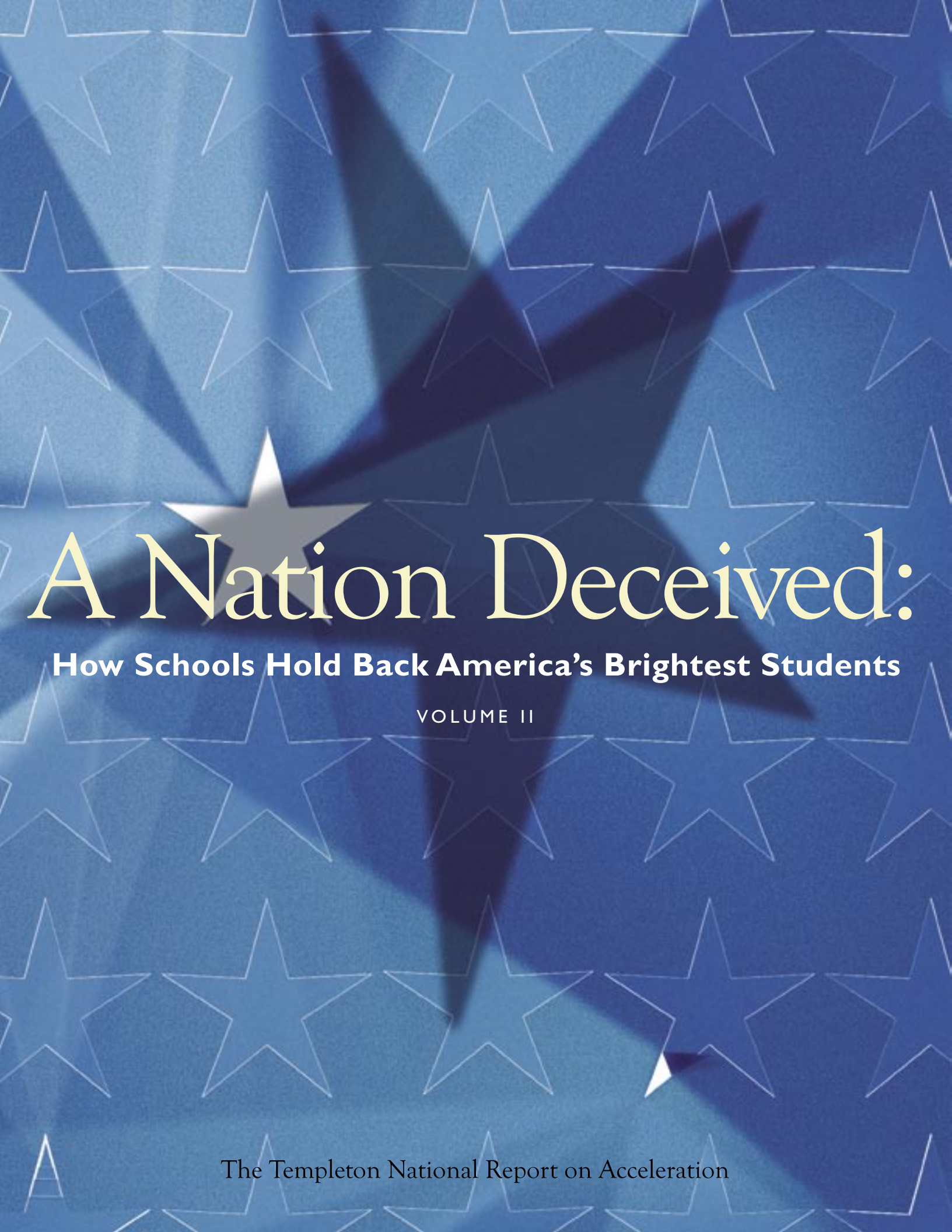

A Nation Deceived:

How Schools Hold Back America's Brightest Students

VOLUME II

The Templeton National Report on Acceleration

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The Templeton National Report on Acceleration

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A Nation Deceived: How Schools Hold Back America's Brightest Students

Acknowledgments

This is truly a national report. With support from the John Templeton Foundation we held a Summit on Acceleration at The University of Iowa in May 2003. We invited distinguished scholars and educators from around the country to help us formulate a national report on acceleration; a full listing of participants is found in Appendix E of Volume II. Together, we deliberated about what schools need to know in order to make the best decisions on educating highly capable students. These vibrant discussions led to the two volumes of *A Nation Deceived: How Schools Hold Back America's Brightest Students*.

The information in Volume II formed the basis for the content in Volume I. We gratefully acknowledge the international experts who wrote the chapters for Volume II.

We want to give special recognition to Belin-Blank Center graduate assistants Leslie Forstadt and Catherine Hirsch who were instrumental in creating the annotated bibliography found in Appendix C of Volume II. We thank Jerilyn Fisher (Belin-Blank Center) and Christina Hamme Peterson (ACT Inc.) for their superb editorial assistance. We are grateful to Robyn Hepker and Joan Benson of Benson & Hepker Design for their design expertise and creativity.

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A Nation Deceived: How Schools Hold Back America's Brightest Students*

Introduction

Acceleration is an educational intervention based on progress through an educational program at rates faster or at ages younger than typical (Pressey, 1949). It is ideally suited to academically gifted students — young people who have an enhanced capacity to learn. Acceleration practices provide the appropriate level of challenge and reduce the time necessary for students to complete traditional schooling (NAGC, Position Paper, 1992).

There are many forms of acceleration; 18 types are identified in this volume. These include:

- Early entrance to school
- Grade-skipping (whole-grade acceleration)
- Subject matter acceleration (e.g., math only)
- Self-paced instruction
- Mentoring
- Curriculum compacting
- Advanced Placement
- Early entrance to college

Many of these forms of acceleration are designed for individual students. Some forms allow small, or larger, groups to accelerate together, as shown in Table 1.

Acceleration does not mean pushing a child. It does not mean forcing a child to learn advanced material or socialize with older children before he or she is ready. Indeed, it is the exact opposite. Acceleration is about appropriate educational planning. It is about matching the level and complexity of the curriculum with the readiness and motivation of the child. Acceleration is about letting students soar. Acceleration is about respecting individual differences and the fact that some of these differences merit educational flexibility.

Schools pay lip-service to the proposition that students should learn at their own pace; in reality, for countless highly able children the pace of their progress through school is determined by the rate of progress of their classmates. In the majority of our classrooms, an invisible ceiling restricts the progress of academically gifted students. At the time of the publication of this report, the No Child Left Behind (NCLB)

Table 1.

Types of Acceleration and Numbers of Students

Individual Students	Small Group	Large Group
Grade-skipping Early entrance Curriculum compacting	Single-subject mentoring	AP classes

* *This report was sponsored by a generous grant from the John Templeton Foundation of Pennsylvania for which we express our sincere gratitude. The editors and authors assume responsibility for the content of the report.*

legislation, which aims to bring all children up to proficiency, is the national focus on education. This is an admirable goal and worthy of our efforts. However, NCLB ignores those students who are well above proficiency, and these students are also worthy of our best efforts. It is this group that is currently invisible on the national agenda and this report is intended to restore visibility to these students and their legitimate education needs.

This report is presented in two volumes. Volume I contains the essence of the research reviews presented in Volume II. Volume II provides an extensive review of the wealth of research on the academic acceleration of gifted students so that discussion and decision-making about acceleration can be based on evidence rather than on myths, misconceptions, or personal bias. It is often difficult to make strong generalizations about research in education since, so often, scholars present contradictory findings. In fact, many educational interventions have been implemented with a flimsy research basis or no research basis at all. Acceleration stands as a striking exception to the rule. For example:

- Acceleration has been well researched and documented.
- Acceleration is the best educational intervention for high-ability (gifted) students.
- Acceleration is consistently effective with gifted students.
- Acceleration is highly effective for academic achievement.
- Acceleration is usually effective in terms of social-emotional adjustment.

These are powerful statements borne out in this report. Volume I presents, simply and frankly, the research findings on acceleration. Volume II provides the resources and scholarly background to Volume I, to enable educators and parents to make informed educational decisions.

Overview of Chapters

This volume of the report (Volume II) contains 11 chapters written by experts in gifted education and acceleration. Each of these chapters focuses on an important aspect of acceleration, and individually, as well as collectively, they provide a sound and comprehensive review of the acceleration literature as it relates to gifted students.

Below is a synthesis of the main points from each chapter.

Chapter 1: Types of acceleration: Dimensions and issues
W. Thomas Southern and Eric D. Jones

- There are 18 types of acceleration practices
- Most accelerative options are well documented for effectiveness and cost
- The few problems that have been experienced with acceleration have stemmed from incomplete (poor) planning
- Educators need to consider the best option(s) for acceleration, given the individual student and the specific circumstances

Chapter 2: Meta-analytic studies of acceleration
James A. Kulik

- No other arrangement for gifted children works as well as acceleration
- Accelerated students are more likely than non-accelerants to aspire to advanced educational degrees
- Acceleration is far more effective in raising student achievement than the most successful school reform models

Chapter 3: Long-term effects of educational acceleration
David Lubinski

- Longitudinal studies, across objective and subjective measures, indicate that a curriculum that is accelerative is educationally and developmentally advisable
- When the curriculum moves at a slow pace, boredom and discontent frequently ensue
- Intellectually precocious students who experience educational acceleration in middle school and high school view their pre-college education experiences much more positively than their non-accelerated intellectual peers
- For developing world-class scientific leaders, accelerative experiences appear to be critical

Chapter 4: Public policy and acceleration of gifted students
James J. Gallagher

- There is little doubt that educators have been largely negative about the practice of acceleration, despite abundant research evidence attesting to its viability
- If we wish to encourage a major change in how educational acceleration is viewed, we will probably need to use all the engines of change: legislation, the courts, administrative rules, and professional initiatives.
- In the case of educational acceleration, what has to change is not written policy, but the attitudes of policy makers

Chapter 5: The academic effects of acceleration
Karen B. Rogers

- Acceleration falls into two broad categories: *grade-based acceleration*, which shortens the number of years a student spends in the K–12 system, and *subject-based acceleration*, which allows for advanced content earlier than customary
- The question for educators seems to be not *whether* to accelerate a gifted learner but rather *how*
- A review of 380 studies revealed that almost all forms of acceleration result in growth in achievement

Chapter 6: Effects of academic acceleration on the social-emotional status of gifted students
Nancy M. Robinson

- We can lay firmly to rest the myth that acceleration is inherently dangerous for gifted students
- As a group, gifted children tend to be socially and emotionally more mature than their age mates
- For many gifted students, acceleration provides a better personal maturity match with their peers than do non-accelerated programs
- There are no deleterious social-emotional effects of acceleration

Chapter 7: Talent searches and accelerated programming for gifted students
Paula Olszewski-Kubilius

- Talent Search scores can be used effectively to select students for accelerated learning programs
- The research evidence from Talent Searches strongly supports the validity of the accelerative instructional models

Chapter 8: Whole-grade acceleration
Nicholas Colangelo, Susan G. Assouline, and Ann E. Lupkowski-Shoplik

- We have the evidence and mechanisms to make whole-grade acceleration a low-risk/high-success intervention for qualified students
- The *Iowa Acceleration Scale (IAS)* is a proven and effective instrument for helping schools make decisions about whole-grade acceleration

Chapter 9: Radical acceleration
Miraca U. M. Gross

- Gifted students pursuing individualized programs of radical acceleration achieve high, sometimes extraordinary, levels of academic success
- There is no indication of social or emotional maladjustment arising from well-planned programs of radical acceleration
- Radical accelerants socialize well with their older classmates

Chapter 10: Early entrance to college: Academic, social, and emotional considerations
Linda E. Brody, Michelle C. Muratori, and Julian C. Stanley

- Research on groups of early entrants is extremely positive. There is much evidence of short-term academic success, long-term occupational success, and few concomitant social and emotional difficulties.
- Many alternatives to full-time early college entrance are available today for advanced high school students who prefer to stay with their age peers, including AP courses, dual enrollment in high school and college, distance education, and summer programs

Chapter 11: Acceleration and twice-exceptional students
Sidney M. Moon and Sally M. Reis

- There is little research on the effectiveness of acceleration with twice-exceptional students
- Effective implementation of accelerative options for twice-exceptional students is time and resource intensive
- Twice-exceptional students can benefit from interest-based talent development programs that expose them to accelerated content in their areas of strength

In addition to these eleven chapters, this volume contains six appendices.

References

National Association for Gifted Children (November, 1992). Position Paper on Acceleration. Washington, DC.

Pressey, S. L. (1949). *Educational acceleration: Appraisals and basic problems*. Columbus, OH: The Ohio State University.

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

Types of Acceleration: Dimensions and Issues

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 practices; we also include one additional practice which is the result of separating early entrance to kindergarten from early entrance to first grade, and consider them as two distinct practices. 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 or first grade 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 the skipping of kindergarten, or from accelerating a student from kindergarten 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 or during the school year.
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. Provision for providing sequenced materials may or may not be with the discretion of the teacher or within the control of the student.
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.
6. **Subject-Matter Acceleration/Partial Acceleration:** This practice allows students to be placed with 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 or partial 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. 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.
7. **Combined Classes:** While not, in and of itself, a practice designed for acceleration, in some instances (e.g., a fourth- and fifth-grade split room), 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 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 gained 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

Table 1.

Types of Acceleration

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

of curricula. The parsing of activities and goals should be based on pre-instructional assessment.

9. **Telescoping Curriculum**: 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). Telescoping differs from curriculum compacting in that 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:** A student is paired with a mentor or expert tutor who provides advanced or more rapid pacing of instruction.
11. **Extracurricular Programs:** Students elect to enroll in coursework or after school or summer programs that confer advanced instruction and/or credit.
12. **Correspondence Courses:** The student enrolls in coursework delivered outside of normal school instruction. Instruction may be delivered traditionally by mail, but increasingly other delivery mechanisms such as Internet-based instruction and televised courses are used.
13. **Early Graduation:** 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 below) or extracurricular and correspondence coursework.
14. **Concurrent/Dual Enrollment:** The student takes a course at one level and receives 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 or taking a high school chemistry course and receiving credit for a university course upon successful completion).
15. **Advanced Placement (AP):** The student takes a course (traditionally in high school) that will confer college credit upon successful completion of a standardized examination.
16. **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.
17. **Acceleration in College:** The student is awarded 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 dual enrollment and credit by examination or by determination of college teachers and administrators.
18. **Early Entrance into Middle School, High School, or 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 bachelors 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.

Pacing. The pacing (rate) of instruction defines acceleration, and it is along this dimension that acceleration practices diverge. Some of the practices cited in the table (see Table 1) do not really represent differential curriculum pacing. For instance, credit by examination and acceleration in college do not truly represent differences in pacing. Instead, they are really 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 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 difficulty. 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 the students have already accomplished. So, too, would the concerns that students would suffer from instructional "gaps" that might deter later learning experiences.

Several practices do involve changes in pacing, for example, 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 assess frequently the adequacy of student prior learning and presents materials at more traditional rates when students do not demonstrate prior accomplishments or more rapid learning. In telescoped classes, on the other hand, one might expect to see more potential failure from participants resulting from 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 Chapter 7 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, also 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 are apt 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 correspondence courses are not

Table 2.

Dimensions of Acceleration
Pacing
Salience
Peers
Access
Timing

apt to attract much attention. 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 "honors" class. If it is more broadly available or more modestly labeled, few if any peers are likely to be aware of the practice. Similarly, Pressey (1949) and DeHaan and Havighurst (1957) posit that grade-skipping is less precise and more dangerous than subject-matter acceleration. In fact, DeHaan and Havighurst refer to it as "gross acceleration." Much of the presumption involves the dimension of salience. 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 year rather than in one fell swoop. In point of fact, neither process has been demonstrated to cause academic or social/emotional difficulties (e.g., Kulik & Kulik, 1984; Rogers, 2002).

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; 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 more than two grade levels above chronological peers are considered to be radically accelerated (Stanley, 1976). 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 (Janos & Robinson, 1985; Robinson & Janos, 1986).

While marked divergence from age-peers would seem to be an extraordinary intervention and potentially could engage serious difficulties, the separation can be managed and its influence can be muted. Consistent with best practices, programs which employ radical accelerations only admit students who score extremely high on appropriate entrance criteria. Support services in counseling and academic adjustment are to 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. Support services are generally easier to provide to groups of students, and the groups themselves provide opportunities to develop friendships and peer support. 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.

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. Income also limits access to summer programs and other accelerative options that might have high costs.

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. 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 when considered with early-entry-to-school, may be more relevant than when considered for early graduation from high school or college, even though both types of acceleration result in placements with older peers. Similarly, both curriculum compacting in early grades and telescoping curriculum in the 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 Web-based 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, 2003). 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 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 which severely limit students' abilities to enter school early, 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 credit earned in summer programs has been rejected by some high schools, for example, even though the same body, which accredits the high school, accredits the program provider.

In other cases, state law or regulations may impede access. These laws often expressly limit accelerative options. Many states have laws that limit early entrance to birthdays 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, some regulations may unintentionally discourage students. 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 in 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 end 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.

Unintended Consequences: Since much of the educational community views acceleration with some skepticism (Southern et al., 1993), it is likely that the 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 high school 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 allow 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 articulations of requirements for both high school graduation and university majors. With the current bureaucracy of public school education, it frequently 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 will also be helpful for the advisors to understand how to navigate the bureaucracies of universities since issues such as the transfer of university course credit will frequently need to be negotiated. 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 optimum 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 remediable 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 apt to be confident in certifying that a student has mastered elements of fourth-grade mathematics, but 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.

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 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 a 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 also to 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). 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.

References

Assouline, S. G., & Lupkowski-Shoplik, A. E. (2003). *Developing mathematical talent: A guide for challenging and educating gifted students.* Waco, TX: Prufrock Press.

Brody, L. E., & Stanley, J. C. (1991). Young college students: Assessing factors that contribute to success. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children*. (pp. 102–132). New York: Teachers College Press.

DeHaan, R., & Havighurst, R. (1957). *Education of the gifted and talented*. (2nd ed.), Englewood Cliffs, NJ: Prentice Hall.

Feldhusen, J. F., Proctor, T. B., & Black, K. N. (1986). Guidelines for grade advancement of precocious children. *Roeper Review*. *9*, 25–27.

Janos, P. M., & Robinson, N. M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly*, *29*, 175–179.

Jones, E. D., & Southern, W. T. (1991). Objections to early entrance and grade skipping. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 51–73). New York: Teachers College Press.

Jones, E. D., & Southern, W. T. (1994). Opportunities for rural gifted students: Improving educational options through acceleration. *The Journal of Secondary Gifted Education*, *5*(4), 60–66.

Kulik, J. A., & Kulik, C. C. (1984). Effects of acceleration on students. *Review of Educational Research*, *54*, 409–425.

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

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration, *Journal of Youth and Adolescence*, *15*, 51–60.

Rogers, K. B. (2002). *Re-forming gifted education: Matching the program to the child.* Scottsdale, AZ: Great Potential Press.

Southern, W. T., & Jones, E. D. (1991). Academic acceleration: Background and issues. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children*. (pp. 1–28), New York: Teachers College Press.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989a). Academic acceleration: Concerns of gifted students and their parents. Paper presented at the annual meeting of the National Association for Gifted Children, Cincinnati.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989b). Practitioner objections to the academic acceleration of young gifted children. *Gifted Child Quarterly*, *33*, 29–35.

Southern, W. T., Jones, E. D., & Stanley, J. C. (1993). Acceleration and enrichment: The context and development of program options. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 387–405). New York: Pergamon.

Stanley, J. C. (1976). The case for extreme educational acceleration of intellectually brilliant students. *Gifted Child Quarterly*, *20*, 65–75.

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Meta-Analytic Studies of Acceleration

Introduction

For decades reviewers have been drawing favorable conclusions about the effects of educational acceleration on students. Long before the invention of meta-analysis in the 1970s, reviewers were reporting that studies of acceleration usually produced positive results, and the invention of meta-analysis did nothing to change their verdict. Meta-analytic reviewers, like their predecessors, have consistently concluded that educational acceleration helps students academically without shortchanging them socially or emotionally.

Meta-analytic reviews, however, brought the effects of acceleration into clearer focus. Meta-analysts searched more exhaustively for studies of acceleration than earlier reviewers had. They expressed the results of the studies more precisely and they documented their findings and conclusions more completely. Meta-analysts thus added precision and weight to reviews of research on academic acceleration. They not only identified the relevant studies, but they showed exactly how strong effects were in each study and precisely how strong the evidence was on the major questions about acceleration.

My purpose in this chapter is to describe the meta-analytic approach to understanding research on acceleration. I start by describing conclusions from research reviews on acceleration written before the development of meta-analytic methodology. I then describe meta-analytic methodology itself. In the final sections of this chapter, I illustrate the application of this methodology to studies of acceleration.

Early Reviews

American schools developed the first programs of acceleration in age-graded schools more than a century ago. According to Tannenbaum (1958), the St. Louis public schools in 1862 instituted what was probably the earliest program of flexible promotion. The plan called for frequent assessment of student progress and rapid promotion of quick learners. In 1891 the school system in Cambridge, Massachusetts, began one of the first programs of grade-telescoping when it put bright children into special classes that covered the work of six years in four. Other school systems introduced other forms of acceleration in the next decades, and by the turn of the century acceleration was an accepted way of meeting the special needs of gifted school children.

After World War I, objective tests became available for use in evaluating school programs, and educators were for the first time in a position to carry out controlled studies on the effects of accelerated instruction. The studies of acceleration carried out during the 1920s and 1930s raised questions that are still being asked today. What areas of a child's life are affected by a program of acceleration? Does acceleration affect a student's academic achievement, concept of self, extracurricular activities, or social adjustment? Are effects in these areas positive or negative? How large are the effects?

In one of the earliest reviews designed to answer such questions, Miles (1954) considered results of four studies in which children were accelerated in their school work. The four studies examined effects of acceleration on school achievement, personality, and school attitudes. Miles reported that each study found positive results. She cautioned, however, that too few studies were available for her to recommend acceleration over other educational arrangements for the gifted.

Passow (1958) also reviewed literature on effects of acceleration on students. His review covered 18 studies of the use of acceleration with the gifted and talented. Of the 18 studies, 5 were conducted at the elementary level, 4 at the secondary level, and 9 at the college level. Passow's conclusions about programs of acceleration were highly favorable. He pointed out that the experimental evidence at all levels of education showed that gifted and talented students gained academically from acceleration. He also concluded that research demonstrated no detrimental effects from acceleration on the social and emotional adjustment of students.

Later reviewers of the literature on acceleration echoed such findings. In her 1958 review, Goldberg pointed out that it

was hard to find a single research study showing acceleration to be harmful, and that many studies proved acceleration to be a satisfactory method of challenging able students. A 1964 review by Gowan and Demos concluded simply that "accelerated students do better than non-accelerated students matched for ability" (p. 194). Gold (1965) added, "No paradox is more striking than the inconsistency between research findings on acceleration and the failure of our society to reduce the time spent by superior students in formal education (p. 238). "Perhaps what is needed," Gallagher suggested in 1969, "is some social psychologist to explore why this procedure is generally ignored in the face of such overwhelmingly favorable results" (p. 541). Getzels and Dillon in 1973 also lamented the lack of interest in acceleration and offered a social psychological explanation:

> *Apparently the cultural values favoring a standard period of dependency and formal education are stronger than the social or individual need for achievement and independence. This is an instance of the more general case one remarks throughout education: When research findings clash with cultural values, the values are more likely to prevail. (p. 717)*

Although entrenched cultural values may have kept people from paying attention to the research findings, it is also possible that the early reviews did not adequately convey the unanimity and strength of the results. The experts in gifted education who wrote the reviews made their case using the informal review methods that were available at the time. Unfortunately, these methods do not ensure comprehensive searches of the literature, impartial treatment of study findings, or a clear relation between study findings and review conclusions. Reviewers who use such methods are always open to the charge of bias and subjectivity, and it is all too easy for skeptics to dismiss the conclusions in the reviews.

Meta-Analysis

Glass's 1976 presidential address to the American Educational Research Association was a landmark event in the history of research reviews in education. Glass argued in his address that reliance on informal and subjective review methods was hindering the development of the social sciences, and he recommended the use of formal and quantitative methods in research reviews. Glass used the term meta-analysis to refer to the methodology he espoused. Reviewers who carry out a meta-analysis first locate studies of an issue by clearly specified procedures. They then characterize the outcomes and features of these studies in quantitative or quasi-quantitative terms. Finally, meta-analysts use multivariate techniques to describe findings and relate characteristics of the studies to outcomes.

One of the key features in meta-analytic reviews is the use of effect size statistics to describe study findings. Cohen (1977) has described a number of different effect size statistics, but the one used most frequently in meta-analytic reviews is the standardized difference between treatment and control means on an outcome measure. This effect size gives the number of standard-deviation units that separate outcome scores of experimental and control groups. It is calculated by subtracting the average outcome score for the control group from the average score for the experimental group and then dividing this difference by the standard deviation of the measure. For example, if an experimental group obtains an average score of 600 and a control group obtains an average of 550 on a criterion test with a standard deviation of 100, then the effect size for the experimental treatment is (600–550)/100, or 0.5. The effect size indicates that the average score in the treatment group is 0.5 standard-deviation units higher than the average score in the control group.

On the basis of a survey of articles in the social sciences, Cohen (1977) proposed rough guidelines for interpreting effect sizes. According to Cohen, effect sizes around 0.2 are small, around 0.5 are moderate, and around 0.8 are large. Slavin, an expert in educational evaluation, judged effect sizes above 0.25 to be large enough to be considered educationally significant (e.g., Slavin, 1991). Glass, McGaw, and Smith (1981) have also pointed out a useful relationship between effect sizes and grade-equivalent scores. Empirically, the effect of one year of schooling turns out to be an increase in performance on most standardized tests of 1.0 standard deviation. Thus, effect sizes can also be interpreted in terms of grade-equivalent scores. An effect size of 0.2 would raise scores by 2 months on a grade-equivalent scale; an effect of 0.5 would raise scores by 5 months; and an effect of 0.8 would raise scores by 8 months.

Researchers immediately recognized meta-analysis as an important contribution to research review methodology. Before a decade had passed, at least five books appeared elaborating on meta-analytic methods (Glass, McGaw, & Smith, 1981; Hedges & Olkin, 1985; Hunter, Schmidt, & Jackson, 1982; Rosenthal, 1984; Wollf, 1986), and reviewers had carried out at least 100 meta-analyses of research findings in education (J. Kulik & Kulik, 1989). Today, reviewers use meta-analyses

extensively in education, psychology, and the health sciences.

Three meta-analytic reports have appeared so far on the effects of acceleration on students. The first of these examined 21 controlled studies of effects of acceleration in elementary and secondary schools (J. Kulik & C. Kulik, 1984). The second analyzed findings in 81 studies of acceleration (Rogers, 1991). Included in Rogers' large study pool were both controlled and uncontrolled studies. The third meta-analysis examined social and emotional outcomes in 23 controlled studies (Kent, 1992). Researchers have also carried out a number of meta-analyses on topics related to educational acceleration. Chen-Lin Kulik and I carried out meta-analyses on ability grouping and enriched classes for the gifted and talented (C. Kulik & Kulik, 1982, 1984; J. Kulik, 2003; J. Kulik & Kulik, 1984). Slavin also carried out two important meta-analyses on ability grouping (Slavin, 1987, 1990). In addition, Hoge and Renzulli (1993) conducted a meta-analysis of studies on the self-concept of gifted students.

Effects of Acceleration

Not all studies of acceleration are suitable for use in a meta-analysis. A large number of studies of the topic lack quantitative data, for example. Rogers (1991) found that only 33% of the 247 studies of acceleration that she located for her analysis contained data from which effect sizes could be calculated. In addition, some quantitative studies lack control groups. Rogers classified only 4% of her studies as controlled experiments or quasi-experiments. Although effect sizes can be calculated for studies without control groups, the effect sizes from uncontrolled studies are usually very difficult to interpret. Finally, some controlled studies of acceleration use inappropriate control groups. Studies of early entrants to elementary school or college, for example, often compare early entrants to classmates who enter school at the normal time. These studies prove very little because they usually compare groups that differ in ability. Proctor, Black, and Feldhusen (1986) found that 18 out of 26 comparisons of early and late entrants (or 69%) involved groups that differed in ability initially. Such studies are of little value in drawing conclusions about the effects of acceleration on students.

Only 26 of the studies cited in the meta-analyses of J. Kulik and C. Kulik (1984), Rogers (1991), and Kent (1992) were controlled studies with quantitative data collected from both accelerated and nonaccelerated students of similar ability. These 26 studies fell into two categories. One group of studies compared accelerated students to nonaccelerated students of the same age. Because the experimental group was accelerated and the control group was not, the two groups differed in grade level when educational outcomes were measured. A second group of studies compared accelerated students with older nonaccelerated students in the same classes. In these studies, the comparison groups were equivalent in grade level and intelligence quotient when outcomes were measured, but the groups differed in both chronological and mental age.

Achievement Effects

The 26 reports contained results from 25 separate studies of achievement effects, 11 studies with same-age comparison groups, and 15 studies with older control groups. Effect sizes were very different in the two groups of studies. Effect sizes fell between 0.16 and 2.68 in studies with same-age controls (Table 1). Effect sizes fell between –0.83 and 0.20 in studies with older control groups (Table 2). There is almost no overlap in the two sets of effect sizes. Because of this difference in results, I carried out separate analyses of the two groups of studies.

Results with same-age control groups. In each of the 11 studies with same-age groups, the accelerated group outperformed the bright non-accelerated control group on achievement tests. In all but one of the studies, the superiority of the accelerated class was great enough to be considered practically significant. The median effect size in the studies was 0.80. This means that the typical accelerated student outperformed the typical non-accelerated control student by 0.80 standard deviation units. Cohen (1977) refers to effects of this magnitude as large. An effect size of 0.80 implies that the scores of the accelerated students were approximately one grade-equivalent above the scores of the bright, non-accelerated students. The overall message from these studies is therefore unequivocal: Acceleration contributes greatly to the academic achievement of bright students.

Results from studies with older control groups. All but two of the studies with older control groups found trivial differences between the young accelerated and the older non-accelerated students. In one of the two exceptional studies, the accelerated students trailed the bright, older non-accelerated students by a great deal (Pennau, 1981). In the other, the accelerated students trailed by a small amount (Fredstrom, 1964). The median effect size in the 14 studies, however, was –0.04. In the typical study, therefore, the difference in examination

TABLE 1.

