on academic acceleration in Europe is how little research exists (Freeman, Raffan, & Warwick, 2010; Gronostaj & Vock, 2014; Györi & Nagy, 2011; Heinbokel, 2012; Himpe, 2008; Hoogeveen et al., 2009; Resch, 2014). Heller (2009) expressed his concern about the infrequency of evaluating gifted programming activities in general. He stated that financial constraints and methodological limitations act as barriers to this type of research. There are also psychological barriers; teachers regard an evaluation of "their" education as a nuisance, or, in some cases, a threat (Heller & Reimann, 2002). Another potential barrier is the existence of many different theories of giftedness and performance; it can be difficult to decide which theory or theories to apply in the research on gifted education (Harder, Vialle & Ziegler, 2014).

All research papers used described those forms of acceleration in which the accelerated student was younger than his or her classmates, probably because these forms are most obvious and lead to more concerns. Generally, findings from European studies seem to parallel the outcomes of earlier studies in the United States; they indicate that acceleration does not harm gifted students, even in the case of multiple grade skips.

Prevalence

The prevalence of accelerated students was studied by Vrignaud (2006), Vock, Penk, and Köller (2013) and Heinbokel (2012), and Himpe (2008) in France, Germany and Belgium, respectively. Vrignaud (2006) found a decrease in the use of acceleration as an educational measure in France. This was also the finding of Himpe, who found the number of accelerated students in the Flemish part of Belgium declined over the past 50 years. Himpe (2008) also found gender differences over time: Before 1972, more boys were accelerated; since then, more girls have been accelerated. Himpe mentioned several possible reasons for the general decline, including a changed curriculum, more influence of the National Educational Advising Institute, or more emphasis on the social-emotional development of students. However, due to a lack of empirical studies, there is no scientific base for these assumptions. In Germany, the movement seems to be in the opposite direction. Since the 1990s, there has been an increase in the number of students who skipped grades in German schools (Heinbokel, 2012). Heinbokel also found substantial differences between the different German states, with the highest rate of acceleration in Hamburg (0.12% of all students in primary and secondary school), and the lowest in Sachsen and Brandenburg (.02%). In their research on German students, Vock, Penk, and Köller found that accelerated students were predominantly boys who had been accelerated during their first years at school. Van Steen (2010) studied policy and practice concerning acceleration in Dutch secondary schools with a special profile for gifted students and gymnasia. He found that 11 of the 15 schools examined offered one or more forms of acceleration. Skipping grades was possible in three of the 15 schools. None of those schools, however, had a policy concerning this type of acceleration.

Cognitive and Academic Achievements of Accelerated Students

Vrignaud (2006) found that 44% of the children in France who entered elementary school when they were five years old (one year earlier than the national norm) obtained their baccalaureate by passing an exam at the end of high school without having to repeat a grade; in contrast, this percentage was 25% for those students who entered at the regular age. This finding supports the idea that, in the French system, acceleration is not a predictor of failure when the child is older (Pereira-Fradin & Lubart, 2012). The positive effect on cognitive and academic achievement was also found by Almeida and Oliveira (2010), who described three Portuguese studies investigating the effects of early entrance to school and grade-skipping, and by Boogaard, who studied Dutch accelerated secondary school students who reported that they were doing well academically. In Ireland, Ledwith (2013) found that early entrants in a dual enrollment program at the University of Dublin performed as well as, if not better than, their first year classmates in their end of semester examinations.

Accelerated German students, however, performed only a little above average on measures of cognitive ability (Vock, Penk, & Köller, 2013). At the time of the survey, 39% did not attend a Gymnasium, the highest level of secondary education in Germany, and 34% had to repeat one grade after having been accelerated. Although their mathematical competence was above average, the students reported average grades in relation to their peers (Vock, Penk, & Köller, 2013).

Social/Emotional Development of Accelerated Students

Heinbokel (1997) conducted a survey among German parents of accelerated students. The data revealed that the number of children with a close friend increased after grade-skipping. Parents of 23% of the girls and 49% of the boys reported that before acceleration their child did not have a very good friend. This number decreased to 17% for girls and 31% of boys after grade-skipping. Boogaard (2008) found similar results in her study of social contacts of accelerated students in secondary school: accelerated students had better contact with their classmates and more friendships than they had in primary school. These positive findings are supported by the results of three Portuguese studies described by Almeida and Oliveira (2010). They concluded that acceleration is effective, not only cognitively and academically, but also considering socio-emotional factors such as self-concept.

In the Netherlands, Hoogeveen, van Hell, and Verhoeven (2011) examined social-emotional characteristics of accelerated gifted students in relation to personal and environmental factors. The results of this study strongly suggested that social-emotional characteristics of accelerated gifted students and non-accelerated gifted students were largely similar. In a study of the self-concept and social status of accelerated and non-accelerated students in their first two years of secondary school in the Netherlands, Hoogeveen et al. (2009) found that accelerated students had more positive self-concepts concerning school in general, and mathematics specifically, than non-accelerated students. They also demonstrated a less positive social self-concept, which increased slightly during their school career. Accelerated students had a lower social status than nonaccelerants and were considered to be less co-operative, humorous, helpful, leading, and social (Hoogeveen et al., 2009). Peer ratings were more negative for accelerated boys than for accelerated girls. The authors suggested that the results might have been influenced by prejudiced attitudes of peers and teachers. The inaccurate, negative attitudes of secondary school teachers found by Hoogeveen et al. (2005), seem to support this suggestion. Cornell (1990) also mentioned prejudicial attitudes in the classroom or school as a possible cause for unpopularity. In a recent follow-up study of the same age group (Wagenaar, Denessen & Hoogeveen, submitted), no differences in social status between accelerated and non-accelerated students were found.

In Ireland, Ledwith (2013) evaluated social, emotional, personal and academic integration of students in a dual enrollment program called Early University Entrance (EUE). Students in this program experienced some difficulties in adapting to the new learning environment, but they adopted a mature attitude toward their studies in coping and overcoming the issues they encountered. Their self-concept decreased at the midpoint but recovered by the end of the program. Socially, the early entrants integrated well with their university peers, although they experienced some difficulties in maintaining links with their school friends. The students' attitudes toward school were negative in the beginning of the program, as students gained greater perspective, their attitudes were relatively positive by the end of the program.

In England, Freeman (1996) described a self-report sample of young gifted students in the United Kingdom. She found that accelerated students and their parents felt that rules such as a curfew were difficult to develop and enforce because of the difference in the accelerated students' ages and those of their classmates. Some of the accelerated students perceived themselves as small, in spite of the fact that they were of normal size for their ages. Other students defended their failure to be chosen for sports teams by saying that they did not like sports anyway. The only boy in the study who reported being "very pleased" with being accelerated was tall and mature for his age. He said he was particularly happy because acceleration enabled him to leave school earlier.

Teachers' Attitudes Toward Acceleration

In the Netherlands, Hoogeveen, van Hell and Verhoeven (2005) investigated secondary school teacher attitudes toward acceleration and accelerated students. Most teachers reported that they considered a special approach for gifted students advisable and viewed acceleration as a useful intervention (Hoogeveen et al., 2005). Teachers' opinions about accelerated students' social competence, school motivation and achievement, emotional problems, and isolation were qualified by the quantity and quality of prior experience with accelerated students and by their opinion on acceleration in gifted education. Teachers who attended a meeting and received written information expressed more positive opinions about accelerated students' social competence, school achievement, and motivation and less negative opinions about emotional problems after acceleration.

Endepohls-Ulpe (2012) studied the attitudes of German secondary school teachers towards students' early entrance to university. She found that teachers in general had a positive attitude toward this kind of acceleration, but also feared organizational and social problems and additional work. She noticed that teachers with less experience with this accelerative option anticipated more problems. Endepohls-Ulpe concluded that these results indicate a lack of information provided to teachers about acceleration and giftedness in general.

Experiences, Beliefs, and Attitudes of Those Concerned with Gifted Students

Most teachers and counselors express concern about social-emotional problems caused by acceleration of gifted students and therefore have a negative attitude toward it (J. T. Bakler, personal communication, January 2015; C. M. Cretu, personal communication, January 2015; Heinbokel, 1997; Hoogeveen, et al., 2005; M. Juriševič, personal communication, August 2015; Sak, personal communication, January 2015; Schilz, personal communication, June 2014; Schraml, personal communication, January 2015; Van Steen, 2010). As a 51-year old history teacher of a Dutch secondary school expressed, "They will behave as solitaries, isolated, having problems to socialize, behaving as little professors" (Hoogeveen, 2008, p. 65). Parents also express those concerns. Parents in Boogaard's (2008) study were afraid that their child would be bullied after an acceleration or would feel bad if their friends could drink alcohol and they could not, because of their age. S. Schraml (personal communication, January 2015) heard similar concerns: "Parents are scared and worried about the age difference, the emotional and social isolation especially later in puberty, and for that reason do not want their child to enter school early or skip a grade."

However, when we look at what accelerated students themselves and their parents say, the image is more positive. Heinbokel (1997) and Kretschmann et al. (2014) asked German accelerated students about their academic performance and both reported positive experiences. S. Schraml (personal communication, January 2015) described how one of her clients who accelerated graduated at age 15 instead of 18 and is doing his master studies at 19. Karisa Matomäki, professor of Turku University (cited in Hornyák, 2011) stated that one of the reasons why he got his PhD degree by his 23rd birthday was that he could make faster progress in the special school he attended. Fifteen-year-old Lucia from Italy was glad that she could skip first grade, because she had been reading since she was 2 ½ years old. She joined an International Baccalaureate School with enthusiasm about the challenging curriculum, individual involvement in social themes, and the encouragement to raise her standards. Lucia will be able to apply to University at 17 years of age, probably in the UK, two years before the typical age of University enrollment in Italy (personal communication, Lucia and her mother, January 2015).

Heinbokel (1997) noted that most accelerated students had more friends after accelerating. Schraml (personal communication, January 2015) observed the same in some of her clients, sometimes after some difficult years of isolation or bullying. Boogaard (2008) found similar results when asking Dutch accelerated students and their parents about their social experiences. Two students said, "It improved my social life very much" and "Now I have friends who are at the same level of development." One of the mothers said, "My daughter is feeling much better. Before the acceleration she said she was tired of life. After a second acceleration she never said that again." Sak (personal communication, January 2015), who advises Turkish parents of gifted children, says that the accelerated students in Turkey felt happy after their acceleration. Smeets' experience in Belgium is that for highly intelligent and motivated students acceleration has a positive effect on their academic achievements and no negative effects on their social emotional functioning (S. Smeets, personal communication, January 2015).

There were some negative experiences, though. A Dutch teacher stated:

> *Other students do not accept him [an accelerated student], partly because they are jealous. He does not [do] his homework, forgets his books, still his grades are fine. His parents have given him the idea he is a miracle, but he is not socially competent, he does not understand criticism (Hoogeveen et al., 2005).*

Also Heinbokel (1997) and Schraml (personal communication, January 2015) found some emotional and social problems in German students. Heinbokel commented that it was not clear, however, whether they were actually caused by the acceleration, by individual, private problems, or by an unsympathetic environment. A unsympathetic environment was also mentioned by the parents who participated in the study of Boogaard (2008); the great opposition of some teachers, combined with a lack of information, made it difficult for parents to make the right decision. Sometimes it is not the social, but academic environment that is insufficient, even after an acceleration, as in the case of the eight-year-old Italian student, Luigi (not his real name). His story illustrates that skipping a grade is not always enough. His father wrote that his son is doing fine socially, but still has the feeling that he is not learning anything that he does not know yet, despite having skipped first grade.

All the personal experiences described here stressed the importance of the individual teacher. Positive and negative experiences where related to knowledge and experience of teachers and the way they did, or did not, support the individual student.

Discussion

This review shows that there are many positive activities concerning gifted education in Europe. Even countries advocating inclusion and not focusing on gifted education appear to offer a good education for the gifted and talented, including opportunities to accelerate. Finland and the UK seem to be good examples of these kinds of educational systems, where, without mentioning gifted education, students' curriculum can be personalized and students can accelerate in an ungraded educational system.

In particular, the German-speaking countries (Germany, Austria and Switzerland) seem to be very advanced in systematically offering educational programs for gifted and talented students. In Switzerland, for example, enrichment and acceleration dovetail with one another and time is created for deeper and broader learning options. The possibilities for acceleration are open, either as a complement to the enrichment activities offered, or in combination with them (Grossenbacher & Vögeli-Mantovani, 2010).

In some countries, like Malta, Norway, and Greece, experts still notice a lack of opportunities for gifted and talented students and there is pessimism concerning the way gifted students are educated. Claiming equality may result in a lack of opportunity and also the freedom to learn for gifted students (Persson, 2005; 2010). However, even in these countries, where experts say that education for the gifted and talented is insufficient, those same experts are passionately advocating for this group.

In some countries, declarations based on thorough psychological assessments are necessary before a student can accelerate, while in other countries recommendations from teachers, in consultation with parents, are enough to make the decision. Although teacher nomination can be a good criterion for acceleration, many researchers and experts in the field comment that there is a lack of teacher training in relation to issues concerning gifted learners (Almeida & Oliveira, 2010; J. Cvetkovic-Lay, personal communication, August 2015; Freeman et al., 2010; Hoogeveen et al., 2005; 2008; Ziegler et al., 2013). Hoogeveen et al. (2005) showed that teacher attitudes toward accelerated students are not only related to the quality of their experiences with accelerated students and their opinions about acceleration, but that these attitudes also can be positively influenced by professional and objective information on giftedness and acceleration. The important role of the teacher in the education of the gifted and talented is mentioned in studies and personal experiences. Almost all experts state that, independent of policy, in the end the academic and social emotional development of gifted and talented students depends to a great extent on the individual teacher.

It is striking that many researchers and experts notice the lack of specific training of teachers in differentiating education for gifted students. Heinbokel (1997) suggested that teachers with a negative attitude towards acceleration see problems that other, less biased and better informed and experienced teachers, would either list under normal behavior after grade-skipping or would help to solve by appropriate means. This suggestion is supported by Hoogeveen et al.'s work (2005) in the Netherlands. We need well-trained teachers, with knowledge and experience about what really works for gifted children.

The focus of this review was on academic acceleration. As in the United States, acceleration works in European educational systems, but it should not be applied blindly. Acceleration is not to be used as a method of disposing a problematic student from a classroom (an experience of Schraml, personal communication, January 2015) or because of the lack of other educational opportunities (Pareira-Fradin & Lubart, 2012). As Gronostaj and Vock (2014) note, academic acceleration has nothing to do with accelerating the natural development of a student, but with the intent to educate students at a level that corresponds with their level of competency. The Belgian scientist De Corte (2013) represents the opinion of most of the experts, declaring that there are conditions that should be satisfied before accelerating, including providing trained and motivated teachers, an appropriate curriculum, and parent support.

The German counseling center LBFH (B. Harder, personal communication, January 2015) is an example of an excellent program that supports acceleration. In this center, counselors prepare students before they skip a grade and make sure they will connect socially and be ready to deal with the subject contents when they enter the higher grade. Teachers evaluate the student's knowledge in specific subject areas; if the student has knowledge gaps, the student can study the appropriate material during the holidays. After the decision has been made for a grade skip, the student moves into the higher class and spends the last four weeks of the school year with those students, as a way of helping him or her to connect with the class. Then, the student moves on with the class to the higher grade in the fall.

With Gronostaj and Vock (2014), we can conclude that acceleration is an uncomplicated measure in gifted education that can prevent the problems occurring when students are placed with their age-mates in an intellectually inadequate situation. Acceleration has the added advantage of reducing costs, is easy to apply and will benefit the students who will move through their educational careers at a faster pace. Our most excellent students can complete their studies at an earlier age, which also offers societal and economic benefits.

Recommendations for Practice and Further Research

In the process of improving gifted education and using acceleration as one of the valuable measures, we can learn from each other. Several best-practices in various countries were discussed. For example, Hoogeveen, van Hell, and Verhoeven (2003) developed a Dutch-language acceleration scale that has been revised to include background information and a workshop (Verlinden, Oostindie, Bouwman, & Ottink, 2014). Schools in other countries could benefit from this instrument.

The Acceleration Institute at the University of Iowa (formerly called the Institute for Research and Policy on Acceleration (www.accelerationinstitute.org) is dedicated to the study and support of educational acceleration for academically talented students and offers information about policy guidelines and an example of an acceleration scale (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2009). Educators and parents can also download Volume I of *A Nation Deceived* in 11 different languages.

The patchwork quilt of gifted education in Europe is colorful and varied; we should take advantage of that, while we increase European cooperation. For the past 25 years, the European Council of High Ability (ECHA) has worked for that cooperation, aiming to advance the study and development of potential excellence in people and, in the 2014 words of ECHA's president, "...to stand in the forefront of building a European Talent Support Network" (Czermely, 2014). This recently founded network will give even more opportunities for researchers interested in gifted education to learn from each other.