Major Features of 11 Studies of Acceleration with Same-Age Control Groups

Study	Program	Comparison groups	Outcome measure	Effect size
Arends & Ford, 1964	Acceleration in math in Grades 7–8 in Walla Walla, WA	2 classes of academically talented compared to 2 classes with similar students in different schools	Standardized math achievement test given at beginning of Grade 9	1.14
Enzmann, 1961	Acceleration in math in Grades 9–12 in Detroit, MI	94 students who accepted an invitation to enroll in special school matched individually in sex, aptitude, and achievement to students who declined invitation	Standardized math achievement test given in Grade 12	0.30
Fox, 1974	Summer algebra program for Grade-7 girls in public schools of Baltimore County, MD	26 program participants matched in aptitude and SES with 26 qualified students who were not invited to participate in the program	Standardized algebra test given in mid-year of Grade 8	0.46
Justman, 1953	Completion of Grades 7–9 in 2 years in New York City schools	95 accelerated students matched on grade, sex, age, and IQ to 95 normal-progress students	Standardized math, science, social studies, study skills, and language arts tests given at end of Grade 8	0.54
Ludeman, 1969	Completion of Grade 7–8 math in one year in Lincoln, NE, schools	98 accelerated students compared to 98 normal-progress students with statistical control for IQ	Grade-12 exams in algebra, trigonometry, and analytic geometry	0.85
Montgomery,1968	Accelerated program in Grade 8–12 math in Sioux City, IA	42 accelerated students matched to normal-progress students on IQ, sex, and completion of math analysis	Math sections of standardized aptitude and achievement tests given in Grades 11 and 12	0.84
Passow, Goldberg, & Link, 1961	Acceleration in Grade 7–8 math in Cheltenham, PA, schools	28 accelerated students matched to control students on IQ, achievement, age, teacher rating, and sex	Standardized and teacher-made math tests given at end of Grade 9	1.34
Ripple, 1961	Movement of bright older pupils from Grade 2 into Grade 4 after 1 summer session	26 pairs of superior pupils randomly assigned to accelerated and normal-progress groups	Standardized achievement tests in seven subjects given one year after start of program	0.80
Rusch & Clark, 1963	Completion of Grades 5–8 in 3 years with 4 summer sessions in school system in NY	30 accelerated students matched individually to normal-progress students on physical, socio-emotional, academic, and intellectual development	Standardized achievement tests in reading, arithmetic, and spelling given 4 years after start of program	0.80
Simpson & Martison, 1961, Study I	Completion of Grades 1–2 in 1 year in southern California	43 accelerated students individually matched on age, IQ, sex, and socioeconomic status to 43 normal-progress students	Standardized reading and arithmetic tests given 1 year after start of program	2.68
Simpson & Martison, 1961, Study II	Completion of Grades 7–9 in 2 years with 3 summer sessions in southern California	42 accelerated students individually matched to 42 normal-progress students on age, IQ, sex, and socioeconomic status	Standardized tests in arithmetic, reading, writing, listening, science, and social studies given in Grade 8	0.16

Table 2.

Major Features of 14 Studies of Acceleration with Older Control Groups

Study	Program	Comparison groups	Outcome measure	Effect size
Adler, Pass, & Wright, 1963	Completion of 5-year program in 4 years in Toronto	431 program participants matched on IQ to students admitted 1 year before start of program	Externally prepared Grade-13 final exam and a Grade-13 reading test	0.11
Culbertson, 1963	Completion of Grades 7–9 in 2 years in Baltimore, MD, public schools	250 accelerated students individually matched to 250 normal-progress students on school location, sex, IQ, reading, and arithmetic level	Standardized tests in four areas: algebra, science, reading, and vocabulary given after 3 years	–0.08
Fredstrom, 1964	Completion of Grade 7–8 math in 1 year in Lincoln, NE	340 accelerated students similar in arithmetic level and IQ to a group of 360 normal-progress students	Arithmetic test given after 1 year; algebra, after 2; geometry, after 3	–0.30
Herr, 1937	Completion of Grades 7–9 in 2 years in Hazleton, PA	97 accelerated students individually matched to normal-progress students on IQ, achievement, teacher ratings, sex, and curriculum	Tests given in Grades 10–12 in history, geometry, chemistry, English, and general information	0.12
Janos & Robinson, 1985	Early entrance to the University of Washington	24 early entrants (aged 14 and younger) compared to 23 National Merit Scholars	College GPA	–0.05
Justman, 1954	Completion of Grades 7–9 in 2 years in New York City area	95 accelerated students matched to 95 normal-progress students on high school, sex, and IQ	Final marks in 32 Grade-10 and 11 courses	–0.04
Klausmeier, Goodwin, & Ronda, 1968	Placement of bright older pupils from Grades 2–3 into Grades 4–5 after summer session in Racine, WI	22 superior accelerated students compared to 22 same-grade students below and 22 same-grade students above the median age for their grade	Six subtest scores on a standardized achievement test given near the end of Grade 9	–0.15
Matlin, 1965	Completion of Grades 4–6 in 2 years in Sacramento, CA, public schools	59 accelerated students matched to 59 normal-progress students on IQ, sex, race, SES, and school grades	Standardized achievement tests in reading, language, and arithmetic	–0.01
Mikkelson, 1962	Completion of Grade 9 math during Grade 8	35 students compared to 35 controls randomly selected from the same pool of high ability students	Standardized test in algebra given 1 year after start of program	–0.83
Morrison, 1970	Completion of Grades 5 and 6 in 1 year in Hewlett, NY, public schools	63 accelerated students matched to 63 normal-progress students on IQ, sex, and reading scores	Standardized achievement and aptitude tests given in Grades 10–12	–0.07
Pennau, 1981	Early entrance to kindergarten in Minneapolis, MN, schools	28 early entrants matched to 51 other entrants in sex and IQ	Standardized tests in reading, math, and language arts given in Grade 3	0.13
Pevec, 1965	Grade skipping in Cleveland, OH, Catholic schools	90 accelerated students compared to 90 similar students who declined offer of acceleration	Total score on a standardized achievement test given in Grade 11	0.10
Rusch & Clark, 1963	Completion of Grades 5–8 in 3 years with 4 summer sessions in a school system in NY	30 accelerated students matched individually to normal-progress students on physical, socio-emotional, academic, and intellectual development	Standardized achievement tests in reading, arithmetic, and spelling given 4 years after program start	0.00
Unzicker, 1932	Completion of Grades 7 and 8 in 1 year in Fond du Lac, WI, school	22 accelerated students compared to 22 top students in the regular class	Tests given in Grade 9 in English, algebra, social studies, and Latin	–0.03

Table 3.

Effect Sizes in 13 Studies of Social and Emotional Effects of Acceleration

Study	Educational plans	Liking for school/subject	Participation in activities	Self-acceptance/ personal adjustment
Studies with same-age control groups				
Arends & Ford, 1964	------	0.44	------	------
Cornell, Callahan, & Loyd, 1991	------	------	------	–0.10
Enzmann, 1961	0.15	–0.24	–0.22	------
Fox, 1974	0.71	–0.14	------	------
Fox, Benbow, & Perkins, 1983	0.39	------	------	------
Justman, 1953	------	------	------	–0.02
Robinson & Janos, 1986				–0.41
Studies with older control groups				
Fredstrom, 1964	–0.05	–0.15	------	------
Janos & Robinson, 1985	------	0.77	------	------
Klausmeier, 1963	------	–0.11	------	------
Matlin, 1965	0.77	------	------	------
Morrison, 1970	------	------	–0.11	------
Pevec, 1965	0.23	------	------	–0.36
Robinson & Janos, 1986	------	------	–0.10	–0.41

performance of accelerated and older non-accelerated students was trivial in size. The accelerated students did just as well as the bright students in the grades into which they moved.

Social and Emotional Effects of Acceleration

Only a small number of studies investigated social and emotional effects of acceleration. Table 3 presents the findings of these studies. I calculated some of the effect sizes in the table from differences in mean scores on rating scales and inventories. But most of the effect sizes are based on differences in proportions. I used Cohen's (1977) procedures for calculating effect sizes from such differences.

Educational plans. Six studies examined the effects on acceleration on students' educational plans. The studies with the strongest effects are those that focus on post-baccalaureate plans. Fox (1974), for example, asked students about their highest level of educational aspiration. She reported that 58% of the accelerated and 24% of the non-accelerated students aspired to careers requiring an education beyond the bachelors degree (ES = 0.71). Fox, Benbow, and Perkins (1983) found a similar difference between groups. They found that 88% of their accelerated and 73% of their non-accelerated students aspired to post-baccalaureate degrees (ES = 0.39).

In four other studies, researchers asked students whether they planned to go to college, but they did not ask the students about their post-college plans (Enzmann, 1961; Fredstrom, 1964; Matlin, 1965; Pevec, 1965). Differences in the college plans of accelerated and non-accelerated students were usually small. Almost all of the students in both groups planned to go to college. Among those planning to go to college were 97% of the accelerated and 95% of the non-accelerated students in

Enzmann's study (ES = 0.15); 95% of the accelerated student and 96% of the non-accelerated ones in Fredstrom's study (ES = –0.05); 100% of the accelerated and 86% of the non-accelerated students in Matlin's study (ES = 0.77); and 86% of the accelerated and 77% of the non-accelerated students in Pevec's study (ES = 0.23).

Overall, it seems likely that educational acceleration has a positive effect on a student's educational plans. Acceleration appears to increase educational ambition. The effect is clear in the responses of accelerated students to questions about advanced degrees. The effect is less clear in their responses to questions about interest in attending college. Nearly all extremely bright school children—whether accelerated or not—intend to go to college, and so questions on college attendance do not provide much information about differences among students in long-range educational plans.

Liking for school and school subjects. Six studies looked at effects of acceleration on a student's liking for a school subject or for school in general. Four of the six studies focused on subject acceleration; the remaining two studies focused on grade acceleration. In the studies of subject acceleration, the researchers asked students about their liking for the subject in which they were accelerated. In the studies of grade acceleration, researchers asked students about their liking for their total school experience.

Findings were inconsistent in the four studies examining acceleration in the subject of mathematics. In three of the studies, effect sizes were negative but small in size. Fox (1974) asked accelerated and non-accelerated students to rate their liking for mathematics on a 5-point scale and found that the ratings of the two groups were fairly similar (ES =–0.14). Enzmann (1961) asked students to name their favorite subject; 13% of the accelerated and 22% of the non-accelerated students chose math (ES = –0.24). Fredstrom (1964) asked students the same question; 29% of the accelerated and 36% of the non-accelerated students chose math (ES = –0.15). Arends and Ford (1964), however, used a similar question but found a different result. These researchers asked students to name their two favorite subjects; 47% of the responses of the accelerated group and 28% of the responses of the non-accelerated group were math or algebra (ES = 0.44)

Results were also inconsistent in the studies of grade acceleration. Klausmeier (1963) asked accelerated and non-accelerated pupils to rank the school classroom and eight other places in order of their liking for the places. Accelerated students gave a higher ranking to their school than non-accelerated students did (ES = 0.11). Klausmeier also gave the two groups a 20-item survey of attitudes toward school, but on this survey the accelerated students gave lower ratings than non-accelerated students did (ES = –0.33). Average of the two effect sizes is –0.11. Janos and Robinson (1985) asked early and regular entrants to the University of Washington to rate the academic environment of the university. The early entrants gave the academic environment significantly higher ratings (ES = 0.77).

Because the results are somewhat contradictory, it is difficult to draw a simple conclusion about the effect of acceleration on a student's liking for a school subject or school in general. In some cases, acceleration may produce a slight downturn in student ratings of their school and school subjects; however, in other cases, acceleration may also produce a moderate-to-strong upswing in their ratings. Both results appear in studies of acceleration. With the relatively small number of studies of the topic now available, it is impossible to isolate the factor or factors that produce the differences in study results.

Participation in school activities. Three studies examined effects of acceleration on participation in school activities. Pevec (1965) asked accelerated and non-accelerated students about offices they held and about their participation in co-curricular activities. Accelerated and non-accelerated students held the same number of offices and participated equally in co-curricular activities at the time of the study, but the accelerated students reported holding slightly fewer offices in the past. Average ES was –0.10. Enzmann (1961) found that accelerated students were slightly less likely to participate in sports programs, but the two groups were equally likely to participate in co-curricular activities. Average ES in Enzmann's study was –0.22. Morrison (1970) collected reports on the number of times that students were club members or club officers and on their participation in leisure-time activities. Differences were small in each of the areas (average ES = –0.11). Overall, therefore, programs of acceleration have little or no effect on student participation in extra-curricular or co-curricular activities. Accelerated students participate in school activities to nearly the same extent as comparable non-accelerated students do.

Self-acceptance and personal adjustment. Four studies examined effects of acceleration on a student's self-acceptance and personal adjustment. Two of the studies used same-age control, and two studies involved older control groups. The two sets of studies reported slightly different results.

Effects on self-acceptance or personal adjustment were trivial in the two studies with same-age control groups. Justman (1953) administered the California Test of Personality to 75 matched pairs of accelerated and non-accelerated seventh graders. He found no difference in the scores of the two groups on a scale of personal adjustment (ES = –0.02). Cornell, Callahan, and Loyd (1991) administered the California Psychological Inventory to early college entrants and matched same-age controls. Immediately on entry to college the accelerated students were lower on the self-acceptance scale

of this inventory (ES = –0.88), but by the end of the year, the accelerated group had almost caught up with the non-accelerated group (ES = –0.10)

The two studies with older control groups found negative effects of acceleration, but these effects were small in size and statistically insignificant. The accelerated students and older control groups in Pevec's (1965) study took the California Test of Personality. The scores of the accelerated students were slightly lower on the personal adjustment scales of the test (ES = –0.36). The accelerated and non-accelerated students in Robinson and Janos's (1986) study took the California Psychological Inventory. The self-acceptance scores of early entrants to the University of Washington were lower than the scores of older National Merit Scholars at the same institution (ES = –0.41).

Acceleration may have a small negative effect on a student's scores on tests of self-acceptance or personal adjustment. Studies with same-age control groups report only trivial drops in self-acceptance for accelerated students. Studies with older control groups report small drops. These findings are consistent with social comparison theory, which predicts a drop in self-esteem for bright students who move from heterogeneous learning environments to homogeneous ones. This drop is sometimes called the Big-Fish-Little-Pond Effect, and it is a frequent finding in studies of ability grouping. Self-esteem or self-acceptance has more than one dimension, and the Big-Fish-Little-Pond effect is usually clearest on the academic component of the self-concept.

Conclusions

The meta-analytic results show that bright students almost always benefit from accelerated programs of instruction. Two major findings support this conclusion. First, on achievement tests, bright accelerated youngsters usually perform like their bright, older non-accelerated classmates. Second, the accelerated youngsters usually score almost one grade-level higher on achievement tests than bright, same-age non-accelerated students do.

The results from studies comparing accelerated students with older pupils are especially impressive because the accelerated students are at a clear disadvantage in these comparisons. In most studies of this sort, the accelerated students are at least one year younger than their non-accelerated classmates. They equal classmates in control groups in IQ but not in mental age. Because performance on standardized tests in subjects such as mathematics and English is strongly influenced by mental age, the accelerated students can hardly be expected to equal the test performance of the older non-accelerates. Nonetheless, the accelerated students did very well in almost all studies. Overall, their performance was indistinguishable from that of bright, older non-accelerated students.

The results of the same-age comparisons are almost as remarkable. It is unusual for groups that are equivalent in general intelligence and age to differ by 0.80 standard deviations on achievement tests, or by almost one grade level in performance. Nonetheless, that is the size of the difference in test scores of accelerated and non-accelerated students in a typical study. In a review of approximately 100 different meta-analyses of research findings in education, Chen-Lin Kulik and I were not able to find any educational treatment that consistently yielded a higher effect size than this one (Kulik & Kulik, 1989).

Meta-analytic studies also show that other provisions for the gifted are less effective than acceleration. Bangert, Kulik, and Kulik (1983) found an average ES of 0.10 in 51 studies of individualized teaching in Grades 6 through 12. Kulik (2003) reported only slightly more positive results from studies where talented students were taught in homogeneous classes without acceleration. The average ES was 0.33 when curricular adjustments were made in the homogeneous classes for learning rate; average ES was essentially zero when grouping was used alone without curricular adjustment. The average ES was 0.41 for special programs of enrichment for gifted and talented students. None of these efforts to meet the special needs of talented students produced effects anywhere near as strong as those from acceleration.

A meta-analysis by Borman, Hewes, Overman, and Brown (2002) also contains good comparative data on the size of effects of educational programs. These researchers analyzed 232 studies on achievement effects of widely implemented models for school reform. They reported that only 3 of the 29 models that they studied were of proven effectiveness: Direct Instruction, the School Development Program, and Success for All. Borman and his colleagues also reported that in controlled evaluations by outside evaluators, the average ES was 0.15 for 38 studies of Direct Instruction, 0.11 for 7 studies of the School Development Program, and 0.08 for 25 studies of Success for All. The conclusion should be clear: acceleration is far more effective in raising student achievement than the most effective of the comprehensive school reform models introduced in recent decades.

In contrast to meta-analytic findings on academic achievement, findings on emotional and social effects of acceleration are fragmentary. Nonetheless, a few conclusions

can be drawn. It is clear, for example, that being in an accelerated program can affect a student's long-range educational plans. Accelerated students are clearly more likely than bright non-accelerated students to aspire to advanced educational degrees. In addition, being in an accelerated program has almost no effect on a student's participation in school activities. Accelerated students participate about as much as other students do in extra-curricular and co-curricular activities. Acceleration does not deprive youngsters of the opportunity to participate fully in the life of their schools.

Meta-analytic results also suggest that acceleration may cause a slight readjustment in a student's assessment of self. It is important to note self-esteem and academic aptitude co-vary in the general population, and that bright students usually exhibit higher levels of self-esteem than slower students do. But bright students may become a little less self-satisfied when taught more challenging material with their intellectual peers. The drop in self-acceptance for accelerated students is usually quite small and may even be short-lived, but researchers have found this Big-Fish-Little-Pond Effect too often to ignore. The practical importance of a slight drop in self-acceptance may not be great, but teachers should probably not expect self-acceptance to rise automatically in students who are moved into accelerated programs.

It is hard to make sense of the meta-analytic results on student feelings about their schools and school subjects. A few investigators have reported that acceleration improves the academic attitudes of bright students, but a greater number of investigators have found little or no improvement in attitudes due to acceleration. With the small number of studies now available, it seems impossible to find a pattern in the findings in this area.

Finally, it is important to note that the meta-analytic reports now available have their limitations. For one thing, the meta-analytic reports on acceleration are becoming dated. They may cover six decades of controlled studies of acceleration, but they include few studies from recent years. In addition, there are other curious omissions in meta-analytic reports. Because of the meta-analytic preoccupation with controlled studies, meta-analytic reviews usually fail to analyze some of the most influential studies on acceleration. Key studies, like the seminal contributions of Terman, Pressey, and Stanley, do not make it into meta-analytic data sets because the studies do not fit the tight mold of the controlled experiment. Meta-analytic contributions would probably be stronger if meta-analytic methodology could encompass such contributions.

Whatever its limitations, however, meta-analysis has clearly made a contribution to the study of acceleration. Meta-analysis has shown not only that acceleration can help bright students; it has also shown that the educational contributions of accelerative programs are hard to equal. No other arrangement for gifted children works as well as acceleration, and the achievement effects of current school reform models seem negligible when compared to the effects of acceleration.

References

Adler, M. J., Pass, L. E., & Wright, E. N. (1963). A study of the effects of an acceleration programme in Toronto secondary schools. *Ontario Journal Education Research*, *6*(Autumn), 1.

Arends, R. H., & Ford, P. M. (1964). *Acceleration and enrichment in the junior high school. A follow-up study*. Olympia, WA: Washington Office of the State Superintendent of Public Instruction. (ERIC Document Reproduction Service No. ED 001 220).

Bangert, R. L., Kulik, J. A., & Kulik, C.-L. C. (1983). Individualized systems of instruction in secondary schools. *Review of Educational Research*, *53*, 143–158.

Borman, G. D., Hewes, G. M., Overman, L. T., & Brown, S. (2002). Comprehensive school reform and student achievement: A meta-analysis. Baltimore: CRESPAR, Johns Hopkins University. (ERIC Document Reproduction Service No. ED 472 569).

Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (rev. ed.). New York: Academic Press.

Cornell, D.G., Callahan, C. M., & Loyd, B. H. (1991). Personality growth of female early college entrants: A controlled prospective study. *Gifted Child Quarterly*, *35*(3), 135–153.

Culbertson, W. P. (1963). An evaluation of an accelerated program in the junior high school. *Dissertation Abstracts International, 24*, 1460. (University Microfilms No. 63-6392).

Enzmann, A. M. (1961). An evaluation of the science and arts curriculum for selected students of high ability at Cass technical high school, Detroit, Michigan. *Dissertation Abstracts International,* 22, 3484. (University Microfilms No. AAD62-00907).

Fox, L. H. (1974). Facilitating the development of mathematical talent in young women. *Dissertation Abstracts International*, 35, 3553. (University Microfilms No. AAD74- 29027).

Fox, L. H., Benbow, C. P., & Perkins, S. (1983). An accelerated mathematics program for girls: A longitudinal evaluation. In C. P. Benbow & J. P. Stanley (Eds.), *Academic precocity: Aspects of its development*. Baltimore: Johns Hopkins University Press.

Fredstrom, P. N. (1964). An evaluation of the accelerated mathematics program in the Lincoln, Nebraska, Public Schools. *Dissertation Abstracts International,* 25, 5628. (University Microfilms No. AAD65-02772).

Gallagher, J. J. (1969). Gifted children. In R. L. Ebel (Ed.), *Encyclopedia of educational research* (4th ed., pp. 537–544). New York: Macmillan.

Getzels, J. W., & Dillon, J. T. (1973). The nature of giftedness and the education of the gifted. In R. M. W. Travers (Ed.), *Second handbook of research on teaching* (pp. 689–731). Chicago: Rand McNally.

Glass, G.V. (1976). Primary, secondary, and meta-analysis of research. *Educational Researcher, 5*, 3–8.

Glass, G.V. McGaw, B., & Smith, M. L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage Publications.

Gold, M. J. (1965). *Education of the intellectually gifted.* Columbus, OH: Charles E. Merrill.

Goldberg, M. L. (1958). Recent research on the talented. *Teachers College Record*, 60, 150-163.

Gowan, J.C., & Demos, G.D. (1964). *The education and guidance of the ablest.* Springfield, IL: C.C. Thomas.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.

Herr, W. A. (1937). Junior high school accelerants and their peers in senior high school. I. Scholastic achievement. *The School Review*, *45*, 186–195.

Hoge, R. D., & Renzulli, J. S. (1993). Exploring the link between giftedness and self-concept. *Review of Educational Research*, *63*(4), 449–465.

Hunter, J. E., Schmidt, F. L., & Jackson, G. B. (1982). *Meta-analysis: Cumulating research findings across studies*. Beverly Hills, CA: Sage Publications.

Janos. P. M., & Robinson, N. M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly, 29*(4), 175–179.

Justman, J. (1953). A comparison of the functioning of intellectually gifted children enrolled in special progress and normal progress classes in junior high school. *Dissertation Abstracts International,* 14, 65. (University Microfilms No. AAD00-06641).

Justman, J. (1954). Academic achievement of intellectually gifted accelerants and non-accelerants in senior high school. *School Review*, *62*, 142–150.

Kent, S. D. (1992). The effects of acceleration on the social and emotional development of gifted elementary students: A meta-analysis. *Dissertation Abstracts International*, 54, 419-A. (University Microfilms No. AAT93-16362)

Klausmeier, H. J. (1963). Effects of accelerating bright older elementary pupils: A follow up. *Journal of Educational Psychology*, *54*, 165–171.

Klausmeier, H. J., Goodwin, W. L., & Ronda, T. (1968). Effects of accelerating bright, older elementary pupils – A second follow-up. *Journal of Educational Psychology, 50*(1), 53–58.

Kulik, C.-L. C., & Kulik, J. A. (1982). Effects of ability grouping on secondary school students: A meta-analysis of evaluation findings. *American Educational Research Journal*, *19*, 415–428.

Kulik, C.-L. C., & Kulik, J. A. (1984, August). *Effects of ability grouping on elementary school pupils: A meta-analysis.* Paper presented at the annual meeting of the American Psychological Association, Toronto. (ERIC Document Reproduction Service No. ED 255 329)

Kulik, J. A., & Kulik, C.-L. C. (1984). Effects of accelerated instruction on students. *Review of Educational Research*, *54*, 409–426.

Kulik, J. A., & Kulik, C.-L. C. (1989). Meta-analysis in educational research [monograph]. *International Journal of Educational Research*, *13*, 221–340.

Kulik, J. A. (2003). Grouping and tracking. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education, 3rd ed.* (pp. 268–281). Boston: Allyn & Bacon.

Ludeman, C. J. (1969). A comparison of achievement in an accelerated program and a standard program of high school mathematics in Lincoln, Nebraska, Schools. *Dissertation Abstracts International*, 31, 299. (University Microfilms No. AAD70-12271).

Matlin, J. P. (1965). Some effects of a planned program of acceleration upon elementary school children. *Dissertation Abstracts International,* 26, 827. (University Microfilms No. 65-8293).

Mikkelson, J. (1962). An experimental study of selective grouping and acceleration in junior high school mathematics. *Dissertation Abstracts International*, 23, 4226. (University Microfilms No. 63-2323).

Miles, C. C. (1954). Gifted children. In L. Carmichael (Ed.), *Manual of child psychology* (pp. 984–1063). New York: John Wiley & Sons.

Montgomery, W. G. (1968). An analysis and appraisal of the Sioux City, Iowa, secondary school accelerated mathematics program. *Dissertation Abstracts International,* 29, 2489. (University Microfilms No. AAD69-03125).

Morrison, W. A. (1970). A comparative study of secondary school academic achievement and social adjustment of selected accelerated and non-accelerated elementary pupils. *Dissertation Abstracts International*, 31, 2015-A. (University Microfilms No. 70-21166)

Passow, A. H. (1958). Enrichment of education for the gifted. In N. Henry (Ed.), Education for the gifted. *57th Yearbook of the National Society for the Study of Education* (Part II, pp. 193–221). Chicago: University of Chicago Press.

Passow, A. H., Goldberg, M. L., & Link, F. R. (1961). Enriched mathematics for gifted junior high school students. *Educational Leadership, 18*, 442–452.

Pennau, J. E. (1981). The relationship between early entrance and subsequent educational progress in the elementary school. *Dissertation Abstracts International*, *42*, 1478-A. (University Microfilms No. AAT81-15026).

Pevec, A. E. (1965). Some problems of academically accelerated senior boys in selected high schools of the Catholic diocese of Cleveland. *Dissertation Abstracts International,* 25, 6350. (University Microfilms No. 65-2331).

Proctor, T. B., Block, K. N., & Feldhusen, J. F. (1986). Early admission of selected children to elementary school: A review of the research literature. *Journal of Educational Research*, *80*(2), 70–76.

Ripple, R. E. (1961). A controlled experiment in acceleration from the second to the fourth-grade. *Dissertation Abstracts International,* 22, 1910. (University Microfilms No. 61-5981).

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence*, *15*(1), 51–60.

Rogers, K. B. (1991). A best-evidence synthesis of research on types of accelerative programs for gifted students. *Dissertation Abstracts International*, *52*, 796-A. (University Microfilms No. AAT91-22206).

Rosenthal, R. (1984). *Meta-analytic procedures for social research*. Beverly Hills, CA: Sage Publications.

Rusch, R. R., & Clark, R. M. (1963). Four years in three: An evaluation. *Elementary School Journal*, *63*, 281–285.

Simpson, R. E., & Martison, R. A. (1961). *Educational programs for gifted pupils: A report to the California legislature prepared pursuant to Section 2 of Chapter 2385, Statutes of 1957.* Sacramento, CA: California State Department of Education. (ERIC Document Reproduction Service Number ED 100 072).

Slavin, R. E. (1987). Ability grouping and student achievement in elementary schools: A best-evidence synthesis. *Review of Educational Research*, *57*, 293–336.

Slavin, R. E. (1990). Achievement effects of ability grouping in secondary schools: A best-evidence synthesis. *Review of Educational Research*, *60*, 471–499.

Slavin, R. E. (1991). IBM's Writing to Read: Is it right for reading? *Educational Evaluation and Policy Analysis*, *13*(1), 1–11.

Tannenbaum, A. J. (1958). History of interest in the gifted. In N. Henry (Ed.), *Education for the gifted*. 57th Yearbook of the National Society for the Study of Education (Part II, pp. 21–38). Chicago: University of Chicago Press.

Unzicker, S. P. (1932). A study of acceleration in the junior high school. *The School Review*, *40*, 346–356.

Wollf, F. M. (1986). *Meta-analysis: Quantitative methods for research synthesis*. Beverly Hills, CA: Sage Publications.

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Long-Term Effects of Educational Acceleration

Introduction

Given the expertise of the contributors to this volume and the necessary space limitations imposed upon authors, this brief chapter will focus on a series of recent findings. The Study of Mathematically Precocious Youth (SMPY) has, over the past four years, published four extensive longitudinal reports. Collectively, they contain evaluations of the subjective feelings and educational-vocational outcomes of thousands of participants, from five cohorts assembled over three decades (Lubinski & Benbow, 1994), who have experienced many different kinds of educational acceleration (Benbow, Lubinski, Shea, & Eftekhari-Sanjani, 2000; Bleske-Rechek, Lubinski, & Benbow, 2004; Lubinski, Benbow, Shea, Eftekhari-Sanjani, & Halvorson, 2001; Lubinski, Webb, Morelock, & Benbow, 2001). These findings are especially important because, among other things, they contain evaluations of adults based on 10- and 20-year longitudinal achievement and reflection. Hence, in addition to conventional criteria, they enable us to ascertain whether participants of accelerative learning opportunities harbor subsequent regrets. Because these findings are fresh, they will be reviewed in detail; but the focus will be on outcomes and subjective impressions exclusively tied to educational acceleration. Readers are referred to the original reports for more extensive findings on the life patterns of this special population.

In a shorter section, some writings of previous generations of leading psychologists will be drawn on. By examining the historical record of those committed to educational practice based on science, it is remarkable how many modern empirical findings were anticipated, and to some extent documented, by early pioneers (Allport, 1960; Hobbs, 1951, 1958; Hollingworth, 1926, 1942; Paterson, 1957; Pressey, 1946a, 1946b, 1949; Seashore, 1922, 1930, 1942; Terman, 1954; Thorndike, 1927; Tyler, 1974).[1] For decades, it is clear that we have known a number of general principles about meeting the needs of intellectually precocious youth, and modern empirical findings have added precision and multidimensionality to this knowledge. Yet, putting this research into practice has been difficult due to a variety of political and social forces that always operate on educational policy and practice (Benbow & Stanley, 1996; Stanley, 2000). Due in no small part to talent searches, and the efficiency with which talent searches facilitate large-scale longitudinal research, an impressive empirical literature has developed to support and add refinement to the efficacy of educational acceleration for intellectually precocious youth (Colangelo & Davis, 2003; Lubinski & Benbow, 2000; VanTassel-Baska, 1998). It is becoming increasingly difficult to neglect the evidence that has emerged (Ceci, 2000; Stanley, 2000). Today, we have a much better understanding of how to identify intellectual precocity, the nonintellectual attributes that facilitate its development, and the learning environments needed for actualizing truly exceptional potential. Hopefully, this volume will contribute toward moving these findings into educational policy and practice.

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[1]*Clearly, if discourse is restricted to those committed to practice based on science, many of the longitudinal findings reviewed herein were anticipated by earlier workers (see, for example, Hollingworth, 1926, 1942; Paterson, 1957; Pressey, 1946a, 1946b, 1949, 1955, 1967; Seashore, 1922, 1930, 1942; Terman, 1954; Thorndike, 1927; Tyler, 1974; Williamson, 1965; Witty, 1951). What modern findings have given us, however, is a better conceptual and more technical appreciation of the psychological diversity of intellectual talent, and the personological dimensions and motivational forces driving talent development toward the acquisition of expertise. A detailed review of the evolution of these developments, and the key historical figures involved, is found in Achter and Lubinski (2003).*

Identifying Students for Accelerative Opportunities and Calibrating Learning Expectations

Pressey (1949, p. 2) defined educational acceleration as "progress through an educational program at rates faster or at ages younger than conventional." This is an excellent characterization, and will be utilized here. There are multiple ways to identify students for accelerative learning experiences, but modern talent searches are among the most widely utilized. Because all but one study reviewed herein utilized this selection procedure, it is important to understand how talent searches work and what they have achieved (see Olszewski-Kubilius, this volume, for more detail).

Talent searches identify young adolescents scoring in about the top 3% on conventional achievement tests administered in their schools and afford these students opportunities to take college entrance exams. They have grown from under 500 students in 1972 to around 200,000 seventh and eighth graders annually. These students routinely produced Scholastic Assessment Test (SAT) score distributions in quantitative reasoning (SAT-M) and verbal reasoning (SAT-V) mirroring high school seniors. Those scoring at or above the mean on these distributions can assimilate a full high school course (chemistry, English, mathematics) in three weeks time; those scoring in the top 1 in 10,000 nationally in general, quantitative, or verbal ability can assimilate more than twice this amount (Benbow & Stanley, 1996; Stanley, 2000). Modern longitudinal findings have also documented that opportunity matters in other ways.

Whereas Terman's (1925, 1959) male-female participants differed markedly in their achievements, findings on more contemporary samples reveal that the sexes are earning educational credentials commensurate with their abilities (Benbow, Lubinski, Shea, & Eftekhari-Sanjani, 2000; Lubinski, Benbow, Shea, Eftekhari-Sanjani & Halvorson, 2001). Across both sexes, young adolescents with general, quantitative, and verbal abilities in the top 1 in 100 secure doctorates at 25 times base rate expectations (25%), while those scoring among the top 1 in 10,000 secure doctorates at 50 times base rate expectations (50%); moreover, the caliber of the universities attended and the creative products generated by this latter (profoundly-gifted) group reveal a much steeper, much more impressive developmental trajectory. Furthermore, the specific nature of their educational development is in part a function of ability pattern: individuals who are more verbally than mathematically talented tend to develop in different but predictable ways from those with the inverse pattern (Lubinski, Webb, Morelock, & Benbow, 2001; Shea, Lubinski, & Benbow, 2001). Collectively, ability level and pattern are both needed to calibrate expectation for learning among students with the potential to profit from course work more rigorous than the norm, and volumes devoted to how this is accomplished are readily available (Benbow & Lubinski, 1996; Colangelo & Davis, 2003; VanTassel-Baska, 1998).

The questions examined here are: How do participants, identified as intellectually precocious at an early age, and who have in general achieved so much, feel about their accelerative educational experiences or lack thereof now that they are adults? Can any conclusions be drawn about their life outcomes, based on their accelerative experiences? And do they as adults harbor regrets about their accelerative educational experiences?

Before reviewing longitudinal findings to answer these questions, some cautionary notes are in order. First, evaluating the educational efficacy of accelerative opportunities will always be quasi-experimental (Campbell & Stanley, 1963; Cook & Campbell, 1979; see, e.g., Bleske-Rechek, Lubinski, & Benbow, 2004; Swiatek & Benbow, 1991a, 1991b), because opportunities have not been withheld from willing and able students due to ethical considerations (so random assignment to accelerative versus non-accelerative opportunities is prohibitive). We already know, from earlier research, that the likely outcomes are positive (Benbow & Stanley, 1996; Heller, Mönks, Sternberg, & Subotnik, 2000; Kulik & Kulik, 1984; Southern, Jones, & Stanley, 1993). Second, since the early 1970s, the opportunities available to intellectually precocious youth have been (and will continue to be) in a continuous state of change due to refinements based on ongoing research. Over the past three decades in particular, accelerative learning opportunities have not only increased in schools but also have become more responsive to the needs of talented youth. Hence, 10-year longitudinal studies (to say nothing of 20-year studies), are always somewhat dated. Nevertheless, as these studies show, across objective and subjective measures, multiple identification procedures, and many different kinds of remote criteria (Humm, 1946) that a curriculum that moves at a pace commensurate with rate of learning (or, for precocious learners, accelerative learning relative to the norm) is educationally and developmentally advisable.

Four Key SMPY Longitudinal Studies

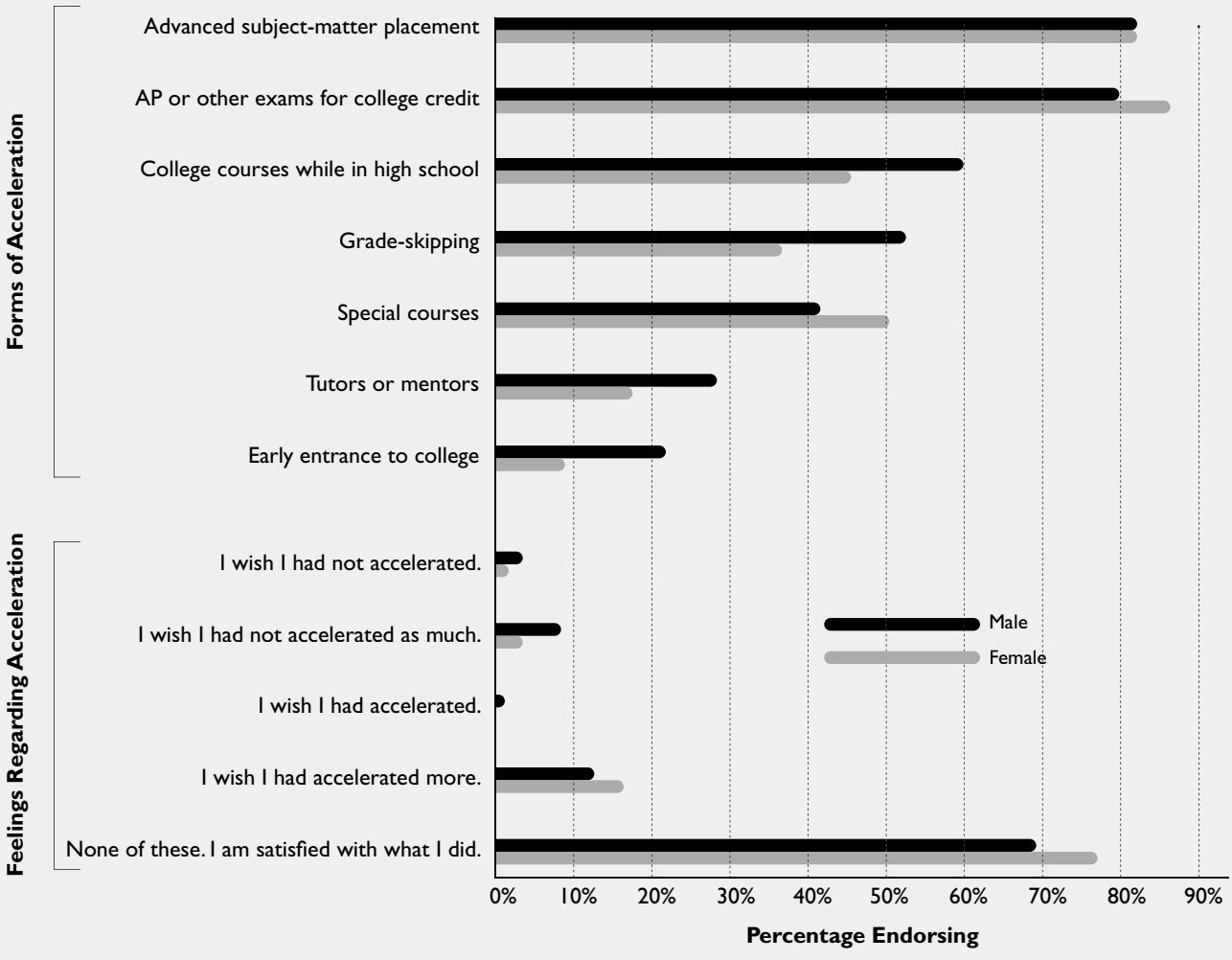
Study 1

(Lubinski, Webb, et al., 2001, Journal of Applied Psychology, *86, 718-729). A 10-Year Longitudinal Study of the Top 1 in 10,000 in mathematical or verbal reasoning (N = 320) identified in the early 1980s (at age 13) [SMPY Cohort 3].*

This study is important in several respects: it consists of SMPY's most able cohort (Mean IQ > 180), and it was the first longitudinal follow-up where the profoundly gifted had been systematically assessed on specific abilities with a sample large enough for meaningful generalizations. Figure 1 illustrates the heterogeneous collection of accelerative opportunities taken advantage of by this special population. And the intensity of these experiences was extraordinary. Across both sexes, +80% took advanced subject-matter placement and AP exams for college credit, and +50% took college courses while in high school. Importantly, when participants were asked how they felt about their accelerative experience, the majority (+70%) expressed satisfaction with what they did. For those who felt differently, more participants wished that they had accelerated more (+13%), relative to participants who (now as young adults) wished that they had not accelerated (5%). Figure 2 illustrates a number of subjective views among participants across a variety of areas. From the participants' point of view, the impact of accelerative experiences on an array of educational and personal aspects of life ranges from "No effect" to "Favorable effects."

Figure 1.

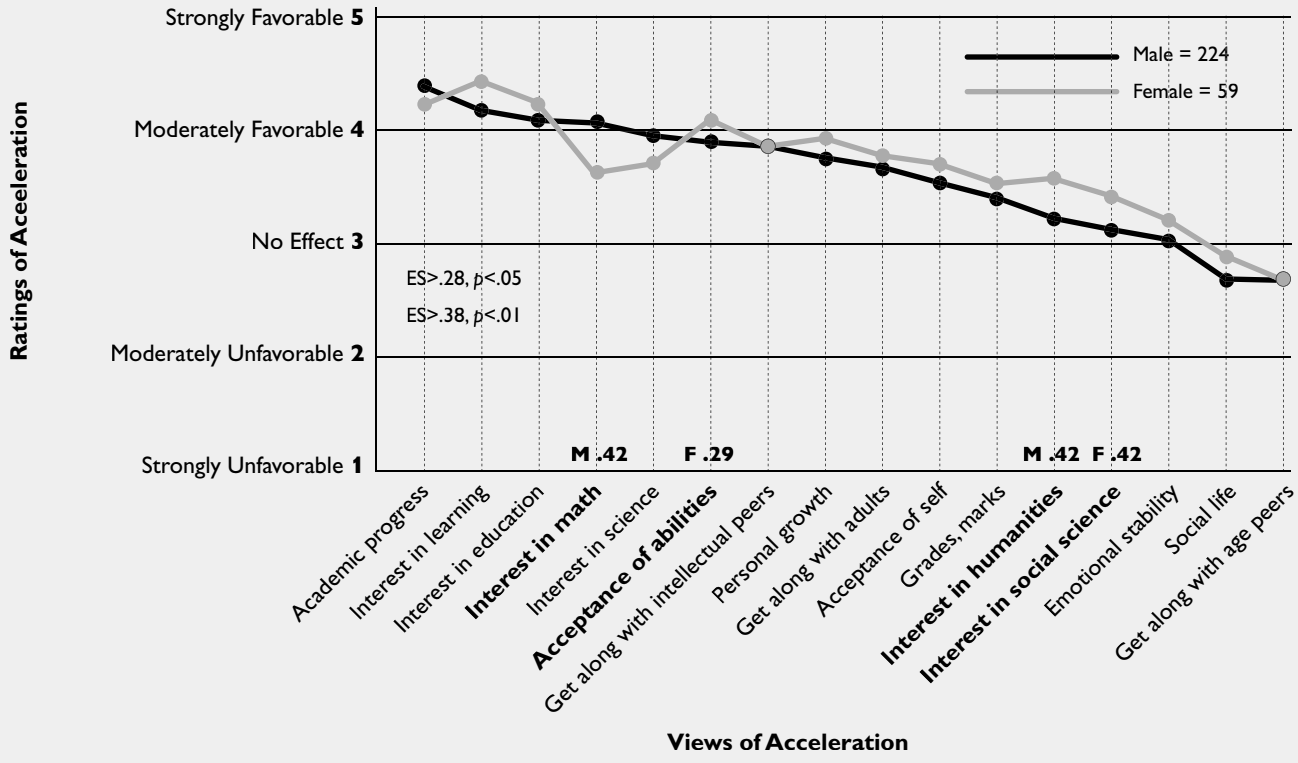
Participation in Accelerative Programs and Satisfaction of SMPY Cohort 3



From Lubinski, Webb, et al. (2001).

Figure 2.

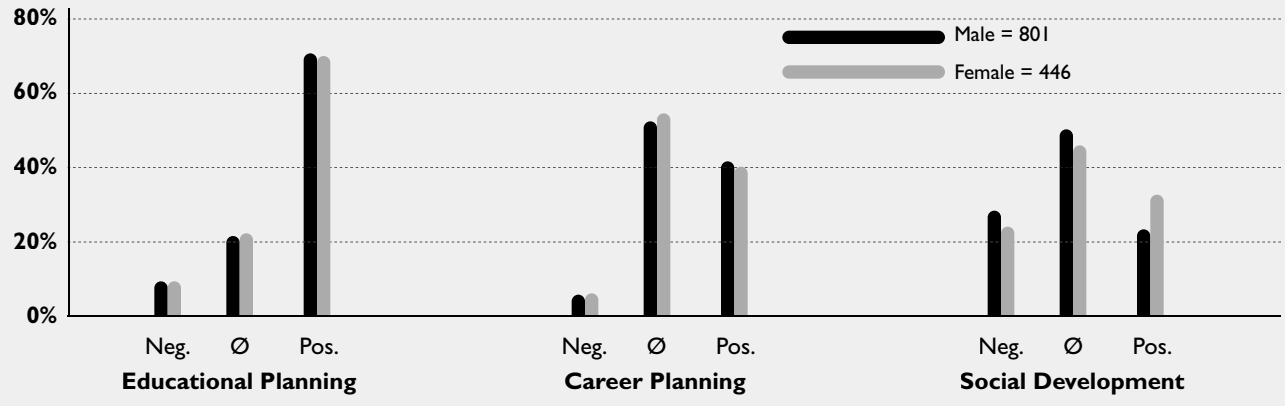
Subjective Views Regarding Acceleration



From Lubinski, Webb, et al. (2001).

Figure 3.

Influence of Educational Acceleration on . . .



From Benbow, et al. (2000).

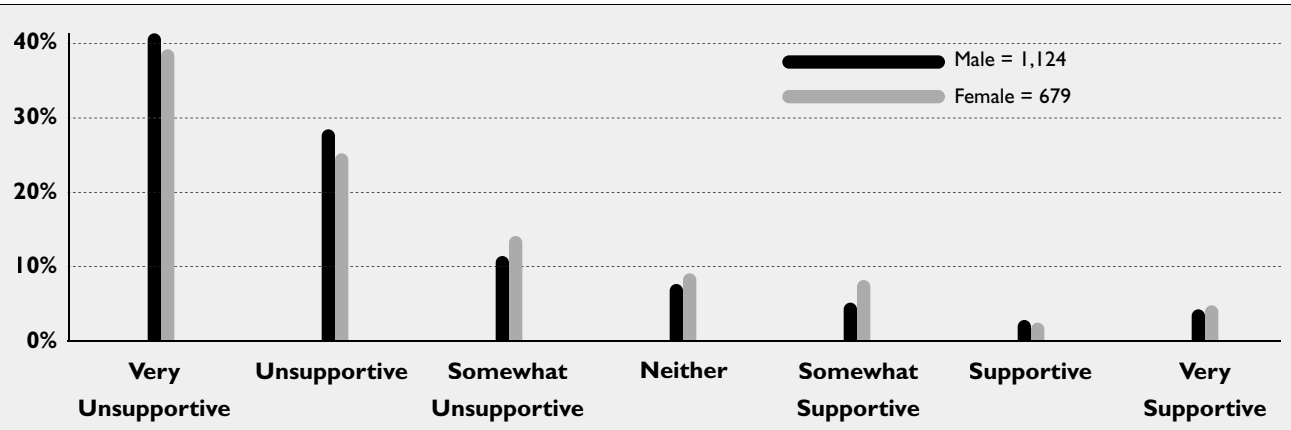
Study 2

(Benbow, et al., 2000, Psychological Science*, 11, 474-480): A 20-Year Longitudinal Study of the Top 1% (N = 1,975) in mathematical reasoning ability (some of whom were more verbally than mathematically precocious), identified throughout the 1970s (at age 13) [SMPY Cohorts 1 & 2].*

In this study, at age 33, participants who were accelerated were asked how they perceived acceleration to have affected their educational planning, career planning, and social development (Figure 3). Clearly, acceleration was seen to have its most helpful effects on educational planning, but significant perceived effects on career planning were also observed. Social

Figure 4.

Support for Eliminating 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?"
From Benbow, et al. (2000).

development was more ambiguous. Yet, here it is good to keep in mind the limited range of accelerative options available to kids back in the 1970s, which would have kept them with their same aged peers. Nevertheless, at the very least, the effects of acceleration on their social development appeared to be essentially neutral.

Finally, participants were asked how they felt about some educational policy makers arguing for the elimination of homogeneous grouping for instruction. The question was worded negatively to stack the deck against homogeneous grouping, thus (all participants were asked):

> *"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?"*

As Figure 4 readily reveals, participants tend to be very much against eliminating homogeneous grouping for instruction. And the pattern is highly consistent across both sexes. Study 3 below offers some reasons for why.

Study 3

(Bleske-Rechek, et al., 2004, Psychological Science, 15, 217–224): Three Decades of Longitudinal Data on the Advanced Placement (AP) Program (N = 3,700) [SMPY Cohorts, 1 through 5].

Here, pooled findings taken from the above samples [SMPY Cohorts 1, 2, and 3], were combined with two additional samples. The first additional sample consisted of (N = 173) top 1% young adolescents (identified at ages 12–14, primarily from within the state of Iowa) between 1992 and 1997 [SMPY Cohort 4]. The second additional sample was not a talent search sample; they were first- and second-year graduate students attending top math/science training programs throughout the U.S. in 1992 (N = 709) [SMPY Cohort 5]. Data from top math/science graduate students complements longitudinal data from talent search participants, and adds information from the point of view of yet another extraordinary population of human capital identified in another way. (Their characteristics will be reviewed in more detail below, see Study 4, and are much more extensively in the original report.)

This study is exclusively restricted to the subjective feelings and educational outcomes based on Advanced Placement (AP) versus non-Advanced Placement (AP) participation. This study is especially important because AP opportunities are viewed by many as the most effective and comprehensive program in place for meeting the educational needs of students whose abilities and motivation for academic achievement is well beyond the norm.

To cut the details of this study down to manageable dimensions, all four talent search groups were combined, but the math/science graduate students were kept separate. Participants reported the number of AP coursework and AP exams. They also were asked to supply open-ended responses to the following questions: "What did you like most about your high school experience?" and "What did you like least about your high school experience?" For talent search participants, high school likes and dislikes, plus their three favorite high school courses, were secured over various post-high school follow-ups. For the math/science participants, they reported this information when initially surveyed in 1992.

Table 1.

Domains of High School Likes and Dislikes, and Their Respective Categories

Likes	Dislikes
Academic and Intellectual Activities	**Lack of Intellectual Stimulation or Engagement**
Intellectual Engagement	Lack of Intellectual Engagement
Teachers and Instruction	Teachers and Instruction
Classes and Departments	Classes and Departments
Success and Recognition	Lack of Success and Recognition
Social Life and Extracurricular Activities	**Social Isolation and Peer Pressure**
Extracurricular Involvement	Limited Extracurricular Involvement
Socializing and Meeting People	Socializing and Meeting People
	Social Isolation and Insecurity
	Peer Pressure
Other	**Other**
School Community and Structure	School Community and Structure
Life/Life Stages	Life/Life Stages
Lack of Intellectual Demand	Intellectual Demand
Global/Miscellaneous	Global/Miscellaneous

From Bleske-Rechek, et al. (2004).

Table 2.

Involvement in the Advanced Placement (AP) Program During High School, by Cohort and Sex

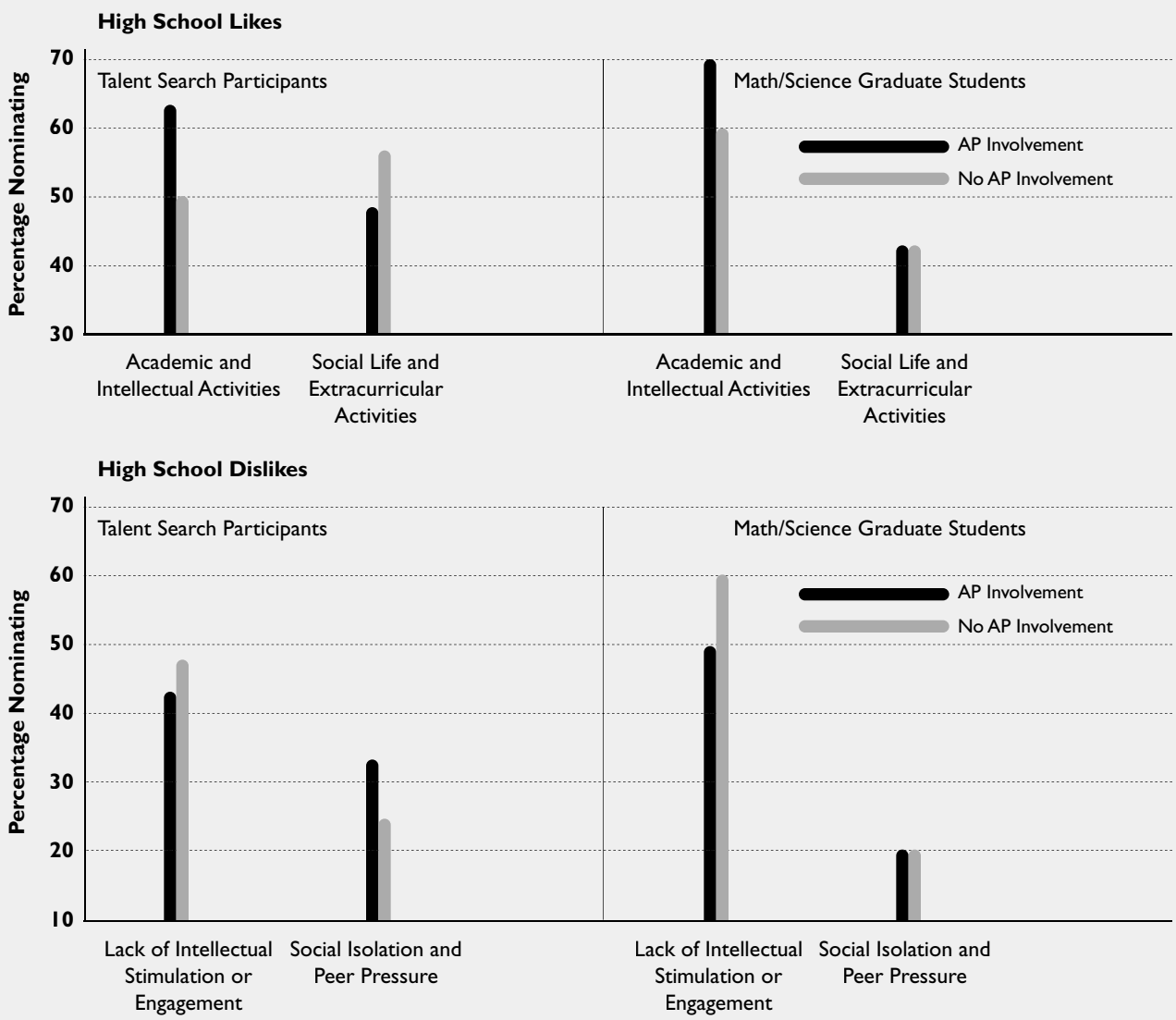
	Cohort 1 Talent Search 1972–74		Cohort 2 Talent Search 1976–79		Cohort 3 Talent Search 1980–83		Cohort 4 Talent Search 1992–97		Cohort 5 Graduate Students 1992	
	M	**F**	**M**	**F**	**M**	**F**	**M**	**F**	**M**	**F**
Respondent N:	1195	764	401	167	328	108	95	78	368	341
Percentage who took one or more AP courses or exams	41.8$_c$	29.3$_c$	80.8	77.8	86.0$_a$	76.9$_a$	79.0	80.8	75.8	77.4
Mean number of courses or exams taken	2.1$_c$	1.8$_c$	3.3$_b$	2.7$_b$	4.2$_b$	3.5$_b$	3.8$_a$	2.9$_a$	3.3	3.2
Percentage who nominated an AP course as their favorite course in high school	—	—	—	—	35.4	26.4	47.6	49.1	27.6	22.5

Note. M=Males; F=Females. "—" denotes unavailable data. Male-female contrasts significant at p<.05, p<.01, and p<.001 are denoted by a, b, and c, respectively. Values shown for talent search participants from 1972–83 include an unknown number of participants who did not have AP courses available at their high school. Values for talent search participants from 1972–74 include only AP exam-taking in high school; values for all other participants include both AP course- and exam-taking. Values for favorite course nominations were calculated using the number of participants involved in the AP program as the denominator; Ns are reduced for 1980–83 talent search analyses because calculations required data from both the 5- and 10-year follow-ups.
From Bleske-Rechek, et al. (2004).

To code participants' high school likes and dislikes, we initially compiled a master list of 223 distinct sub-categories. After coding participants' idiographic responses according to this list, we formed three domains of likes: Academic and Intellectual Activities, Social Life and Extracurricular Activities, and Other; and, conversely, three domains of dislikes: Lack of Intellectual Stimulation or Engagement, Social Isolation and Peer Pressure, and Other. These domains, along with their respective categories, are displayed in Table 1.

Figure 5.

Perceptions of High School Experiences as a Function of AP Instruction



Percentage of SMPY participants who nominated academic and social high school likes (top panel) and dislikes (bottom panel) as a function of their involvement in the Advanced Placement program during high school. Participants nominated up to 6 high school likes (talent search $\overline{X}$=1.75; graduate student $\overline{X}$ =1.76) and 6 high school dislikes (talent search $\overline{X}$ =1.39; graduate student $\overline{X}$ =1.47). Sample sizes are as follows: talent search participant likes: AP=1271, No AP=925; dislikes: AP=1165, No AP=891; math/science graduate student likes: AP=461, No AP=223; dislikes: AP=433, No AP=216.
From Bleske-Rechek, et al. (2004).

AP Involvement

Table 2 displays rates of AP involvement. Except for Cohort 1, for whom AP was not yet widely available, over 75% of participants reported taking at least one AP course or exam. The values for Cohorts 4 and 5 exclude those students for whom AP was not available (AP courses or exams were not available for 20% of Cohort 4 and 23% of Cohort 5), but the values for Cohorts 1 through 3 do not. Hence, the values shown for Cohorts 1 through 3 are lower-bound estimates because they include an unknown number of participants without AP opportunities.

Between 22 and 49% of participants who took at least one AP course also nominated it as a favorite high school class. These values, too, are conservative estimates because favorite class nominations were not coded as AP unless participants explicitly labeled them as AP. Thus, common nominations such as Organic Chemistry, Calculus I and II, and Multivariate Calculus were not coded as AP, although they likely were AP courses (or courses taken at a local university while students were still in high school).

Table 3.

Percentage nominating academic-related categories of high school likes and dislikes, by sex

	Talent Search Participants		Math/Science Graduate Students	
Academic-related category (and representative nominations)	**M**	**F**	**M**	**F**
Likes				
Intellectual Engagement 'Opportunity to take advanced placement classes.' 'Working hard in my classes.' 'Association with highly intelligent classmates.' 'Solid education – good preparation for college.'	33.0	34.9	33.6_a	41.5_a
Teachers and Instruction 'Several supportive and encouraging teachers.' 'Intelligent and knowledgeable teachers.' 'Several teachers encouraged advanced learning.' 'Getting to know teachers.'	15.0_a	18.4_a	19.8_a	27.6_a
Classes and Departments 'Math and language courses.' 'Well-balanced curriculum.'	11.8_b	15.9_b	10.7_b	18.5_b
Success and Recognition 'Excelling at academics.' 'Receiving recognition from others for my academic achievement.'	5.5	6.1	3.7	4.8
Dislikes				
Lack of Intellectual Engagement 'The slow pace of instruction in most classes.' 'Not being challenged intellectually.' 'Lack of intelligent, motivated peers.' 'Poor education – I wasn't taught enough.'	23.5	23.6	31.0	32.9
Teachers and Instruction 'Unenthusiastic, controlling teachers.' 'Some teachers were not bright.' 'Teachers who tried to inhibit my advancement.' 'Half the teaching was mediocre.'	8.5	9.4	14.6	16.9
Classes and Departments 'Boring, required classes.' 'English and reading Shakespeare.'	9.3	10.5	13.4	14.1
Intellectual Demand 'Quizzes.' 'Doing homework.'	6.7	5.4	4.2	4.2

Note. M=Males; F=Females. Male-female contrasts significant at p<.05 and p<.01 are denoted by a and b, respectively. Talent search Ns are as follows: Male likes = 1327 and dislikes = 1252; female likes = 797 and dislikes = 755. Graduate student Ns are as follows: Male likes = 354 and dislikes = 336; female likes = 330 and dislikes = 313. Non-respondents have been omitted from analyses. Other academic-related categories were nominated by fewer than 2.5% of participants and thus are not shown here.
From Bleske-Rechek, et al. (2004).

Table 4.

Predicting Advanced Degree Status at the Age 33 Follow-up

	Talent Search 1972-74		Talent Search 1976-79	
Variable entered	**Multiple R**	**Incremental R^2**	**Multiple R**	**Incremental R^2**
SAT-M (before age 13)	$.20_c$	—	$.16_b$	—
AP Involvement	$.34_c$	$.07_c$	$.28_c$	$.05_c$

Note. Age-33 follow-up data were available only for the first two talent search cohorts. Respondent N for talent search 1972–74 = 1263; for 1976–79 = 469. SAT scores were secured at initial data collection, reports of AP involvement at 5-year follow-up, and reports of advanced degrees at 20-year follow-up. Advanced degrees include master's degree or equivalent, doctoral degree or equivalent, medical degree, or law degree. Values of $p<.01$ *and* $p<.001$ *denoted by b and c respectively. From Bleske-Rechek, et al. (2004).*

High School Likes and Dislikes

Figure 5 displays participants' perceptions of their high school experiences as a function of AP involvement. Cohorts 1 through 4 are combined because the same pattern was replicated in each talent search cohort. Overall, participants valued academic and intellectual stimulation in high school and found the lack of it distressing. Table 3, which displays representative likes and dislikes from academic-related categories, shows that participants regularly voiced positive reactions to working hard, being intellectually challenged, and being with their intellectual peers. Across samples, over a third of participants nominated either intellectual challenge, opportunities for acceleration, pro-intellectualism, school work, academic clubs, or excelling at academics as something they liked most about their high school experience. Fewer than 7% nominated tests, exams, homework, or quizzes as something they disliked. Overall, participants placed more emphasis on academics than on socializing. When asked what they liked most about high school, over 60% cited something academic (i.e., academic and intellectual activities), whereas 49% cited something social (i.e., social life and extracurricular activities). When asked what they liked least, over 45% cited something academic (i.e., lack of intellectual stimulation or engagement), and 30% cited something social (i.e., social isolation and peer pressure).