Acknowledgements

Writing this chapter has given me the opportunity to go deeply into the fascinating world of gifted education in Europe. I had interesting discussions with distinguished European experts, who are mentioned below. It made me realize how many people are concerned with gifted students and are willing to put efforts into offering them the best possible education. I am sure that there are more experts with whom I did not have the chance to communicate. This story does not end here. I would like to invite all people involved in gifted education to add their knowledge and experience. A lot has been done, and much work remains. Not only is the United States of America empowering teachers, parents, and students; Europe is joining them.

European Experts Consulted for this Chapter

Austria

Petra Wolfsberger, MSc – ECHA-Specialist in Gifted Education – National Correspondent ECHA – Coordinator for Gifted Education Niederösterreich

Belgium

Dr. Stijn Smeets – Modesto development of intellectual talent – University of Leuven – Center for the Study of Giftedness – Radboud University

Croatia

Jasna Cvetkovic-Lay – National Correspondent ECHA - Founder and vice-president of the Center for Gifted Child Development BISTRIĆ Zagreb

Jasna Arrigoni - Center for Gifted Children, Rijeka

Cyprus

Dr Zena Poulli – National Correspondent ECHA - Director of Secondary Education in the Ministry of Education and Culture of Cyprus

Denmark

Ole Kyed – Psychologist - Danish delegate of ECHA and World Council for Gifted and Talented Children

Estonia

Dr. Viire Sepp – National Correspondent ECHA – Director, The Gifted and Talented Development Centre - University of Tartu

Germany

Dr. Bettina Harder – Landesweite Beratungs- un Forschungsstelle für Hochbegabung (LBFH)- University of Erlangen-Nuremberg, Germany

Dr. Annette Heinbokel – Editor of ECHA news; German Association for Gifted Children (DGhK; 1978)

Dr. Miriam Vock – University of Potsdam

Sabine Schraml - certified educator - pedagogue for giftedness- Forum Hochbegabung, Hof (Bavaria)

France

Elise Hill – President ANPEIP Est (Alsace, Champagne-Ardenne, Lorraine), Association Nationale Pour les Enfants Intellectuellement Précoces

Greece

Dr. Aikatarina Gari – National Correspondent ECHA - National and Kapodistrian University of Athens.

Hungary

Csilla Fuszek – National Correspondent ECHA - Association of Hungarian Talent Support Organizations

Italy

Dr. Anna Maria Roncoroni – General Committee ECHA - President of the Italian Association for Gifted and Talented Students

Ireland

Don Mahon - Assistant Chief Inspector - Department of Education and Skills – Dublin

Dr. Colm O'Reilly - Director at the Centre for Talented Youth, Ireland

Latvia

Laili Sakijeva – National Correspondent ECHA - Foundation ASNI (Giftedness System for the Nation's Development)

Lithuania

Dr. Grazina Gintiliene – National Correspondent ECHA – Vilnius University

Luxembourg

Prof. Dr. Lony Schiltz – National Correspondent ECHA

Macedonia

Prof. Ljupco Kevereski - President of the Macedonian Association for Gifted and Talented (MANT) Bitola

Norway

Kari Kolberg – National Correspondent ECHA - Board member of the Norwegian gifted children parent's network "Lykkelige Barn"

Portugal

Filomena Pereira – General Director of Education

Romania

Prof. Dr. Carmen Mihaela Cretu - Vice Rector University of Iasi, "Alexandru Ioan Cuza" - Faculty of Psychology and Educational Sciences

Slovenia

Dr. Mojca Juriševič – University of Ljubljana – Faculty of Education

Spain

Prof Dr. Javier Touron – University of Navarra – Faculty of Education – formal president of ECHA

Prof Dr. Luz Perez - University Complutense Madrid – member of the Superior Council of Experts in High Abilities

Sweden

Dr. Arne Engström – National Correspondent ECHA - Karlstad University

Switzerland

Thomas Wetter – Information Specialist Schweizer Zentrum für Heil- und Sonderpädagogik SZH

Turkey

Prof. Ugur Sak – Chair, Gifted Education Division – Director, Center for Research and Practice on Gifted Education (EPTS) – Editor Turkish Journal of Giftedness and Education – Anadolu University

Ukraine

Dr. Alexander Burov - System Engineer and Psycho physiologist - Institute of Information Technologies and Education Technologies

United Kingdom (Scotland)

Dr Margaret Sutherland – University of Glasgow – Director of the Scottish Network for Able Pupils – member of the Executive Committee of the European Council for High Ability (ECHA)

Dr. Niamh Stack – University of Glasgow - Development Officer Scottish Network for Able Pupils.

United Kingdom (England)

Johanna Raffan – National Correspondent ECHA - Founding Director of the National Association for Able Children in Education (NACE)

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Acceleration in Australia: Flexible Pacing Opens the Way for Early University Admission

Marie Young, University of New South Wales, Sydney, Australia
Karen Rogers, University of St. Thomas, Minneapolis, Minnesota
Katherine Hoekman, University of New South Wales, Sydney, Australia
Helen van Vliet, Sydney, Australia
Lye Chan Long, Sydney, Australia

Abstract

Early admission to university is generally accepted in the United States; however, it is less likely to occur in Australia. Qualitative analysis of in-depth interviews with 12 Australian subjects who retrospectively recalled their experiences of acceleration through school and entry to university early (before the age of 18) elicited five key themes centering on the accelerative pathways the students experienced in school, as well as on academic, social, and psychological adjustment at university. In response to individual needs for flexible pacing, schools facilitated a number of accelerative pathways at different ages and stages. The students were generally pleased to have accelerated, and they acknowledged and successfully negotiated a number of academic and social challenges linked to acceleration with support from family and/or school staff. Similar positive themes emerged concerning early entry to university. In particular, all subjects were generally pleased to have entered university early, expressing a general sense of relief to find their academic interest rekindled. Developing friendships with like-minded peers and participating in extra-curricular activities were significant factors in adjusting and responding positively to the stimulation of university. Parents, university staff, and friends provided support. Other prevalent trends that arose include the accelerated students' preference for less formal support structures at school and university, and a strong desire to be treated like other university students. Results suggest that acceleration can work well for academically talented students in Australia, and these students enjoy the opportunity to enter university early and experience the freedom and challenges of university life.

Introduction

All Australian states and territories now have policies regarding the education of gifted and talented students, and some of these policies acknowledge the practice of acceleration. The presence of gifted education policies, however, does not guarantee that these policies will be implemented in schools (Long, 2012). There is considerable variation between education sectors, systems, and individual schools in terms of the implementation of academic acceleration across Australia (Gross, Urquhart, Doyle, Juratowitch, & Matheson, 2011). The new Australian Curriculum documents from the Australian Curriculum, Assessment and Reporting Authority (ACARA; Australian Government, 2013) and the New South Wales Syllabus from the Board of Studies, Teaching and Educational Standards (BOSTES), for example, make specific reference to the need to consider gifted students. While they mention the possibility of flexible pacing, there is no explicit reference to mandate or exclude consideration of accelerative options.

Concerns about the long-term social and emotional consequences of accelerated progression have generally tempered enthusiasm and negatively impacted the prevalence of this promising educational practice. Although acceleration is one of many differentiation strategies used to address the educational needs of gifted students in Australia, there is little Australian research that records students' recollections of school acceleration and early transition to university (Jung, Young, & Gross, 2015). It is important to consider students' experiences because there are concerns about the wisdom of school-based acceleration and early admission to university among

Australian school teachers, parents, and university staff that persist despite policy support for acceleration practices across Australian states and territories (Gross et al., 2011).

This qualitative study involved interviewing 12 subjects who were accelerated through school and experienced early entrance to university. It aimed to provide helpful insights regarding the variety of accelerative pathways gifted students might experience and to address concerns about what might subsequently happen to these learners at the university level. How did the subjects view the flexible pacing opportunities provided at school? Were they able to handle the accelerated level of study? Could they manage to adjust socially and to connect with other learners, regardless of their young age? Were they able to maintain positive perceptions of themselves as learners and remain motivated to challenge themselves through rigorous studies?

To locate study subjects, academic personnel were approached who worked in the area of gifted and talented education at Australian universities where early entry was known to take place. These academics were able to suggest possible candidates. Some subjects (n=4) did not complete school but rather left ahead of time, commencing university at 12 to 15 years old. Therefore these subjects experienced accelerated progression by skipping one or more of the final years of high school. The other subjects (n=8) completed the final year of high school and then moved on to university but they were younger than the regular first year university students as a result of grade acceleration during elementary and/or high school. They were between 16 and 17 years old when they commenced university.

Through in-depth interviews with these 12 accelerated students, the researchers explored issues that affected the students' experiences at school and university. A retrospective analysis of the varied paths taken through the elementary and high school experience is also elaborated. A detailed analysis provides helpful insights from this small sample about the variety of ways that academically talented students' need for flexible pacing can be accommodated in Australian schools.

Research Background

Early admission to university has been studied extensively in the United States for over 50 years. In general, it is shown to be a positive experience academically, socially, and affectively (Bleske-Rechek, Lubinski, & Benbow, 2004; Lubinski, Webb, Morelock, & Benbow, 2001; Noble, Arndt, Nicholson, Sletten, & Zamora, 2007; Rogers, 1991; Swiatek & Benbow, 1991). Researchers and practitioners have compiled guidelines (Brody & Stanley, 1991; Olszewski-Kubilius, 1995; Rogers, 2002; Sayler, 1994) and have instituted supportive programs. There is, however, little documentation of the variety of accelerative pathways actually implemented in school to facilitate flexible pacing, and a paucity of empirical Australian research to confirm - or deny - that early admission of exceptionally talented students is viable for stakeholders including students, university, and society.

The Education of Gifted Children (The Commonwealth of Australia, 2001) report to the Senate indicated that all their submissions stated that there was a problem with the education of gifted students in Australia. "The problem, in brief, is children of high intellectual ability have special needs in the education system; for many their needs are not being met; and many suffer underachievement, boredom, frustration and psychological distress as a result" (p. 2). In regard to early admission, Recommendation 11 stated that there was a need to "develop a policy providing more flexible university entry and study options for gifted students" (p. 77).

In most states of Australia, it is mandatory to provide students with the appropriate level of educational challenge, which takes into account their special characteristics as learners. The Adelaide Declaration on National Goals for Schooling for the 21st Century, mentioned in *The Education of Gifted Children* (The Commonwealth of Australia, 2001), enshrined this same principle in its first goal: that "schooling should develop fully the talents and capacities of all students" (p. 14). The *Guidelines for Accelerated Progression* (Board of Studies NSW, 2000) directed that gifted school students should be provided with a wide range of challenging options to cater to their exceptional ability. Various forms of acceleration may be instituted by educators in schools in New South Wales, including radical acceleration (i.e., two-years). If the needs of the student cannot be met by appropriate intellectual challenge at available schools, then early university admission is a possible option.

Young, Rogers, and Ayres (2007) reported on their efforts to map the terrain concerning early admission to university education for gifted learners in 40 Australian universities. The statistics they collected on Australian universities offering early admission options indicated that 13 universities offer formal or informal early admission to gifted students, while 33 universities provide dual enrollment options. No minimum age requirements are in place for the majority of Australian universities. Nonetheless, the authors concluded that enrollment of students younger than 17 years is more often used as a recruiting tool than as an accommodation for extraordinary academic talent. Information about available early admission or dual enrollment opportunities is often difficult to find and procedures vary greatly from institution to institution. At the time of the study, the authors recommended that streamlining access would facilitate gifted high school students finding appropriate university options across the country. However, little central coordination has occurred since then.

In a separate study, Young, Ayres, and Rogers (2009) identified 61 Australian students who entered university early after grade accelerations in elementary and/or high school. A number of students experienced subject acceleration as well as grade-skipping. Part of the issue lies in the perspective most Australian states have that all students must complete the state graduation tests, such as the Higher School Certificate (HSC) in New South Wales or the Victorian Certificate of Education in Victoria (VCE), which are normally completed in 12th grade. These high stakes assessments are considered the "final word" in whether a student is ready for university or for the world of work. In recent years, however, the International Baccalaureate (IB) program has been used by many schools, especially private schools, as an alternative means for demonstrating students' readiness for university. Hence, it is rare that individual students go against these traditional choices and apply directly for university admission. Early admission, in the form of entering university one or more years early without completing the "acceptable" alternatives is infrequently practiced. Therefore, although comparatively young students may be accepted as regular undergraduates, there are lingering concerns among school teachers, parents, and university staff about the potential consequences of early admission of gifted students.

The following discussion of Australian research mentions young students entering university because there are some accounts of accelerative options that include students who have progressed to university study ahead of their age cohort (Bailey, 1997; Gross, 1992; Merrotsy, 2003, 2006; Vialle, Ashton, Carlon, & Rankin, 2001). In her longitudinal study of 15 radically accelerated students, Gross (2004) reported on their young age on entry to university, academic success, outstanding careers, and on positive social and psychological adjustment. Merrotsy's (2003, 2006) case studies on dual enrollment for radically accelerated students indicated that the students progressed to full time study at university but provided scant detail about their actual adjustment at university. One student commented that he found university study to be exciting and interesting, and he was never bored. Bailey (1995) briefly referred to a case study of "Michael," an early admission student who excelled; Michael found people at university who shared his interests, and commented that high school appeared "as one great stretch of misery" (Bailey, 1995, p. 17).

Australian researcher, Shannon (1997), wrote a personal reminiscence about his early admission to university at the age of 15.5 years. His reflection suggested that he found academic work challenging and satisfying, had positive self-esteem, was motivated, and that friendships were not a problem.

Methodology

The methodology design followed the descriptive case study protocol suggested by Yin (1993). The multiple-case studies were exploratory. The research questions were guided by issues that arose from the literature from the United States and focused on the following questions: (a) what were the experiences of accelerative options designed to enable flexible pacing at school; (b) what issues, perceived by the students, facilitated their positive adjustment to university; and (c) what hurdles students identified. Ethics approval was obtained, an interview schedule was developed, and personal interviews were conducted.

To put a face on the data (Sharratt & Fullan, 2012), a qualitative analysis was conducted with in-depth interviews with 12 Australian early-entrants. The interviews were compared and the responses were used to elicit key themes centering on their personal history of acceleration, as well as their academic, social, and psychological adjustment at university. The audiotaped interviews were transcribed and were imported into NVivo 8, which assisted in data management and organization, and facilitated the coding and categorizing of the large amount of narrative text generated by the interviews. The use of thematic analysis, both inductive and comparative, allowed for the data to be analyzed for specific themes: for example, difficulty in initial university adjustment, necessity of positive family and university support for decision, need to escape earlier school malaise, value of social relationships, and personal self-direction and intrinsic motivation to learn. Each interview was summarized as a case study, because each student's responses were analyzed question by question (Creswell, 2007). Cross-case analysis, which integrated case-oriented, variable-oriented, and mixed strategies, was used to analyze the case studies. The process included the interpretation and naming of categories, comparison and pattern analysis (Miles & Huberman, 1994), in order to refine and relate categories, examine divergent views and negative cases, and relate data to the literature review, as suggested by Bazeley (2007).

Participants

The students were selected as a convenience sample. Four were known to the researchers; two were tracked down via the public domain of a university website; two were referred for participation via students; and four were identified after requesting help from the researchers' colleagues. All prospective candidates were informed of the research, and invited to contact the researchers through email. When possible, the interviews were conducted in a face-to-face situation; however, when face-to-face interviews were not possible, either a phone interview or an emailed response was substituted. The interview was planned to take 40 minutes, a time span recommended by Seidman (1998) to avoid participant fatigue. This time span excluded written responses addressing the section entitled, "Reflections on your early admission experiences." As a professional courtesy, as well as a validating procedure recommended by Yin (1984), the interviews were transcribed and sent to each participant for checking and/or amendment. Some (n=4) participants did not respond to this checking process; one responded and made no amendments; some (n=3) made small amendments; and some (n=4) made extensive amendments. Table 1 lists each student's pseudonym, gender, acceleration history, age at entry to university, how they entered (completed HSC or IB or decided not to participate in those alternatives), and degrees.

Interview Schedule

The interview schedule used standardized open-ended questions that emerged from a review of research from the United States on early entrance to university (Benbow & Arjmand, 1990; Brody, Assouline, & Stanley, 1990; Lubinski et al., 2001; Muratori, Colangelo, & Assouline, 2003; Noble & Drummond, 1992; Rogers, 1991; Sayler, 1994; Sethna, Wickstrom, Boothe, & Stanley, 2001; Swiatek, 1993). The preliminary strategy was to ask the students about their past, their present, and their future. The approach then became tied to specific concepts: (1) past experiences with acceleration; (2) making the early admission decision; (3) process of early admission; (4) university adjustment; (5) their future; and (6) reflections on early admission experiences.

This section will summarize a smorgasbord of accelerative options implemented in Australia. It focuses on the variety of accelerated pathways taken at different ages and stages by this sample of students, as they negotiated their elementary and high school years prior to early admission to university. All of the early-entrants to university students were relatively younger than their cohort, with an age range of 12 -17 years on entering university.