Participants' high level of intellectual engagement was underscored by their likes and dislikes as a function of AP involvement. As displayed in Figure 5, talent search participants and graduate students who took one or more AP courses were more likely than those who did not to nominate academic and intellectual activities as a favored aspect of high school: talent search, $X^2(1, N = 2196) = 27.51$, $p < .001$; graduate students, $X^2(1, N = 684) = 10.70$, $p < .01$. Among both groups, individuals involved in AP were less likely to nominate a lack of intellectual stimulation or engagement as a disfavored aspect of high school: talent search, $X^2(1, N = 2056) = 4.19$, $p < .05$; graduate students, $X^2(1, N = 649) = 6.41$, $p < .05$. Among talent search participants only, individuals who were involved in AP were less likely than those who were not involved in AP to nominate social life and extracurricular activities as a favored aspect of high school, $X^2(1, N = 2196) = 9.91$, $p < .01$, and more likely to nominate social isolation and peer pressure as a disfavored aspect, $X^2(1, N = 2056) = 12.10$, $p < .001$.

Advanced Degrees

Longitudinal data on secured educational credentials were available for participants in Cohorts 1 and 2. At age 33, 70% of individuals who had taken one or more AP courses or exams during high school had obtained an advanced degree (master's or beyond), compared to 43% of those who had not taken an AP course or exam. Table 4 displays multiple regression analyses controlling for mathematical reasoning ability (SAT-M scores at or before age 13) in the prediction of advanced degree status. (SAT-V scores were available for only approximately half of participants.) Although SAT-M scores predicted advanced degree attainment 20 years later, AP involvement accounted for an additional 7% and 5% of variance in advanced degree status for Cohorts 1 and 2, respectively. 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.

Overall, intellectually talented youth embraced and placed a premium on intellectual challenge in high school. The majority participated in AP. Those who did more frequently expressed satisfaction (and less frequently expressed dissatisfaction) with the intellectual caliber of their high school experience. Moreover, students who participated in AP were more likely to earn an advanced educational degree, even after controlling for mathematical reasoning ability.

Normative data suggest that the high school mindset of

Table 5.

Educational Experiences (%) of Graduate Student and Talent Search Males and Females

	GS		TS	
	M	**F**	**M**	**F**
Interest in math/science stimulated by a special person	61	69	68	73
Math/science contest or special program before college	**58**	**54**	**54**	**37**
Accelerated primary and/or secondary education ...				
via advanced subject-matter placement	58	62	68	60
via AP or other exams for college credit	66	67	92	88
via college courses during high school	33	33	37	29
via grade skipping	11	13	23	28
by any means	88	91	92	92
Reported positive influence of acceleration experience	78	80	70	70
Reported negative influence of acceleration experience	2	1	10	8
Took biology, chemistry, physics, and calculus during high school	68	66	65	60
Favorite high school class in math or science	**79**	**74**	**64**	**39**
Selected for the National Honor Society	70	79	63	70
Was National Merit finalist	23	21	42	38
Awarded National Merit Scholarship	15	17	23	21
Was Presidential Scholar	13	13	3	5
Experienced mentoring relationship before college	28	28	33	34
Positive influence on educational/career plans	96	97	95	89
Negative influence on educational/career plans	3	0	2	2
Math/science contest or special program during college	**20**	**21**	**25**	**11**

Note. Substantive item comparisons are displayed in bold. Group Ns vary by item. GS = graduate students, TS = talent search, M = males, F = females. From Lubinski, Benbow, et al. (2001).

intellectually talented youth differs markedly from that of their typical age mates. Recall that over 60% of participants cited something academic as a favored aspect of their high school experience, whereas 49% cited something social (30% cited friends and socializing, and 29% cited extracurricular activities; some nominated both). In contrast, 85% of a representative sample of 1560 Indiana high school students cited friends and socializing as a favored aspect of high school, with less than half that (40%) nominating educational benefits (Erickson & Lefstein, 1991). Further, less than 2% of intellectually talented participants, compared to 19% of Indiana high school students, nominated the opposite sex and dating as a favored aspect. Less than 7% of SMPY participants nominated exams, homework, or studying as something they disliked about high school, while 35% of Indiana youth nominated homework or term papers, and 6% nominated tests and exams (Erickson & Lefstein, 1991). Across groups, 2% of SMPY participants nominated early mornings, and 1% nominated long school days, as aversive; of Midwestern high school students, 23% complained about getting up early and 20% about long school hours or days.

Although the Indiana youth were surveyed while still in high school and SMPY participants after high school, SMPY participants' pattern of responses was robust across a wide range of longitudinal follow-ups. The overall picture of intellectually talented youth is one of young men and women who have an intense need for intellectual growth and who are invested in their intellectual development. Their distinct learning preferences (cf., NRC, 2002, annex 6–1, pp. 11–14) necessitate a differentiated curriculum. In contrast, a significant subset of normative high school students appears to be more concerned about socializing and dating, and more annoyed by homework and early mornings. AP opportunities appear to facilitate the positive development of highly motivated students who learn at rapid rates. Yet, like all educational interventions, AP is not a panacea. For profoundly gifted students, for example, AP coursework may need to be combined with grade skipping, taking college courses early, and even going to college early (Lubinski, Webb, et al., 2001, Study 1 above).

Table 6.

Educational Experiences of Graduate Student Males and Females

	M	F
Participated in a talent search during junior high school	15	13
Believe would have been eligible for talent search	63	62
Believe would **not** have been eligible for talent search	7	8
Would have enrolled in talent search	65	72
Gifted programs were available at some point	74	78
Participated in gifted program (given available)	86	84
Ave. number of years participated in gifted programs (*SD*)	5.2 (2.9)	5.4 (2.9)
Participated in a summer program for the gifted	26	23
Positive experience from gifted programs	67	71
Negative experience from gifted programs	3	3
Worked on independent research project during high school	25	23
Took honors course during high school in:		
Humanities	52	59
Social studies	42	45
Languages	30	38
Science	66	68
Changed undergraduate major	29	35
From program outside math/sciences	12	11
Age decided on undergraduate major (*SD*)	17.7 (2.1)	18.1 (1.8)
Participated in undergraduate research program	83	83
Positive influence on career/educational plans	88	88
Negative influence on career/educational plans	5	4
Experienced mentoring relationship as undergraduate	57	61
Positive influence on educational/career plans	96	94
Negative influence on educational/career plans	1	3
Undergraduate honor society (e.g., Phi Beta Kappa)	71	76
Median number of graduate school hours spent on:		
Studying	20	20
Research	30	30

Note. No significant difference found at alpha = .01. Statistics represent percentages, except where otherwise specified. From Lubinski, Benbow, et al. (2001).

Study 4

(Lubinski, Benbow, et al., 2001, Psychological Science, *12, 309–317). A Comparison of Top Math/Science Graduate Students (females = 346, males = 368) with same-age SMPY Participants Tracked Over 20-Years (females = 528, males = 228) [SMPY Cohorts 2 & 5].*

The final study to be reviewed was not based on a talent search population. This study was based on the math/science population (whose AP experiences were examined in Study 3, above). This investigation was designed in part to ascertain the developmental experiences that propelled top math/scientists to secure admission to some of the world's best graduate training programs. Because math/science disciplines contain a greater proportion of males relative to females, we over sampled the women to obtain sufficient numbers for confident generalizations. Never before has a large sample of women of this scientific caliber been psychologically profiled this extensively. Their experiences and thoughts afford critical information for future educational planning. The aspect of their development that is perhaps most striking is psychological similarity between male and female scientists (see Lubinski, Benbow, et al., 2001). Here, however, we focus on their educational experiences in comparison to age-equivalent SMPY participants (Table 5) and their unique experiences (Table 6).

Table 5 reveals that approximately 90% experienced some form of acceleration: 60% took advanced subject-matter placement, 66% took AP exams for college credit, 33% took college courses during high school, and 12% skipped grades. Over 78% reported a positive educational accelerative experience, whereas less than 2% reported negative experiences. The lack of significant sex differences in these data is truly remarkable.

Table 6 reveals that this sample desired opportunities to develop advanced academic skills at an early age, and worked to make such opportunities happen. These data point to ways to develop extraordinary academic talent. Again, it is remarkable that there are no significant sex differences. The information in Table 5 and Table 6 paint a clear picture. Specifically, at an early age, accelerative learning experiences were embraced by these truly exceptional students.

Summary of Empirical Findings

Overall, these four studies paint a clear picture. Being responsive to individual differences in learning rates facilitates achievement and learning, and the subjective impressions of intellectually precocious participants who experienced such opportunities view them positively well into adulthood. Indeed, when the curriculum moves at a slow pace, boredom and discontent frequently ensue. Intellectually precocious students who experience educational acceleration in middle school and high school view their pre-college educational experiences much more positively than their intellectual peers who were deprived of such experiences. Moreover, for developing world-class scientific leaders, such experiences appear to be critical. But these experiences are conducive to achieving extraordinary distinction in other intellectually demanding domains as well. In working with special populations, all interventions — as well as all decisions not to intervene — engender positive and negative effects, yet the evidence reviewed here strongly suggests that the former far outweigh the latter. Having said this, a brief mention of some things that could contribute further refinement to educational acceleration is in order.

Some Omitted Aspects

An important corollary found in this line of work is the magnitude of psychological diversity found within intellectually precocious populations across both intellectual and nonintellectual attributes relevant to academic and occupational content. Evidence suggests that by taking these aspects of individuality into account, the positive findings on acceleration uncovered herein, and in other reports (Heller, et al., 2000; Kulik & Kulik, 1984; Southern, et al., 1993), could be enhanced. First, current practices are not identifying certain populations of intellectually precocious youth who would profit from accelerative learning experiences (e.g., those talented in spatial visualization); but methods are available to identify these students at an early age so they do not fall through the cracks (Gohm, et al., 1998; Humphreys, et al., 1993; Shea, et al., 2001). This probably constitutes the largest source of talent missed by modern talent searches.

Second, affective and conative factors need to be attended to as well. Non-intellectual personal attributes, such as interests, values, and time willing to study and work, are critical for effective educational-vocational counseling (Dawis, 1992, 2001; Lubinski & Benbow, 2001), the implementation of accelerative educational opportunities, and the scientific study of the developmental trajectory of intellectual precocity (Achter, et al., 1999; Lubinski & Benbow, 2000; Schmidt, et al., 1998; Webb, et al., 2002). These relatively neglected aspects of individuality are important to be vigilant of in research and practice associated with educational acceleration. Being responsive to all educationally and vocationally relevant personal attributes can only enhance learning and achievement as well as the subjective evaluations of accelerative educational opportunities designed for precocious youth. A full explication of these ideas, however, is beyond the scope of this chapter (but see Lubinski & Benbow, 2000).

Concluding Statement

The findings reviewed here belong to a broader class of aptitude by treatment interactions (ATIs). In his famous APA Presidential address, Cronbach (1957) scolded differential psychologists for focusing too exclusively on variation among people and, simultaneously, he criticized experimentalists in a similar tone for only concerning themselves with variation among treatments. Cronbach (1957) stressed the need to assign different treatments (learning opportunities) to different people based on their individuality (Corno, Cronbach, et al., 2002; Cronbach, 1996; Cronbach & Snow, 1977). For optimal intervention, both personal attributes and environmental attributes need to be aligned. This idea is now widely accepted.

In the present context, because of the rapid rate at which intellectually precocious students learn abstract material, the curriculum needs to move at a pace well beyond normative expectations. Just as the pace of the curriculum needs to be adjusted for students challenged by developmental delays, the curriculum needs to be accelerated for precocious learners (relative to the norm). This practice has been called *appropriate developmental placement* (Lubinski & Benbow, 2000): adjusting the curriculum at a pace commensurate with student learning. This ATI is relevant to all students, because learning is optimally facilitated when the curriculum moves with the speed at which students learn.

Orchestrating developmentally appropriate ATIs for intellectually precocious youth requires multidimensional assess-

ment. This includes the cognitive abilities useful for selection and setting expectations, ability level and pattern configuration for ascertaining strengths (and relative weaknesses), and individual differences in nonintellectual personal attributes. Moreover, the student body also needs to be taken into account, because peers are important. Peers influence almost all learning environments and engender a wide range of harmful to helpful effects. Treatments conducive to a constructive classroom atmosphere for some students foster destructive behaviors in others: learning environments that move too quickly frustrate, whereas those that move too slowly result in boredom. Heterogeneity in student readiness within the same classroom ensures boredom or frustration or both. (These outcomes are ATIs as well.) The range of student readiness in classroom situations should not be left to chance. For classrooms to be somewhat responsive to each student's individuality, a degree of homogeneous grouping by competence is critical. To optimally teach students, we must first learn who they are by assessing individual differences relevant to their *passion* (or needs and interests, for commitment) and their *potential* (or abilities, for growth); following this, opportunities responsive to their individuality must be provided. Perhaps what needs to be stressed most is that appropriate developmental placement is important for *all students* (cf. Humphreys, 1985), not just the gifted. Appropriate developmental placement is predicated on the idea that one size will never fit all, and it has accrued a vast amount of empirical and practical support.

Over 40 years ago, Gordon Allport (1960), an early protagonist to the modern-day positive psychology movement (Seligman & Csikszentmihalyi, 2000), was keenly aware of the need to embrace individual differences in cognitive ability for determining optimal learning environments for intellectually precocious youth:

> *It is my own conviction that most of our institutions of higher learning offer intellectual fare distressingly below the digestive capacity of the gifted. I am not thinking merely of colleges that offer frivolous courses in fudge-making, but of our "best" institutions, where courses are often repetitive, routine, and devoid of challenge. Perhaps from the point of view of the average student they are adequate, but they stretch no nerve with the gifted student.... Usually such a student does well, and the teacher rejoices, but in many cases the teacher should feel less joy than guilt, for he has, unintentionally, beckoned the gifted student downward toward mediocrity rather than upward toward maximum self-development. (Allport, 1960, p. 68)*

Perhaps Julian C. Stanley (2000) was drawing on the wisdom of his advisor (Allport) when, 40 years later, he crafted, "Helping students learn only what they don't already know." Motivating Ceci (2000, p. 247) to remark, "In the media coverage of this debate [on intellectually precocious youth], I have never heard responses to the kind of examples Stanley [2000] gives, yet we know that such children exist, and in nontrivial numbers, too."

An appraisal from arguably the most distinguished counseling psychologist of the twentieth century, Leona E. Tyler (1974), taken from her brilliant treatment of *Individual differences: Abilities and motivational directions*, tells a similar story:

> *[I]n our haste to abolish the unjust and the obsolete, we cannot afford to ignore the psychological realities that generated such systems in the first place. There are highly significant psychological differences among individuals, and the soundness of our social institutions depends upon how successfully we take them into account.... A complex society cannot regard its members as identical interchangeable parts of a social machine. Its complex functioning depends upon the contributions of individuals specializing along different lines, equipped for carrying out different specialized tasks. For this reason we must not be content with any system of universal education that provides identical treatment for all pupils. We must look for ways of diversifying education to make it fit the diverse individuals whose talents should be developed and utilized (pp. 6–7).*

I hope that this volume is successful in responding to Allport's (1960) observations, and putting Tyler's (1974) wisdom, and the wisdom of other distinguished psychological scientists (Hobbs, 1951, 1958; Paterson, 1957; Pressley, 1955, 1967; Seashore, 1922; Stanley, 2000; Terman, 1954; Thorndike, 1927; Williamson, 1965), into broad practice.

References

Achter, J. A., & Lubinski, D. (2003). Fostering exceptional development in intellectually talented populations. In W. B. Walsh (Ed.), *Counseling psychology and optimal human functioning* (pp. 25–54). Mahwah, NJ: *Lawrence Erlbaum Associates*.

Achter, J. A., Lubinski, D., & Benbow, C. P. (1996). Multipotentiality among the intellectually gifted: It was never there and already it's vanishing. *Journal of Counseling Psychology*, *43*, 65–76.

Achter, J. A., Lubinski, D., Benbow, C. P., & Eftekhari-Sanjani, H. (1999). Assessing vocational preferences among gifted adolescents adds incremental validity to abilities. *Journal of Educational Psychology*, *91*, 777–786.

Allport, G. W. (1960). Uniqueness in students. In W. D. Weatherford (Ed.), *The goals of higher education*. Cambridge, MA: Harvard University Press.

Benbow, C. P. (1991). Mathematically talented children: Can acceleration meet their educational needs? In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 154–165). Boston: Allyn and Bacon.

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

Benbow, C. P., & Lubinski, D. (1996). *Intellectual talent: Psychometric and social issues*. Baltimore: Johns Hopkins University Press.

Benbow, C. P., & Lubinski, D. (1997). Intellectually talented children: How can we best meet their needs? In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 155–169). Boston: Allyn and Bacon.

Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability at age 13: Their status 20 years later. *Psychological Science*, *11*, 474–480.

Benbow, C. P., & Stanley, J. C. (1996). Inequity in equity: How "equity" can lead to inequity for high-potential students. *Psychology, Public Policy, and Law*, *2*, 249–292.

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.

Campbell, D. T, & Stanley, J. C. (1963). Experimental and quasi-experimental designs for research on teaching. In N. L. Gage (Ed.), *Handbook of research on teaching.* Chicago: Rand McNally.

Ceci, S. J. (2000). So near and yet so far: Lingering questions about the use of measures of general intelligence for college admission and employment screening. *Psychology, Public Policy, and Law*, *6*, 233–252.

Colangelo, N., & Davis, G. A. (2003). (Eds.), *Handbook of gifted education* (3rd ed.). Boston: Allyn and Bacon.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field studies*. Chicago: Rand McNally.

Corno, L., Cronbach, L. J., et al. (Eds.) (2002). *Remaking the concept of aptitude: Extending the legacy of Richard E. Snow*. Mahwah, NJ: *Earlbaum*.

Cronbach, L. J. (1957). The two disciplines of scientific psychology. *American Psychologist, 12*, 671–684.

Cronbach, L. J. (1996). Acceleration among the Terman males: Correlates in midlife and after. In C. P. Benbow & D. Lubinski (Eds.). *Intellectual talent: Psychometric and social issues* (pp. 179–191). Baltimore: Johns Hopkins University Press.

Cronbach, L. J., & Snow, R. E. (1977). *Aptitudes and instructional methods: A handbook for research on interactions.* New York: John Wiley & Sons.

Dawis, R. V. (1992). The individual differences tradition in counseling psychology. *Journal of Counseling Psychology*, *39*, 7–19.

Dawis, R. V. (2001). Toward a psychology of values. *Journal of Counseling Psychology, 29*, 458–465.

Dawis, R. V., & Lofquist, L. H. (1976). Personality style and the dynamics of work adjustment. *Journal of Counseling Psychology*, *23*, 55–59.

Dawis, R. V., & Lofquist, L. H. (1984). *A psychological theory of work adjustment*. Minneapolis: University of Minnesota Press.

Erickson, J. B., & Lefstein, L. M. (1991). *Indiana youth poll: Youths' views of high school life*. Indianapolis: Indiana Youth Institute.

Gohm, C. L., Humphreys, L. G., & Yao, G. (1998). Underachievement among spatially gifted students. *American Educational Research Journal*, *35*, 515–531.

Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotnik, R. F. (Eds.). (2000). *International handbook of research on giftedness and talent* (2nd ed.). New York: Elsevier.

Hobbs, N. (1951). Community recognition of the gifted. In P. Witty (Ed.), *The gifted child* (pp. 163–183). Boston: Heath.

Hobbs, N. (1958). The compleat counselor. *Personnel and Guidance Journal*, *36*, 594–602.

Holahan, C. K., & Sears, R. R., & Cronbach, L. J. (1995). *The gifted group in later maturity.* Stanford, CA: Stanford University Press.

Hollingworth, L. S. (1926). *Gifted children: Their nature and nurture*. New York: Macmillan.

Hollingworth, L. S. (1942). *Children above 180 IQ*. New York: World Book.

Humm, D. G. (1946). Validation by remote criteria. *Journal of Applied Psychology, 30*, 333–339.

Humphreys, L. G. (1985). A conceptualization of intellectual giftedness. In F. D. Horowitz & M. O'Brian (Eds.), *The gifted and talented: Developmental perspectives* (pp. 331–360). Washington, DC: APA Press.

Humphreys, L. G., Lubinski, D., & Yao, G. (1993). Utility of predicting group membership and the role of spatial visualization in becoming an engineer, physical scientist, or artist. *Journal of Applied Psychology, 78*, 250–261.

Kulik, J. A., & Kulik, C. C. (1984). Effects of accelerated instruction on students. *Review of Educational Research*, *54*, 409–425.

Lubinski, D. (2004). Introduction to the special section on cognitive abilities: 100 years after Spearman's (1904) "'General intelligence,' objectively determined and measured." *Journal of Personality and Social Psychology*, *86*, 96–111.

Lubinski, D., & Benbow, C. P. (1994). The study of mathematically precocious youth: The first three decades of a planned 50-year study of intellectual talent. In R. F. Subotnik & K. D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 255–281). Norwood, NJ: Ablex Publishing.

Lubinski, D., & Benbow, C. P. (2000). States of excellence. *American Psychologist, 55*, 137–150.

Lubinski, D., & Benbow, C. P. (2001). Choosing excellence. *American Psychologist*, *56*, 76–77.

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.

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.

Murray, C. (1998). *Income, inequality, and IQ*. Washington, DC: American Enterprise Institute.

National Research Council (2002). *Learning and understanding: Improving advanced study of mathematics and science in U.S. high schools*. Washington, DC: National Academy Press.

Paterson, D. G. (1957). Conservation of human talent. *American Psychologist, 12*, 134–144.

Pressey, S. L. (1946a). Acceleration: Disgrace or challenge? *Science, 104*, 215–219.

Pressey, S. L. (1946b). Time-saving in professional training. *American Psychologist, 1*, 324–329.

Pressey, S. L. (1949). *Educational acceleration: Appraisals and basic problems*. Columbus, OH: The Ohio State University.

Pressey, S. L. (1955). Concerning the nature and nurture of genius. *Scientific Monthly, 81*, 123–129.

Pressey, S. L. (1967). "Fordling" accelerates ten years after. *Journal of Counseling Psychology, 14*, 73–80.

Scarr, S. (1996). How people make their own environments: Implications for parents and policy makers. *Psychology, Public Policy, and Law, 2*, 204–228.

Schmidt, D. B., Lubinski, D., & Benbow, C. P. (1998) Validity of assessing educational-vocational preference dimensions among intellectually talented 13-year olds. *Journal of Counseling Psychology, 45*, 436–453.

Seashore, C. E. (1922). The gifted student and research. *Science, 56*, 641–648.

Seashore, C. E. (1930). Carl Emil Seashore. In C. Murchison (Ed.), *A history of psychology in autobiography* (Vol. 1, pp. 225–297). Worcester, MA: Clark University Press.

Seashore, C. E. (1942). *Pioneering in psychology*. (University of Iowa Studies, No. 398). Iowa City: University of Iowa Press.

Seligman, M. E. P., & Csikszentmihalyi, M. (2000). Positive psychology: An introduction. *American Psychologist, 55*, 5–14.

Shea, D. L., Lubinski, D., & Benbow, C. P. (2001). Importance of assessing spatial ability in intellectually talented young adolescents: A 20-year longitudinal study. *Journal of Educational Psychology, 93*, 604–614.

Southern, W. T., Jones, E. D., & Stanley, J. C. (1993). Acceleration and enrichment: The context and development of program options. In K. A. Heller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook for research on giftedness and talent* (pp. 387–409). Oxford: Pergamon Press.

Stanley, J. C. (1973). Accelerating the educational progress of intellectually gifted youth. *Educational Psychologist, 10*, 133–146.

Stanley, J. C. (1996). SMPY in the beginning. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 225–235). Baltimore: Johns Hopkins University Press.

Stanley, J. C. (2000). Helping students learn only what they don't already know. *Psychology, Public Policy, and Law, 6*, 216–222.

Swiatek, M., & Benbow, C. P. (1991a). A 10-year longitudinal follow-up of participation in a fast-paced mathematics course. *Journal for Research in Mathematics Education, 22*, 138–150.

Swiatek, M. A., & Benbow, C. P. (1991b). A ten-year longitudinal follow-up of ability matched accelerated and unaccelerated gifted students. *Journal of Educational Psychology, 83*, 528–538.

Terman, L.M. (1925). *Mental and physical traits of a thousand gifted children*. Stanford, CA: Stanford University Press.

Terman, L. M. (1954). The discovery and encouragement of exceptional talent. *American Psychologist, 9*, 221–230.

Terman, L.M. (1959). *The gifted group at mid-life*. Stanford, CA: Stanford University Press.

Thorndike, E. L. (1927). *The measurement of intelligence*, Teachers College, Columbia University New York:

Tyler, L. E. (1953). *The work of the counselor*. New York: Appleton-Century-Crofts.

Tyler, L. E. (1965). *The psychology of individual differences* (3rd Edition). New York: Meredith.

Tyler, L. E. (1974). *Individual differences: Abilities and motivational directions*. New York: Meredith.

U. S. Department of Education, National Center for Education Statistics. (1997). *Digest of Education Statistics,* 1997 (NCES 98-015). Washington, DC: *Author*.

VanTassel-Baska, J. (1998). *Excellence in educating: Gifted and talented learners* (3rd ed.). Denver: Love Publishing Co.

Webb, R. M., Lubinski, D., & Benbow, C. P. (2002). Mathematically facile adolescents with math/science aspirations: New perspectives on their educational and vocational development. *Journal of Educational Psychology, 94*, 785–794.

Williamson, E. G. (1965). *Vocational counseling: Some historical, philosophical, and theoretical perspectives.* New York: McGraw-Hill.

Witty, P. (1951). *The gifted child*. Boston: Heath.

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Public Policy and Acceleration of Gifted Students

Introduction

One of the earliest educational strategies used to cope with the special needs of gifted students has been educational acceleration, the more rapid movement of a student through the traditional educational calendar. The decision to accelerate a bright student would seem to be a relatively easy one for an educational decision maker since it requires minimal changes in curriculum, or additional personnel training. Yet this strategy is used infrequently in American schools, and it seems important to discover the reasons for such reluctance.

Reasons for Acceleration

One of the first known efforts at educational acceleration was the Cambridge Double Track Plan of 1891, which grouped bright children into special classes that covered six years of work in four (Tannenbaum, 1958). There were also special progress classes established in 1900 in New York City that allowed the telescoping of three years of curriculum into two (Kulik, 2003). Such a strategy of educational acceleration is designed to achieve two goals: (1) to put the student with older students who will be more competitive with, and stimulating to, the accelerated student; and (2) reduce the time the student has to spend in the educational system.

With regard to the second goal, saving time, advanced professional training seems to be extending further and further into the future. For example, gifted students seeking a medical career can be over thirty years old before beginning their careers unless some method is used to shorten the program at some time in the student's progress (Gallagher & Gallagher, 1994; Passow, 1996).

Table 1 indicates that it is possible to educationally accelerate a child at any stage of the K–12. At the primary level, 'early admittance to school' could be used. An 'ungraded primary' could be utilized where a group of students could take

Table 1.

Most Common Methods of Acceleration of Gifted Students

Grade Level	Type of Acceleration
Primary (K–3)	1. Early admittance to school 2. Ungraded primary
Intermediate (4–5)	1. Ungraded classes 2. Grade skipping
Middle School	1. Three years in two 2. Senior high classes for credit
Senior High	1. Extra load—Early admission to college 2. Advanced Placement

Source: Gallagher, J. (2003a) Educational acceleration: Why or Why not? Parenting for High Potential, *June (p. 13).*

the K–3 program in three years. At the Intermediate level, 'grade skipping' has been used, often skipping the last year in the Intermediate period and moving the student into middle school a year early (Feldhusen, Proctor, & Black, 2002).

At the middle school level, collapsing the three-year period to two years with an accelerated program has been adopted infrequently. The senior high programs have a great preference for Advanced Placement courses that yield college credit and may reduce the expensive time in college (Olszewski-Kubilius, 2002). All of these interventions require energy and commitment on the part of the staff. If that is not present, then the status quo looks more favorable.

The purpose of this chapter is to review public policy and legislation about acceleration and to discover why these procedures have been infrequently used in American education. One reason for such reluctance could be that the strategy of educational acceleration has been viewed as harmful to the students involved. Certainly many teachers and administrators believe that accelerating gifted students could create a variety of social and emotional problems (Southern & Jones, 1991).

There is little doubt that educators have been largely negative about the practice of acceleration, despite abundant research evidence attesting to its viability (e.g., see the chapters in this volume), and the clear advantage of saving a year or two over an educational span for a gifted student that could add up to a quarter of a century in school (Gallagher, 1996). It is difficult to understand the hostility of many educators to this acceleration strategy. Perhaps it is the threat that many parents may ask for this adaptation and disrupt school procedures. Perhaps there is a tinge of envy at the presence in the school of an intellect clearly superior to the typical student or educator.

Engines of Change

Gallagher (2002) has identified four engines for change in American education: legislation, court decisions, administrative rule making, and professional initiatives. While these engines of change have been most effective in shaping special education for children with disabilities, they have not been nearly as active in the education of gifted students, or in particular in educational acceleration.

Legislation

One of the legislative initiatives related to acceleration has been 'early admittance to school,' allowing the young child who manifests clear developmental advancement to enter kindergarten or first grade earlier than the school calendar ordinarily permits.

Twenty-two states currently have provisions by which a young child who demonstrates advanced development in cognitive, physical, social, and emotional domains can be placed into an appropriate educational setting ahead of the usual entrance time. This will not shorten the student's total time in the education system, but he or she will finish a year or so in advance of the expected time.

An example of such legislation for early admission to school can be seen in the state of North Carolina. The legislation that created the opportunity is fairly simple. The entire text of the legislation follows:

> *(d) A child who has passed the fourth anniversary of the child's birth on or before April 16 may enter kindergarten if the child is presented for enrollment on later than the end of the first month of the school year and if the principal of the school finds, based on information submitted by the child's parent or guardian, that the child is gifted and that the child has the maturity to justify admission to the school. The State Board of Education shall establish guidelines for the principal to use in making this finding. (G.S. 115c-364(d))*

This amendment to the school law was initiated by a state legislator in response to an irate parent whose child was refused admission to school, because of her age, despite clear developmental advancement. The parent went to this state legislator and asked him to do something about it, and he composed the above amendment without consulting educational leaders. Out of such events, educational policy is sometimes established!

Since the legislation is silent on many of the details of how this law would be implemented, there is heavy reliance on the administrative rules and regulations which are necessary to carry out the legislation. In this case, the rules set down by the North Carolina Department of Instruction are rather stringent, perhaps guaranteeing that not many parents will take advantage of the law even if they were aware of its existence. This is one example of how the implementation of rules can shape policy. Consider these provisions from the Rules:

- A student must score at the 98th percentile of a standard individual test of intelligence.
- A student must score at the 98th percentile on either reading or mathematics on a standard test of achievement.

- A student must be able to demonstrate to the principal tasks well above age peers, e.g., independent reading, problem solving skills, advanced vocabulary, etc.
- A student must be socially and developmentally mature enough to be in a structured school setting for a full school day.
- A student must be eager to learn and excited about a new school experience.

It often is the responsibility of the parents who are making this petition for early admission to school to pay for the expense of the individual testing required, and to assemble the necessary documentation necessary for the school to take action. It is hard to imagine low-income families taking advantage of such provisions.

Court Actions

There have been surprisingly few court cases that challenged the schools' rules and regulations related to educational acceleration. It should be remembered that there is a severe time crunch for the parent in such disputes. Court actions can take nine months to several years, and by the time the issue has been settled, the passage of time has cancelled out the solution that the parents sought for their child. Suppose a parent wished the school to admit her developmentally advanced four-year-old to kindergarten. By the time the case was settled the child would be five years old and ready for kindergarten anyway. The realization of the time involved in the legal processes may inhibit parents from taking action along this dimension.

Administrative Rules and Regulations

As we noted earlier, rules and regulations established at the state or local level can either facilitate or inhibit the use of educational acceleration as an option for coping with gifted students in the public schools. Since acceleration often is perceived as upsetting the normal routine of the schools, it is not surprising that there are rules to discourage this practice. It takes a discerning and persistent educational leader to establish the acceleration program as a regular part of the school program.

Professional Initiatives

Practically all of the advancement of educational acceleration as an educational policy has been due to a variety of initiatives by groups of professionals. These have taken the form of (1) program development, such as the Advanced Placement program, (2) research on the effects of acceleration, (3) development of measures to make decisions about acceleration, and (4) the establishment of standards and policies by professional associations.

Advanced Placement

One of the most successful professional initiatives that resulted in the institutionalization of acceleration has been the Advanced Placement (AP) program. Started in the 1950s by the Ford Foundation for the Advancement of Education, it originally involved three private high schools and three universities (Harvard, Yale, and Princeton) to design a set of achievement examinations to give bright, hardworking students advanced placement in the university (Nugent & Karnes, 2002).

The College Board took the responsibility for administering the rapidly expanding program in 1955. The program now offers 34 courses in 19 subject areas, and over 900,000 students took AP exams in 2002 (College Board, 2003). Over 90 percent of the nation's colleges and universities have an AP policy granting incoming students credit, placement, or both, for qualifying with a high score on the AP exams. Numerous students are able to begin their college work with a number of credits that can reduce the amount of time needed to complete their undergraduate college career. The popularity of Advanced Placement courses results from providing bright secondary school students a challenge during their high school years, and also saving time for them in college.

Research

Fortunately, there have been a wide variety of studies conducted over a fifty-year period designed to answer the concerns of educators regarding the consequences of student acceleration. A number of acceleration initiatives took place in widely separate geographic areas such as Brookline, Massachusetts; Pittsburgh, Pennsylvania; New York; and Nebraska in the 1940s and 1950s. Hobson (1948) reported the early admission of students into the Brookline, Massachusetts, schools and found, as many who followed after him, that the children who were accelerated were actually doing better in later grades than students who had not been accelerated. Worcester (1956) reported on a series of studies in the state of Nebraska on early admission to school that also found that students who had been accelerated were doing very well, not only in academic work, but also in their social and emotional adjustment. Birch (1954) reported that an overwhelming majority of the children admitted early to first grade in Pittsburgh, Pennsylvania, were making satisfactory school adjustment in all areas: academic, social, emotional, and physical.

In New York City, Justman (1954) compared junior high students who took the three-year curriculum in two years with

a matched group of students in intelligence who had spent the entire three years in the program, and found major advantages in favor of the accelerated group in mathematics and science and social studies. Justman carefully ruled out ninth-grade test items on the grounds that they might be unfair to students who had taken only two of the three years at the time of testing. Even with that correction there were still significant differences in favor of the accelerated group in math and science, but not quite in social studies.

Significant contributions were made by the longitudinal study of 1528 gifted students begun by Lewis Terman in the 1920s, who followed those youngsters in this sample that had been accelerated during their early school career (Terman & Oden, 1947). Terman concluded that the consequences of acceleration were consistently positive, but that acceleration did work out badly for a few individuals. Cronbach (1996) did a separate analysis on the Terman group. He found that those students who had been accelerated attained higher levels of education, were rated more highly on adult vocational accomplishment, and were more often in the upper levels of income. As Cronbach points out, these results do not necessarily mean that acceleration caused all these positive outcomes, it is quite possible that it was the very positive accomplishments of the students that encouraged educators to accelerate them in the first place, and that these positive forces continued on into adult life. What it does seem to show, however, is that acceleration does not bring any major negative consequences with it.

A study done a half-century ago by the Ford Foundation's Fund for the Advancement of Education (1957) studied early admission to colleges and universities by students who had skipped the last one or two years of their high school careers. The follow-up of these students indicated that those who had been accelerated did better in college than students who had been paired with them in aptitude, and the accelerated students also gained more from college sophomore to senior year on the Graduate Record Examination.

A 10-year follow-up study of 320 profoundly gifted students (1 in 10,000) discovered that 95% of the sample (reporting at age 23) had taken advantage of various forms of academic acceleration in high school or earlier to make a better match with their needs (Lubinksi, Webb, Morelock, & Benbow, 2001). The vast majority of these brilliant students expressed positive feelings towards their acceleration and attributed some of their later outstanding attainments to the opportunity to be accelerated. The group reported no serious negative effects on their social life and peer adjustment. It would appear that the brighter the student, the more likely that acceleration might be employed as one strategy to help him/her find an appropriate academic placement. When one considers the manifest advantage of saving a year or two from a potential quarter-of-a-century of schooling, apart from other advantages, such as more challenge in the school curriculum, it would seem to be an easy policy to invoke for selected children whose advanced academic credentials and favorable personal adjustment call for such a placement.

One of the most successful professional initiatives in the field of educational acceleration has been the long-term work of Julian Stanley (Stanley, 1996). Stanley initiated the Study of Mathematically Precocious Youth (SMPY) in 1971, in an attempt to find extraordinarily gifted students in mathematics, and to provide them with advanced training, and even early entrance into college. This program was a clear success, and there was a call to expand the content areas, as well as the talent search aspect of the program.

Verbal abilities were added to the mathematics abilities, and the original SMPY model became the Center for the Advancement of Academically Talented Youth (CTY). There was also a residential program of fast-paced courses in the summertime where the students would master an advanced mathematics course in a few weeks and receive credit at their high school for their performance. In addition, a large number of regional talent searches were begun at Duke University, Northwestern University, and the University of Denver, with other programs following in a number of states, including Arizona, California, Georgia, Illinois, Indiana, Iowa, Minnesota, North Carolina, Pennsylvania, Texas, Washington, and Wisconsin.

What Stanley and his associates were able to demonstrate was that young students could master advanced courses in mathematical and linguistic content and, in many cases, were able to accelerate their own academic program through fast-paced courses, and through early entrance into colleges, such as Johns Hopkins University.

Assessment

One of the factors hindering the use of educational acceleration as a strategy is that many educators do not feel comfortable in how such a process should be managed. One of the professional initiatives that have dealt with that issue has been the development of the *Iowa Acceleration Scale. A Guide for Whole Grade Acceleration, K–8* (2nd ed.), (Assouline, Colangelo, Lupowski-Shoplik, Lipscomb, & Forstadt, 2003).

This scale allows interested educators to review the necessary information on the candidate for acceleration. It lists useful measuring instruments for aptitude, rating scales on the child's intellectual and emotional development, and areas of potential problems. The *Iowa Acceleration Scale (IAS)* has been used in every state and several foreign countries, and appears to be a useful tool for educators when considering student acceleration.

Standard Setting

Another initiative has been taken by the professional organization most in contact with gifted students. The National Association for Gifted Children (NAGC) has produced a position statement on acceleration as follows:

> *The practice of educational acceleration has long been used to match appropriate learning opportunities with student abilities. The goals of acceleration are to adjust the pace of instruction to the student's capability, to provide an appropriate level of challenge, and to reduce the time period necessary for students to complete traditional schooling. When acceleration has been effective in achieving these goals, highly capable individuals are prepared to being contributing to society at an earlier age. . . .*
>
> *Opportunities to learn must be offered to all children. Accordingly, highly able students with capability and motivation to succeed in placements beyond traditional age/grade parameters should be provided the opportunity to enroll in intellectually appropriate classes and educational settings.*
>
> *–National Association for Gifted Children Acceleration Position Statement (1992) Washington, D.C. (see Appendix B).*

Pressey (1962), noting the effects of lengthy schooling on gifted students, quoted an APA President, Ernest Hilgard, as follows:

> *I think it is almost criminal to let people stay in the social role of student any longer than is absolutely necessary. The only progress I see in people's development is that which comes from their own independent work. The longer they remain students the longer they remain subordinate, passive, always looking up to others instead of out toward the horizons for themselves.* (p. 314)

The negative consequences of keeping bright students in a dependent role in school for many years has been noted by other observers (Gallagher, 1996; Passow, 1996).

Where Is the Policy?

How can we account for the lack of educational action in the face of the positive reactions to programs and their positive evaluation findings? To understand this issue we can assemble the list of criteria that may be used in making a policy decision on educational acceleration.

Table 2 indicates the various factors that would appear to be considered in deciding about educational acceleration as a strategy for gifted students. We have reviewed the research evidence, which indicates a very positive outcome for students who have been accelerated, with individual exceptions, of course. Since the costs of such strategies are minimal, in fact, saving money for the school system in the long run, and no additional personnel would be required for such a policy, it is difficult for many academicians to understand why the policy has not been more widely implemented.

Yet, Table 2 also shows a generally negative viewpoint on the part of the general public, and such views can be counted upon to produce caution in public decision makers who take their cues from the attitude of the general public. Also there is the clear antagonism of teachers, administrators, and their professional associations, who continue to express concern over negative outcomes despite the clear research reports.

Table 2.

Decision Making Factors

	Cost	Needed Personnel	Research Evidence	Public Beliefs	Educator Views
Educational Acceleration	Minimal	None	Highly positive	Generally negative	Strongly negative

Ways to Influence Policy on Acceleration

If we wish to encourage a major change on how educational acceleration is viewed, we will probably need to use all of the engines of change: legislation, the courts, administrative rules, and professional initiatives. One step is to try to influence key decision makers in the policy arenas.

One question that we should ask ourselves is, "How do decision makers get the information they use to make decisions?" They are subjected to a barrage of information on a daily basis, often from sources eager to get them to make a favorable decision on one decision or another. It doesn't seem reasonable to think that they would spend their limited time pouring over scientific reports or scholarly treatises on acceleration, or similar policy issues.

It seems likely that much of their information is picked up through the mainstream media—journals like *Newsweek*, and *Time*, and the *Sunday New York Times* or other newspapers, as well as viewing the evening news on a regular basis. This, together with getting information from specialists who they have trusted in the past to be reliable informants in special fields like education, would seem to be the most likely sources they use to form the basis of their actions (Gallagher, 2002).

If these assumptions are true, then the mainstream media would seem to be the best target to organize a media blitz that would have a chance of getting their attention. Since educational acceleration seems to be much misunderstood, there would have to be a considerable corrective information flow to the current negative feedback that they have received. Such efforts will be effective only if it is the commitment of some professional association or organization, such as the National Association for Gifted Children (NAGC) or The Association for the Gifted (TAG), that can orchestrate such a campaign and see it through over time since none of these efforts, by themselves, will likely change the prevailing attitudes. Some examples of such material that might be produced and circulated:

- Interviews with adults who have been accelerated at some time in their educational career, who can respond on the positive nature of the experience.
- A four-page research synthesis should be produced summing up the major studies that have been carried out on this issue.
- Establishing alliances with other professional associations such as SRCD and ASCD to promote articles or conference presentations on the topic of educational acceleration.
- Publicizing in the media the policy statements of groups, such as the National Association for Gifted Children, that reveal professional support for the practice.
- Stories about young professionals who have settled into the community early as a result of educational acceleration.
- Develop and disseminate model legislation for such issues as Early Entrance to School.
- Popular articles on the virtues of the Advanced Placement Program with illustrations of specific students and their work.

Another practical step would be to find a decision maker, someone in a position of power in the state or federal legislative or executive branches of government, who would be sympathetic to this cause, and would be willing to take concrete steps to encourage more use of this educational strategy. Having a 'friend in power' is invaluable to getting some concrete actions taken.

One of the lessons of educational policy is that once it has been established it remains in place until somebody, or some groups of people, determine to change it. It does not matter if the policy is foolhardy or wrongheaded, it remains on the books until changed. In the case of educational acceleration, fortunately it may be that what has to be changed is not written policy, but merely the attitudes of policy makers.

If concerned professionals wish to bring policy more in line with available evidence on educational acceleration, then a vigorous campaign to change or initiate policy may be necessary. It does little good to hope that somebody will do it or that the facts, by themselves, will carry the day. It takes positive personal action or professional association for the changes to take place.

References

Assouline, S.G., Colangelo, N., Lupkowski-Shoplik, A., Lipscomb J., & Forstadt, L. (2003). *Iowa Acceleration Scale Manual: A guide for whole-grade acceleration K-8 (2nd ed)*. Scottsdale, AZ: Great Potential Press .

Birch, J. (1954). Early school admission for mentally advanced children. *Exceptional Children 21*, 84–87.

College Board (2003). (http://www.apccentralcollegeboard.com/program).

Cronbach, L. (1996). Acceleration among the Terman males: Correlates in midlife and after. In C. Benbow & D. Lubinski (Eds.). *Intellectual Talent: Psychometric and social issues* (pp.179–191). Stanford, CA: Stanford University Press.

Feldhusen, J.F., Proctor, T.B., & Black, K.N. (2002). Guidelines for grade advancement of precocious children. *Roeper Review*, *24* 3, 169–171.

Ford Foundation Fund for the Advancement of Education (1957). *They went to college early*. New York: The Fund.

Gallagher, J. (1996). Educational research and educational policy: The strange case of acceleration. In C. Benbow & D. Lubinski, (Eds.). *Intellectual talent: Psychometric and social issues* (pp. 83–92). Baltimore: John Hopkins University Press.

Gallagher, J. (2002). *Society's role in education gifted students: The role of public policy.* Storrs, CT: The National Research Center on the Gifted and Talented.

Gallagher, J. (2003a). Educational acceleration: Why or why not? *Parenting for High Potential*, June (p. 13).

Gallagher, J. (2003b). Issues and challenges in the education of the gifted. In N. Colangelo & G. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp 11–23). Boston: Allyn & Bacon.

Gallagher, J., & Gallagher, S. (1994). *Teaching the gifted child* (4th ed). Boston: Allyn & Bacon.

Hobson, J. (1948). Mental age as a workable criterion for school admission. *Early School Journal, 48*, 312–321.

Janos, P.M., & Robinson, N.M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly*, *29* (4) 175–179.

Justman, J. (1954). Academic achievement of intellectually gifted accelerants and nonaccelerants in junior high school. *School Review*, *62*, 143–150.

Kulik, J.A., & Kulik, C.L.C. (1984). Effects of accelerated instruction on students. *Review of Educational Research*, *54*, 3, 409–425.

Kulik, J.A., & Kulik, C.L.C. (1984). Synthesis of research on effects of accelerated instruction. *Educational Leadership*, *42* 2, 84–89

Kulik, J. (2003). Grouping and tracking. In N. Colangelo & G. Davis (Eds.) *Handbook of gifted education*, (3rd ed., pp 268–281). Boston: Allyn & Bacon.

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* (4): 718–729.

Neihart, M., Reis, S.M., Robinson, N.M. & Moon, S.M. (Eds.). (2002). *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock Press.

Nugent, S., & Karnes, F. (2002) The Advanced Placement program and the International Baccalaureate programme: A history and update. *Gifted Child Today*

Olszewski-Kubilius, P. (2002). A summary of research regarding early entrance to college. *Roeper Review*, *24* (3), 152–157.

Passow, H. A. (1996) Acceleration over the years. In C. Benbow, D. Lubinski, (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 93–98). Ames, IA: Iowa State University of Science and Technology.

Pressey, S. (1962). Educational acceleration: Occasional procedure or major issue. *Personnel & Guidance Journal*, *41*, 12–17.

Robinson, N.M. (1996). Acceleration as an option for the highly gifted adolescent. In C.P. Benbow & D.J. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 169–178). Baltimore: Johns Hopkins University Press.

Rogers, K.B. (2002), Effects of acceleration on gifted learners. In M. Neihart, S. Reis, N. Robinson, & S. Moon, (Eds.), *The Social and emotional development of gifted children: What do we know?* (pp. 3–12). Waco, TX: Prufrock Press.

Southern, W.T., & Jones, E.D. (Eds.). (1991). *The academic acceleration of gifted children*. New York: Teachers College Press.

Tannenbaum, A. (1958). History of interest in the gifted in N. Henry (Ed.), *Education for the gifted: 57th yearbook of the National Society for the Study of Education*. Chicago: University of Chicago Press.

Terman, L., & Oden, M. (1947). *The gifted child grows up.* Stanford, CA: Stanford University Press.

Stanley, J. (1996). In the beginning: The study of mathematically precocious youth. In C. Benbow & D. Lubinski, (Eds.), *Intellectual talent*. Baltimore: Johns Hopkins University Press.

Worcester, D. (1956). *The education of children of above average mentality*. Lincoln, NE: University of Nebraska Press.

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The Academic Effects of Acceleration

Introduction

As Southern and Jones (1991) explained in their classic text, *The Academic Acceleration of Gifted Children*, accelerative options fall into two general categories of instructional management: (1) subject-based acceleration, which exposes the learner to advanced content, skills, and understandings before expected age or grade level in a specific content area or areas; and (2) grade-based acceleration, which shortens the number of years a learner remains in the K–12 school system before entering a college or university or other post-secondary training. The effects of either set of accelerative options may vary, depending 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 child with little independence, no willingness to be challenged, a weakness in one or more content area(s), and well-instilled habits of non-production will not likely be "cured" academically by shortening his/her years K–12. On the other hand, this child might improve in academic achievement overall if provided with direct daily challenge beyond grade level in his/her specific academic talent area. Likewise, a child who is very self-directed, motivated to learn "new" things, and working well beyond grade level in most academic areas might benefit equally well from grade-based or subject-based acceleration (Rogers, 2002).

Despite this argument for the idiosyncratic approach to accelerative decision-making for gifted learners, the field contains a large and informative body of studies that support a variety of accelerative forms for them. Furthermore, knowing 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.

Beginning in 1990 and continuing through 1998, I collected all extant studies on every form of academic acceleration. The earliest study located was reported in 1861 and the most recent ones included in my synthesis were published in 1998. A five-year update (1998–2003) is currently in progress. To collect these studies, I searched the Educational Research Information Clearinghouse (ERIC), Resources in Education (RIE), Child Development Abstracts (PSYCH), Exceptional Children Educational Resources (ECER), Psychological Abstracts Index (PSYCHINFO), and Comprehensive Dissertation Index (DAI) databases, collecting all studies back to the inception of these bases (approximately 1965). The Education Index in book form was used to collect all acceleration studies from 1929–1966. Both the Thesaurus of ERIC Descriptors and the Thesaurus of Psychological Index Terms were used to identify all potential key words and descriptors. From these database sources, a total of 307 actual research studies or reports was located. What followed was a search through the reference lists of the 19 reviews of research on various forms of acceleration published between 1933–1998, identifying an additional 32 studies, and a search through the reference lists of all studies located through Education Index, which located another 41 studies. In total, 380 studies on 11 forms of academic acceleration were located through database searching, review of research searching, and reference branching. In addition, the "invisible college" and "fugitive" literature were systematically searched out in order to locate studies that were not published for some reason.

In order to be included as a research study in my synthesis, published or unpublished, the manuscript had to report the author's method for systematically collecting data about the purpose described in the study. Impressionistic and anecdotal program descriptions were eliminated. 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, single-subject designs, as well as correlation, regression, causal-comparative, and survey designs were included. No studies were eliminated because of methodological flaws, so long as 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 computed for each outcome. In cases where the findings of several instruments described a single outcome, such as mathematics achievement, the results were pooled to compute a composite result. 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 category. Finally, the accelerative op-

tion described in each study had to have been used with gifted children, with specifications included as to how the children were identified.

The majority of the qualifying studies reported quantitative results that could be reduced to the metric of effect size. In general, this calculation requires the subtraction of the mean achievement of the control group from that of the treatment group. This remainder is divided by the pooled standard deviation of the two groups (Glass, McGaw, & Smith, 1981). As the various data were reported study by study, ultimately 21 different formulae for calculating effect size had to be derived and applied (Rogers, 1992). For those studies that did not report data adequate for the calculation of effect size, Light and Pillemer's (1984) method of denoting outcome direction allowed these studies to be included without having them averaged with actual effect sizes.

Effect size can be interpreted in a variety of ways. In general, most meta-analysts recognize an effect size of 0.30 or higher as being of practical significance to classroom practice. According to Glass, McGaw, and Smith's (1981) interpretation, an effect size of 0.30 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 the equivalent position of a school year's teaching efforts, suggesting that if the current teaching effort were to continue for three years, the experimental students would be a full school year ahead of their equally able controls.

To add to this knowledge base, 19 reviews of research on academic acceleration, ranging from 1933–1998, were also content-analyzed and subjected to meta-evaluation. What these reviews contributed was the realization that reviews or syntheses without comprehensive collection and an objective perspective on acceleration in general may not be worth the paper on which they are printed. Too often conclusions were drawn based on a highly subjective, selective sampling of studies—almost gathering evidence on one side to make one's argument, or to reflect the *zeitgeist* of the times. For example, the 1933 (Witty & Wilkins, 1933) negative review of academic acceleration that pushed for "horizontal" enrichment reflected the drastic competition for work during the Depression era, a time when the work force would not want more people out there competing for limited jobs. Likewise, the Ford Foundation's positive reviews (Boardman, 1943: Pressey, 1967) of early college admission in the 1940s reflected a time when preparing gifted youth for leadership in time of war was a national goal.

The Effects of Subject-based Accelerative Options

In previous work, Rogers (1992) identified 13 forms of subject-based acceleration, all of which either allow gifted learners to progress flexibly through the general K–12 curriculum or expose these learners to knowledge, skills, and understandings beyond expected age or grade levels. Each is listed and defined below. Table 1 summarizes the research-based effects (and effect sizes, where applicable) for each of these forms.

Early Entrance to Kindergarten or First Grade—allowing a gifted learner with a readiness to perform school work to enter kindergarten or first grade 1–2 years earlier than the usual beginning age.

Compacted Curriculum—tailoring the regular curriculum of any or all subjects 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 or deficient areas, thus moving rapidly through the curriculum offered in the educational setting. Replacement challenges are provided to fill in the learner's classroom time.

Single-Subject Acceleration—allowing a gifted learner 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.

Concurrent/Dual Enrollment—allowing a gifted learner 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.

Talent Search Programs—allowing a learner who is highly talented in a specific subject, and who scores highly on the SAT or ACT while in middle school, to partake of high school-level courses, often on college campuses, outside of regular school time (evenings, summers, weekends, or on-line).

Correspondence Courses—allowing a gifted learner to work with outside materials, provided by a college or other organization, in lieu of the regular grade-level curriculum of the school. The learner would be allowed credit for learning in this area by the school.

Distance Learning—allowing a gifted learner to take a course in a specific subject of talent or interest via television or on-line in lieu of the regular curriculum of the school.

Independent Study—providing the gifted learner with a structure for studying in depth a topic of interest on his/her own during the school day, in lieu of the regular curriculum of the school.

Table 1.

Effects, Research Limitations, and Predictors of Success in Subject-based Acceleration Options

Option	Academic Effect	Limitations of Research conducted	Prior Indicators of Probable Student Success
Early Entrance to Kindergarten or First Grade	1/2 year's additional growth in all academic areas (ES=.49) when compared to equally gifted age peers. Growth was a one-time gain (Rogers, 1992).	Only 25 of 68 studies on children identified as gifted. Only 19 of 49 retrospective studies were conducted on gifted learners. No addressing of gender differences among these "selected" studies (Rogers, 1992).	• Processes and achievement well above age peers • Is independent and motivated to learn • Enjoys visual and small motor activities • Likes academic work and has exhausted what preschool can offer (Rogers, 2002).
Compacted Curriculum	4/5 of a year's additional growth (ES=.83) in mathematics (and perhaps in science); about 1/3 year's additional growth (ES=.26) in language arts and social studies. Growth continues for each year compacting is implemented (Rogers, 1992; Reis, Westberg, Kulikowich, Caillard, Hebert, & Plucker, 1993).	10 studies total from 1959–1993, of which 8 are K–6 studies, and 2 are middle school studies (Rogers, 1998).	• Mastery well above grade/age level in specific subject area or topic • Is persistent, motivated to learn, self-directed, confident, intense and focused in learning, and processes information quickly • Is willing to work alone or in small groups on self-instructional materials • Prefers to skip what is already known and be challenged instead • Has high interest in compacted area, wide-ranging academic interests, and little patience for routine academic tasks (Rogers, 2002).
Single-Subject Acceleration	3/5 of a year's additional growth in the subject accelerated (ES=.57) (Rogers, 1992).	21 studies covering grades 2–12. Only 2 studies on reading and 2 on science. Remainder were on math acceleration (Rogers, 1992).	• Is achieving 2 or more grade levels ahead • Has strong achievement need, strength in planning • Is independent, persistent in own interests, makes connections, processes and retains information quickly, is willing to take risks • Prefers fast-paced challenge and independent or small-group learning • Has intense interest in accelerated area • Is involved in wide variety of out-of-school activities (Rogers, 2002).
Concurrent/Dual Enrollment	2 month's additional growth in the specific area where dually enrolled (ES=.22) (Rogers, 1992).	36 studies on gifted learners; half of studies on junior high/senior high dual enrollment and half on high school/college dual enrollment. No out-of-level achievement measures used in these studies, so actual measurement of what was learned at the higher level not done (Rogers, 1992).	• Is achieving 2 or more grade levels ahead • Has strong achievement need, strength in planning • Enjoys school, is accepting of others, socially mature, confident, independent in thought and action • Strong preference for most forms of instructional delivery, except independent study • Prefers challenge and fast-paced learning • Has intense interest in accelerated area • Has wide-ranging academic interests, is active in variety of out-of-school activities • Shows little enthusiasm for extra-curriculars offered at current building level (Rogers, 2002).

Table 1 (continued).

Effects, Research Limitations, and Predictors of Success in Subject-based Acceleration Options

Option	Academic Effect	Limitations of Research Conducted	Prior Indicators of Probable Student Success
Talent Search Programs	Clear academic gains in specific areas of expertise and satisfaction with the academic experiences of these classes, especially reported through Northwestern, Washington, Duke, and Johns Hopkins.	Research on academic gains tends to be survey or case study, hence untranslatable to ES; more empirical focus has been placed on the social relationship, family dynamics, and self-esteem outcomes of these programs.	• Ability/achievement in upper 3% • Strength in motivation, communication expression, precision • Strong need to achieve • Is independent, frustrated with repetitive tasks, socially mature, persistent, self-directed • Strong preferences for most forms of instructional delivery • Comfortable in competitive situations • Enjoys working with others of like ability • Intense interest in specific academic area • Wide-ranging academic interests • Involved in wide variety of out-of-school activities as well as school-related extra-curriculars (Rogers, 2002).
Correspondence Courses/ Distance/ On-line Learning	No actual research has been reported.	No research studies reported.	• Is processing and achieving well beyond grade-level peers in specific academic area • Has strong achievement need • Shows strength in planning and communication precision • Is independent in thought and action, persistent in own interests, enjoys learning, is good at structuring and organizing tasks and own time, socially mature • Prefers independent and self-instructional learning • Prefers fast-paced challenge in learning • Has intense interest in specific academic area • Has wide-ranging activities outside of school • Does not find school extra-curriculars very interesting (Rogers, 2002).
Independent Study	No impact on overall achievement (ES=0) (Rogers, 1998).	Measurements of achievement unlikely to measure specifics of independent studies undertaken; no documentation of research skill levels of students engaged in independent study (Rogers, 1998).	• Has strong achievement need • Shows strength in planning, motivation, communication • Is independent in thought and action, persistent in own interests, enjoys learning, good at time and task organization • Prefers independent and self-instructional materials • Has intense interest in specific academic area • Has wide-ranging academic interests (Rogers, 2002).
Advanced Placement/ International Baccalaureate Programs	3 months' additional growth in specific area in which AP or IB class was taken (ES=.27) (Rogers, 1992). AP score most important predictor of college GPA, # of semesters on Dean's List, and honors graduation (Brody & Stanley, 1991).	22 studies, but college GPA in specific academic area used as measure of achievement, and most of the studies were conducted in highly selective colleges or universities (Rogers, 1992).	• Is processing and achieving beyond grade-level peers in specific academic areas • Is self-directed, persistent, accepting of others, perceptive, reflective, retains information easily, socially mature, likes taking cognitive risks • Prefers learning through lecture, discussion, small-group projects • Is comfortable in challenging, in-depth, fast-paced learning, competitive experiences • Has intense interest in specific academic area • Has wide-ranging academic interests • Is actively involved both inside and outside of school in learning activities (Rogers, 2002).

Table 1 (continued).

Effects, Research Limitations, and Predictors of Success in Subject-based Acceleration Options

Option	Academic Effect	Limitations of Research Conducted	Prior Indicators of Probable Student Success
College-in-the-Schools Programs	Small, positive academic effect, similar to concurrent enrollment (Rogers, 2002).	Only one study, but much of what has been found for concurrent enrollment could apply here (Rogers, 1998).	• Is achieving 2 or more grade levels beyond age peers • Has strong achievement need • Shows strength in planning and communication precision • Independent, persistent, accepting of others, enjoys school, socially mature • Strong preference for lecture, discussion, and projects • Comfortable in challenging, fast-paced, competitive experiences • Has intense interest in specific academic area • Has wide-ranging academic interests • Is actively involved both inside and outside of school in learning activities (Rogers, 2002).
Mentorships	3/5 of a year's additional growth in specific area of mentorship (ES=.57) (Rogers, 1992).	13 studies, of which one is gr. 5–7, remaining on high school programs; mentorships ranged from 1–3 years in length. Two studies looked retrospectively many years after the actual mentoring experience (Rogers, 1992).	• Is achieving 2 or more grade levels beyond grade-level peers • Has strong achievement need • Shows strength in planning and communication precision • Is independent, persistent, accepting of others, focused and intense when learning • Has strong preferences for lecture, discussion, projects • Is comfortable in challenging, fast-paced learning experiences • Has intense interest in specific academic area • Has wide-ranging academic interests (Rogers, 2002).
Credit for Prior Learning/ Testing Out	3/5 of a year's additional growth in all academic areas; one-time gain (ES=.56) (Rogers, 1992).	13 studies ranging in sample size from 79–11,082. All studies were conducted at the college level with college testing programs (Rogers, 1992).	• Has above-average ability and is achieving 2 or more grade levels ahead • Is frustrated with pace of regular classroom instruction • Is independent, motivated to learn, enjoys school, self-accepting • Prefers fast-paced, challenging learning • Prefers self-instructional materials or work with small like-ability group • Has strong interests in special academic area • Is actively involved in activities and hobbies outside of school (Rogers, 2002).
Post-Secondary Options	Students achieve high grade point in classes taken (Solano & George, 1976).	Only one study that surveyed achievement in such courses, but surveyed across 277 different college courses. No comparison group, however (Solano & George, 1976).	• Is achieving 2 or more grade levels beyond grade-level peers • Has strong achievement need • Shows strength in planning and communication precision • Is independent, persistent, abstract thinker, socially mature, accepting of others, retains information quickly and easily • Enjoys school learning • Prefers competitive situations in which to test self • Strong preferences for most forms of delivery, except independent study • Is comfortable in challenging, fast-paced learning • Has intense interest in specific academic area • Has wide-ranging academic interests • Is actively involved in out-of-school activities • Not interested in extra-curriculars in school (Rogers, 2002).