Results and Implications

Experience with School Acceleration

Acceleration fell into three categories: grade acceleration (where a student skipped one or more grades), subject acceleration (where a student moved ahead in a single subject), and a combination of these two. Four students experienced a grade skip of one year, five students a grade skip of two years, and two students a grade skip of three years. The grade accelerations (n=9) mostly took place in elementary school, but two students experienced grade acceleration in both elementary and high school. Five students experienced subject acceleration: two began by taking accelerated math courses in elementary school, as well as multiple subject accelerations in high school; three students took multiple subject accelerations in high school. Four students undertook a combination of grade acceleration and subject acceleration. One student experienced both grade-skipping and subject acceleration in elementary school; three students were grade skipped in elementary school and then, in high school, took subject acceleration as well.

In general, grade-skipping occurred mostly in elementary school and subject acceleration in high school. The two students who began radical subject acceleration in elementary school were gifted in math. Daniel was six years ahead of his peers and Peter was three years ahead of his peers. Those who took subject acceleration in high school seemed to have taken multiple subject accelerations. Admission routes to university were varied. One participant began dual enrollment at 12 years, and at 15 was admitted as a full-time undergraduate through case-by-case admission. Another 15-year-old had early admission through a formal program and a third 15-year-old had early admission through an informal case-by-case process. The fourth 15-year-old, who had been radically accelerated, had case-by-case admission as he had completed his HSC. Eight other young students, 16 to 17 years old, had completed the HSC and experienced routine admission.

Student Voice

The following vignettes focus on the students' school experiences, and their academic and social adjustment to university. In general, the students seemed pleased to have accelerated, and succeeded with the challenges of university study. Finding friends and participating in extra-curricular activities were significant factors in adjusting and responding positively to the stimulation of university. Parents, staff, and friends were supportive. As these vignettes point out, there were

Table 1: Subject Acceleration History, Age, and Degrees

	Age		History of Acceleration		Degrees	
Name	On Entering University	On Interview	Elementary	Secondary	Current	Completed
Daniel	12 - Single subject dual enrollment (Math) 15 - Full Time	30	Grade acceleration: 2 to 4,4 to 6 Radical subject acceleration: Math (at age five, taking grade six Math)	Subject acceleration: HSC 3U Math in grade nine (age 12)		Bachelor of Mathematics Bachelor of Computer Science (Honors) PhD
Sean	15	29	Grade acceleration: 2 to 4	Grade acceleration: 8 to 10, 11 to university		Bachelor of Science - Medicine Bachelor of Computer Engineering (Honors) Masters of Biomedical Engineering
Peter	15	21	Radical subject acceleration: Math by three years	Subject acceleration: HSC 4U Math in grade nine HSC 2U Physics in grade nine Grade acceleration: 9 to university	PhD	Bachelor of Arts in Advanced Mathematics (Honors) Masters of Mathematics
Adrian	15	19	Early entry to K Grade Acceleration: K to 2, 2 to 4		Masters Doctor of Public Health in Biostatistics	Bachelor of Advanced Mathematics - Applied Statistics (Honors)
Nanette	16	21	Grade Acceleration: 1 to 2, 3 to 5			Bachelor of Science and Arts
Sophie	16	30	Grade Acceleration: 5 to 7	Grade Acceleration: nine to 10	PhD	Bachelor of Arts (Honors)
Felicity	16.5	17	Grade Acceleration: 3 to 5, 5 to 7		Bachelor of Advanced Science	
Suzanne	16.5	17	Grade Acceleration: 1 to 3	Subject Acceleration: HSC 2U History in grade10 HSC Extension History in grade 10 HSC 3U English in grade 11 HSC 3U French in grade 11 Distinction Course in grade 12	Bachelor of Advanced Science	

Table 1: Subject Acceleration History, Age, and Degrees (continued)

	Age		History of Acceleration		Degrees	
Name	On Entering University	On Interview	Elementary	Secondary	Current	Completed
Gena	16.5	26	Grade Acceleration: K to 2, 4 to 6	Subject acceleration: HSC 3U* Math in grade nine HSC 4U Math in grade 10 Physics Olympiad in grade 10 HSC 2U Physics in grade 11 HSC 2U Chemistry in grade 11 Distinction Course in grade 12		B Medical Science (Honors) B Medicine
Steve	17	18	Grade Acceleration: K to 2	Subject Acceleration: HSC 2U Chemistry in grade 11 Distinction Course in grade 12	Bachelor of Computer Science	
Tim	17.3	24	Grade Acceleration: 5 to 7			Bachelor of Engineering - Software Engineering (Honors) Bachelor of Science - Pure Mathematics
Lucinda	17.5	20	Grade Acceleration: 4 to 6		Bachelor of Arts/ Law (Honors)	

**U refers to Units of Study.*

significant individual differences in how the intrapersonal, motivational, and environmental catalysts combined.

Sean's "self-direction was an asset" and extra-curricular participation assisted transition. Sean was radically accelerated by three years; he skipped third, ninth, and 12th grades and began university when he was 15-years-old. He was admitted to the University of New South Wales (UNSW) under the Early Entry Program, after completing 11th grade without a University Admission Index (UAI).

Sean's parents initiated the first acceleration from second to fourth grade. He does not recall any social problems with skipping third grade and nor did he have any social problems with the next two accelerations. He felt challenged when he skipped ninth grade as he had to catch up in subjects other than Science and Mathematics; his performance improved and he was happier at school. He felt competitive and responded when friends challenged him in Physics and Chemistry. In 11th grade, the challenge subsided, as he had mastered his subjects; he was getting bored and he relied on self-directed learning to stay interested. He was not looking forward to a similar experience in 12th grade, and feared that he would not achieve his best. As a result, Sean investigated the Early Admission for Exceptionally Talented Students at the University of New South Wales on his own, but supported by his parents. Sean was not concerned about fitting in at university, as he was used to mixing with older students, nor was he apprehensive about missing out on 12th grade activities.

Sean successfully navigated the rigorous admission process, including extensive interviews with five university personnel focusing on his social and psychological maturity and reasons for early matriculation, followed by the four-hour Scholastic Aptitude Test (SAT). As Sean described, he adjusted well to university: "Like a duck to water! It was just right. ... There wasn't really a period of adjustment." Being a quick, self-directed learner was an asset. Sean loved the work and interactions with other students. He enjoyed the environment - "independent people" with "amazing ideas"; some of his lecturers were "inspirational."

In his first year, support was minimal and private and that was the way he liked it. One of the admission panel members chose to keep in contact, and was very helpful in sorting out subjects and courses. Lecturers were aware of his age, but he did not feel he was treated any differently from other students. He acknowledged that there was a lot of support available, if needed. Dating, drinking, drugs, driving, and extra-curricular activities were not significant issues. He made great friends at university and attributed his successful social adjustment, in some measure, to his experience of playing in a community band with people of all ages. The outside interest that began in high school enhanced his social skills to mix, work, and cooperate with people of all ages.

Sean was pleased with his accelerated pathway. He has been really happy ever since he started university. He believed that an element of luck was involved: his supportive parents, his education in Australia, and his fortuitous career situation all helped to yield a good experience. Personal factors contributing to his happiness included being a quick and self-directed learner. His advice to students considering early admission was that the advantages outweighed the disadvantages. His advice to universities is to allow more early admissions, and perhaps to "lower the bar" for entry. He completed a degree in Computer Engineering and a Masters in Biomedical Engineering and PhD in the near future.

Peter coped with "the usual undergraduate issues" thanks to his love of math. Peter was accelerated by three years in mathematics, in elementary school, in spite of his school's resistance to acceleration. He continued to take accelerated math in high school while taking all other subjects with his same-age peers. In eighth grade, he also took 11th grade classes. In ninth grade he was studying two HSC subjects: 4 Unit Mathematics and 2 Unit Physics, as well as his other ninth grade subjects.

During high school, Peter spent most of his time with his same-age peers. When he participated in the accelerated classes, his older classmates welcomed him. At university, he became friends with those older classmates and they made him feel like one of them. He had no regrets about leaving high school early to attend university as he saw that it was the only possible route available to him in order to continue with his accelerated subjects. "I don't think at the time I had any real concerns, [sic] University seemed exciting and High School isn't the most forgiving place."

At university, he experienced some of the usual undergraduate difficulties in adjusting. His parents were constantly supportive and he continued to live at home. He enjoyed university, especially mathematics. This led, ultimately, to his doctoral studies on Number Theory. At university his intellectual peers were his "big brothers"; they always included him and made him feel welcome. However, he didn't fit in with people his own age at that time, and he characterized his social life as "mixed." If given the opportunity, though, Peter would make the same decisions again about acceleration and early admission. In addition to recognizing his supportive parents, Peter found the encouragement given by the computer science lecturer to be very important: "[His support] was invaluable, everything from his friendship down to the programs we worked on, he made the first couple of years amazing."

Daniel relied on friends and family for support with dual enrollment. When 12-year-old Daniel started university to study mathematics, he wore his school uniform. He had been radically accelerated by multiple grade skips as well as subject acceleration. He was able to attend two schools where there were not demarcated grade levels; instead, students were classified on ability, rather than age. He experienced acceleration in mathematics and science. He was in a formal school setting as well as homeschooled at various times.

By 10th grade, Daniel began dual enrollment at his local university; he entered university as a full time undergraduate at the age of 15. Initially the university accepted Daniel on a case-by-case basis; his HSC results for 3 Unit Mathematics (the most difficult level offered in high school) was accepted as proof of his ability, and allowed him to enroll in university mathematics subjects, even though he had not completed the HSC in any other subjects.

Daniel's parents and his schools worked together to create an accelerative program for Daniel. When he was ready to attend high school, Daniel's father had to become very proactive in his advocacy by writing letters to the government and lobbying to get public policy changed to allow students younger than 12 years to attend high school. Daniel was supported by the New South Wales Gifted and Talented Association. Ultimately, after demanding evidence through general ability and IQ tests, a private school agreed to allow Daniel to enroll, and provided a bursary (scholarship) for him. The school recognized his giftedness and supported and supervised his progress.

At some points during his school years, Daniel was homeschooled for some subjects. This highlighted the fact that he was academically advanced compared to other students. Daniel recalled enjoying hanging around with older students, since they treated him like an equal and they were willing to spend time with him. Daniel's athletic ability became an asset; he played handball with the older students at lunchtime and played ball, backyard cricket, and used the trampoline with neighborhood children who were his age. Although there was recognition of "something different" about Daniel, it did not matter.

By 11th grade, Daniel became academically bored: he was disruptive, made jokes, read the paper, and did crosswords, but he gained a sense of belonging. Once at university he adjusted well to the academic challenges. Later, he found the freedom to play computer games and to miss lectures. His academic ability enabled him to fit in. Dating, drinking, and driving were not issues for him. He lived with his parents, who were a constant support. Daniel relied on his outside group for social contact and support. Although learning came easily, he did not always maximize his achievements, nor was he motivated to do his best. He did not look for support on these issues from the university. Although he had some humiliating failures, he finished a Bachelor of Mathematics and a Bachelor of Computer Science (Honors) by the age of 19. He later related that he undertook his doctoral study through a sense of inevitability, rather than motivated by passion.

If given the option again, Daniel would make the same decision about acceleration "because there is no alternative." Through the acceleration he averted boredom; otherwise there would have been problems. He felt motivated by his enjoyment of math, and his parents cleared the path of obstacles, supported him, and provided a stable home life. His advice to students considering acceleration – or early admission – is that it is not a matter of choice, but rather a matter of being prepared to adapt, to deal with changing environments. Being gifted is about opportunity, motivation, discipline, perseverance and determination. For Daniel the advantages of early admission were clear: "Why would I choose to be consistently bored, for years of my life so that I finish at the same time as other people? Would it not be better for me not only to enjoy school, but to have extra time?"

Suzanne just wanted to be respected and treated like an adult. In elementary school, Suzanne was accelerated from first grade to third grade; she also experienced radical subject acceleration. Her parents did not have to initiate the acceleration, but when they found she was bored and unhappy, they did ask for change, by requesting extra work as well as subject acceleration. During high school, she continued with various subject accelerations in English, History, French, and Geography. By the age of 16 she began university, having completed 19 units of her HSC when most of her same-age peers had completed only 12 units. She also completed an external Distinction Course in Cosmology, a university based course for high school students.

Suzanne had bitter memories of her school days, as she clashed with some staff and school executives. She was physically and verbally bullied by peers, but well supported by some teachers in both elementary and high school. Eventually, she found good friends when she surrendered her unrealistic dreams of joining the "cool" group. She had a happy social life, with friends outside of school. At university, Suzanne chose to study subjects about which she was passionate, rather than choosing the humanities in which she excelled. She took two semesters to adjust academically to physics, her weakest subject, and two semesters to overcome anxiety issues about math exams. She had always been a highly motivated student who enjoyed working independently. Although young, she had a normal undergraduate entry and embraced university studies with joyful enthusiasm, enjoying the freedom from school authority:

> *... I love uni, absolutely. I love my classes; I love the culture of university. People treat you with respect, they treat you as an adult...At university, no-one cares! That's the thing. If you don't turn up, you may fail and that's your problem and I'm not going to yell at you because it's your life. So that's fantastic.*

Suzanne participated in university activities. Her high admission score enabled her to join the Talented Students' Program (TSP); her TSP mentor was encouraging and supportive. She had a wide, informal support system of friends. She did not use any of the formal counseling structures available at university. Her age was not an issue socially, and none of the lecturers made an issue of it.

Suzanne regarded her experience of early admission as "an overwhelmingly positive experience." She attributed her success to her own hard work, help from faculty and staff, and support from friends, both her undergraduate peers and her older friends, including former teachers. She appreciated the role her mentor played in assisting and guiding her during her first undergraduate year. Involvement in the extra-curricular activities was a means of interacting with older students. For Suzanne, the most important outcome of her acceleration was "getting to uni and over the psychological scars of a twisted and evil school system."

Felicity's family, good friends, and extra-curricular activities assisted her positive adjustment to university. Felicity, at 16 years old, began a four year Bachelor of Advanced Science, including an honors year. Her enrollment was routine for an undergraduate, although she was younger than usual.

In elementary school, Felicity had been accelerated in some subjects such as Science, English and Mathematics but finally she skipped fourth and sixth grades, resulting in a radical (i.e., two-year) acceleration. Her school was very cooperative and willingly presented her with opportunities, such as attending an external accelerative cluster group for mathematics; her parents did not initiate the acceleration but supported her. After skipping two grades, she followed a conventional pathway through high school.

Felicity recalls that she never felt socially comfortable in elementary school; instead, she enjoyed the company of like-minded friends during extension classes. Felicity reported that she was verbally bullied and isolated when unwilling to join in class pranks. She disapproved of constant chatter in class. She remembers running back home, at times, to escape. Felicity completed her HSC and proceeded to university with a routine admission, at 16 years of age. Felicity adjusted to university studies and coped well with academic challenges: "It's fairly different from (high) school. It's good: you get more time to learn things, over a whole semester." At high school she had always relied on her independence and anonymity, for she disliked seeking help. In university, she felt comfortable mixing with adults or talking to lecturers and staff. Felicity enjoyed the freedom of university. For academic support, Felicity relied on her university friends and did not seek the formal university support systems. She did not feel conspicuous about her ability at university, for she did not always tell her friends her results; she performed well in university (she achieved a distinction average over the year). Socially, she managed to conceal her age until she turned 17 years. She was a lot happier at university than she was at high school. Family, good friends, and extra-curricular activities assisted her positive adjustment to university. Felicity also had a strong interest in sailing, where she learned to balance work and other commitments; membership was not based on age, so she had opportunities to make good, older friends. She considered that the decision to accelerate was worthwhile, for it averted boredom and got her out of school sooner. Her early admission to university came while she was still excited about academic work. Her final words of wisdom to gifted students: "Try and find other gifted students: That's the best way to have friends."

Lucinda's change from "being a total loser at school to being socially valued at uni…was a wonderful turnaround." Lucinda's self-described prima donna behavior in kindergarten was very disruptive. She was bored in class, and her reading was very advanced. Her kindergarten teacher had suggested that she be accelerated but the advice was not heeded by the school and her parents thought it might have been too big a social jump at the time. Lucinda was accelerated by one year when she skipped fifth grade, and her behavior in class and at home improved. After sixth grade, Lucinda proceeded through high school in the usual way, completed her HSC and enrolled at university at 17 years old for a double degree: a Bachelor of Arts/Law, with honors in English.

Prior to enrolling in the university, Lucinda did not find her social niche at school; she found companionship, but not with her intellectual peers: "… I ended up attaching myself to the… social misfits." Her school life was lonely: "I felt totally, totally isolated and obviously school…was my only…social sphere and one which I didn't fit into." Lucinda's parents had always been supportive; she did not consider them to be pushy or ambitious; although she reports that it was mainly ambition and academic determination that moved her forward.