Advanced Placement Courses—providing courses with college-level advanced or accelerated content, which affords the learner an opportunity to "test out" of, or be given credit for, completion of college-level coursework while still in high school, depending upon the test score received on the national examination.

International Baccalaureate Programs—providing courses with an internationally recognized level of advanced or accelerated content, which affords the learner an opportunity to "test out" of, or be given credit for, completion of college-level coursework, while still in high school, depending upon the test score received on the international examination.

College-in-the-School Programs—providing a course on the high school site (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.

Mentorships–connecting a high school student who has exhausted all high school curriculum in his/her talent area 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.

Credit for Prior Learning/Testing Out—allowing a gifted learner to bypass a course or year of study in a specific area either based on knowledge of what the learner knows or through assessing the learner's mastery of that curriculum.

Post-Secondary Options—allowing a high school student to spend part of his/her school day taking courses at a local college or university for both high school and college credit.

In Table 1, the effects, the limitations, and the personal learning characteristics and strengths that predict success with the respective options are included. Note that correspondence courses and on-line or distance-learning courses have been combined on the table, as have Advanced Placement and International Baccalaureate programs, due to the respective common research study bases of these options.

Key Studies on Subject-based Acceleration Practices

Of the 68 studies found on early entrance to kindergarten or first grade (ranging across 72 years), the majority were conducted in the late 1950s and early 1960s, perhaps in response to the U.S. priority to regain scientific leadership considered lost with the launch of Sputnik in 1957. These studies were primarily causal-comparative in design, comparing gifted children who entered school early with equally gifted children who did not. Although 66% of the studies on early entrance did not specifically identify giftedness, among the studies that did use such identification, the results were consistently positive. A representative study by Halliwell and Stein (1964), for example, compared the achievement, in all academic core areas, of 142 gifted first-grade early entrants and regular entrants, reporting significantly higher achievement for those gifted learners who entered school early.

Compacted curriculum studies numbered 10, ranging from 1959–1995. Most were conducted in the late 1950s and early 1960s before the term "compacting" had become a regular part of the field's vocabulary. Afreth and MacEachern (1964), for example, compared the mathematics achievement of students identified as gifted, either high achievers or average achievers, who had been randomly assigned to compacted or traditional math programs. Achievement was measured using pre- and post-tests of math achievement. Students whose math programs were compacted performed at significantly higher levels, regardless of their initial achievement levels.

Among the 21 subject acceleration studies, ranging from 1962–1987, most were either case studies or comparative in design. Stanley (1975), for example, compared the math achievement of 90 mathematically talented students in grades 4–7, who were allowed to accelerate into high school algebra, with the achievement of 66 8th-grade students. The younger, gifted students significantly outperformed the 8th-grade students.

Thirty-six studies on concurrent or dual enrollment were conducted from 1959–1988; the predominant design was comparative. For example, Braun and Steffensen (1960) compared 66 matched pairs of 8th-grade gifted students, one of whom was enrolled in 1–3 high school courses, while the other received no acceleration. Both the academic achievement and the socialization of the concurrently enrolled students were significantly more positive.

Research on Talent Search courses consists primarily of case study or survey designs. Thomas (1987), for example, conducted a 4-year follow-up study of 44 Talent Search (1982) participants who took summer courses in mathematics, finding outstanding performance not only in math achievement but also in academic self-concept and socialization in high school.

Research on independent study has been rare, but a few case studies do exist. The principal issues underlying the lack of academic effect for this option have been initially that traditional measures of achievement, such as the Iowa Tests of Basic Skills or the California Achievement Tests, are unlikely to

have even a single test item that pertains to what an individual learner has studied independently. An additional concern is that the research conducted thus far has not documented the actual skill levels of the gifted independent researcher, which would naturally affect whether or not transferable skills or knowledge were learned as a result of the independent work.

Among the Advanced Placement and International Baccalaureate program research, 22 studies were located, these being primarily comparative in design. These studies date from 1955, the first year of the AP program's establishment, through to 1986. Typical of this body of research is Ruch's (1968) study, in which the grade-point averages of 42 matched pairs of students who had taken or not taken AP courses in high school were compared at the university level. Students who had taken AP courses had significantly higher grade-point averages in the subjects in which they had accelerated than did their non-AP matches.

Only one specific study on a program that brings the college to a high school to provide a college-level course (college-in-the-schools) was identified through the literature review. Gudaitis (1986) compared the Scholastic Aptitude Test scores of 606 students who took college courses on their high school sites with the scores of 5,352 students who did not participate. Participants' scores were significantly higher than the scores of non-participants.

Mentorship as a subject-based accelerative option has been studied extensively (13 studies) during the 1978–1988 period only. The research comprises mainly case studies, either short-term or longitudinal, but one interesting comparative study conducted by the Baldwyn District (1982) compared the academic achievement of seven gifted students receiving mentorships with seven gifted students who were not mentored. The achievement gains were significantly higher for the mentored learners in their specific areas of mentoring.

Among the 13 studies on credit for prior learning, all were conducted on students at the college level using survey data about their actual performance in college. Pressey (1945), for example, conducted a study of performance and the time taken to graduate when students had taken examinations for course placement or were given credit for prior learning. Academic achievement was reportedly higher, and somewhat less time was spent remaining in college at the undergraduate level, for students given credit for prior learning than for students normally placed.

Post-secondary options, as a corollary to concurrent enrollment, has been parsed out from the concurrent enrollment research study base. A case study by Rifugiato (1962), for example, reported the academic effects of 38 gifted students who took university courses while in high school and four gifted students who went to university full-time while still in high school, but graduated with their high school class. The academic achievement gains were reportedly substantial for both groups, measured pre- and post-, but no specific effect size could be calculated from the reported data.

The Effects of Grade-based Accelerative Options

In previous work, Rogers (2002) has identified five forms of grade-based acceleration, all of which allow gifted learners to progress more quickly through the general K–12 curriculum, leaving the system anywhere from 1–4 years earlier than the normal age/grade lock-step system permits. Each is listed and defined below. A table follows which summarizes the research-based effects (and effect sizes where applicable) for each of these forms.

Grade Skipping–double promoting a gifted learner such that s/he bypasses 1–2 grade levels.

Non-Graded/Multi-Age Classrooms—placing learners of all ability levels in a classroom undifferentiated by grade levels. Students work through the curricular materials at a pace appropriate to individual ability and motivational levels.

Multi-Grade/Combination Classrooms—placing learners of all ability levels in a classroom that "covers" 2 years' curriculum, such as a 1/2 classroom.

Grade Telescoping—allowing a student or group of students to progress more rapidly through the curriculum of several grade levels. A middle school student or group would complete the three years of middle school curriculum in two years.

Early Admission to College—permitting a student to enter college as a full-time student without completion of a high school diploma.

Table 2 shows the effects, the limitations of the research studies collected, and the personal learning characteristics and strengths that predict success with the respective options.

TABLE 2.

EFFECTS, RESEARCH LIMITATIONS, AND PREDICTORS OF SUCCESS IN GRADE-BASED ACCELERATION OPTIONS

Option	Academic Effect	Limitations of Research Conducted	Prior Indicators of Probable Student Success
Grade Skipping	1/2 year's additional growth in all academic areas (ES=.49) This is a one-time jump (Rogers, 1992).	32 studies on gifted learners. Most studies used two control groups (same age equally gifted who did not skip and older age equally gifted who had not skipped). The effect sizes of each control group were averaged together. Outcomes of all 32 studies were remarkably consistent and positive (Rogers, 1992).	• Processes in top 2–5% and achieves in most academic areas 2 or more grade levels ahead • Is frustrated with slow pace and repetition of regular classroom experiences • Is independent in thought and action, persists in assigned and self-selected tasks, enjoys learning, socially mature • Prefers fast-paced, challenging learning • Enjoys self-instructional materials • Enjoys working with others of like ability • Has wide-ranging academic interests • Is actively involved in activities and hobbies outside of school (Rogers, 2002; Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2003).
Non-Graded/ Multi-Age Classrooms	2/5 of a year's additional growth in all academic areas (ES=.38) for each year child is placed in this conformation (Rogers, 1998).	11 studies that focused on effects of gifted learners in such classrooms; all but one junior high study are of elementary conformations (Rogers, 1992).	• Needs to learn more in a year than the typical 1-year curriculum can offer • Has above-average ability and is advanced beyond grade level in most academic areas • Shows frustration with pace of regular classroom instruction at grade level • Is independent, persistent, motivated to learn, socially mature, accepting of others • Prefers discussion, peer tutoring, group projects • Likes self-instructional materials • Has wide-ranging interests • Is actively involved in variety of activities and hobbies outside of school (Rogers, 2002).
Multi-Grade/ Combination Classes	1.9 months' additional growth in all academic areas (ES=.19) (Rogers, 1998). No additional growth (Veenman, 1995).	5 studies that reported effects for higher-ability learners; all were elementary studies. None of the studies documented how students were placed in the multi-grade situation. 2 meta-analyses with contradictory findings, but not focused on gifted learners (Rogers, 1998).	• Needs more to learn in a year than the typical 1-year curriculum can offer • Has above-average ability and is advanced beyond grade level in most academic areas • Is a good reader with long attention span in area of interest • Shows frustration with pace of regular classroom instruction at grade level • Is independent, persistent, motivated to learn, socially mature, accepting of others, enjoys school • Prefers to work alone or in small like-ability groups • Likes self-instructional materials • Has wide-ranging interests • Is actively involved in variety of activities and hobbies outside of school (Rogers, 2002).

Table 2 (continued).

Effects, Research Limitations, and Predictors of Success in Grade-based Acceleration Options

Option	Academic Effect	Limitations of Research Conducted	Prior Indicators of Probable Student Success
Grade Telescoping	3/5 of a year's additional growth in all academic areas for each year involved (ES=.40) (Rogers, 1992).	28 studies, of which 6 were elementary children; remainder were half middle school and half high school studies. Sample sizes in studies ranged from 15–1,027 (Rogers, 1992).	• Processes and achieves well above most others at current grade level • Is frustrated with regular classroom pace • Has strong achievement need, takes risks, confident, persistent, independent, socially mature, accepting of others • Enjoys working in like-ability or like-interest groups • Is actively involved in a variety of activities and hobbies outside of school (Rogers, 2002).
Early Admission to College	1/3 year additional growth in all academic areas—one-time gain. (ES=.32) (Rogers, 1992). Extraordinary academic progress with more radical forms of early admission (Brody & Stanley, 1991; Gross, 1993).	27 studies that focus on gifted learners who enter only 1–2 years early. Several case studies of those with more radical acceleration (Rogers, 1992).	• Scores >150 on IQ test and has completed advanced-level college coursework while in high school • Scores > 650 on SAT Math or SAT Verbal exams prior to 11th grade (or equivalent on ACT) • Is frustrated with pace of regular classroom instruction • Is independent in thought and action, motivated to learn, socially mature, accepting of others, self-confident, competitive • Prefers fast-paced challenge • Prefers to work with self-instructional materials, lecture, individual projects, and discussion • Will not "regret" leaving the social atmosphere of high school • Has strong interest in at least one academic area • Has some involvement in activities outside of school (Rogers, 2002).

Key Studies on Grade-based Acceleration Practices

Research on grade skipping comprises one of the strongest and most consistent bodies of research in the field of gifted education. Among the 32 studies on its effects, most are either comparative or case study in design. Sample sizes for these studies range from 22–6,886 students. A representative study on this option is one by Robeck (1968), in which the achievement of 57 grade-skipped students was compared with both an older control group and a same-age control group, both matched with the accelerants for mental age. Not only was academic achievement more positive for the grade-skipped learners, but also their social adjustment and academic self-esteem were more positive.

Of the 11 studies on non-graded or multi-age classrooms, most were comparative or case study in nature. The period in which this option was studied ranged from 1924–1986. Brody (1970), for example, compared the academic achievement of 603 students in one school system assigned to either non-graded or graded classrooms. Comparisons, although among non-equivalent groups, were controlled for IQ, and sub-samples of the groups with IQs over 125 and those with IQs under 115 were also compared. Gifted children in non-graded classrooms tended to outperform their graded-classroom controls significantly. A representative study of multi-grade or combination classes can be found in the work of Kierstead (1963). The researchers compared ability-matched groups in reading within a combination class with students in a traditional-graded classroom. Although the sample of gifted students compared was only six in number, the results showed more positive reading achievement for those students in the multi-grade classroom.

Studies on grade telescoping number 28 and range from 1918–1998. Most are comparative or case study in design. Race (1918), for example, compared the academic pre- and post-test achievement of 21 fourth-grade students for whom two years of academic work was telescoped into a single year. The students did indeed accomplish the two years' curriculum satisfactorily in half the time. In a comparative study of gifted learners, Culbertson (1961) monitored the academic pre- and post-test achievement of 178 pairs of junior high students matched on IQ and gender, finding significantly higher achievement in those who were telescoped than those who proceeded through the lock-stepped grade progression.

Studies of early admission to college numbered 27 and ranged from 1916–1988. Most were relatively well-designed comparative studies using sizable samples. Robinson and Janos (1986), for example, compared early admittants (n=24), regular admittants (n=24), National Merit Scholars (n=23), and students eligible for early admission who chose to remain in high school (n=27) on their socialization and psychological adjustment, finding no difference in these traits generally for early admittants. Similarly, Van der Jagt and Angell (1950) compared early admittants and regular admittants in college science courses, finding the early admittants significantly outperformed the regular college students.

Conclusions

As can be seen, accelerative options fall into two broad categories of instructional management. Grade-based acceleration shortens the number of years a gifted learner must remain in the K–12 system before enrolling in college or university. Subject-based acceleration allows the gifted learner to engage with advanced content or skills in an area of special talent and interest at an age earlier than customary. Acceleration is much more than a simple grade skip.

The multiple forms of acceleration described in this chapter provide educational decision-makers with a broad, research-supported menu of accelerative options which, when appropriately applied, result in significant academic achievement for gifted learners. However, it is important that decisions about acceleration, either grade-based or subject-based, be formed on more than the research findings alone. Individual student readiness is critical.

It is therefore imperative that educators, considering the use of acceleration with a gifted learner, collect adequate supplementary information on the individual learner's levels of cognitive functioning, learning strengths, learning preferences, and interests and involvements inside and outside of school. The school should consider not simply whether the individual student would benefit from acceleration, but which form or forms of acceleration would be most responsive to his or her learning and social needs.

As can be seen from the research findings reported above, the academic outcomes of acceleration are impressive. Accelerated students consistently outperform non-accelerated ability-peers, regardless of which form of acceleration is employed. As discussed in Robinson's and Gross's chapters in this volume, socio-affective outcomes are likewise positive. The question for educators seems to be not *whether* to accelerate a gifted learner, but rather *how*.

References

Afreth, O.B., & MacEachern, D. G. (1964). An action research study in arithmetic. *The Arithmetic Teacher, 11*, 30–32.

Assouline, S., Colangelo, N., Lupkowski-Shoplik, A., Lipscomb, J., & Forstadt, L. (2003). *The Iowa Acceleration Scale*—2nd Ed. Scottsdale, AZ: Great Potential Press.

Baldwyn School District. (1982). *A gifted model designed for gifted students in a small, rural high school: Post-evaluation design*. Baldwyn, MS: Office of Elementary and Secondary Education, Washington, DC. (ERIC Document Reproduction Service No. ED 233 847).

Boardman, C. (1943). Findings from selected studies on early admission to college. *The School Review, 51*, 460–470.

Braun, R. H., & Steffensen, J. (1960). Grouping, acceleration, and teacher aide experiments in Urbana secondary schools. *NASSP Bulletin, 44*, 305–315.

Brody, E.B. (1970). Achievement of first- and second-year pupils in graded and nongraded classrooms. *The Elementary School Journal, 70*, 391–394.

Brody, L., & Stanley, J.C. (1991). Young college students: Assessing factors that contribute to success. In W.T. Southern, & E. D. Jones (Eds.), *Academic acceleration of gifted students* (pp. 102–132). NY: Teachers College Press.

Culbertson, W. P. (1961). An evaluation of an accelerated program in the junior high school. *Dissertation Abstracts International*, *42* (11-A), 4790.

Glass, G.V., McGaw, B., & Smith, M.L. (1981). *Meta-analysis in social research*. Beverly Hills, CA: Sage.

Gross, M.U.M. (1993). *Exceptionally gifted children*. NY: Routledge.

Gudaitis, J.L. (1986). *Advanced college project: Final evaluation report*. Unpublished manuscript. Bloomington, IN: Indiana University. (ERIC Document Reproduction Service No. ED 267 097).

Halliwell, J. W., & Stein, B. W. (1964). A comparison of the achievement of early and late school starters in reading related and non-reading related areas in fourth and fifth grades. *Elementary English*, *41*, 631–639.

Kierstead, R. (1963). A comparison and evaluation of two methods of organization for the teaching of reading. *Journal of Educational Research*, *56*, 317–321.

Light, R.J., & Pillemer, D.B. (1984). *Summing up: The science of reviewing research*. Cambridge, MA: Harvard University Press.

Pressey, S. L. (1945). Credit by examination: Present use and future need. *Journal of Educational Research*, *38*, 596–605.

Pressey, S.L. (1967). "Fordling, 38–46 accelerates ten years later. *Journal of Counseling Psychology*, *14*, 73–80.

Race, H.V. (1918). A study of a class of children of superior intelligence. *The Journal of Educational Psychology*, *9*, 91–98.

Reis, S.M., Westberg, K.L., Kulikowich, J., Caillard, F., Hebert, T.P., & Plucker, J.A. (1993). *Why not let high ability students start in January? The curriculum compacting study.* (Research Monograph #93106). Storrs, CT: National Research Center on the Gifted and Talented.

Rifugiato, F. J. (1962). Special courses for the high ability student. *NASSP Bulletin*, *46* (271), 26–33.

Robeck, M. C. (1968). *California project talent: Acceleration of intellectually gifted pupils. California Department of Education report.* Washington, DC: Office of Education (DHE). (ERIC Document Reproduction Service No. ED 034 353).

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence*, *15*, 51–60.

Rogers, K.B. (1992). A best-evidence synthesis of the research on acceleration options for gifted learners. In N. Colangelo, S.G. Assouline, & D. L. Ambroson (Eds.), *Talent development: Proceedings from the 1991 Henry B. and Jocelyn Wallace national research symposium on talent development* (pp. 406–409). Unionville, NY: Trillium.

Rogers, K.B. (1998). Using current research to make "good" decisions about grouping. *National Association for Secondary School Principals Bulletin*, *82* (595), 38–46.

Rogers, K.B. (2002). *Re-forming gifted education: How parents and teachers can match the program to the child*. Scottsdale, AZ: Great Potential Press.

Ruch, C. (1968). A study of the collegiate records of Advanced Placement and non-Advanced Placement students. *College and University*, *43*, 207–210.

Solano, C.H., & George, W.C. (1976). College courses and educational facilitation of the gifted. *Gifted Child Quarterly*, *20*, 275–285.

Southern, W.T., & Jones, E.D. (Eds.). (1991). *The academic acceleration of gifted children*. NY: Teachers College Press.

Stanley, J. C. (1975). *Special fast mathematics classes during school: Algebra taught quickly by college professors to fourth through seventh graders*. Paper presented at the annual meeting of the American Educational Research Association (Washington, DC). (ERIC Document Reproduction Service No. ED 136 536).

Thomas, T. A. (1987). *CSUs academic talent search follow-up report: After the first four years.* Paper presented at the annual meeting of the American Educational Research Association, Washington, DC. (ERIC Document Reproduction Service No. ED 287 253).

Van der Jagt, E. R., & Angell, G. W. (1950). Should accelerated students be penalized by admission requirements? *School and Society, 71*, 198–200.

Veenman, S. (1995). Cognitive and noncognitive effects of multi-grade and multi-age classes: A best-evidence synthesis. *Review of Educational Research*, *65*, 319–382.

Witty, P.A., & Wilkins, L.W. (1933). The status of acceleration or grade skipping as an administrative practice. *Educational Administration and Supervision*, *19*, 321–346

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Effects of Academic Acceleration on the Social-Emotional Status of Gifted Students

Introduction

By now, the evidence concerning the positive academic effects of acceleration in all its many forms has been well accepted and, for the most part, academic issues are no longer a serious concern for educators or parents of gifted students. Much more pervasive and subtly entrenched are concerns about social and emotional effects (Jackson, Famiglietti, & Robinson, 1981; Southern, Jones, & Fiscus, 1989; Vialle, Ashton, Carlon, & Rankin, 2001). These worries are usually confined to forms of acceleration that involve younger gifted students being placed in settings with older classmates rather than in more advanced classes with other students of their own age. Although the absence of anticipated harmful effects of acceleration on affective development is a redundant finding of research in this field (Cornell, Callahan, Bassin, & Ramsay, 1991), the fears just don't go away.

Concerns about Social-Emotional Status of Accelerants

Apprehensions about social and emotional effects of acceleration have multiple sources. First, educators usually assume, incorrectly, that gifted children's emotional maturity relates primarily to chronological age rather than to mental age. An immediate set of questions then has to do with whether young gifted students are mature enough to handle classroom expectations appropriate for older students, such as the ability to sit still and not demand more than their share of teacher attention; whether their fine motor skills are sufficient for writing assignments; and whether they can meet expectations for personal organization and planning, increased homework, and perseverance with more complex assignments. Another set of concerns is purely social. Will the students make friends in the new situation or become social isolates? Will younger boys find girls to date? How will they feel when their classmates start driving before they can? Will they be tempted into situations such as boy-girl relationships or smoking and alcohol use before they are ready to handle such issues? Will precious social and extra-curricular opportunities be lost, especially if the high school years are reduced? What about the prom?

Finally, mental health issues are also concerns. There are widespread myths about the psychological vulnerability of gifted students and therefore fears that acceleration will lead to an increase in disturbances such as anxiety, depression, delinquent behavior, and lowered self-esteem. In fact, a comprehensive survey of the research on this topic finds no evidence that gifted students are any more psychologically vulnerable than other students, although boredom, underachievement, perfectionism, and succumbing to the effects of peer pressure are predictable when needs for academic advancement and compatible peers are unmet (Neihart, Reis, Robinson, & Moon, 2002). Questions remain, however, as to whether acceleration may place some students more at risk than others.

Considerations before Examining the Research

It is important to recognize the complexity of the questions being asked, and the numerous caveats that must be invoked when evaluating the research evidence, such as it is, that addresses the concerns mentioned above.

First, of course, are both the diversity of the gifted population eligible for acceleration and the diversity of the accelerative solutions possible. There are a mind-boggling number of permutations possible. Student differences include age, gender, degree of advancement, characteristics of personality and temperament, possible learning disabilities, racial/cultural differences, urban/rural differences, educational level of parents, family resources, and family dynamics that may affect outcomes. Accelerative programs differ as to whether the acceleration is initial (early entrance to school) or later; whether it is gradual or abrupt; whether it is part-time (subject matter only) or full-time; and whether it amounts to acceleration of a single grade or several grades (radical acceleration).

Defining "adjustment," or "social-emotional effects" is also a much messier business than examining academic achievement. Which outcome measures should we use? Although there do exist psychometrically sound personality inventories, such as the MMPI or the California Psychological Inventory, as well as behavioral rating scales, such as the Achenbach Child Behavior Checklist, by far the most frequent variable examined by investigators has been one or another index of academic self concept. This variable is highly dependent on the student's comparison group (Marsh, 1987). Also, there is some disagreement as to whether gifted children as a group, accelerated or non-accelerated, differ from others in aspects such as sensitivity and excitability (O'Connor, 2002), thereby complicating comparisons of gifted students with their classmates.

Furthermore, the nature of research on acceleration is and will be descriptive and correlative, using one or more quasi-experimental designs (Campbell & Stanley, 1966). Given educators' and parents' strong convictions about these issues, we are unlikely ever to undertake true experimental studies involving randomization of gifted students to accelerated and non-accelerated settings. Willingness to accelerate will always be voluntary, and will be more eagerly sought by some families and students than others.

In evaluating outcomes for students, we should recall that acceleration is often undertaken to solve a problem, that problem usually being a student's dissatisfaction, unhappiness, diminished interest in school, or lack of friends. If the student does not subsequently find happiness, what factors may be at play aside from acceleration?

As mentioned previously, still another issue has to do with the effects of changing comparison groups on one's self-esteem, or perhaps, expression of self-esteem. Gifted students have often been at the very top of their regular class ever since preschool, but when entering a class of older and more experienced students or a special class, they may find themselves in less auspicious positions. (To quote Professor Julian Stanley, "In a room full of Nobel Prize winners, half are above average and half are below average.") There is convincing evidence (Marsh & Hau, 2003) that in at least some respects, students in selective programs endorse less positive academic self-esteem statements (e.g., "I'm good at most school subjects,") than do students in non-selective programs, but the interpretation of such effects is not clear (Plucker, et al., 2004). Is this a "modesty effect," gifted students sometimes grasping earlier than age mates that tooting one's horn is unseemly? Does it reflect a more sophisticated view of what expertise really demands? (In contrast, people who are not skilled at something tend to overestimate their own skills and underestmate the abilities of others [Dunning, Johnson, Ehrlinger, & Kruger, 2003]). Does it reflect a positive sense of belonging, fitting in, to a group of highly able peers? Is academic self-concept less important a determinant of status in a high-ability population than in a regular classroom (Cornell, et al., 1990)? Is being the big fish in a little pond (Marsh, 1987) the road to confidence for the student who is at the top of an under-challenging class in which attainment comes with little effort and no true peers exist against whom to measure oneself? Or is that student likely to develop an "entity view" of ability (Dweck, 2000), with all its burdens of arrogance, brittleness of self-concept, and avoidance of new challenges and learning opportunities? As Gross (1998, p. 23) expressed it, "The modest academic self-esteem . . . reflects an acceptance of how far they still have to go if they are to become all they can be."

Still other questions about acceleration emanate from more general research knowledge about optimal child development. In what kind of setting is the student's pervasive interest in school and life experiences — a strong correlate of achievement and well-being (Hunter & Csikszentmihalyi, 2003) — most likely to be enhanced? In terms of adolescents' pursuit of their talents, their achievement motivation, and confidence, there is a growing body of evidence that an optimal pattern consists of family demandingness, high expectations, and promotion of independence in the context of warmth and parental responsiveness (Baumrind, 1989; Csikszentmihalyi, Rathunde, & Whalen, 1993; Schmidt & Padilla, 2003). Are high expectations in the school setting, i.e., those occurring when the curriculum is accelerated and the peer group of com-

parable ability, not equally important for positive social and emotional outcomes in gifted students?

Finally, we have virtually no information about the social and emotional effects of voluntary or involuntary non-acceleration on gifted students who are clearly academic misfits in their school settings. Do we really do them no harm by treating them "just like anybody else?" One survey after the demise of a gifted program (Purcell, 1993) found that parents saw their children as "experiencing a decline in energy, curiosity, and intrinsic motivation to achieve . . . and . . . beginning to disengage from the traditional curriculum" (p. 177). Longitudinal comparative case studies such as those published by Gross (2003) suggest strong negative effects when highly gifted children are not given opportunities for acceleration. Any professional in this field deals with discouraged youngsters who are bored and unhappy in regular classrooms. But the body of empirical research about this question is thin and, given the broad diversity in the gifted population as well as the selective factors that bring children to professional attention, lingering questions remain.

The Research Evidence

Personal Maturity of Gifted Students

As a group, gifted children tend to be socially and emotionally more mature than their age mates. Reviews of research on social cognition, friendships, moral judgment, fears, play interests, and personality variables (Janos & Robinson, 1985; Robinson & Noble, 1992) have shown that psychosocial maturity relates more closely to mental age than chronological age, or that gifted children's psychosocial maturity falls somewhere between. Gross (2002), studying friendship preferences, has shown how deeply even young gifted children yearn for stability, loyalty, and intimacy in relationships, qualities beyond the capacity of most of their age mates to comprehend or provide. This being the case, for many gifted students, accelerative options can provide a better personal maturity match with peers than do non-accelerated programs, to say nothing of a better cognitive match.

Accelerative Options that Enable Students to Remain with Chronological-Age Peers

A number of accelerative options enable students to remain with age peers in academically advanced settings (see Southern & Jones, this volume). Most of these are a strong mix of enrichment and acceleration. Not surprisingly, because such programs do not create age displacement, few questions have been asked about their social-emotional effects (Rogers, 1992; Shields, 1995). Analyses of the few studies that have questioned the outcomes of special-class grouping of equally gifted students on self-esteem and other social-emotional indices typically find none-to-small effects (e.g., Arends & Ford, 1964; Shields, 1995; Swiatek & Benbow, 1991), although even the modest effects tend to be positive rather than negative (Kulik & Kulik, 1984; see Kulik, this volume; Rogers, 2002). Most comparisons of the adjustment status of gifted students in special programs with regular-class non-gifted students tend to be positive (Sayler & Brookshire, 1993) or at least, not negative (Schneider, Clegg, Byrne, Ledingham, & Crombie, 1989), but the role of acceleration is unclear in such studies.

Studies of selective settings versus heterogeneous classrooms do yield somewhat different results. Marsh and Hau's (2003) large-scale study of academic self-esteem statements of students in selective high schools in 26 countries, contradicts the Kulik and Kulik (1984) conclusion. Like Schneider, et al., (1989), Marsh and Hau found lower self-esteem scores in selective settings, which they interpret as a negative effect. As discussed above, however, the validity of such interpretation is not at all clear.

A few additional studies have looked at the effects on adjustment of summer programs that typically engage students in classes that are faster paced and more advanced than the usual fare. High-school credit is often awarded subsequent to successful performance. Summer-program studies (e.g., Neber & Heller, 2002; Thomas, 1993) describe the students as evidencing healthy adjustment but have not included comparison groups of eligible, non-enrolled gifted students. Males (more than females) who do not do as well as they expect in such programs may be somewhat vulnerable (Gibbons, Benbow, & Gerrard, 1994). Most students show a dip in academic and general self-concept measures during the program (social comparison effects), but recover their original status after they return to their home classrooms.

Accelerative Options that Place Gifted Students with Older Classmates

Although there exists a very wide variety of methods by which grade-based acceleration can be achieved (see Southern & Jones, this volume), only three models have received much attention. These three are early entrance to school, grade-skipping, and early college entrance.

Early School Entry

Early entry to kindergarten or first grade has a number of advantages (see Colangelo, Assouline, & Lupkowski-Shoplik, this volume). It is the least disruptive in terms of friendships and curriculum, it is inexpensive, and it provides — at least in the beginning — an appropriate degree of challenge for children who are moderately gifted and not yet advanced readers. (For early entrants who are advanced readers, additional curriculum adaptation is needed.) At the same time, however, this option requires decision-making when a child is still quite young and has long-term consequences, since it is a decision difficult to reverse (Shepard & Smith, 1986).

This area of inquiry is beset with booby traps in the form of multiple studies that redundantly demonstrate a birth-date effect. Unselected children with summer birthdays tend to show more "immaturity" (surprise!) than their older classmates, are more often referred for suspicion of learning disabilities (Maddux, 1983), and show more behavior problems (Gagné & Gagnier, 2004). This effect tends to disappear with time, as the spread of ages within a grade decreases in proportion to total age. Many parents who seek early entry for their children are responding to the children's needs, but in addition, financially strapped parents, who would not otherwise do so, may seek entry for their children with fall birthdays mainly to avoid paying for day care (Mawinney, 1964).

Several reviews of the literature on social-emotional outcomes for carefully selected groups of early entrants (Proctor, Black, & Feldhusen, 1986; Rankin & Vialle, 1996; Robinson & Weimer, 1991; Rogers, 1992) conclude that academically, these children are usually well served by early entrance, although an occasional study, such as that by Obrzut, Nelson, and Obrzut (1984), reported a higher-grade-retention rate among selected early entrants. With regard to socio-emotional indices, Rogers (1992) found slightly positive (though practically insignificant) socialization and psychological effect sizes for studies of early entrance. Hobson (1963), who followed early entrants for a number of years, found a higher proportion engaging in extracurricular activities and occupying school positions of leadership. Worcester (1956) similarly reported positive findings. A recent study by Gagné and Gagnier (2004) found on average few adjustment differences between the entrants and their regular-age classmates, although the differences were positive. Qualitatively, they discovered that teachers judged a significant minority of early entrants less than well adjusted. Boys were at greater risk than girls, although fewer boys were nominated by their parents for early entrance.

Practically every reviewer of this literature has weighed in favorably about the practice of permitting early entrance, but invariably with caveats. It is suggested that early entrance, except in very exceptional cases, be limited to students with birthdays that fall three months or less after the ordinary cutoff date; that evaluation include not only intellectual advancement but pre-academic skills related to reading and math; that emotional regulation, social skills, and social maturity be taken into account; and that gross and fine motor skills also be evaluated. The youngster's developmental status in most domains should be well into the top half of the new class (by age-equivalence). In addition, a trial placement of several weeks is sometimes recommended. Finally, it is recommended that decisions should take into account the attitude of the receiving teacher as well as the average achievement level of the school, and that somewhat greater caution be taken with boys than girls (see Colangelo, Assouline, & Lupkowski-Shoplik, this volume).

Grade-Skipping

Most of the available studies of the outcomes of grade skipping are *ex post facto*. The proliferation of the regional talent searches that identify very bright students at middle school age has made it relatively easy to access students who are more academically advanced than expected for their age (e.g., Bower, 1990; Brody & Benbow, 1987; Pollins, 1983; Richardson & Benbow, 1990). The National Education Longitudinal Study (NELS) has yielded a large database for analysis as well (Sayler & Brookshire, 1993). The talent search databases are less representative, because selective factors (such awareness of the programs and the courage to enroll in a competitive situation) affect membership in the talent search population. The results of these analyses as well as others (Engle, 1938; Heinbokel, 1997; Plucker & Taylor, 1998; Prado & Scheibel, 1995) are encouraging. Rogers (1992) reported positive effects for socialization (mean effect size .46) and psychological variables (mean effect size .12) across the studies she reviewed. Indeed, for highly gifted students, Gross (1994) found that those who had not skipped more than one grade were less well adjusted than those who had done so.

It is worth describing a couple of these studies in detail. Sayler and Brookshire (1993), using the NELS88 database, identified accelerated 8th-grade gifted students who had entered early or skipped a grade, students in 8th-grade gifted classes, and regular 8th-grade students. Both accelerated and gifted students had better perceptions of their social relationships and emotional development, and tended to have fewer serious school behavior problems than the regular students. Non-accelerated gifted students said that their peers saw them as good students, popular, important, and athletic more often than the other two groups, while the accelerated students reported that they were less often seen as troublemakers and more often seen as good students, but were more like the regular students on the other variables. In a subsequent report,

Sayler (1996) concluded that the differences between adjusted and poorly adjusted accelerants related to the interactions of parents and schools in meeting the needs of these students.

Richardson and Benbow (1990) identified over 2,000 12–14-year-old students who had scored high on the math section of the College Board Scholastic Aptitude Test in 1972–1974. These students responded to questionnaires at age 18 (91% response rate) and again at age 23 (65% response rate). More than half had followed an accelerated trajectory by age 18. Both accelerants and non-accelerants reported high self-esteem and internal locus of control. Acceleration did not seem to affect social interactions, self-acceptance, or identity, nor did it relate to social and emotional difficulties. Very few respondents (6% at age 18, 3% at age 23) saw the acceleration as having a negative effect on their lives. Gender differences were not significant (see Lubinski, this volume).

We can, then, conclude that grade-skipping is a highly viable option for gifted students, although one that is not currently in vogue. There is no evidence that being younger than one's classmates is associated with social or psychological difficulties. Often it becomes obvious during the first year or two of school that a bright student needs a higher-level, faster-paced instructional setting. If this is not the case, grade skipping is recommended during the year just before a natural transition would occur (i.e., to middle school or high school) because social groups would undergo realignment anyway in a new and usually larger school.

Early Entrance to College

The history of early college entrance is discussed by Brody, Muratori, and Stanley (this volume). Since universities have existed, a few students have entered at early ages (Cox, 1926; McCurdy, 1960), most with healthy psychological outcomes (Janos, 1987; Weiner, 1953), but a few who became spectacularly unsuccessful (Montour, 1977). Almost all of these early entrants in former times were initially tutored at home, and none had the advantage of programmatic support. The first programs were established during World War II (Fund for the Advancement of Education, 1957). Most programs existing today owe their origins and their research emphasis to Dr. Julian Stanley (1991a), who has generously provided leadership, mentorship, and inspiration.

Students can come at an early age to college in one of three ways: They may graduate from high school early, having skipped grades or otherwise accelerated; they may enroll concurrently in high school and college programs; or they may forego all or part of their high school education and enroll in college directly.

High-school graduates. Young high school graduates simply proceed to college on their own and seldom find special support there. Most manage the transition to college independently, usually with considerable assistance from parents. Accordingly, most of our information about this group is through case studies, the popular media, and parent report, and would be difficult to summarize (though the general picture is positive).

Concurrent enrollment. Few studies have dealt with the psychological effects of concurrent enrollment in high school and college, although it is becoming increasingly frequent. Interviewing 20 students, McConnaha (1997) found that, while the students were highly motivated, self-confident, and positive in attitude, the dual enrollment did impact their social lives. Similarly, Halvorsen, Noble, Robinson, and Sisko (2000) found that students using Washington State's Running Start program, while well satisfied, spent very little non-class time on either the community college campus or the high school campus. They appreciated their friendships with college classmates as well as their newfound independence; many had felt high school to be claustrophobic.

Skipping all or part of high school. There is, in contrast, considerable research about students who enter full-time college-based programs, because these students naturally come under the surveillance of associated faculty (who are eager to publish!). The most common pattern substitutes college courses for part, sometimes all, of high school. There are currently more than a dozen residential early-entrance programs in the United States, and several others in which the students live at home (see, e.g., Boothe, Sethna, Stanley, & Colgate, 1999). Clearly, there are different questions to ask when students enter college at 12–14 years of age versus when they enter at 17, when they live at home versus in dorms, and when efforts are made to maintain social groups and activities versus encouraging students to integrate with others on the campus. Still, the thrust of the research findings is similar: students tend to thrive, once any of these programs gets through the "shake down" phase (Olszewski-Kubilius, 1995).

Some of the pioneer programs in fact did experience initial "wobbles" that made life difficult for students, although each of these programs subsequently addressed the issues successfully. For example, a residential program for girls initially accepted some students who were not sufficiently able or prepared for the experience; raising entrance standards and modifying counseling support did the trick (Cornell, Callahan, & Loyd, 1991a, 1991b; Ingersoll & Cornell, 1995; Stanley, 1991b). An early spate of underachievement in another program (Janos, Sanfilippo, & Robinson, 1986) was handled by a curriculum change, a counseling change, and more careful admissions. Most programs gradually attract better qualified applicants as the programs become known and selection criteria are better

understood (e.g., Caplan, Henderson, Henderson, & Fleming, 2002; Sethna, Wickstrom, Boothe, & Stanley, 2001).

The freshman year may be a particularly difficult time for young students who are leaving home and high school (Brody, Lupkowski, & Stanley, 1988; Lupkowski, Whitmore, & Ramsay, 1992; Muratori, Colangelo, & Assouline, 2003). In the absence of matched comparison groups, however, it is difficult to identify how much the student's youth adds to the ordinary angst of the transition.

A common worry about such programs focuses on whether students will be able to make friends with classmates who are older. How swiftly this process occurs depends in part on the nature of the program. A strong peer group of like-age students furnishes a home base enabling students to make older friends at their own pace (Janos, et al., 1988) although, even in the absence of any programmatic support, younger students often find friends among classmates (Glazer & Shore, 1984). Furthermore, the longer the programs exist on a campus, and the more heterogeneous the student body, the more likely are the older students to be comfortable with younger ones and vice versa.

Although few studies of early entrants have employed comparison groups, studies at the University of Washington (UW) did compare adjustment status and personal orientation of early entrants, non-accelerated classmates, and National Merit Scholarship finalists (NMFs) who entered the UW at the expected age (Janos, Robinson, & Lunneborg, 1989; Noble, Robinson, & Gunderson, 1993; Robinson & Janos, 1986). Few differences were found; clearly, the early entrants were doing as well as the other groups and in some ways were more mature than college students who were not gifted. When younger, they were somewhat more independent and unconventional than the NMFs. By the time they were young adults, they had become as serious and focused as the NMFs, while their rates of college completion and of proceeding to graduate and professional schools were higher.

Finally, what do early entrants themselves have to say about the situation? We have a number of surveys and personal reports (Charlton, Marolf, & Stanley, 1994; Muratori, Colangelo, & Assouline, 2003; Noble, Arndt, Nicholson, Sletten, & Zamora, 1999; Noble & Drummond, 1992; Noble & Smyth, 1995; Stanley, et al., 1996) that all point to a high rate of satisfaction with the choice to accelerate, and typically few regrets about what was missed in high school. As Olszewski-Kubilius (1995) points out, this is perhaps not surprising because early entrants typically have been desperate to escape high school. Furthermore, many high-school extracurricular activities can be replicated on a college campus.

Conclusions and Recommendations

The overwhelming evidence suggests that all the forms of academic acceleration constitute viable options as part of any attempt to provide an optimal educational and social match for gifted students. None of the options has been shown to do psychosocial damage to gifted students as a group; when effects are noted, they are usually (but not invariably) in a positive direction. While educators' worries about harming students by accelerative choices can generally be laid to rest, we still have little empirical information about how best to match student and option, about the optimal timing of such choices, about how to make the transition successful, or about how to create best-fit packages of options, especially for those many gifted students for whom a single year of academic acceleration is not enough. We also need to resign ourselves to the fact that we are unlikely ever to undertake true experimental studies that include random assignment of gifted children to contrasting experiences.

Even with these questions, however, we have developed an extensive body of experience, bolstered by the research in hand. A few recommendations can be offered.

- We can lay firmly to rest the myth that acceleration is inherently dangerous for gifted students.
- Acceleration of some sort should be a central aspect of every gifted student's program to achieve an optimal match not only with the pace and level of academic instruction but also with a peer group of equally mature classmates.
- Indeed, it is likely that not just one, but several, accelerative options, together with enrichment options, should be included in a student's educational trajectory from preschool through college.
- Acceleration involving age displacement, which makes use of existing classes for older students, is an inexpensive and effective option that does not increase ethnic or socioeconomic disproportionality.
- On the other hand, some groups may be more vulnerable to negative effects of acceleration than others. There probably should be more caution in placing boys, students who are unlikely to be above the median of the new class, students with attention problems, those with poor fine motor skills, and those from conflicted and/or unsupportive families.
- Assessment of the child's abilities, skills, and personal characteristics should precede decision-making.
- Transitions should be planful, involving not only the stu-

dent and family but receiving teachers as well. Academic gaps, if any, should be addressed before the transition, and any psychosocial issues should be anticipated with the student before the shift is made. Gradual transitions (e.g., single-subject acceleration preceding grade-skipping) are probably preferable, but there is no research evidence addressing this issue.

- Students who enter an older grade or more selective class should be coached in how to handle the possibly disconcerting feeling of not always being top of the class. Gifted though they are, they may well not grasp the fact that their lower status in the class arises from a change of comparison group.
- Many gifted students will initially reject a change of class because they fear losing the only friends they have. Although their feelings should be recognized, this should not be a sufficient reason to forego such an option. Students can be asked to accept the new placement as an experiment, with the option of returning to the regular class after a few months if they are unhappy.
- Students who see themselves as similar to classmates rather than different tend to make a better adjustment (Engle, 1938; Janos, Fung, & Robinson, 1985), whether their classmates are their age or older. A clear danger of not accelerating is that gifted students will respond to peer pressure by denying their giftedness to avoid feeling different (Rimm, 2002).
- Ability is not the only issue to consider; student interests should guide choices as well. A student leader or team athlete may prefer not to graduate early; students with interests outside the high school curriculum may be eager to do so.
- Further research is needed to explore student responses to different forms of acceleration, and possible interventions to assure that accelerative programs more reliably improve students' social and emotional adjustment, as opposed simply to doing no harm. Investigators can now put aside the "big question" (Is acceleration bad for students?) and focus on variance in both students and options and better ways to match the two.
- Finally, difficult as it may be, future research will yield much greater understanding if we focus not just on gifted accelerants, but on two additional groups: equally gifted non-accelerants, and older students who are classmates (and mental-age mates) of the accelerants. We need context to make sense of the picture.

References

Arends, R., & Ford, P. M. (1964). *Acceleration and enrichment in the junior high school: A follow-up study.* (Report). Olympia, WA: Washington Office of the State Superintendent of Public Instruction.

Baumrind, D. (1989). Rearing competent children. In W. Damon (Ed.). *Child development today and tomorrow.* San Francisco: Jossey-Bass.

Boothe, D., Sethna, B. N., Stanley, J. C., & Colgate, S. D. (1999). Special opportunities for exceptional able high school students: A description of eight early-college-entrance programs. *Journal of Secondary Gifted Education*, *10*, 195–202.

Bower, B. (1990). Academic acceleration gets social lift. *Science News*, 138(*4*), 212–222.

Brody, L. E., & Benbow, C. P. (1987). Accelerative strategies: How effective are they for the gifted? *Gifted Child Quarterly*, *31*, 105–110.

Brody, L. E., Lupkowski, A., & Stanley, J. C. (1988). Early entrance to college: A study of academic and social adjustment during the freshman year. *College & University*, *63*, 347–359.

Campbell, D. T., & Stanley, J. C. (1966). *Experimental and quasi-experimental designs for research*. Chicago: Rand McNally.

Caplan, S. M., Henderson, C. E., Henderson, J., & Fleming, D. L. (2002). Socioemotional factors contributing to adjustment among early-entrance college students. *Gifted Child Quarterly*, *46*, 124–134.

Charlton, J. C., Marolf, D. M., & Stanley, J. C. (1994). Follow-up insights on rapid educational acceleration. *Roeper Review*, *17*, 123–130.

Cornell, D. G., Callahan, C. M., Bassin, L. E., & Ramsay, S. G. (1991). Affective development in accelerated students. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 74–101). New York: Teachers College.

Cornell, D. G., Callahan, C. M., & Loyd, B. H. (1991a). Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program. *Gifted Child Quarterly*, *35*, 58–66.

Cornell, D. G., Callahan, C. M., & Loyd, B. H. (1991b). Research on early college entrance: A few more adjustments are needed. *Gifted Child Quarterly*, *35*, 71–72.

Cornell, D. G., Pelton, G. M., Bassin, L. E., Landrum, M., Ramsay, S. G., Cooley, M. R., Lynch, K. A., & Hamrick, E. (1990). Self-concept and peer status among gifted program youth. *Journal of Educational Psychology*, *82*, 456–463.

Cox, C. M. (1926). *Genetic studies of genius: Vol. 2. The early mental traits of three hundred geniuses*. Stanford, CA: Stanford University Press.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. New York: Cambridge University Press.

Dunning, D., Johnson, K., Ehrlinger, J., & Kruger, J. (2003). Why people fail to recognize their own incompetence. *Current Directions in Psychological Science*, *12*, 83–87.

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*. Philadelphia: Taylor & Francis.

Engle, T. L. (1938). A study of the effects of school acceleration upon the personality and social adjustments of high-school and university students. *Journal of Educational Psychology*, *29*, 523–539.

Fund for the Advancement of Education of the Ford Foundation (1957). *They went to college early: Evaluation Report No. 2*. New York: The Fund.

Gagné, F., & Gagnier, N. (2004). The socio-affective and academic impact of early entrance to school. *Roeper Review*, *26*(3), 128–138.

Gibbons, F. X., Benbow, C. P., & Gerrard, M. (1994). From top dog to bottom half: Social comparison strategies in response to poor performance. *Journal of Personality and Social Psychology*, *67*, 638–652.

Glazer, S., & Shore, B. M. (1984). *The social and academic success of younger-than-average-aged students at McGill University*. Montreal: Centre for Teaching and Learning Services.

Gross, M. U. M. (1994). Radical acceleration: Responding to academic and social needs of extremely gifted adolescents. *Journal of Secondary Gifted Education*, 5(*4*), 27–34.

Gross, M. U. M. (1998). "Fishing" for the facts: A response to Marsh and Craven, 1998. *Australasian Journal of Gifted Education*, 7(*1*), 16–28.

Gross, M. U. M. (2002) Gifted children and the gift of friendship. *Understanding Our Gifted*, 14(*3*), 27–29.

Gross, M. U. M. (2003). *Exceptionally gifted children* (2nd edition). London: Routledge Falmer.

Halvorsen, M., Noble, K. D., Robinson, N. M., & Sisko, N. (2000). *Making the transition: Assessment of student satisfaction with preparation for Running Start*. University of Washington: Robinson Center for the Study of Capable Youth.

Heinbokel, A. (1997). Acceleration through grade skipping in Germany. *High Ability Studies*, *8*(1), 61–77.

Hobson, J. R. (1963). High school performance of underage pupils initially admitted to kindergarten on the basis of physical and psychological examinations. *Educational and Psychological Measurement*, *23*, 159–170.

Hunter, J. P., & Csikszentmilhalyi, M. (2003). The positive psychology of interested adolescents. *Journal of Youth and Adolescence*, *32*, 27–35.

Ingersoll, K. S., & Cornell, D. G. (1995). Social adjustment of female early college entrants in a residential program. *Journal for the Education of the Gifted, 19*, 45–62.

Jackson, N. E., Famiglietti, J., & Robinson, H. B. (1981). Kindergarten and first grade teachers' attitudes toward early entrants, intellectually advanced students, and average students. *Journal for the Education of the Gifted*, *4*, 132–142.

Janos, P. M. (1987). A fifty-year follow-up of Terman's youngest college students and IQ-matched agemates. *Gifted Child Quarterly*, *31*, 55–58.

Janos, P. M., Fung, H., & Robinson, N. M. (1985). Self concept, self esteem, and peer relations among gifted children who feel "different." *Gifted Child Quarterly*, *29*, 78–82.

Janos, P. M., & Robinson, N. M. (1985). Psychosocial development in intellectually gifted children. In F. D. Horowitz & M. O'Brien (Eds.). *The gifted and talented: Developmental perspectives* (pp. 149–195). Washington, DC: American Psychological Association.

Janos, P. M., Robinson, N. M., Carter, C., Chapel, A., Cufley, R., Curland, M. (1988). Social relations of students who enter college early. *Gifted Child Quarterly*, *32*, 210–215.

Janos, P. M., Robinson, N. M., & Lunneborg, C. E. (1989). Academic performance and adjustment status of early college entrants, non-accelerated peers, and college classmates. *Journal of Higher Education*, *60*, 495–518.

Janos, P. M., Sanfilippo, S. M., & Robinson, N. M. (1986). Underachievement among markedly accelerated college students. *Journal of Youth and Adolescence*, *15*, 303–311.

Kulik, J. A., & Kulik, C-L. C. (1984). Effects of accelerated instruction on students. *Review of Educational Research*, *54*, 409–425.

Lupkowski, A. E., Whitmore, M., & Ramsay, A. (1992). The impact of early entrance to college on self-esteem: A preliminary study. *Gifted Child Quarterly*, *36*, 87–90.

Maddux, C. D. (1983). Early school entry for the gifted: New evidence and concerns. *Roeper Review*, *5*(4), 15–17.

Marsh, H. W. (1987). The big-fish-little-pond effect on academic self-concept. *Journal of Educational Psychology*, *79*, 280–295.

Marsh, H. W., & Hau, K-T. (2003). Big-fish-little-pond effect on academic self concept: A cross-cultural (26-country) test of the negative effects of academically selective schools. *American Psychologist*, *58*, 364–376.

Mawinney, P. E. (1964). We gave up on early entrance. *Michigan Education Journal*, *41* (May), 25.

McConnaha, W. R. (1997). An analysis of dual enrollment as an acceleration option for high school students. *Dissertation Abstracts International,* 58(3-A). US: University Microfilms International.

McCurdy, H. (1960). The childhood patterns of genius. *Horizon*, 2(*5*), 33–38.

Montour, K. M. (1977). William James Sidis: The broken twig. *American Psychologist*, *23*, 265–279.

Muratori, M., Colangelo, N., & Assouline, S. (2003). Early-entrance students: Impressions of their first semester of college. *Gifted Child Quarterly*, *47*, 219–238.

Neber, H., & Heller, K. A. (2002). Evaluation of a summer-school program for highly gifted secondary-school students: The German Pupils Academy. *European Journal of Psychological Assessment*, *18*, 214–228.

Neihart, M., Reis, S. M., Robinson, N. M., & Moon, S. M. (2002). *The social and emotional development of gifted children*. Waco, TX: Prufrock Press.

Noble, K. D., Arndt, T., Nicholson, T., Sletten, T., & Zamora, A. (1999). Different strokes: Perceptions of social and emotional development among early college entrants. *Journal of Secondary Gifted Education*, *10*, 77–84.

Noble, K. D., & Drummond, J. E. (1992). But what about the prom? Students' perceptions of early college entrance *Gifted Child Quarterly*, *36*, 106–111.

Noble, K. D., Robinson, N. M., & Gunderson, S. A. (1993). All rivers lead to the sea: A follow-up study of young adults. *Roeper Review*, *15*, 124–129.

Noble, K. D., & Smyth, R. K. (1995). Keeping their talents alive: Young women's assessment of radical, post-secondary acceleration. *Roeper Review*, *18*, 49–55.

Obrzut, A., Nelson, R. B., & Obrzut, J. E. (1984). Early school entrance for intellectually superior children: An analysis. *Psychology in the Schools*, *21*, 71–77.

O'Connor, K. J. (2002). The application of Dabrowski's theory to the gifted. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.). *The social and emotional development of gifted children* (pp. 51–59). Waco, TX: Prufrock Press.

Olszewski-Kubilius, P. (1995). A summary of research regarding early entrance to college. *Roeper Review*, *24*, 152–157.

Plucker, J. A., Robinson, N. M., Greenspon, T. S., Feldhusen, J. F., McCoach, D. B., & Subotnik, R. R. (2004). It's not how the pond makes you feel, but rather how high you can jump. *American Psychologist, 59*, 268–269.

Plucker, J. A., & Taylor, J. W. V. (1998). Too much too soon? Non-radical advanced grade placement and the self-concept of gifted students. *Gifted Education International*, *13*, 121–135.

Pollins, L. D. (1983). The effects of acceleration on the social and emotional development of gifted students. In C. P. Benbow & J. C. Stanley (Eds.). *Academic precocity: Aspects of its development* (pp. 150–178). Baltimore: Johns Hopkins University Press.

Prado, T. M., & Scheibel, W. (1995). Grade skipping: Some German experiences. *European Journal for High Ability*, 6(1), 60-72.

Proctor, T. B., Black, K. N., & Feldhusen, J. F. (1986). Early admission of selected children to elementary school: A review of the research literature. *Journal of Educational Research*, 80, 70-76.

Purcell, J. H. (1993). The effects of the elimination of gifted and talented programs on participating students and their parents. *Gifted Child Quarterly*, 37, 177-187.

Rankin, F., & Vialle, W. (1996). Early entry: A policy in search of practice. *Australian Journal of Early Childhood, 21*, 6–11.

Richardson, T. M., & Benbow, C. P. (1990). Long-term effects of acceleration on the social-emotional adjustment of mathematically precocious youths. *Journal of Educational Psychology*, *82*, 464–470.

Rimm, S. (2002). Peer pressures and social acceptance of gifted students. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.). *The social and emotional development of gifted children* (pp. 13–18). Waco, TX: Prufrock Press.

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence, 15,* 51–60.

Robinson, N. M. & Noble, K.D. (1992). Social-emotional development and adjustment of gifted children. In M. Wang, M. Reynolds, & H. Walberg (Eds.), *Handbook of special education: Research and practice* (Vol. 4, pp. 57–76). Oxford: Pergamon Press.

Robinson, N. M., & Weimer, L. J. (1991). Selection of candidates for early admission to kindergarten and first grade. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 29–73). New York: Teachers College Press.

Rogers, K. B. (1992). A best-evidence synthesis of research on acceleration options for gifted students. In N. Colangelo, S. G. Assouline, & D. L. Ambroson (Eds.), *Talent Development: Proceedings of the 1991 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development* (pp. 406–409). Unionville, NY: Trillium Press.

Rogers, K.B. (2002). Effects of acceleration on gifted learners. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.). *The social and emotional development of gifted children* (pp. 3–12). Waco, TX: Prufrock Press.

Sayler, M. F. (1996). *Differences in the psychological adjustment of accelerated 8th grade students.* Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.

Sayler, M. F., & Brookshire, W. K. (1993). Social, emotional, and behavioral adjustment of accelerated students, students in gifted classes, and regular students in eighth grade. *Gifted Child Quarterly, 37*, 150–154.

Schmidt, J. A., & Padilla, B. (2003). Self-esteem and family challenge: An investigation of their effects on achievement. *Journal of Youth and Adolescence, 32*, 37–46.

Schneider, B. H., Clegg, M. R., Byrne, B. M., Ledingham, J. E., & Crombie, G. (1989). Social relations of gifted children as a function of age and school program. *Journal of Educational Psychology, 81*, 48–56.

Sethna, B. N., Wickstrom, C. D., Boothe, D., & Stanley, J. C. (2001). The Advanced Academy of Georgia: Four years as a residential early-college-entrance program. *Journal of Secondary Gifted Education, 13*, 11–21.

Shepard, L. A., & Smith, M. L. (1986). Synthesis on school readiness and kindergarten retention. *Educational Leadership*, *44*, 78–86.

Shields, C. M. (1995). A comparison study of student attitudes and perceptions in homogeneous and heterogeneous classrooms. *Roeper Review, 17*, 234–238.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989). Practitioner objections to the academic acceleration of gifted children. *Gifted Child Quarterly*, *33*, 29–35.

Stanley, J. C. (1991a). Reflections on my life and how it grew. In D. L. Burleson (Ed.). *Reflections: Personal essays by 33 distinguished educators* (pp. 340–55). Bloomington, IN: Phi Delta Kappa Educational Foundation.

Stanley, J. C. (1991b). Critique of "Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program." *Gifted Child Quarterly*, *35*, 67–70.

Stanley, J. C., Slotnik, A., & Cargain, M. J. (1996). Educational trajectories: Radical accelerates provide insights. *Gifted Child Today, 19*, 205–209.

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.

Thomas, T. A. (1993). *The achievement and social adjustment of accelerated students: The impact of academic talent search after seven years.* Sacramento, CA: California State University.

Vialle, W., Ashton, T., Carlon, G., & Rankin, F. (2001). Acceleration: A coat of many colours. *Roeper Review*, *24*, 14–19.

Weiner, N. (1953). *Ex-prodigy: My childhood and youth*. Cambridge, MA: MIT Press.

Worcester, D. A. (1956). *The education of children of above-average mentality*. Lincoln, NE: University of Nebraska Press.

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Talent Searches and Accelerated Programming for Gifted Students

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 educational services matched to their tested abilities. The programs are run by universities and some have been in existence for over 20 years. 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 (Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003). Stanley found that 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 extreme mathematical aptitude among junior high 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, New Zealand, The People's Republic of China, Ireland, and Spain. The services have been augmented to include use of the ACT Assessment; discovery of verbal, non-verbal, and science reasoning talent; a variety of types of educational programs; newsletters; services for parents, as well as the implementation of analogous Talent Searches for younger students (i.e., grades 4–6) using tests such as the PLUS and EXPLORE.

The Rationale for the Talent Search Model

The Talent Search Model is built upon the idea of "above-level" testing. A basic premise 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 in-grade-level achievement tests indicates a high level of mastery of the in-grade-level curriculum. However, these tests cannot tell how 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 Aptitude Test (SAT) or the American College Testing Program (ACT), the EXPLORE, or the PLUS, provide more accurate measurement of gifted students' abilities because they are designed to be used with older students.

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). 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,

Table 1.

Components of Talent Search

Diagnosis/Evaluation
- Assesses areas of talent
- Measures level of talent
- Yields estimate of learning rate

Educational Placement and Guidance
- Recommendation of sequential sets of educational experiences that develop area of talent
- Grade acceleration
- Subject acceleration
- Curriculum modifications such as compacting and telescoping

Talent Development Opportunities
- Saturday programs
- Summer programs
- Contest/Competitions
- Informational newsletters
- Clubs
- Magazines
- Career programs
- Weekend courses and programs
- Contact with gifted education experts
- Awards ceremonies
- Contact with other gifted children and their families
- Internships and mentorships
- Distance education courses

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 650 (85th percentile compared to college-bound 12th graders) and the other earns a score of 350 (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 similar 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 350 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 650 on SAT-Math is functioning mathematically like a child four to five years older and likely knows a great deal of precalculus mathematics without having taken a formal course (Bartkovich & Mezynski, 1981). 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 in scope, pace, or both.