Lucinda found university a "major jump" in terms of academic expectations, but she thoroughly enjoyed that challenge. It was dispiriting when her marks went from 98% at school to 68% at university; however, she attributes this in large part to the impact of anorexia and depression, which started in high school. Gradually, both her health and her marks improved. In her honors year she received high distinctions in all her work. Her love of learning motivated her: "I finally felt that I was on the road to doing something that actually meant something…whereas at school it seemed like a bit of a game, like being sort of stuck in a fairly boring, mindless limbo. And so at uni I had that determination from the very start, and the love of it, from the very start."

Being legally underage meant she was excluded from many social events. However, she enjoyed the intellectual stimulation of fellow students who were like-minded and fun. University was a very positive experience: "I went from being a total loser at school to being socially valued at uni. It was a wonderful turnaround." Living at home with her very supportive family was also a positive factor in her adjustment to university. Throughout her continuing battle with anorexia, the university provided excellent support for her illness, but there was no support system for helping her to adjust socially and academically. She chose not to join any clubs or societies until her third year. She acknowledged that she might have found support if she had alerted staff that she had trouble "settling in," but she persisted independently.

Lucinda indicated that she would make the same decision again about acceleration, because it made her battle through social and mental issues and, as a consequence, made her stronger. Her illness exacerbated the difficulty with adjustment to early admission to university; however, she recognized that it is impossible to separate cause and effect. Most important for Lucinda was the intellectual satisfaction: "I finally felt challenged, and *that* was worth everything."

Her final words of wisdom to gifted students were cautionary about social and emotional issues: "Don't beat yourself up, too much. Take a running leap – but be aware that not everything is always easy. Don't forget yourself. Take every opportunity thrown at you, and seek out more. Don't be ashamed of yourself – years pass, people fall away, you will grow. It just takes patience."

Gena's university experience was a " time to grow up, to have fun, to develop socially, to develop emotionally, to go out and do things." Gena was a profoundly gifted student who was accelerated by two years in elementary school with radical subject acceleration in high school. She was also accelerated in university physics. Gena entered high school when she was 10.5 years old, and she was very advanced in math, chemistry and physics. She was also gifted in music and foreign languages. She entered the university at 16 years as a regular undergraduate, having completed 16 units of her HSC, seventh grade violin, and an external university-based course. She also represented Australia in the Physics Olympiad. Gena took a double degree: a Bachelor of Medical Science and a Bachelor of Medicine.

Gena's elementary school initiated the grade skip and her parents agreed to it. Her parents supported her acceleration and sometimes contacted the high school to suggest changes in pace and sequence of subjects, based on Gena's academic needs. Gena reported that she never found her social niche until she reached university. She found elementary school difficult; she refused to go to school, had tantrums and was "...generally not getting through." Her family guided and supported her and supervised her challenges.

Gena settled into university in the first week. She enjoyed the lectures because they presented her with new information. She thought university was not challenging; she said, "I mean it was time consuming, but it wasn't...difficult." She found a group of friends who had reasonably similar interests and were academically focused. Gena did not feel conspicuous because of her age, and she did not feel socially awkward. She enjoyed the culture of freedom at university. However, she experienced some mental health issues, and did not develop essential skills to manage her own life:

> *"I think [there] is a difficulty...for gifted young adults who find themselves in the freedom of university. We do not need to study. You can cruise through university and pass everything with high distinctions, and not do much. And that doesn't prepare you for challenges."*

For Gena, acceleration bought her time to get on with her life and choice in her career. She had no regrets about leaving high school as she had completed the various stages, and even though she had health issues at university, she did not regret the experience. It enabled her to meet like minds: "...university is an area of opportunity... opportunities to develop in a lot of other areas...music and sport, for example... It is also a time to grow up, to have fun, to develop socially, to develop emotionally, to go out and do things." Given the opportunity, she would make the same decisions again about her acceleration and early admission to university, because:

> *"university is a bit more of an accepting environment than high school is, for a gifted person... obviously I was very lucky in terms of ...the way mine was managed, and I had a lot of opportunities. I think I would want more support – psychological support – at the school level. Not necessarily by the school, but at that time."*

Steve's dual enrollment helped him avoid boredom, provided excellent academic preparation for university, and facilitated making supportive friends. Steve was first accelerated from kindergarten to second grade. In elementary school, Steve was placed in a gifted and talented class, and then placed in a selective class for bright students for fifth and sixth grade. He then progressed to a selective high school where he had a series of subject accelerations with a cohort of peers. With his class, he completed 11th grade chemistry while in 10th grade; and the following year (11th grade) completed HSC chemistry. At the end of 11th grade, he participated in the Chemistry Olympiad Summer School but was not included in the final team. In 12th grade, Steve was able to undertake a Distinction Course (inter-disciplinary university level course) in Cosmology that he thoroughly enjoyed. He enrolled at the university in a Bachelor of Computer Science program at the age of 17 and reported that he was treated like any other undergraduate, which was his preference.

While he was growing up, Steve felt "out of place." When he was accelerated he had no special friends in his grade; when he changed schools, he was able to start afresh in making friends who were a year or two older. Yet without acceleration, he "would have been more bored." He found there was little choice about subject acceleration: "...it was a good thing to get into the accelerated class.... because that means you're smart...so you were selected ... so, you couldn't say no." He enjoyed it, because he was with friends; "[It] is a lot easier to do the course if you have all your friends there with you and you can study together."

Steve responded to university study with ease; however, he persisted in making wrong choices by taking courses that were not really challenging for him or that did not interest him. Steve found that dual enrollment was excellent academic preparation for university: he learned to do research, write essays, and compile bibliographies. What Steve enjoyed most about university were the student societies, as they were fun and useful for getting to know fellow students. Having friends was the best support. Also, he reported that dating was not a problem and he continued living at home.

Sophie's greatest achievement was overcoming her personal problems, which ultimately made her happier and more confident. Sophie was accelerated by two years: she skipped from fifth grade to seventh in elementary school, and completed ninth and tenth grades during the same year in high school. Sophie's parents initiated both of the accelerations and each involved changing schools. The first move was from an elementary school to an all girls' high school, and the second was from the country high school to a city private girls' school. The receiving schools were happy to accommodate Sophie, especially the private school, which willingly accelerated her to 10th grade.

In elementary school, Sophie was bored and unhappy; she did not get along well with her age-peers. She had friends outside school from her gifted and talented courses and the neighborhood. She was much happier at her high school as she had more friends and found the high school acceleration challenging and interesting, as she had to "catch up." However, the mid-year move from grade nine to grade ten was socially disruptive, as she was new to the school and self-conscious about being accelerated:

> *"... I always felt like basically people treated me like a bit of a freak...I really started, in a way, to act out. Like I made friends but a lot of that was based on like going out heaps, just started to drink a lot, like the girls at school who took drugs, you know, really trying, I think, to prove that I was one of them and just normal."*

Sophie did have friends then, but she did not work hard in 11th grade. In 12th grade, after the school called her parents in for a meeting, she settled down and achieved an excellent HSC. She discovered punk music while she was in high school and that interest was sustained for the first few years of university; the friend with whom she shared that interest has remained a good friend. However, friendship in general seemed to elude her. When Sophie moved to the city to attend school there, her family continued living in the country and she boarded with her older step-sister. It was during these later years of high school that Sophie "acted out" by experimenting with alcohol and drugs, and attending punk gigs.

For Sophie the next automatic step was university. She enrolled in a Bachelor of Medicine program as a regular undergraduate at 16 years old; however, by the end of the first year she transferred to a different university with an emphasis on an Arts degree. Adjusting to university was not overwhelming because she had lived away from her rural home for three years when she attended a city school and had learned independence. Freedom at university was a challenge: "...it's mainly those normal things like not getting too carried away when, you know, you realize that you can just not go to class. No one cares. But you do have to control your own life very much more."

Sophie's parents were the catalysts for her acceleration; yet, in Sophie's opinion, her parents were not supportive and she indicated that her mother became irate when Sophie's HSC marks were not sufficiently excellent to merit mention in the newspapers. "My parents at that time were more pushy than supportive. I definitely did feel, by that stage, like we didn't have a very good relationship around that time, end of school and beginning of uni. And I did actually feel very pushed by them." Sophie reports that her parents approved of her doing Medicine but were very upset when she changed to Arts because they were disappointed that they "had wasted all this time and money and effort" for her to do an Arts degree.

Sophie was able to cope with university studies, but was disabled by her anxiety disorder. Her academic record was a mixture of High Distinctions, Withdrawals, or Absent Fails. Although Sophie took a long time to complete her first degree, she did not associate her difficulties in adjusting to university with her acceleration or her age.

> *"I think it was a combination of things. It was more to do with stuff from my family, than that [personal] stuff ... – and thinking back now, I had problems I had to deal with and I don't think...I actually don't think they were exacerbated by going to uni. I don't think I would have been happier or better adjusted by still being at school an extra two years."*

Overcoming her personal problems was Sophie's great achievement and made her happier and more confident. She felt she had also been successful in achieving her academic goals, despite taking many years to move forward. She listed her success factors: "Academic success, academic support along the way, from academics, I've had good friends – friendships have been a big thing for me, in my life." Sophie used the counseling services at university to help her sort out her personal problems, and her lecturers were also very supportive. She went to great pains to dissociate her personal issues from her acceleration. What she wanted was "... basically, for no-one to know that I was accelerated. And to go through and just be normal."

She did not feel conspicuous because of her age; she used a fake ID and socialized with her undergraduate peers. She felt that drinking and drugs did not have a great impact on her at university as she had experimented with them during high school. She did not feel that she stood out because of her ability, as there was a wide mix of abilities in the Arts students, but she was aware that lecturers noted her ability, her keen interest, and her good marks. She has since completed a Ph.D.

Sophie expressed that she was pleased to have accelerated and reports that she does not have any regrets about her acceleration. Given a second chance, Sophie would make the same decision about acceleration:

> *"... I did want to get out of school and I did want to get to uni and I really wanted to start my life. I felt like things were just on hold and I don't think it would have been very good for me to stay at school any longer. Definitely...I don't have any regrets about it."*

Tim found academic support from older students through his campus community. Tim was accelerated from a fifth grade gifted and talented extension program into seventh grade at a full time high school for gifted students. He completed high school in the usual sequence. He entered university at 17 years of age, after completing his HSC. He completed a double degree: Bachelor of Engineering (Software Engineering with Honors) and Bachelor of Science (Pure Mathematics).

In elementary school, Tim was generally unhappy and disconnected from his same-age peers and his behavior was poor. He was quite bored and lacked a sense of direction: "I was bouncing around in elementary school without really knowing what I was doing." His high school academic experience was disappointing:

> *"I imagined that moving to high school would be like going to university really ... that there'd be kind of ...more freedom and open-ended...staff with more a focus on actually doing something... rather than kind of sit in classrooms and be instructed, be told."* He continued: *"I know that I didn't really fit in socially at high school until the later years."*

Tim felt that his parents were supportive of his acceleration; his mother was relatively keen on the move but his father was more ambivalent. Although Tim expected that high school would be more of a challenge, making the decision to accelerate into high school was not difficult.

From an academic perspective, Tim coped well with university. His biggest struggle was with time management. He enjoyed the more flexible social environment of university, as well as his actual studies. Tim found academic support, without seeking additional help. He found informal support from the older students in university social clubs and coped with social situations involving alcohol when he was underage. Living at home was a positive factor in adjusting to university life. "I think that a healthy campus community which allows people to meet others, particularly those outside their [grade] group, is important." If given the opportunity again, Tim would make the same decision about acceleration, to skip one whole year. He attributes his success at school and university to good teachers, lecturers who made it interesting and enjoyable, and to good friends who helped him succeed with the challenges.

Nanette's personal motivation to succeed contributed to her success. Nanette was accelerated by two years in elementary school when administrators collapsed first and second grade into one year. A couple of years later, she skipped fourth grade. She was transferred to a full-time Opportunity Class (OC) for gifted students in sixth grade. She attended a selective high school, and proceeded to university at the age of 16-years where she enrolled in her double degree: Bachelor of Science and Arts.

Nanette did not find her accelerations disruptive to her friendships, as the elementary school had multi-grade classes. In high school, the age difference was not an issue for her. Nanette's family was her chief source of support, and pressure:

> *"I always had some amount of pressure from my parents to perform well. As well as that, since I was at a selective school, there was the usual pressure of being in a cohort of high-performing peers, which forced me to try to perform my best."*

Nanette found that university was as she expected and she had no issues in adapting to the academic challenges. She stated that her experiences were no different than any other undergraduate adjusting to the change. Socially, there were minor setbacks because she was only 16 years old. However, she had long ago adjusted to being with a cohort of older students at school, so it was not difficult. Nanette enjoyed the freedom of university: "And there was a lot of flexibility you know, what I could do and when I could do it and so on and so forth... I had some time to do extracurricular activities, get a job and that sort of thing." She was treated as a normal undergraduate and that was the way she liked it. Living at home was a positive factor in Nanette's life; she accepted that cultural expectation. She was very positive about her experience. She viewed herself as having had a "distorted time line" and that, having arrived at the end of her degree, she had achieved her goal, rather than having saved time. According to Nanette, personal motivation to succeed contributed to her success.

Adrian found his social niche after moving into college, where he had friends and felt normal. Adrian was radically accelerated by three years in elementary school. He experienced early-entry to Kindergarten when he was four years old; then skipped first and third grades. He proceeded through the rest of his precollege studies and enrolled at the local university at 15 years old. His university admission, in spite of the fact that he was 15 years old, was routine. He enrolled in a Bachelor of Advanced Mathematics with Honors, majoring in Applied Statistics.

His parents had to push hard for the elementary school acceleration and found the school to be uncooperative. Adrian's family was a constant source of support; his older brother was particularly encouraging. Socially, Adrian found school difficult:

> *"I had regrets about the acceleration in high school as I felt excluded from social activities. I was a recluse and an outcast, socially. It was not until I was 17 -18 that things turned around. Academically, from [seventh to twelfth grade], I felt I was marking time, waiting for the piece of paper at the end to show I had completed the course. It was not enjoyable..."*

He had learned to be emotionally and mentally tough: "... I knew the only way to escape high school ...was to do well at school, so no matter what, I had to work hard."

Once he was at university, Adrian found mathematics difficult. After changing to statistics, he performed well academically. Socially, he did not enjoy his first three years of university: "I was used to coping... I just had to be incredibly resilient and plough through the hard times waiting until I was old enough to properly socially interact with my fellow students." Age restrictions were problematic: "Because I was young, I was singled out. I could not go to a bar. I tried a fake ID. I couldn't drive so I had to use the train. I was not invited out." He found dating a problem as well: "I felt incredibly alone, as I couldn't go out with any of the girls at uni...it was hard to socialize with friends and girlfriends."

Adrian appreciated the lecturers treating him like everyone else. He did not seek any assistance and his family was supportive. Adrian suffered from depression in his first year at university. He worked hard, academically, in order to achieve his all-encompassing dream: "I also want to go to Harvard to have a real 'university experience,' i.e. living on campus and getting involved in sports and campus activities." Adrian began to enjoy university life when he moved onto campus and found his social niche, where he had friends and felt normal. His dreams came true when he was awarded an overseas scholarship to undertake postgraduate studies at Harvard. After university, he wants to include enjoyment, excitement, and adventure in his future plans, perhaps initially as a fire fighter, or in the defense force, but ultimately as a diplomat or as a medical doctor.

Given the opportunity, Adrian would make the same decisions again about acceleration and entering college early. He learned to be emotionally and mentally tough, and he saw long term benefits: "I will get an incredibly good qualification from Harvard, while being the proper age to enjoy all uni things at Harvard, and I'll get out into the workforce at a good age (25)."

Implications

In aggregating the descriptions of university adjustments to the radical acceleration, five themes emerged.

Theme One: Early entrance to university as a method of escaping social ostracism and lack of academic challenge. Some students reported boredom in high school, which was relieved to some extent by acceleration. Lack of like-minded friends made it difficult to find a social niche during their earlier school life. Their needs were satisfactorily addressed through acceleration and early entry to university. The honors students in the study by Hébert and McBee (2007) experienced a similar sense of isolation at school. Asynchronous development (Silverman, 1993) may have accounted for much of the early negative school experience reported in this study. By the time the flexible pacing had finally allowed the participants to reach university and find like minds, this asynchrony seems to no longer have been as significant.

Theme Two: The students were self-directed and motivated learners. It could be that self-motivation made for an easier adjustment to the more rigorous curriculum they encountered at university. Earlier accelerations while in the K-12 system brought them temporary relief, but at university, they recognized that access to learning was "in their own hands." In the university environment the participants were highly motivated; perhaps for the first time, there was the optimal match (Csikszentmihalyi, Rathunde, & Whalen, 1993; Hoekman, McCormick, & Gross, 1999) between their skills and the academic challenges they faced. Robinson, Reis, Neihart, and Moon (2002) emphasized that social and emotional difficulties are often dissipated when the educational fit of academic level and pace is appropriate. For the students in this study, this self-direction followed most of them after university graduation, with advanced studies in postgraduate institutions in Australia and overseas.

Theme Three: The students enjoyed the stimulation and friendships provided by university. Participants expressed delight in academic stimulation and challenge, in finding intellectual peers, and in the freedom of university where fewer restrictions allowed for greater independence. They enjoyed the "anonymity" of their age, and being treated respectfully like any other undergraduate.

As Gross (1994) pointed out, highly gifted children are often lonely because they mix with same-age peers who do not have the same interests or values. Sayler (2008) argued that talent development is necessary for thriving, but in addition "the gifted individual must develop good friendships in order to thrive" (p. 3). Friendship offered vital support and seemed to complement academic stimulation. A study from the United States (Hébert & McBee, 2007) showed that 12 university honors students found intellectual stimulation, academic challenge, an intellectual and social network of like-minded peers, and an effective mentor. That was echoed by Rinn (2008) who found that students enrolled in honors programs, and in early entrance programs, were likely to have positive academic, social, and emotional development. Therefore, friendship may be a crucial factor in positive social and emotional adjustment as well as academic success at university.

Theme Four: Social life improved at university. Early acceleration to university provided the participants with a more satisfying social life in most cases. Like-minded friends, perhaps true peers, were acquired mainly through classes, clubs, societies, and some through activities outside university studies. Participants were very positive about having established friendships, and it seemed crucial to their process of adjusting to the university scene. Building friendships was key, for it was friends who often helped them navigate the various academic, personal, and social challenges. For most of the participants building friendships was not a serious obstacle, as it is common to any undergraduate experience. However, some participants faced serious problems such as physical and mental illness, difficult relationships, and social discomfort. None of these obstacles were necessarily related to their accelerated program, but these problems sometimes took years to overcome, perhaps mitigating further success.

The social restrictions for minors (e.g. dating, driving, alcohol related activities) existed for these students, but they only mildly affected them and these restrictions lapsed by the age of 18 years. Age related concerns such as dating, drinking, and driving have been raised in the U.S. literature relating to early university entry (Sethna et al., 2001). The participants in Noble et al.'s (1998) study accepted that there were difficulties in being young but that they learned responsibility concerning social interaction with the older students. Predictors of success for early entrants have been developed in the U.S. (Muratori, 2007; Olszewski-Kubilius, 1999; Sayler, 1994), as have guidelines to reduce the risk of placing a student inappropriately (Robinson & Harsin, 2002; Rogers, 2002; Trost, 2000). Such guidelines could be developed for Australian students to ensure the degree of success that the 12 participants in this study experienced. The early admission scheme at the University of New South Wales provided an excellent example for Australian universities: early admission concept, criteria for entry, application form, and interview process.

Theme Five: A support system was critical for successful negotiation of university life. Four students lived at home for most of their university years and had minimal needs for outside psychological support. Even with living at home they participated in social activities at the university. One of the students living at home had psychological issues, which were lessened once he moved onto campus. Of the seven students who lived on the campus, two had less than totally positive experiences, but they did not take advantage of the available university supports. One who did use these supports reported having a very positive university experience. The others who found their own solutions felt as if they belonged by doing so. This sense of belonging may be related to ownership relative to resolving personal issues, including self-discipline, academic success, or engagement in academic and social activities. Similar to the findings of the present study, Robinson et al. (2002) found that family played an influential role in supporting early college entrants. However, university support systems for early entrants in Australia contrast markedly to those established in the United States, where many universities provide formal academic, social, and psychological support programs. According to Gross (2006; Gross & van Vliet, 2005), there was only one Australian university that had a formal scheme in place for early entry and this scheme was discontinued in 2015. By contrast, there are at least 23 formal early admission programs in the United States (Muratori, 2007; Brody & Muratori, this volume). Noble et al. (2007) found that early-entry graduates from the University of Washington appreciated the formal support structures in place. While Australian early entrants acknowledged the importance of informal support from faculty, friends and family, one student in the current study suggested that more formal support from an academic mentor could be provided. Evidence from research from the United States (Maine & Maddox, 2007; Rinn, 2005; Robinson & Harsin, 2002; Rogers, 2002; Sayler, 1994) suggests that both informal and formal support may be needed to help with academic, social, or psychological issues.

In summary, the university experience was, overall, a positive one, although sometimes that initial adjustment to the university environment posed a hurdle. This was consistent with the findings of Neihart (2007), who noted that not all of the research from the United States had reported positive adjustments of early entrants to university, but the negative effects were often ameliorated by appropriate personal coping mechanisms or external interventions. Four Australian participants experienced psychological issues; all ultimately coped with these personal hurdles, a fact that perhaps reinforces the power of the appropriately stimulating university scene.

Conclusions

The 12 accelerated students found the university setting to be a stimulating, positive experience. They were pleased to leave behind the limitations and restrictions of school, to be motivated by the challenging experiences of university, to experience academic success, and to find friendship with intellectual peers through extra-curricular activities. They were supported by family, friends, and staff. They particularly enjoyed being treated as typical undergraduates. Hurdles reported appeared to be short-lived.

The common issues identified in this small study mostly conform to previous findings from the United States. The possible social-emotional problems that co-occurred or arose from acceleration and early admission to university have been refuted by many of these studies (Olszewski-Kubilius, 1998; Robinson at al., 2002). The evidence from the Australian students interviewed supported the widespread idea of flourishing in the stimulating environment of university. When challenge and skills are matched, and engagement is shared with like-minded students/friends, students are usually motivated to succeed.

While it is difficult to generalize as their pathways were quite individualized, the trends identified suggest that all of the students were pleased to have been accelerated, and they succeeded with the challenges of university study. Finding friends among like-minded peers, and participating in extra-curricular activities were significant factors in adjusting and responding positively to the stimulation of university. The accelerated students in this sample certainly reported different intrapersonal and coping skills, nevertheless, they all appear to have thrived on opportunities that allowed them to engage in more self-directed learning. Parents, staff, and friends provided support, and while the challenges differed, most of the Australian accelerated students in this sample preferred less formal support structures that allowed them to blend in with university life.

The results of this study correlate with research findings from the United States, which suggest that accelerated students enjoy the opportunity to enter university early and generally they adjust and cope well. The results indicate that the provision of flexible pacing opportunities that enhance the academic and social engagement of gifted students, and alleviate frustration at school, can lead to positive outcomes in relation to social connections, self-direction, and academic challenges of university life.

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Appendices

Author Biographies

ALDERDICE, COREY

Corey T. Alderdice is the director of the Arkansas School for Mathematics, Sciences and the Arts in Hot Springs. Prior to his work at ASMSA, he served as a founding administrator of the Gatton Academy of Mathematics and Science in Kentucky. His research interests include the role of recruitment and admissions at selective public high schools, academic engagement for rural students, and global learning in specialized high schools. In 2013, the Bezos Family Foundation recognized him as one of twelve Educator Scholars. Alderdice's work in utilizing social media and technology for admissions and campus external relations has been spotlighted in *Education Week* and *The Washington Pos*t.

ANDERSEN, LORI

Lori Andersen received her Ph.D. in Educational Policy, Planning, and Leadership with an emphasis in Gifted Education from The College of William and Mary in 2013 and currently is Senior Science Curriculum and Assessment Specialist for The Achievement and Assessment Institute at The University of Kansas. She is interested in the development of talent in the STEM domains, as well as issues concerning implementation and assessment of the *Next Generation Science Standards.* She has published articles in *Science Education* and *Roeper Review* that explore high-ability students' decisions to pursue STEM occupations. Her research has been recognized by multiple national awards, including the NAGC Doctoral Student award in 2013 and second place in the NAGC dissertation competition in 2014.

ASSOULINE, SUSAN

Susan G. Assouline is the director of the University of Iowa's Belin-Blank Center for Gifted Education and Talent Development, a professor of school psychology, and in 2015 was named the Myron and Jacqueline Blank Chair in Gifted Education. She is especially interested in the identification of academic talent in elementary students and is co-author (with Ann Lupkowski-Shoplik) of both editions of *Developing Math Talent: A Comprehensive Guide to Math Education for Gifted Students in Elementary and Middle School.* As well, she is co-developer of the *Iowa Acceleration Scale*, a tool designed to guide educators and parents through decisions about grade-skipping students; she has consulted on hundreds of decisions concerning acceleration.

BRODY, LINDA

Linda E. Brody is the director of the Study of Exceptional Talent (SET) at the Johns Hopkins University Center for Talented Youth (CTY). She also directs CTY's Diagnostic and Counseling Center, its test development division, the publication of *Imagine* magazine, and numerous special projects. In SET, she leads a team that provides counseling to exceptionally advanced students about intervention strategies, including options for acceleration, to help them fulfill their potential and achieve their goals. Her research interests focus on evaluating such strategies, and studying the academic and social needs of special populations, especially the highly gifted, gifted females, and twice-exceptional students.

CEDERBERG, CHARLES

Charles Cederberg is a doctoral student in Counseling Psychology within the Department of Psychological and Quantitative Foundations at the University of Iowa. His primary clinical and research interests include positive youth development, primarily with regards to gifted youth diagnosed on the autism spectrum. He is a licensed mental health counselor with over five years of experience providing mental health and consultative services to children and adolescents within private agency and public school settings. He currently works as a graduate assistant at the University of Iowa's Belin-Blank Center for Gifted Education and Talent Development.

COLANGELO, NICHOLAS

Nicholas Colangelo is the Dean of the College of Education, University of Iowa. He is also Director Emeritus of the Belin-Blank Center for Gifted Education and Talent Development. Dean Colangelo has been a scholar focusing on the counseling needs of gifted students as well as acceleration as the primary intervention on behalf of the academic and social needs of gifted students. Dean Colangelo has published extensively and presented at leading national and international conferences. In 1991, he received the Distinguished Scholar Award and in 2012 the Ann Isaacs Founder's Memorial Award, both presented by the National Association for Gifted Children. In 2013, he received the International Award for Research presented by the World Council for Gifted and Talented Children.

CROFT, LAURIE

Laurie Croft is a Clinical Associate Professor in the Department of Teaching and Learning (University of Iowa College of Education) and is the Associate Director for professional development at the Belin-Blank Center for Gifted Education and Talent Development, a part of the UI College of Education. She received her Bachelor of Arts (Honors) and Master of Arts degrees, both in History, from Oklahoma State University and the University of Oklahoma, respectively. She earned her Ph.D. in Educational Leadership at the University of Tulsa, emphasizing gifted programming. Research interests include the conceptual foundations of gifted education and professional development for teachers of the gifted.

CROSS, TRACY

Tracy L. Cross, Ph.D., holds an endowed chair as the Jody and Layton Smith Professor of Psychology and Gifted Education and is the executive director of the Center for Gifted Education at William & Mary. He has published more than 150 articles, book chapters, and columns; has made more than 200 presentations at conferences; and has published nine books. He has edited five journals in the field of gifted studies (*Gifted Child Quarterly*, *Roeper Review*, *Journal of Secondary Gifted Education*, *Research Briefs*) and is the current editor of the *Journal for the Education of the Gifted*. Tracy is the president of the National Association for Gifted Children.

DEGNER, KATHERINE

Kate Degner is an assistant professor of STEM and mathematics education at St. Ambrose University, in Davenport, Iowa. Her research interests include the sociology of mathematics education, as well as the involvement of underrepresented groups in upper-level STEM coursework during their K - 12 experience.

FOLEY-NICPON, MEGAN

Megan Foley-Nicpon is an Associate Professor of Counseling Psychology and Associate Director for Research and Clinic at the Belin-Blank Center for Gifted Education and Talent Development, both at the University of Iowa. Dr. Foley-Nicpon's research and clinical interests include assessment and intervention with twice-exceptional students, particularly gifted students with autism spectrum disorder, ADHD, and emotional/learning difficulties, and the social and emotional development of talented and diverse students. She has over 35 referreed articles and book chapters in the areas of gifted, counseling psychology, and twice-exceptionality, and over 60 presentations at international, national, and state professional meetings. Awards include the NAGC Early Scholar Award; AERA Research on Giftedness, Creativity, and Talent Path Breaker Award; AERA Division E Outstanding Research Award in Human Development; and, twice, the MENSA Research Award, MENSA Education & Research Foundation.

GROSS, MIRACA

Emeritus Professor Miraca Gross AM is Honorary Director of the Gifted Education Research, Resource and Information Centre (GERRIC) at the University of New South Wales in Sydney, Australia. Miraca's research focuses on issues of equity for gifted students, ability grouping, acceleration, socio-affective development, and the highly gifted. She has won several international research awards including, in 1987, the Hollingworth Award for Excellence in Research in Gifted Education and, in 1988 and 1990, the Mensa International Education and Research Foundation Awards for Excellence. In 2008, this Foundation further honored her with its Lifetime Achievement Award. In 2005, the American National Association for Gifted Children honored her with their Distinguished Scholar Award - the first time this was awarded outside North America. In 2008, she was appointed a Member of the Order of Australia in the Queen's Birthday Honours List for services to gifted education. The University of New South Wales appointed Miraca as Emeritus Professor on her retirement in December 2011 in recognition of her long-term and ongoing service to her field and to the University.

HARRIS, BRYN

Bryn Harris, PhD, NCSP, is an Assistant Professor in the School of Education and Human Development at the University of Colorado Denver. Her primary research interests include the psychological assessment of English language learners, underrepresented gifted populations, and improving mental health access and opportunity within traditionally underserved school populations. Dr. Harris is the director and founder of the bilingual school psychology program at the University of Colorado Denver. She is also a bilingual (Spanish) psychologist who has conducted numerous research projects within Spanish speaking countries.

HOEKMAN, KATHERINE

Katherine Hoekman lectured in Gifted Education at the School of Education for over a decade, and is currently an adjunct lecturer in the Office of Educational Leadership at the University of New South Wales in Sydney, Australia. She is the Consultant: Academic Performance at the Association of Independent Schools NSW in Sydney, Australia, assisting schools in the independent sector to optimize the achievement and growth of high potential students. She was the Director of Research and Innovative Learning at Abbotsleigh Anglican School for Girls in Sydney from 2005-2011 and 2014, and was the Director of the Eileen O'Connor Centre serving the needs of diverse learners using assistive technology across the Archdiocese of Sydney from 2011-2014. She has been an invited presenter at regional, national, and international conferences, as well as a consultant with schools on the ways to meet the cognitive, motivational and affective needs of gifted students.

HOOGEVEEN, LIANNE

Lianne Hoogeveen is a developmental psychologist and director of the Center for the Study of Giftedness (CBO) (www.ru.nl/fsw/cbo) of the Radboud University in the Netherlands, a board member of the Internationales Centrum für Begabungsforschung (ICBF) (Westfälische Wilhelms-Universität Münster, Germany) and a member of the Executive Committee of the European Council for High Ability (ECHA). She is professor of the Radboud University and guest lecturer in different other universities, in and outside the Netherlands. She is involved in post-academic education for psychologists and teachers and in individual counseling of gifted children, youngsters, and adults. She conducts scientific research on giftedness and education and wrote her PhD-thesis on academic acceleration. Concerning research and education, she cooperates with colleagues of other universities, in- and outside the Netherlands.

IHRIG, LORI

Lori Ihrig is the Administrator for STEM Excellence and Leadership at the Belin-Blank Center for Gifted Education and Talent Development. In addition to overseeing the faculty hiring and development for the Center's pre-college student programs throughout the year, she is the lead administrator for the Secondary Student Training Program, program director for the STEM Excellence and Leadership program, and oversees the Blast, Challenge Saturdays, Invent Iowa, and Weekend Institute for Gifted Students programs. Her research interests include the development of highly effective science teachers and academic talent-development in high-ability rural students. She has authored articles for science teachers, been a member of multiple curriculum writing teams, reviewed science books for the American Association for the Advancement of Science, and won awards for her teaching and research.

JOHNSEN, SUSAN

Susan K. Johnsen, PhD, is a professor in the Department of Educational Psychology at Baylor University in Waco, Texas, where she directs the PhD program and programs related to gifted and talented education. She is editor of *Gifted Child Today* and coauthor of The *Practitioner's Guide for Using the Common Core State Standards for Mathematics, Using the Common Core State Standards for Mathematics with Gifted and Advanced Learners, Using the NAGC Pre-K-Grade 12 Gifted Programming Standards, Math Education for Gifted Students*, and more than 250 articles, monographs, technical reports, chapters, and other books related to gifted education. She has written three tests used in identifying gifted students: *Test of Mathematical Abilities for Gifted Students* (TOMAGS), *Test of Nonverbal Intelligence* (TONI-4) and *Screening Assessment Gifted Students* (SAGES-2).

JONES, ERIC

Eric D. Jones, prior to his retirement, was a professor of education at Bowling Green State University, where he taught graduate and undergraduate classes in special education and was co-director of the Center for Evaluation Services. Dr. Jones was appointed Director of the School of Intervention Services at BGSU. He also provided advocacy and behavioral consultation for families with children with special education needs. His research interests include: acceleration of gifted students, applied behavior analysis, and mathematics education.

JUNG, JAE YUP

Jae Yup Jung is an Australian Research Council DECRA Fellow and a senior lecturer in the School of Education at The University of New South Wales, Australia. He is also a senior research fellow at the Gifted Education Research, Resource and Information Centre (GERRIC) at The University of New South Wales. His research program incorporates various topics relating to gifted adolescents, including their career- and friendship-related decisions and academic acceleration. He has published in a range of journals including

Gifted Child Quarterly, *Journal for the Education of the Gifted*, *Roeper Review, Journal of Career Assessment, Journal of Career Development,* and *Research in Higher Education.*

LONG, LYE CHAN

Lye Chan Long is Learning Enrichment Leader at Inaburra School, Sydney, where she has oversight of students needing additional support by way of learning difficulties or extension. She was recently working as Gifted Education Mentor at OLMC Parramatta, 2013-2014, and as coordinator of the Centre of Excellence for the Education of Students with Additional Needs, incorporating 14 independent Catholic schools who wanted to use their federal grant monies to support teachers in their practice of teaching students with needs at both ends of the spectrum. Lye Chan has worked as a presenter for courses offered by the Gifted Education Research, Resource, and Information Centre (GERRIC), University of New South Wales. She was also awarded a Templeton Foundation Fellowship by the Belin-Blank Center in 2008.

LUPKOWSKI-SHOPLIK, ANN

Ann Lupkowski-Shoplik, Ph.D. is the Administrator for the Acceleration Institute at the Belin-Blank Center for Gifted Education and Talent Development and an adjunct professor in the Department of Psychological and Quantitative Foundations, both at the University of Iowa. She was founder and director of the Carnegie Mellon Institute for Talented Elementary Students (C-MITES) at Carnegie Mellon University. Together with Dr. Susan Assouline, she wrote *Developing Math Talent: A Comprehensive Guide to Math Education for Gifted Students in Elementary and Middle School (2nd ed.).* She is also a co-author of the *Iowa Acceleration Scale* with Susan Assouline, Nicholas Colangelo, Jonathan Lipscomb, and Leslie Forstadt.

MAMMADOV, SAKHAVAT

Sakhavat Mammadov is a PhD candidate in Educational Policy, Planning and Leadership program with an emphasis in gifted education at The College of William and Mary. He currently is working as a graduate research assistant at the Center for Gifted Education. He earned a B.S. in teaching mathematics and a M.A. degree in elementary education from Bogazici University, Turkey. He has worked with gifted children for many years in a variety of contexts. His interest areas are social-emotional lives of gifted children, personality, creativity, mentoring mathematically gifted students, and administrative and policy issues in gifted education.

MCCLARTY, KATIE

Katie McClarty, Director of the Center for College & Career Success in Pearson's Research & Innovation Network, leads a team of researchers who plan and execute research in support of the Center's mission, which is to identify and measure the skills needed to be successful in college and careers, determine pathways for students to be college- and career-ready, track their progress along those pathways, and evaluate effective ways to keep students on track. Dr. McClarty's personal research interests include talent identification and development, assessment design and standard setting, and non-cognitive predictors of success. Her work has been published in journals such as the *American Psychologist, Research in Higher Education, Gifted Child Quarterly, Educational Measurement: Issues and Practice,* and *Educational Researcher*.

MURATORI, MICHELLE

Michelle C. Muratori is a senior counselor and researcher at the Johns Hopkins Center for Talented Youth (CTY) where she works with exceptionally advanced middle school and high school students who participate in the Study of Exceptional Talent (SET) and their families. She is currently collaborating with Kimberly Lohrfink on a mixed methods study about how high ability students perceive stress and manage their day-to-day pressures, hassles, schedules, and activities. Michelle's past research focused on the academic, social, and emotional adjustment of early college entrants, and inspired her to write *Early College Entrance: A Guide to Success* (Prufrock Press, 2007). A faculty associate in the Johns Hopkins School of Education, Michelle earned the 2014 Johns Hopkins University Alumni Association Excellence in Teaching Award.

OLSZEWSKI-KUBILIUS, PAULA

Paula Olszewski-Kubilius is the director of the Center for Talent Development at Northwestern University and a professor in the School of Education and Social Policy. Over the past 30 years, she has created programs for all kinds of gifted learners and written extensively on issues of talent development. She has served as the editor of *Gifted Child Quarterly*, co-editor of the *Journal of Secondary Gifted Education* and on the editorial review boards of *Gifted and Talented International, The Roeper Review,* and *Gifted Child Today*. She is currently the immediate Past-President of the National Association for Gifted Children and received the Distinguished Scholar Award in 2009 from NAGC.

PLUCKER, JONATHAN

Jonathan Plucker is the Raymond Neag Endowed Professor of Education at the University of Connecticut. His research examines education policy and talent development, with over 200 publications to his credit. Recent books include *Critical Issues and Practices in Gifted Education* (2nd ed.) with Carolyn Callahan and *Intelligence 101* with Amber Esping. He recently became editor for the *Research-Based Decision Making for Gifted Education and Talent Development* book series at Palgrave-Macmillan and the *Psychological Perspectives on Contemporary Educational Issues* series at IAP. His work defining and studying excellence gaps is part of a larger effort to reorient policymakers' and educators' thinking about how best to promote success and high achievement for all children.

ROBERTS, JULIA LINK

Julia Link Roberts is the Mahurin Professor of Gifted Studies at Western Kentucky University as well as Executive Director of The Center for Gifted Studies and The Carol Martin Gatton Academy of Mathematics and Science in Kentucky. She is active in the leadership of The Association for the Gifted (a division of the Council for Exceptional Children), the National Association for Gifted Children, the Kentucky Association for Gifted Children, and the World Council for Gifted and Talented Children. She is the author of books, chapters, and articles on differentiation, advocacy, STEM schools, and twice-exceptional learners. She was honored with the first NAGC David W. Belin Award for Advocacy, the Acorn Award as the outstanding professor in a four-year Kentucky university, and the 2015 Palmarium Award from the Institute for the Development of Gifted Education at the University of Denver.

ROGERS, KAREN

Karen Rogers is Professor Emerita of Gifted Studies at the University of St. Thomas in Minneapolis, Minnesota. She taught and conducted research there from 1984 - 2014, except for a three-year hiatus at the University of New South Wales in Sydney, Australia, where she was Director of Research for GERRIC (Gifted Education Research and Resource Information Centre). She has written five books with four more in press, over 200 journal and magazine articles, 36 differentiated curricula for gifted learners, and conducted 78 program and curriculum evaluations throughout the United States and Australia. Her interests in meta-analysis and meta-synthesis techniques began as part of her doctoral dissertation in 1991 and continue to this day. She is currently an Honorary Professorial Fellow at the University of Wollongong and an Honorary Professor at the University of New South Wales in Australia, in addition to her Emerita status at the University of St. Thomas.

SOUTHERN, W. THOMAS

W. Thomas Southern is a professor emeritus at Miami University of Ohio. Prior to his retirement, he was the Coordinator of Special Education at Miami University of Ohio where he worked to develop a gifted education program. Formerly, he was a member of the faculty in the special education department at Bowling Green State University. He served as a consultant on gifted education to the Ohio and Indiana State Departments of Education. His research interests include: the identification and programming needs of special populations of gifted children.

VANTASSEL-BASKA, JOYCE

Joyce VanTassel-Baska is the Smith Professor Emerita at The College of William and Mary in Virginia where she developed a graduate program and a research and development center in gifted education. Formerly, she initiated and directed the Center for Talent Development at Northwestern University. She has also served as the state director of gifted programs for Illinois, as a regional director of a gifted service center in the Chicago area, as coordinator of gifted programs for the Toledo, Ohio public school system, and as a teacher of gifted high school students in English and Latin. Dr. VanTassel-Baska has published widely including 29 books and over 550 refereed journal articles, book chapters, and scholarly reports. Her major research interests are on the talent development process and effective curricular interventions with the gifted.

VAN VLIET, HELEN

Helen van Vliet earned her PhD from the School of Psychiatry at the University of New South Wales (UNSW), Australia and holds honors degrees in both medicine and education. Her teaching and research is situated within the fields of gifted education and child and adolescent health and development. Particular interests include social and emotional wellbeing in the school context, supporting high ability learners in the early years, and student focused approaches to teaching and learning. Helen is presently teaching in university level education and health programs and taking enrichment programs with elementary school students. She provides professional development in schools focusing on supporting the cognitive and affective needs of gifted and talented students.

WAI, JONATHAN

Jonathan Wai is a research scientist at the Duke University Talent Identification Program, a visiting researcher at Case Western Reserve University, and earned his doctorate at Vanderbilt University where he worked on the Study of Mathematically Precocious Youth. A former member of the board of directors of the MATHCOUNTS foundation, his research has won multiple Mensa Awards for Research Excellence, and has been featured in *The Economist, The Wall Street Journal, The New York Times, Education Week, Wired,* and newspapers worldwide. He researches and writes about the development of talent and its impact on society and contributes to popular publications such as *Psychology Today, Business Insider, Quartz,* and others, where his ideas have reached millions of people and started international conversations.

WOOD, SUSANNAH

Susannah Wood is currently an associate professor at the University of Iowa, where she teaches both doctoral students and students who are pursuing their master's in school counseling with an emphasis in gifted education in partnership with the Belin-Blank Center for Gifted Education and Talent Development. Susannah received her M.Ed. in School Counseling and Ph.D. in Counselor Education and Supervision from The College of William and Mary. She was a middle school counselor working with sixth and seventh grade students in Newport News, Virginia during the academic year, and spent summers as a residential counselor for programs such as Johns Hopkins' Center for Talented Youth, and the Virginia Governor's School for the Visual and Performing Arts and Humanities. Her research interests encompass preparing school counselors for their practice with a focus on serving the gifted population in collaboration with other educators and professionals.

YOUNG, MARIE

Marie Young has been an adjunct academic at the University of New South Wales (UNSW) in the School of Education since 2010, after completing her doctoral thesis, which focused on early entrance to university of accelerated students and the associated social and emotional issues. As a high school teacher of English and mathematics for many years, she developed an abiding interest in gifted education; she was a school coordinator of gifted education and has taught in many gifted programs at UNSW. She has been a tutor for gifted education courses and for teacher education courses at UNSW; as well she has undertaken several projects as a research assistant in both teacher education and gifted education.

The National Association for Gifted Children Position Statement[1] on Acceleration

Educational acceleration is one of the cornerstones of exemplary gifted education practices, with more research supporting this intervention than any other in the literature on gifted individuals. The practice of educational acceleration has long been used to match high level student general ability and specific talent with optimal learning opportunities. The purposes of acceleration as a practice with the gifted are 1) to adjust the pace of instruction to the students' capability in order to develop a sound work ethic, 2) to provide an appropriate level of challenge in order to avoid the boredom from repetitious learning, and 3) to reduce the time period necessary for students to complete traditional schooling. Acceleration benefits many highly capable individuals by better motivating them toward schooling, enhancing their involvement with extracurricular activities, promoting more challenging options in the middle school and high school years, and preparing them to begin contributing to society at an earlier age. While not as widely used as a practice with diverse gifted learners, evidence suggests that it can be a successful strategy with low income, minority, and students with learning problems as well. Therefore, NAGC strongly endorses this practice as one important avenue to address the needs of gifted learners.

Acceleration practices involve allowing a student to move through traditional educational organizations more rapidly, based on readiness and motivation. Research documents the potential academic benefits and positive outcomes of all forms of appropriately implemented acceleration strategies for intellectually gifted and academically talented learners. These research-based best practices include grade-skipping, telescoping, early entrance into kindergarten or college, credit by examination, and acceleration in content areas through such programs as Advanced Placement and International Baccalaureate at the high school level. Instructional adaptations in the classroom such as compacting, which allows for more economic use of learning time in a specific subject, are also a desirable and best practice for talented students.

Both group and individual decisions can be made in respect to accelerative options. For example, both AP and IB programs by virtue of their structure and content offer college-level work. As long as students meet prerequisites and accept the rigors of such programs, gifted and other learners can and should take advantage of such group-oriented programs. At an individual level, students may be tutored or engage in online coursework at an accelerated level. Such options can be more readily tailored for individual needs.

Talent search programs at selected universities provide early assessment of advanced mathematical and verbal abilities in students such that decisions on appropriate accelerative options can be constructed inside and outside of schools. For example, several acceleration opportunities can be accessed through online coursework in specific content areas or offered at university sites. Advanced Placement as an accelerative option may be made available throughout the high school years or earlier through independent study, tutorials, or special classes.

Acceleration options should be available at each stage of development in a child's educational program from early entrance to primary school up through early college entry in order to even out the curriculum challenge. Parents may also wish to seek out accelerative opportunities beyond the school setting in order to accommodate an individual student need that cannot be met in traditional school settings.

Yet acceleration decisions should be made thoughtfully with the needs of the whole child in mind. In decision-making about the appropriateness of a particular form of acceleration and the extent of acceleration for a given child at a given time, educators and parents should consider the child's intellectual and academic profile, socio-emotional and physical

The National Association for Gifted Children (NAGC) is an organization of parents, teachers, educators, other professionals, and community leaders who unite to address the unique needs of children and youth with demonstrated gifts and talents as well as those children who may be able to develop their talent potential with appropriate educational experiences.
All position papers are approved by the NAGC Board of Directors and remain consistent with the organization's position that education in a democracy must respect the uniqueness of all individuals, the broad range of cultural diversity present in our society, and the similarities and differences in learning characteristics that can be found within any group of students. NAGC Position Papers can be found at www.nagc.org.
Approved September 27, 2004

development, and preferences and dispositions of the child relative to the decision since acceleration may not always be the appropriate option for every gifted child. Factors that enhance the success of acceleration practices include 1) positive attitudes of teachers, 2) timelines related to the decision, 3) parental support, and 4) careful monitoring of the implementation.

Highly able students with capability and motivation to succeed in placements beyond traditional age/grade parameters should be provided the opportunity to enroll in appropriate classes and educational settings. The National Association for Gifted Children program standards provide some guidance for using accelerative practices on a routine basis at all stages of development.

Acceleration policies in schools should ensure that opportunities such as the ones described here are available provisions in all gifted programs for individuals and groups of learners ready to advance beyond the standard curriculum at any age and in any area of learning.

Selected References

Benbow, C. P., & Lubinski, D. (1996). *Intellectual Talent.* Baltimore: Johns Hopkins Press. This book chronicles landmark research on gifted individuals and the use of acceleration in their development. Based on the work of many researchers in the field, the volume explicates our understanding of the effectiveness of acceleration techniques with such students, the efficacy of accelerative programs and services for them, and views on the interplay of intelligence and productivity.

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Rogers, K. (2003). *Reforming gifted education: How parents and teachers can match the program to the child*, Scottsdale, AZ: Great Potential Press Inc. This comprehensive text on program development provides meta-analyses on the issue of acceleration, coupled with sound practical strategies for employing it in schools.

Southern, T. & Jones, E. (Eds.) (1991). *The academic acceleration of gifted children*, New York, NY: Teachers' College Press. This edited volume provides a strong overview of diverse perspectives and views on acceleration in various modes and at various stages of development. It represents a compendia of important ideas for practitioners.

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. This research article reports on the long term benefits of acceleration in a rigorously controlled study. Based on the Study for Mathematically Precocious Youth (SMPY) findings, the authors highlight the positive outcomes found for accelerated learners.

VanTassel-Baska, J. (2004). *The acceleration of gifted students' programs and curricula.* In Karnes, F. A. & Stephens, K. R. (Eds.) fastback series, Waco, TX: Prufrock Press. This practical guide provides administrators and teachers with ideas, strategies, and assessment protocols for using various techniques of acceleration in school, including the diagnostic prescriptive approach, compacting, testing out of curriculum standards, and selection of advanced materials.

Guidelines for Developing an Academic Acceleration Policy

Developed by the National Work Group on Acceleration, November, 2009

In 2009, several members of a national working group collaborated to generate guidelines to establish local, state, or district guidelines for acceleration policy. The participants of the national working group were professionals from the Belin-Blank Center (B-BC), the Council of State Directors of Programs for the Gifted (CSDPG), and the National Association for Gifted Children (NAGC).

The complete Guidelines for Developing an Academic Acceleration Policy publication, which includes introductory letters from the B-BC, CSDPG, and NAGC leadership, as well as five highly informative appendices is available at: http://www.accelerationinstitute.org/Resources/Policy_Guidelines/

The information below represents an abridged version of the 2009 publication.

Recommended Elements of an Acceleration Policy

Each school district should have a written acceleration policy stating that acceleration is an appropriate and effective intervention for select highly able students who have demonstrated high performance in one or more academic areas. In this section, we recommend 17 elements in 5 key areas that can help schools develop a comprehensive, consistent, and research-based policy.

The policy is characterized by accessibility, equity, and openness. Specific recommended elements of a policy to meet accessibility, equity, and openness criteria include the following:

<u>Access to referral for consideration of acceleration is open to all students.</u> A policy should not limit access to referral for consideration of accelerative curricular modification based on gender, race, ethnicity, disability status, socioeconomic status, English language proficiency, or school building attended. The policy shall be applied equitably and systematically to students referred for acceleration.

<u>All student populations are served.</u> The acceleration policy will be comprehensive in addressing acceleration for all grades, K-12, and all students who demonstrate advanced academic ability in one or more content areas, including students who are English language learners (ELL)[1], at-risk, of low socio-economic status, profoundly gifted, and/or twice-exceptional. Profoundly gifted students are those whose ability scores place them at the 99.9th percentile. Because these students are so rare (1 in 1,000), they require special attention when discussing appropriate educational interventions. Twice-exceptional students are those who are gifted and who have a cognitive, social, or behavioral disability; they, too, require special attention.

<u>Student evaluation is fair, objective, and systematic.</u> A fair, objective, and systematic evaluation of the student should be conducted using the appropriate instruments for the form of acceleration being considered. When evaluating English language learners, appropriate instruments should include those in the student's heritage language.

<u>Parents or guardians are allowed open communication about the policy and procedures.</u> Written consent is required from parents or legal guardian(s) in order to evaluate the referred student for possible acceleration placement. All students who have been referred, and for whom consent has been obtained, should receive an evaluation from professionals in the district. Parents or legal guardians should be informed of the evalua-

1. ELL enrollment in the United States has grown by 57 percent over the past 13 years, compared with less than four percent for all other student populations (Flannery, 2009). ELLs account for 10 percent of the total student population, representing more than five million students. There are students within this linguistically and culturally diverse group who have advanced academic achievement and cognitive abilities that exceed those of grade and age peers. Academic acceleration should be a highly valued program option for the schools these students attend.

tion results in a timely manner (within 10 days recommended). A comprehensive written plan for the acceleration of recommended students should be developed; a copy of which should be provided to the student's parents or legal guardian(s).

<u>The community has ready access to the policy document and procedure guidelines.</u> Community access includes making the policy available in the language(s) served by the school. The acceleration policy and procedures must be easily accessible to the community. The acceleration policy and referral forms should be available upon request in the language(s) served by the school. Parents should receive this information in writing and in their heritage language. The administration and school staff should be informed on an annual basis to assist the parents and students about the referral process.

The policy provides guidelines for the implementation of acceleration. Specific recommended elements of a policy that provides guidelines for the practice of acceleration include:

<u>The categories, forms, and types (where appropriate) of acceleration are specified.</u> The two categories of acceleration, grade-based and content-based, their specific forms (e.g., telescoping, curriculum compacting), and types (when appropriate) should be part of a school's acceleration policy.

<u>The entire process to obtain acceleration services is detailed in the policy.</u> The process of implementing acceleration includes referral and screening, assessment and decision making, and planning.

<u>Acceleration decisions should be made by child study teams, not individuals.</u> An acceleration policy should be informed by research-based best practices, not personal opinions or anecdotal evidence. A common impediment to acceleration occurs when acceleration decisions are made by one person, a gatekeeper, who may harbor negative personal views about acceleration (Southern & Jones, 2004, this volume). A child study team, which should include experts in gifted education, should consider individual acceleration cases, and, with the use of valid and reliable instruments to guide the discussion, decide on the form of acceleration needed.

<u>The child study team creates a "Written Acceleration Plan."</u> The child study team should appoint a staff member of the school to oversee and aid in the implementation of the Written Acceleration Plan.

The district should retain a copy of the student's Written Acceleration Plan to help assure that future opportunities specified in the plan are provided and that the student does not run into obstacles in subsequent years of school (such as when a student who is accelerated by continuous progress requires curriculum from two different schools).

<u>The policy specifies that the acceleration process include a monitored transition period within which decisions can be reversed.</u> If a student is recommended for accelerated placement, the child study team should establish an appropriate transition period. We recommend that the student's transition be evaluated no later than 30 days after the placement, and sooner if there are concerns about the placement. A staff member of the school should monitor the student's adjustment during the transition period.

Within the time specified for the transition period, the parent or legal guardian may request in writing an alternative placement. The administrator should bring such proposals before the decision-making team who will be responsible for issuing a decision within a specified number of days (we recommend a decision within 10 days) of receiving the request. If the acceleration plan is modified, the written acceleration plan should be updated.

During this time, the parent or legal guardian(s) may request, in writing, the discontinuation of the acceleration program without any repercussions.

The policy provides guidelines on administrative matters to ensure fair and systematic use of accelerative opportunities and recognition for participation in those accelerative opportunities. Specific recommended elements of a policy that provides guidelines on administrative matters include the following:

<u>Short-term needs are addressed.</u> An acceleration policy should provide guidance for issues in the short term, which include, but are not limited to:

- specifying which grade level state achievement test the student should take, and
- allowing for flexible transportation arrangements should a student need to travel between buildings.

Long-term needs are addressed. An acceleration policy should provide guidance for issues in the long term, which include, but are not limited to:

- providing guidance throughout K-12 to make sure that students will be allowed to maintain their accelerated standing,
- working with the district to discuss distance learning options,
- indicating accelerated coursework on a student's transcript, and
- determining the student's class rank.

The process of awarding credit to students is specified. There are multiple considerations when specifying how students will be awarded credit, including:

- whether a middle school student receives middle school credit for courses taken at the high school (or college level),
- whether a high school student receives high school credit for courses taken at the college level, and
- whether a student receives credit for demonstration of subject area competency outside of or in combination with completing hours of classroom instruction. Alternative credit pathways may include, but are not limited to:
  a. "Testing out" of a course or part of a course by attaining an established minimum score on an approved assessment instrument;
  b. Demonstrating prior mastery through the presentation of a portfolio of relevant student work;
  c. Successfully completing a program of independent study based on an approved learning contract;
  d. Successfully completing a flexibly paced distance learning program addressing content comparable to the traditional course.

The policy provides guidelines for preventing non-academic barriers to the use of acceleration as an educational intervention. Specific recommended elements of a policy that provides guidelines for preventing non-academic barriers to the use of acceleration include the following:

Extracurricular opportunities, especially interscholastic sports opportunities, should not be withheld or denied to students who are accelerated. For example, a middle school student who receives high school credit should not have any reduction of sports eligibility. We recommend that a conversation be initiated between gifted education experts in the area of acceleration and the governing board for interscholastic activities to review the impact of the current rules and policies on students participating in subject acceleration.

Use of acceleration should not negatively affect school funding. The appropriate agency should review school funding formulae to identify benefits and disincentives to appropriate use of academic acceleration.

The policy includes features that prevent unintended consequences. Specific desirable elements of a policy that proactively works to prevent unintended consequences include the following:

An appeals process should be specified for decisions made at any step during the process. An appeals process, including procedures for appealing decisions and the time limitations on starting an appeal, should be specified. We recommend that the appeals process is specified in writing and accessible.

The acceleration policy should be regularly evaluated on its effectiveness. The acceleration policy should include recommendations for how to evaluate the effectiveness of the policy itself and its effectiveness in successfully accelerating students. The policy should provide recommendations for the point at which the policy's effectiveness is evaluated (for example, a committee should be convened once a year to review success of the policy as well as unintentional barriers to the use of acceleration).

Conclusion

The members of the National Work Group on Acceleration developed this document to assist schools in writing and modifying an acceleration policy that adheres to research-based best practices and is suited to local needs. These guidelines for policy development should encourage the systematic adoption and practice of acceleration in schools across the nation.

There are many barriers to acceleration, some of which we have reviewed in this document. For example, some states and local education agencies have absolute age requirements for entering school. Others have curriculum requirements tied to specific grade levels, or prerequisites for certain courses/programs that are so specific in policy that they tie educators' hands. Additionally, colleges and universities may present barriers by arbitrarily limiting participation of accelerated students in dual enrollment programs. In some states, students aren't allowed to take a state graduation test until the spring of the sophomore year. In these states, colleges and universities require students to have passed the graduation test before enrolling in their dual enrollment programs. In effect, this locks students out of college-level courses until their junior year. When these barriers can be removed, students are in a better position to receive the educational opportunities and experiences necessary for their personal and academic growth.

Table 1: Checklist for Developing an Academic Acceleration Policy

An ideal acceleration policy will have a "yes" answer to each question.

Is your acceleration policy characterized by accessibility equity and openness?	**YES**	**NO**	**UNSURE**
Is access to referral for consideration of acceleration open to all students regardless of gender, race, ethnicity, disability status, socioeconomic status, English language proficiency, and school building attended?			
Are all student populations served, including ELL, at-risk, low socioeconomic status, profoundly gifted, and twice-exceptional?			
Is the process of student evaluation fair, objective, and systematic?			
Do parents or legal guardians have open communication with school officials about the policy document?			
Does the community have access to the policy document? Is the policy accessible in the languages served by the school?			
Does your acceleration policy provide guidelines for implementing acceleration?	**YES**	**NO**	**UNSURE**
Are both categories of acceleration (grade-based and content-based) specified?			
Are the forms of acceleration (e.g., early admission to school, telescoping, AP) and types (where appropriate) specified?			
Is the process of obtaining acceleration services detailed (including referral & screening, assessment & decision making, and planning)?			
Does the policy specify that child study teams, not individuals, consider acceleration cases?			
Does the policy specify the creation of a "Written Acceleration Plan"?			
Does the policy specify a monitored transition period?			
Does your acceleration policy provide guidelines on administrative matters?	**YES**	**NO**	**UNSURE**
Does the policy address short-term needs, such as... • specifying which grade-level achievement test should the student take?			
• clarifying transportation issues for students who need to travel between buildings?			
• determining the student's class rank?			
Does the policy address long-term needs, such as... • maintaining accelerated standing?			
• assigning appropriate credit for accelerated coursework?			
• indicating acceleration coursework on a transcript?			
• specify the process of awarding course credit to students?			
Does your acceleration policy provide guidelines for preventing non-academic barriers?	**YES**	**NO**	**UNSURE**
Are procedures in place to ensure participation in extracurricular activities, including sports?			
Have funding formulae been reviewed to prevent unintended disincentives?			
Does your acceleration policy include features that prevent unintended consequences?	**YES**	**NO**	**UNSURE**
Is an appeals process detailed?			
Will the policy be regularly evaluated for its effectiveness?			

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[1] *This reference list reflects the entire list in the 2009 document.*

About the Belin-Blank Center and the Acceleration Institute

The Connie Belin and Jacqueline N. Blank Center for Gifted Education and Talent Development (Belin-Blank Center): www.belinblank.org

The Belin-Blank Center (BBC) is a comprehensive center focused on nurturing potential and inspiring excellence through myriad programs and services. The mission of the Belin-Blank Center is to empower and serve the international gifted community through exemplary leadership in programs, research, and advocacy.

The Belin-Blank Center:

- Identifies gifted, talented, and artistic learners;
- Offers specialized educational opportunities for students;
- Increases awareness and use of acceleration to enhance learning;
- Provides assessment, counseling, and consultation services;
- Develops curriculum resources and materials;
- Facilitates the professional development of educators;
- Disseminates information through conferences and publications;
- Leads in local, national, and international policy formation;
- Enhances educational opportunities through technology;
- Collaborates with the worldwide gifted community; and
- Promotes access, diversity, and equity in developing talent.

The Belin-Blank Center supports the development of gifted education programs throughout the world. Our international efforts include the Templeton International Fellows program. The administrative faculty and staff have conducted professional development programs for educators from South Korea and Russia. Students from other countries, especially China and Hong Kong, are regular participants in our summer programs.

Housed at the Belin-Blank Center, the Wallace Research and Assessment Clinic is home to the National Institute for Twice-Exceptionality (NITE). Twice-exceptionality refers to gifted students who have learning, behavioral, and/or social-emotional difficulties. NITE provides a clearinghouse for resources related to the topic of twice-exceptionality. The NITE team of licensed psychologists and researchers has actively researched this topic and abstracts of several recent research publications are available on the Assessment and Counseling Clinic webpage, www.belinblank.org/clinic.

Acceleration Institute: www.accelerationinstitute.org

The Belin-Blank Center's Acceleration Institute was originally established under the name, "Institute for Research and Policy on Acceleration" in 2006 through the generous support (2006-2012) of the John Templeton Foundation. The Acceleration Institute is dedicated to the study of curricular acceleration for academically talented children.

The primary purposes of the Acceleration Institute are:

- Conducting research on the cognitive and affective characteristics that moderate students' success with different forms of academic acceleration;
- Synthesizing current research on acceleration in ways that are useful to practitioners, policy makers, and researchers; and
- Serving as an international clearinghouse for research and policy on acceleration.

Belin-Blank Center Staff

Directors

Susan G. Assouline, Ph.D., Myron and Jacqueline Blank Chair in Gifted Education, *Director*

Nicholas Colangelo, Ph.D., Dean, College of Education, *Director Emeritus*

Laurie Croft, Ph.D., Clinical Associate Professor, *Associate Director for Professional Development*

Brian Douglas, M.B.A., *Assistant Director for Finance, Operations, and Technology*

Megan Foley-Nicpon, Ph.D., Associate Professor of Counseling Psychology, *Associate Director for Research and Clinic*

Jan Warren, M.A., *Assistant Director for Student Service*s

Administrative Staff

Alissa Doobay, Ph.D., *Supervisor of Psychological Services for Wallace Assessment and Counseling Clinic*

Kristin Flanary, M.A., *Coordinator for Iowa Online Advanced Placement Academy (IOAPA)*

Joyce Goins, Ph.D., *Licensed Psychologist, Assessment and Counseling Clinic*

Lori Ihrig, Ph.D., *Supervisor for Curriculum and Instruction, Program Director for STEM Excellence and Leadership*

Joshua Jacobs, A.A.S., *Network Administrator*

Emily Ladendorf, B.A., *Online Technology*

Ann Lupkowski-Shoplik, Ph.D., *Administrator, Acceleration Institute; Adjunct Professor, Psychological and Quantitative Foundations*

Ashlee Van Fleet, M.A.T., *Administrative Curriculum and Instruction*

Faculty Staff

Clar Baldus, Ph.D., Clinical Associate Professor for Art Education, *Consultant, Visual Arts Programs*

Leslie Flynn, Ph.D., Clinical Associate Professor for Science Education, *Coordinator JSHS*

Clerical Staff

Rachelle Blackwell

Lori Hudson

Melissa Keeling

Bridget Pauley

Nancy Whetstine

Graduate Assistants

Maggie Candler, B.S.

Chuck Cederberg, M.A., LMHC

Erica Damman, B.F.A., M.F.A

Staci Fosenburg, B.S.

Ellen Henning, S.S.P

Erin Lane, M.A.

Soeun Park, M.S.

Katie Schabilion, B.A.

Anne Sparks, B.A.

Kirstin Swenson, B.A.

Jiaju Wu, M.A.

Kristin Wurster, M.A.

Practicum Students

Staci Fosenburg (Clinic)

Jonny Goodwin (Clinic)

Michael Rieger (Honors Program)

LaNeisha Waller (Clinic)

Undergraduate Assistants

Aulburee Hawkins

Lara Shema

Resources for Parents and Educators

This appendix offers resources that may be useful for parents and educators of gifted and talented students. The entries in each category below serve as a representative sample, rather than an exhaustive list, of available resources.

Centers for Gifted Education and Talent Searches

Academic Talent Search
California State University, Sacramento CA
http://www.csus.edu/coe/ats/

The Belin-Blank International Center for Gifted Education and Talent Development
University of Iowa, Iowa City, IA
http://www.belinblank.org

Center for Bright Kids
http://www.centerforbrightkids.org

Center for Gifted Education
College of William & Mary, Williamsburg, VA
http://education.wm.edu/centers/cfge/

Center for Gifted Studies
Western Kentucky University, Bowling Green, KY
http://www.wku.edu/gifted/

Center for Talent Development
Northwestern University, Evanston, IL
http://www.ctd.northwestern.edu

Center for Talented Youth
Johns Hopkins University, Baltimore, MD
http://cty.jhu.edu

Davidson Institute for Talent Development
Reno, NV
http://www.davidsongifted.org

Frances A. Karnes Center for Gifted Studies
University of Southern Mississippi, Hattiesburg, MS
http://www.usm.edu/karnes-gifted

Gifted Development Center
Denver, CO
http://www.gifteddevelopment.com

Gifted Education Research Resource and Information Center
University of New South Wales, Sydney, NSW, Australia
https://education.arts.unsw.edu.au/about-us/gerric/

Gifted Education Resource Institute
Purdue University, West Lafayette, IN
http://www.geri.education.purdue.edu

Gifted Students Institute
Southern Methodist University, Dallas, TX
http://www.smu.edu/gsi/

Jodie Mahony Center for Gifted Education
University of Arkansas at Little Rock
http://ualr.edu/gifted/

Neag Center for Gifted Education and Talent Development
University of Connecticut, Mansfield, CT
http://www.gifted.uconn.edu

Office of Precollegiate Programs for Talented and Gifted (OPPTAG)
Iowa State University, Ames, IA
https://www.opptag.iastate.edu/

Robinson Center for Young Scholars
University of Washington, Seattle, WA
https://robinsoncenter.uw.edu/

Talent Identification Program
Duke University, Durham, NC
http://tip.duke.edu

University of Minnesota Talented Youth Mathematics Program (UMTYMP)
University of Minnesota, Minneapolis, MN
http://mathcep.umn.edu/umtymp/

Wisconsin Center for Academically Talented Youth
Madison, WI
http://www.wcaty.org

Contests and Competitions

American Mathematics Competitions
http://www.maa.org/math-competitions
Offers a series of competitions, including American Mathematics Contest 8, 10, and 12; American Invitational Mathematics Exam; United States of America Mathematical Olympiad (USAMO).

American Model United Nations International
http://www.amun.org/

American Regions Mathematics League (ARML)
http://www.arml.com
ARML is a national mathematics competition for high school students.

American History Essay Contests
http://www.dar.org/national-society/education/essay-contests

Destination Imagination (DI) Challenge Program
http://www.destinationimagination.org/challenge-program
Teams work together to solve their chosen challenge, and team solutions are assessed at regional, state, or country tournaments.

Future Problem Solving Program International (FPSPI)
http://www.fpsp.org
FPSPI offers competitive and non-competitive activities in creative problem solving.

Intel Science Talent Search (Intel STS)
https://student.societyforscience.org/intel-sts
Intel STS is the nation's most prestigious science research competition for high school seniors. Students submit independent research projects and winners receive college scholarships.

Junior Science and Humanities Symposia
http://jshs.org/
JSHS is designed to challenge and engage students (Grades 9-12) in science, technology, engineering or mathematics (STEM). Individual students compete for scholarships and recognition by presenting the results of their original research efforts before a panel of judges and an audience of their peers. Opportunities for hands-on workshops, panel discussions, career exploration, research lab visits and networking are provided.

MATHCOUNTS
http://www.mathcounts.org
MATHCOUNTS is a national competitive mathematics program for middle school students. Students can win scholarships and other prizes.

Math Day at the University of Nebraska-Lincoln (UNL)
http://www.math.unl.edu/programs/mathday
UNL Math Day invites Nebraska high school students to participate in one individual and two team math competitions. Top prizes include scholarships to UNL. The University of Nebraska Lincoln also sponsors the
All Girls/All Math Summer Camp
http://www.math.unl.edu/programs/agam
for high school girls who have completed geometry.

Math League Contests
http://www.mathleague.com
The Math League offers contests for students in grades four through 12.

Math Olympiads for Elementary and Middle Schools (MOEMS)
http://www.moems.org/
The Olympiad Program includes a series of math problem solving contests for school-based teams of up to 35 students in grades four through eight. School math clubs can meet year-round to explore math topics and prepare for contests, which are offered monthly from November to March.

National Academic Quiz Tournaments (NAQT)
http://www.naqt.com/index.html
NAQT organizes middle school, high school, community college and college national quiz bowl championships and provides a format for independent tournaments.

National Geographic Bee
http://www.nationalgeographic.com/geobee/
The National Geographic Bee is open to schools with students in grades four through eight. School champions may qualify to participate in their state Bee, and state champions attend the national championship, where prizes include scholarships.

National History Day (NHD)
http://www.nationalhistoryday.org
Students select an historical topic, conduct research, and develop a project representing their knowledge. Projects can be entered for judging at local, regional, state and national levels, and prizes include scholarships and internships.

National Merit Scholarship Program
http://www.nationalmerit.org/nmsp.php
High school students who take the Preliminary SAT/National Merit Scholarship Qualifying Test (PSAT/NMSQT) and meet published eligibility criteria are entered in the National Merit Program. Winners receive college scholarships.

National Science Bowl
http://science.energy.gov/wdts/nsb/
The National Science Bowl is an academic competition that tests students' science and math knowledge. Regional champions in middle school and high school divisions advance to the national championship.

Odyssey of the Mind
http://www.odysseyofthemind.com
Odyssey of the Mind invites students from kindergarten through college to form teams and solve a wide variety of creative problems. Competitions occur at local, state, and world levels.

Science Olympiad
http://soinc.org/
Science Olympiad offers programs for students in kindergarten through grade twelve. Competitions occur at regional, state, and national levels.

Scholastic Art and Writing Awards
http://www.artandwriting.org/
The nation's longest-running, most prestigious recognition initiative for creative teens, and the largest source of scholarships for young artists and writers.

Scripps National Spelling Bee
http://www.spellingbee.com
The Scripps National Spelling Bee program offers opportunities for schools to enroll in the program, develop and hold local contests, and send winners to the next levels of competition, culminating yearly in the National Spelling Bee.

Tests of Engineering Aptitude, Mathematics and Science (TEAMS)
http://teams.tsaweb.org
TEAMS is an annual one-day competition in which middle and high school students can apply their math and science knowledge to solve real-world engineering challenges.

U.S. National Chemistry Olympiad (UNSCO)
http://www.acs.org/content/acs/en/education/students/highschool/olympiad.html
The USNCO is a chemistry competition for high school students. The local competitions are open to all high school students, and nominees are selected to take the national exam. Top performers on the exam go on to the study camp, and four students are selected to represent the U.S. at the International Chemistry Olympiad.

U.S. Physics Team
http://www.aapt.org/physicsteam/
The American Association of Physics Teachers recruits, selects, and trains teams to compete in the International Physics Olympiad Competition. Schools can register high school students to participate in the local exam, and top scorers go on to take the USA Physics Olympiad Exam.

U.S.A Mathematical Talent Search (USAMTS)
http://www.usamts.org
The USAMTS is a free math contest open to all U.S. middle and high school students. The competition aspect of the program is secondary to the development of problem solving and math reasoning skills.

United States Academic Decathlon (UASD)
http://usad.org/
The USAD is a scholastic competition for teams of high school students. Teams are made up of three "Honor" students (3.75-4.00 GPA), three "Scholastic" students (3.00-3.749 GPA) and three "Varsity" students (0.00-2.999 GPA).

Distance Learning

Advanced Placement (AP) Program
http://apcentral.collegeboard.com
AP courses are offered in many high schools nationwide. National examinations are given each May, and high scores earn college credit. Many states sponsor grants to pay for online AP courses if they are not offered in person.

CTYOnline
Center for Talented Youth, Johns Hopkins University
http://cty.jhu.edu/ctyonline/index.html
CTYOnline offers challenging courses for eligible students in grades Pre-K to 12. These courses are available year-round, and each student receives guidance, feedback, and evaluation from a CTY faculty member.

GIFTEDANDTALENTED.COM
(formerly the Education Program for Gifted Youth [EPGY] at Stanford University)
http://giftedandtalented.com
Computer-based courses designed to meet the needs of advanced learners in grade K-12.

Gifted LearningLinks
Center for Talent Development, Northwestern University
http://www.ctd.northwestern.edu/gll/
GLL offers challenging online courses for gifted and talented students in kindergarten through grade 12.

Iowa Online Advanced Placement Academy (IOAPA)
Belin-Blank Center, University of Iowa
http://www.iowaapacademy.org
Since 2001, IOAPA has offered access to Advanced Placement (AP) courses to all Iowa high school students, especially those in small and rural schools. The Belin-Blank Center has recently begin expanding the online AP learning program to schools outside of Iowa.

University of Nebraska High School
University of Nebraska
http://highschool.nebraska.edu
The University of Nebraska High School (UNHS) is an accredited school offering flexible, self-based online coursework. Students in any location may choose to enroll at UNHS full-time to earn a UNHS diploma, or they may transfer credits earned through UNHS to their local school.

Early Entrance to College Programs

Below is a sample of early entrance to college programs. More information can be found in the Brody and Muratori chapter in *A Nation Empowered* (Vol. 2) and at http://www.accelerationinstitute.org/Resources/early_college.aspx and http://www.hoagiesgifted.org/early_college.htm.

*Organizations marked with an * are members of the National Consortium of Early College Entrance Programs.*

Accelerated College Entrance
California State University, Sacramento
http://www.csus.edu/coe/ace/
For students in grades 11 and 12

Advanced Academy of Georgia*
University of West Georgia
http://www.westga.edu/-academy/
For students in grades 11 and 12

Bard College at Simon's Rock*
http://www.simons-rock.edu/
For students who have completed 10th grade

Boston University Academy*
http://www.buacademy.org
For students in grades nine through 12

The Clarkson School*
Clarkson University
http://www.clarkson.edu/tcs/
For students who have completed 11th grade

The Davidson Academy of Nevada
http://www.davidsonacademy.unr.edu/
For students under the age of 18 who meet the Qualification Criteria

The Early College
Guilford College
http://ecg.gcsnc.com/pages/Early_College_At_Guilford
For students in grades nine through 12

Early Entrance Program*
California State University, Los Angeles
http://web.calstatela.edu/academic/eep/
For qualified students 11 to 18 years old

Early Entrance Program*
Belin-Blank Center, University of Iowa
http://www.belinblank.org/academy
Formerly the National Academy of Arts, Science, and Engineering

Massachusetts Academy of Math and Science
http://www.massacademy.org/
For students in grades 11 and 12

Program for the Exceptionally Gifted*
Mary Baldwin College
http://www.mbc.edu/early_college/peg/
For girls between the ages of 13 and 15

Robinson Center for Young Scholars*
University of Washington
https://robinsoncenter.uw.edu/
For students who have completed at least sixth grade and are younger than 15 years old

Texas Academy of Mathematics and Science*
Denton, TX
https://tams.unt.edu/
For Texas students in grades 11 and 12 who are interested in math and science

Organizations

Most states have an organization to promote advocacy for gifted and talented students at the state and local level; provide pre-service and in-service training in gifted education; and support parent/community awareness, education, and involvement. See the NAGC website for specific information by state.

National Association for Gifted Children (NAGC)
http://www.nagc.org
NAGC is a non-profit organization dedicated to serving parents, educators, community leaders, and other professionals who work on behalf of gifted children. It hosts an annual convention and publishes several periodicals. In addition, most states have an NAGC-affiliated state organization, and the NAGC website offers state-specific policies and information.

American Psychological Association (APA) Center for Gifted Education Policy (CGEP)
http://www.apa.org/ed/schools/gifted/index.aspx
The mission of the CGEP is to generate public awareness, advocacy, clinical applications, and cutting-edge research ideas that will enhance the achievement and performance of children and adolescents with special gifted and talents.

The Association for the Gifted (TAG)
http://cectag.com/
TAG is a special interest division of the Council for Exceptional Children (CEC). It promotes the welfare and education of children and youth with gifts, talents, high potential, and those who are twice-exceptional.

Supporting Emotional Needs of the Gifted (SENG):
http://sengifted.org/
The mission of SENG is to foster environments in which all gifted children and adults can understand and accept themselves and be understood, valued, and supported by others.

Periodicals

Connecting for High Potential
http://www.nagc.org/resources-publications/nagc-publications/connecting-high-potential
This publication from the National Association for Gifted Children is designed to bridge the gaps between parents and teachers of gifted children and to offer opportunities to examine each perspective.

Gifted Child Quarterly (GCQ): http://www.nagc.org/resources-publications/nagc-publications/gifted-child-quarterly GCQ is the scholarly journal of the National Association for Gifted Children. It contains articles of interest to professionals and those with some experience in the field of gifted education.

Gifted Child Today (GCT)
http://gct.sagepub.com/
GCT provides practical advice about teaching and parenting gifted and talented children. Articles cover topics relevant for parents, teachers, and administrators of gifted students.

Imagine
http://cty.jhu.edu/imagine/index.html
Imagine is written for students in grades 7-12, and is published by the Johns Hopkins University Center for Talented Youth.

Journal for the Education of the Gifted (JEG)
http://jeg.sagepub.com/
JEG is the official publication of The Association for the Gifted (a division of the Council for Exceptional Children). It presents information and research on the educational and psychological needs of gifted and talented children.

Parenting for High Potential
http://www.nagc.org/resources-publications/nagc-publications/parenting-high-potential
This magazine is published by NAGC and designed for parents.

Roeper Review
http://www.roeper.org/Roeper-Review
This publication is designed for professionals and includes articles that are research-based and often deal with both theoretical and practical issues.

Understanding Our Gifted
http://www.ourgifted.com/
This online journal is published quarterly, and each issue focuses on a different gifted education topic.

Vision
http://www.belinblank.org/newsletter
Vision is the monthly newsletter from the Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development.

Web and Print Resources

The Acceleration Institute
(formerly the Institute for Research and Policy on Acceleration), a project of the Belin-Blank Center for Gifted and Talented Education, the University of Iowa
http://www.accelerationinstitute.org
This website is home to many resources that are useful for making acceleration decisions, developing acceleration policies, and examining specific forms of acceleration. The watershed publication on acceleration, *A Nation Deceived: How Schools Hold Back America's Brightest Students*, can be downloaded for free. A PowerPoint presentation discussing acceleration is available for download. The Policy section provides information about state legislation regarding acceleration for all 50 U.S. states that can inform parents and educators interested in acceleration. The downloadable *Guidelines for Developing an Academic Acceleration Policy* may be of assistance to school personnel who are considering creating a policy. Also found on this website are acceleration stories: personal anecdotes from parents, teachers and students who have had experiences with acceleration.

Academic Earth
http://academicearth.org/
A collection of free online college courses from many universities. Courses include biology, chemistry, computer science, engineering, mathematics, physics, and psychology.

ALEKS
http://www.aleks.com
Web-based assessment and learning system that uses adaptive questioning to determine what a student knows and doesn't know in a course. ALEKS then instructs the student on the topics he or she is most ready to learn.

Cogito
https://cogito.cty.jhu.edu/
Sponsored by the Center for Talented Youth at Johns Hopkins University, this website connects exceptional students from around the world who love science, technology, engineering and math. Students can participate in online interviews with mathematicians and scientists; view science and math-related news articles, essays, videos and blogs; and access a database of academic programs and math and science competitions. Cogito also includes members-only discussion forums.

Davidson Gifted Database
http://www.davidsongifted.org/db/
This database features an online article library, searchable resources for and about gifted students, gifted education state policy information, and a gifted issues discussion forum.

Developing Math Talent: A Comprehensive Guide to Math Education for Gifted Students in Elementary and Middle School (2nd ed.)
By Assouline, S., and Lupkowski-Shoplik, A. (2011). Published by Prufrock Press (Waco, TX). This handbook integrates the unique roles of educators and parents in responding to the exceptional needs of mathematically talented students.

Educational Opportunity Guide
https://eog.tip.duke.edu/guide/search
This guide is updated annually by Duke University's Talent Identification Program (TIP). It lists many summer and school-year programs throughout the country.

Federal Registry for Educational Excellence (FREE)
http://free.ed.gov/
The FREE website compiles digital teaching and learning resources.

Genius Denied
http://www.geniusdenied.com
By Davidson, J., & Davidson, B. (2004). Published by Simon and Schuster (New York). Additional resources, blogs, news, and other information are listed on the website.

The Hoagies Gifted Education Page
http://www.hoagiesgifted.org
This website hosts a wide variety of resources for parents of gifted students, educators and professionals working with gifted students, and gifted kids and teens.

IDEAL Solutions for STEM Acceleration
http://www.idealsolutionnsstem.com
This is an online tool that assists parents and educators in making decisions about academically talented students. Teachers can gain research-supported recommendations regarding students' readiness for acceleration in STEM subjects. Recommendations are aligned with national standards. The goal is to assist school personnel with accelerated placement in STEM subjects so they can feel confident that their placement decisions are supported by research.

Iowa Acceleration Scale, 3rd Edition
http://accelerationinstitute.org/Resources/IAS.aspx
Developed by Susan Assouline, Nicholas Colangelo, Ann Lupkowski-Shoplik, Jonathan Lipscomb, and Leslie Forstadt (2009). Published by Great Potential Press (Scottsdale, AZ). This instrument provides a systematic and thorough method of decision-making for educators and parents

who are considering whole-grade acceleration for students in kindergarten through eighth grade.

Khan Academy
https://www.khanacademy.org/
Provides practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom. Subjects include math, science, computer programming, history, art history, economics, and others.

Listservs

Belin-Blank Center Listserv
The Gifted Teachers email list provides a way for educators around the world interested in gifted education to interact. Nearly 1,000 educators currently participate. To subscribe to the list, send an email message to listserv@list.uiowa.edu. Leave the subject line blank. In the text of your message, write: SUBSCRIBE GIFTED-TEACHERS First-Name Last-Name.

Center for Gifted Education Policy (CGEP) Listserv
The CGEP Listserv is a forum of over 400 subscribers from around the world that engenders communication among researchers in giftedness studies and education. It provides opportunities for researchers and graduate students to discuss issues, exchange information, and generate potential collaborations. See http://www.apa.org/ed/schools/gifted/listserv/index.aspx for instructions on how to subscribe.

Hoagies Gifted Education Page
The Hoagies Gifted website contains a listing of many different email lists, Facebook groups, blogs, and other online communities for individuals interested in gifted education. Visit http://www.hoagiesgifted.org/on-line_support.htm.

A Nation Empowered: Social Media

For current information about *A Nation Empowered*, visit www.nationempowered.org, follow @BelinBlank on Twitter, or read the Belin-Blank Center blog at https://belinblank.wordpress.com/.

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