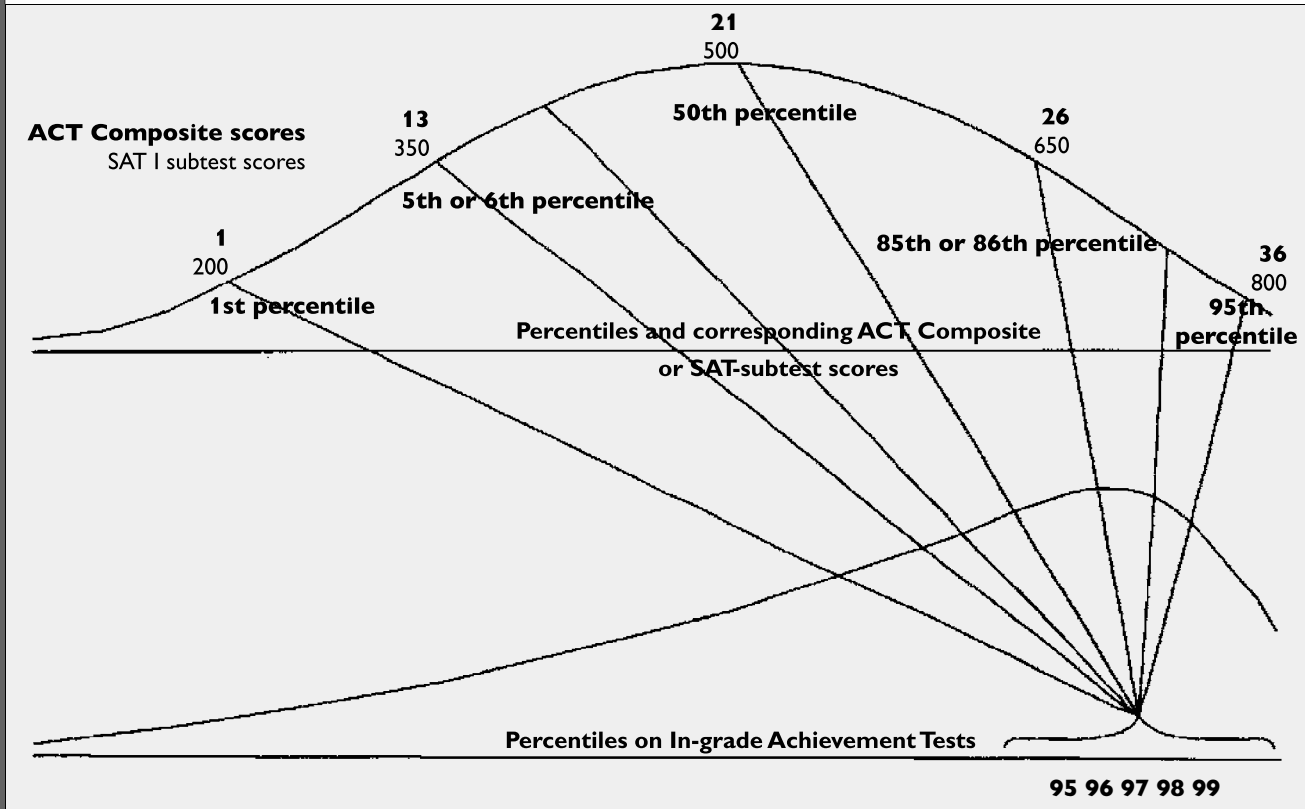
In addition to discerning areas and levels of ability within areas, the Talent Search gives educators a useful estimate of learning rate or the extent to which typical school instruction will be inappropriately slow paced and/or conversely, the rate at which instruction should be accelerated in order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

Approximately 130,000 7th- through 9th-grade students took the SAT with a Talent Search organization during 2001–2002 (J. Zumoff, personal communication, April 4, 2002). Another 37,000 students took the ACT, with a Talent Search organization (P. Dana, personal communication, August 6, 2003). Another 18,000 students in grades 3 through 6 took the EXPLORE test through ACT (P. Dana, personal communication, June 27, 2003) and over 18,000 5th and 6th graders took the PLUS test (L. Barnett, personal communication, September 11, 2003).

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 (i.e., college-bound 11th and 12th graders, see Table 2). These data indicate that above-level testing is not too difficult for these students, and significant proportions of students who score at the top of in-grade-level achievement tests have knowledge and abilities similar to students three to five years older.

FIGURE 1.

ABOVE-LEVEL TESTS USED WITH MIDDLE SCHOOL STUDENTS



The ACT Standard Scale Score range for each subtest is 1–36. The average score for collge-bound seniors is 21. The SAT Standard Scale Score range is 200–800 for each subtest. The average for college-bound seniors is 500. All percentiles' corresponding scores are approximate because they vary slightly from year to year.

Educational Placement and Guidance

The information yielded from Talent Search testing is very useful for educational placement. For example, Northwestern University's Center for Talent Development has developed recommended accelerated course sequences within each of the content areas (see Table 3 for an example) and a set of program recommendations matched to a student's Talent Search scores (see Table 4). The basis for these recommendations are differences in students' reasoning capabilities and learning rates, i.e., differences in their above-level scores. These differences are matched to educational programs that are appropriate in level, scope, and pace to sequentially and systematically develop a student's talents and interests over time.

Table 4 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 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. Accelerative practices, such as fast-paced classes, which compress a year's worth of high school level coursework into three weeks; curriculum compacting or diagnostic-prescriptive teaching, which use testing to eliminate already known material and; telescoped classes in which, for example, fours years of high school math is compressed or compacted into two years, can be used to provide a more appropriate pace of instruction (see Southern and Jones, this volume). 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

Table 2.

Percentage of Talent Search Students Scoring at the Normative Group or Above the Mean on the EXPLORE, ACT, or SAT

EXPLORE	English	Reading	Math	Science
4th Graders n=6,504	40%	27%	27%	26%
5th Graders n=15,702	64%	51%	58%	60%
6th Graders n=14,607	81%	72%	84%	79%
4th, 5th & 6th Graders n=36,812	62%	50%	56%	55%
Mean for 8th Graders	**13.9**	**13.9**	**14.4**	**15.9**

Note: Data are based on 2002–2003 testing year through May

ACT	English	Reading	Math	Science
6th, 7th, & 8th Graders n=36,715	21%	25%	11%	19%
Mean for College-Bound Seniors	**20.4**	**21.3**	**20.7**	**21.0**

Note: Data are based on the 2002–2003 testing year through May

SAT	Verbal	Math
6th Graders n=1266	10%	10
7th Graders n= 63,146	19%	20%
8th Graders n=24,344	41%	43%
Mean College-Bound Seniors	**507**	**519**

Note: Data are based on 2002–2003 testing year through May and were obtained directly from Talent Search organizations

other opportunities, such as contests and competitions, scholarships, as well as expert advice on issues such as acceleration and social-emotional aspects of giftedness. 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 who participate, and the effects of these opportunities on students can be enormous.

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 a particular subject area.

Fast-paced summer programs usually use SAT and ACT scores that are comparable to the average scores of college-bound high school seniors as entrance criteria. 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. Higher scores may be required for courses that are very advanced and/or very compressed. The available research evidence suggests that these practices are valid (see Olszewski-Kubilius, 1998b, for a review).

Olszewski-Kubilius, Kulieke, Willis, and Krasney (1989) 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

Table 3.

Accelerated Course Sequence Recommendations for Foreign Language

Grade	Sequence 1	Sequence 2
7th	Etymologies, Word Usage, Linguistics	1st-year Level I Language (according to the American Council of Teachers of Foreign Languages)
8th	1st-year Level I Language* (according to the American Council of Teachers of Foreign Languages)	2nd-year Level I Language
9th	2nd-year Level I Language	3rd-year Level I Language & 1st year of Level II, III, or IV Language
10th	3rd-year Level I Language* & 1st year of another-Level I Language	4th-year Level I Language & 2nd year of Level II, III, or IV Language or AP Language course or AP Literature
11th	4th-year Level I Language & 2nd year of second-Level I Language or AP Language course	3rd year of Level II, III, or IV Language
12th	3rd year of second Level I Language or AP Literature	4th year of Level II, III, or IV Language

**Level I or II languages refer to the American Council of Teachers of Foreign Language's guidelines for the difficult mastery of a given language. The commonly used romance languages are Level I. Higher level languages are those considered to be of a greater difficulty because they do not use the English alphabet. Japanese, Finnish, and Chinese are examples of Level IV languages.*

Extracurricular or Enrichment Activities

Travel to foreign countries; contemporary foreign magazines, comparable to People*, are available in larger cities and university bookstores, or by subscription; college language departments sponsor a variety of activities centering around languages; many popular computer programs and board games are available in common second languages; competitions sponsored by the Junior Classical League, a national organization that offers scholarships for students and hosts a summer convention for Latin students.*

hours) were appropriate as measured by student performance on standardized achievement tests. In summer, self-paced, high school-level mathematics classes, achievement was also high, and comparable to high school students who typically take year-long courses.

Bartkovich and Mezynski (1981) found that students who scored at 600 or above on SAT-Math successfully completed (as determined by performance on standardized tests) two high school-level mathematics classes in just 50 hours of in-class instruction on average. Similarly, junior-high-aged students whose average SAT-M scores were above 600 achieved at high levels 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 obtained average scores on standardized tests that were above the 70th percentile compared to high school students who typically take these tests after having one full year of instruction. Similarly, Kolitch and Brody (1992) reported that all but a few of the Talent Search students who accelerated themselves by taking high school- or college-level mathematics classes several years earlier than is typical, received grades of A or B for those classes and excelled on the Advanced Placement calculus examination. The results of these studies all suggest that acceleration in terms of instructional pace and/or level is an appropriate and successful practice for gifted students selected on the basis of talent search scores.

Talent Search students who accelerate their coursework in special programs do not experience ill effects. There is no evidence of burnout (Kolitch & Brody, 1992; Swiatek, 1993; Swiatek & Benbow, 1991a,b), as students retain their interest in mathematics and continue to take rigorous courses throughout high school and college. Learning mathematics in an accelerated 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,b). Students in fast-paced summer classes succeeded in subsequent classes, as determined by their own reports and those of their teachers. Fast-paced classes are not detrimental to long-term retention of the subject matter (Benbow, Perkins, & Stanley, 1983), as is evidenced by performance on standardized achievement tests taken long after the class is completed. Also, accomplishing high school coursework through fast-paced classes does not affect college placement; Talent Search participants who accelerated in mathematics via special programs were placed at an appropriate and advanced level in mathematics in college (Kolitch & Brody, 1992) unless they requested a special placement.

Table 4.

Program Recommendation Based on SAT I or ACT Performance Ranges

A Range	B Range	C Range
230–470 on SAT-V **200–510 on SAT-M** **OR** **0–21 on ACT-Eng or ACT-Read** **0–17 on ACT-Math**	**480–580 on SAT-V** **520–600 on SAT-M** **OR** **22–27 on ACT-Eng or ACT-Read** **18–23 on ACT-Math**	**580+ on SAT-V** **600+ on SAT-M** **OR** **28+ 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 Sequence 1 in area of academic strength 2. Early access to advanced school courses 3. Supplement coursework with enrichment-oriented school, Saturday, or summer programs 4. Early career counseling 5. Sequence 1 of "Recommended Course Sequences"	1. Long-range academic planning, following Sequence 2 of "Recommended Course Sequences" in area of academic strength 2. Fast-paced school, Saturday, or summer classes in area of strength, using "curriculum compacting" to compress courses into shorter time frames. 3. Early access to college-level coursework through Advanced Placement (AP), distance-learning, dual-enrollment, or summer courses. 4. Early career counseling, including access to mentorships, tutorials, and internships.	Options 1–4 from B Range, plus: 5. Individualized program of study, using "test-out" approach in areas of strength. This helps advanced students avoid spending time on material they already know. 6. Consider grade acceleration (grade skipping) or early admission to college 7. Individualized work with a mentor to pursue advanced study in an area, possibly aimed at specific AP exam.

Talent Search students who accelerated themselves did not differ from equally able students who did not accelerate on various personality characteristics, locus of control, and other psychosocial measures (Brody & Benbow, 1987; Richardson & Benbow, 1990; Swiatek, 1993), and they participated in extra-curricular activities to the same extent as non-accelerated students, except for those who radically accelerated (Swiatek, 1993). Talent Search students who chose to accelerate themselves during high school overwhelmingly reported that they were satisfied with their choices and generally viewed acceleration as having positive effects on their academic progress, interest in learning, acceptance of their abilities, and ability to get along with their intellectual peers (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 several domains that can be matched to educational programs adjusted for pacing and level of content. While 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 placements in grades and courses based solely on chronological age.

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

An important question about accelerative programs is their influence on students both short and long term. Proponents of Talent Search programs and special educational programs built on Talent Search scores assert many benefits to participation based on anecdotal data (Olszewski-Kubilius, 1989). Some of these have also been documented empirically. The studies reported below were direct assessments of the effects of Talent Search accelerative programs and involved comparisons between groups of participants and non-participants 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) taken in junior high on students' course-taking behavior and their attitudes in high school. Comparisons were made between programs and to control groups of students with similar-tested abilities who were not in programs. Girls in this study who participated in the accelerated mathematics summer program continued to be accelerated at grade nine compared to control boys and girls; however, that advantage

was lost by grade 11. At grade 11, the summer-program girls were on par with boys who had not been in a program but accelerated in mathematics compared to girls who had not been in a program. The authors conclude that the summer program helped talented females to keep up with talented boys who tend to accelerate without any intervention.

Barnett and Durden (1993) compared students who had participated in a Talent Search to students who had participated both in the Talent Search and in special summer programs. While both groups of students had a pattern of high achievement and completed a rigorous high school program, compared to the talent-search-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 rigorous AP Calculus BC exam, took College Board Achievement Tests more frequently and earlier, and took more college classes while still in high school. These students showed a pattern of using accelerative options in their educational programs.

Similarly, Olszewski-Kubilius and Grant (1996) compared Talent Search participants who took mathematics in a summer program to students who took accelerated summer courses in other subjects. They found that females who studied math benefited more than students who took other subjects. The mathematics females tended to accelerate themselves more and earned more honors in math during high school than other summer-course boys or girls. An interesting finding of this study was that for females, participation in a summer mathematics program was associated with taking more AP courses in any subject. Thus, while the research on the effects of special Talent Search programs suggests that participants generally pursue an accelerated and rigorous track within the subject of summer study, the effects may be generalized to other areas. This may be a result of increased confidence to succeed in rigorous academic settings.

There is also evidence that students who participate in a fast-paced mathematics class subsequent to a Talent Search participation are more likely to attend a more selective undergraduate institution (Barnett & Durden, 1993; Swiatek & Benbow, 1991a) and to enter college early (Swiatek & Benbow, 1991a). Females are more likely to major in math or science in college (Olszewski-Kubilius & Grant, 1996), go on to graduate school (Swiatek & Benbow, 1991a,b), and have higher educational aspirations (Olszewski-Kubilius & Grant, 1996).

In summary, participation in special accelerative programs subsequent to Talent Search can have many positive effects, and these extend to high school and college coursetaking and educational aspirations. These effects, particularly potent for talented females, may be due to increased interest in the subject. 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 because of the capabilities of one's classmates, does much to bolster confidence and raise expectations of oneself. The fact that students continue to use accelerative options attests to perceived value 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 the 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. Exposure to an academically rigorous educational program over a period of years is also associated with the development of abilities measured by the SAT and results in greater gains on SAT scores from junior high to high school (Brody & Benbow, 1990).

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 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 a supplemental summer program. Talent Search scores can be used effectively to select students for in-school, accelerated learning programs as well (McCarthy, 1999).

A continuing problem for Talent Searches and related education programs is access to them by economically disadvantaged students. Given the success of the model, educators need to work to ensure that all qualified students have access to the testing program and supplementary educational programs.

Notes

1. Portions of this article have been previously published in Olszewski-Kubilius, P. (Spring, 1998). Talent search: Purposes, rationale and role in gifted education. Journal of Secondary Gifted Education, 9 *(3) 106–114; Olszewski-Kubilius, P. (Spring, 1998). Research evidence regarding the validity and effects of talent search educational programs.* Journal of Secondary Gifted Education, 9 (3)*, 134–138; and Olszewski-Kubilius, P. (2004). Talent search: Purposes, rationale and role in gifted education. In D. Boothe & J. C. Stanely (Eds.)* In the eyes of the beholder: Critical Issues for Diversity in Gifted Education. *Waco, TX: Prufrock Press.*

2. The SAT is now known as the SAT-I, Scholastic Assessment Test. The College Board high school achievement tests are now known as SAT-II. The American College Testing Program Tests are now the ACT Assessment.

References

Barnett, L. B., & Durden, W. G. (1993). Education patterns of academically talented youth. *Gifted Child Quarterly*, *37*, 161–168.

Bartkovich, K. G., & Mezynski, K. (1981). Fast-paced precalculus mathematics for talented junior-high students: Two recent SMPY programs. *Gifted Child Quarterly*, *25*, 73–80.

Benbow, C. P (1992). Mathematical talent: Its nature and consequences. In N. Colangelo, S. G. Assouline, & D. L. Ambroson (Eds.), *Talent development: Proceedings from the 1991 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development* (pp. 95–123). New York: Trillium Press.

Benbow, C. P., & Arjmand, O. (1990). Predictors of high academic achievement in mathematics and science by mathematically talented students: A longitudinal study. *Journal of Educational Psychology*, *82*, 430–441.

Benbow, C. P., Lubinski, D., & Suchy, B. (1996). The impact of SMPY's educational programs from the perspective of the participants. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 266–300). Baltimore, MD: The Johns Hopkins University Press.

Benbow, C. P., Perkins, S., & Stanley, J. C. (1983). Mathematics taught at a fast pace: A longitudinal evaluation of SMPY's first class. In C. P. Benbow and J. C. Stanley (Eds.), *Academic precocity: Aspects of its development* (pp. 51–78). Baltimore: Johns Hopkins University Press.

Brody, L. E., & Benbow, C. P. (1990). Effects of high school coursework and time on SAT scores. *Journal of Educational Psychology*, *82*, 866–875.

Brody, L. E., & Benbow, C. P. (1987). Accelerative strategies: How effective are they for the gifted. *Gifted Child Quarterly*, *31*, 105–109.

Brody, L., & Fox, L. H. (1980). An accelerative intervention program for mathematically gifted girls. In L. H. Fox, L. Brody, & D. Tobin (Eds.), *Women and the mathematical mystique* (pp. 164–178). Hillsdale, NJ: Erlbaum.

Fox, L. H., Brody, L., & Tobin, D. (1985). The impact of early intervention programs upon course-taking and attitudes in high school. In S. F. Chipman, L. R. Brush, & D. M. Wilson (Eds.) *Women and mathematics: Balancing the equation* (pp. 249–274). Hillsdale, NJ: Erlbaum.

Kolitch, E. R., & Brody, L. E. (1992). Mathematics acceleration of highly talented students: An evaluation. *Gifted Child Quarterly*, *36*, 78–86.

Lupkowski-Shoplik, A. E., Benbow, C. P., Assouline, S. G., & Brody, L. E. (2003). In N. Colangelo & G. Davis (Eds.) *Handbook of gifted education, 2nd Ed.* (pp. 204–218). Boston, MA: Allyn and Bacon.

Lynch, S. J. (1992). Fast-paced high school science for the academically talented: A six-year perspective. *Gifted Child Quarterly*, *36*, 147–154.

Mills, C. J., Ablard, K. E., & Lynch, S. J. (1992). Academically talented students' preparation for advanced coursework after an individually-paced precalculus class. *Journal for the Education of the Gifted*, *16*, 3–17.

McCarthy, C. R. (1999). Assimilating the talent search model into the school day. *Journal of Secondary Gifted Education*, *9*, 114–123.

Olszewski-Kubilius, P. (1998a). Talent search: Purposes, rationale and role in gifted education. *Journal of Secondary Gifted Education*, 9 (*3*), 106–114

Olszewski-Kubilius, P. (1998b). Research evidence regarding the validity and effects of talent search educational programs. *Journal of Secondary Gifted Education, 9* (*3*), 134–138.

Olszewski-Kubilius, P. (1989). Development of academic talent: The role of academic programs. In J. VanTassel-Baska & P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners. The home, the self, and the school* (pp. 214–230). New York: Teachers College Press.

Olszewski-Kubilius P., & Grant, B. (1996). Academically talented women and mathematics: The role of special programs and support from others in acceleration, achievement and aspiration. In K. D. Noble & R. F. Subotnik (Eds.), *Remarkable women: Perspectives on female talent development* (pp. 281–294). Cresskill, NJ: Hampton Press.

Olszewski-Kubilius, P., Kulieke, M.J., Willis, G.B., & Krasney, N. (1989). An analysis of the validity of SAT entrance scores for accelerated classes. *Journal for The Education of the Gifted. 13*, 37–54.

Richardson, T. M., & Benbow, C. P. (1990). Long-term effects of acceleration on the social-emotional adjustment of mathematically precocious youths. *Journal of Educational Psychology*, *82*, 464–470.

Swiatek, M. A. (1993). A decade of longitudinal research on academic acceleration through the Study of Mathematically Precocious Youth. *Roeper Review*, *15*, 120–124.

Swiatek, M. A., & Benbow, C. P. (1991a). Ten-year longitudinal follow-up of participants in a fast-paced mathematics course. *Journal for Research in Mathematics Education*, *22*, 138–150.

Swiatek, M. A., & Benbow, C. P. (1991b). Ten-year longitudinal follow-up of ability-matched accelerated and unaccelerated gifted students. *Journal of Educational Psychology*, *83*, 528–538.

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Whole-Grade Acceleration

Introduction

The last two decades of the twentieth century were witness to increasing activity on behalf of gifted students, including the establishment of university-based centers of gifted education. Parents of gifted students recognized the potential for such centers to serve as resources for appropriate programming for their gifted children, especially when schools failed to provide the programming. Parents of gifted students also were among the first to experience their school's anti-acceleration policy. They turned to centers of gifted education as an outlet to express their frustration with educators and administrators who ignored the extensive documentation regarding the effectiveness of accelerative practices, especially whole-grade acceleration. The disconnect between evidence and practice resulted in institutional anti-acceleration policies, which were typically based on individual biases and preferences rather than on fact. Parents viewed centers of gifted education as advocates for appropriate programming, including acceleration, for their children.

Faced with an increasing number of individual requests to assist in the decision-making process regarding whole-grade acceleration (grade skipping), a guidance tool was conceptualized to standardize the process. This guidance tool, now known as the *Iowa Acceleration Scale* (*IAS*) (Assouline, Colangelo, Lupkowski-Shoplik, & Lipscomb, 1998), and for which there is a second edition (Assouline, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2003) has proven itself as a systematic and defensible way to generate recommendations and guidelines for whole-grade acceleration (Assouline, Colangelo, Ihrig, Forstadt, Lipscomb, Lupkowski-Shoplik, 2003b; Lipscomb, 2003). (See the report of two validation studies, Appendix D , this volume.) One of the important considerations in whole-grade acceleration, and an especially strong feature of the *IAS*, is systemizing the decision-making procedures in order to improve the probability that adequate information is gathered and objective decisions are made (Assouline, et al., 2003a; Piper & Creps, 1991). Feldhusen (1992) also noted the importance of evaluating an encompassing set of factors with respect to whole-grade acceleration.

The *IAS* (Assouline, et al., 2003a) was developed after nearly two decades of clinical work with students considered for whole-grade acceleration. The *IAS*-2nd edition manual describes the *IAS* purpose and items in detail; a considerable portion of this chapter relies on the literature review for the *IAS*-2nd edition and our clinical experience with students who have been accelerated. The *IAS* includes 20 items that are rated and categorized into five subtotals that include the most salient 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. In this chapter we will examine the role of two of the subtotals: (a) Academic Ability, Aptitude, and Achievement, as well as (b) Attitude and Support. The three other subtotals are well documented among the other chapters in this volume. A third part of this chapter addresses early entrance to school, a special application of whole-grade acceleration.

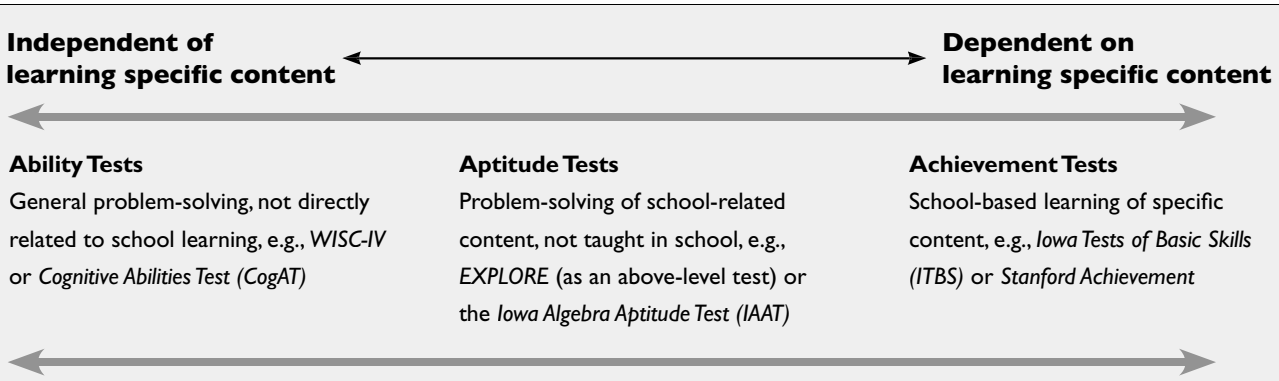
The Role of Academic Assessment in the Decision-Making Process of Whole-Grade Acceleration

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.

Are assessment and testing identical? We agree with Sattler (2001) and view testing as one of four components of an assessment. Assessment is the umbrella term for comprehensive and systematic gathering of information on 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

Figure 1.

Continuum of Tests from Ability to Achievement



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* 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* assessment process.

Tests needed for the IAS

There are nearly three thousand 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, and constitute 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 of test. Achievement tests are based upon the student's exposure and expertise with specific school-related subject content. Aptitude tests measure problem solving in specific content areas taught in school, and are therefore not as dependent upon learning specific content. Ability tests are least dependent upon learning specific content. The continuum in Figure 1 provides examples. The *IAS*-2nd edition 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*. An individualized intelligence test that is professionally administered continues to be a very effective predictor of academic success in elementary and secondary school (Sattler, 2001; Seigler & 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) has since suggested this figure (IQ equal to or greater than 130) as the required performance level at which acceleration is recommended. Terman and Oden (1947) and Davis and Rimm (1994) have determined the figure to be an IQ of 135 or higher, and Feldhusen, Proctor, and Black (1986) have used the figure 125. Users of the *IAS* are required to administer an individualized intelligence test. To be recommended for *consideration* of whole-grade acceleration, students must earn an IQ that is at least one standard deviation above the mean (i.e., >115).

Assessment of Aptitude

A test of general ability can be an excellent indicator of need for whole-grade acceleration; however, measures of general ability do not provide specific information concerning subjects or content areas. Stanley (1984) advocates that a comprehensive profile of students' specific 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 means 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 a student is ready to learn more challenging material. Scores at or above the 75th percentile on an above-level test indicate that the student has exceptional aptitude in a subject area. In both cases, the student is ready for more advanced work, and in the case of the higher 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 (Lupkowski-Shoplik, Benbow, Assouline, & Brody, 2003; see chapter, this volume, by Olszewski-Kubilius). For young students who perform exceptionally well on grade-level tests, there often is a "ceiling effect," where scores cluster in the 95th to 99th percentiles. 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 scores, to determine where specific academic aptitudes are. Taking an above-level test gives a better picture of the 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.

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 a student is ready to learn a new level of material. Performance at or above the 90th percentile on grade-level material constitutes that level of excellence.

For the purpose of the *IAS*, a grade-level standardized test such as the *Iowa Tests of Basic Skills* (ITBS), 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
- 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 their grade-level content, but has "hit the ceiling" of the grade-level test. 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; 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* accounts for this divergence. In the *IAS-2nd ed.*, 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.

Attitude and Support

Testing provides much of the objective information needed to make a decision about skipping a grade or entering school early. In spite of all the evidence that might show a student is a good candidate for acceleration, school personnel and parents still may hesitate to move the student up a grade. Regardless of the documented evidence about a student's ability to be grade skipped, such an educational intervention also contains a strong element of "Is this OK for us to do?" In answering such a question, we are talking about positive attitude and support from three main and important groups: students, parents, and the educators. To do anything out-of-step usually requires a modicum of courage and an affirming perspective from these three groups helps structure courage.

Attitude and Support from the Student

VanTassel-Baska (1991) discusses how cultivating a student's willingness and enthusiasm for whole-grade acceleration is critical to the process' ultimate success. In fact, one of the "Critical Items" included in the *Iowa Acceleration Scale* is the student's attitude toward acceleration. If the student doesn't want to accelerate in school, other alternatives for academic challenge need to be considered. The student also needs to be included in the discussion about acceleration; this becomes more and more important for older students. To fully present the potential impact of acceleration, it is helpful to include the student in discussions 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 our experience most students enthusiastically embrace the idea of acceleration, and in some cases initiate the process (Assouline, et al., 2003a).

Students also benefit from outside-of-school activities that are intellectually stimulating and challenging. These activities offer two positives. First, they are instances of challenge that help a student gain confidence and experience; second, outside-of-school activities offer opportunities to interact with students who are often older.

Southern and Jones (1992) warn that whole-grade acceleration that is attempted late in a student's academic career, perhaps at the end of junior high school, may increase reluctance by the student to separate from peers and current school settings. The older the student, the more difficult it will be to integrate with the new peer group. In addition, if parents and educators are apprehensive about the acceleration, it is more likely that the student will be reluctant to attempt a leadership or social role in the new placement. Such concerns represent a rationale for early entrance to school, which is discussed later in this chapter.

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 either hurrying those children through their childhood or are pushing them into situations for which they are not yet ready (VanTassel-Baska, 1991). Existing research, however, supports the view that most parents have a positive impact on their gifted children. In a survey of more than 3,000 academically talented elementary students and their families, Colangelo, Assouline, Chen, and Tsai (1998) gathered information about perceptions of parent involvement in their children's academic and social lives. Over 80% of the students felt that their mothers were involved "about right" in both school and social activities. Over 75% felt the same about their fathers. More importantly, of the remaining students, fewer than 5% felt that their parents were involved "too much." In fact, up to 10% perceived their parents as being involved "too little." Colangelo (1998), Bloom (1985), VanTassel-Baska and Olszewski-Kubilius (1989), and Csikszentmihalyi, Rathunde, and Whalen (1993) have also documented the important role of the parents in the lives of talented students.

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 importance 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, the *IAS* requires that parents be included as part of the decision-making team.)

Attitude and Support from the School System

Southern, Jones, and Fiscus (1989) found that 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. Southern and Jones (1992) similarly 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).

Not all educators display such reluctance or discomfort 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* process.

Once a child has been grade skipped, it has been found that 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, Daniel, & Boston, 1985). 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*, 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* 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

One of the unique types of whole-grade acceleration is early entrance to school (i.e., kindergarten or first grade). For academically talented young children, early entrance to school may provide an excellent accelerative option. There is abundant evidence that bright youngsters who are carefully selected for early entrance generally perform very well, both academically and socially (Robinson, this volume; Robinson & Weimer, 1991). However, there is great hesitation on the part of many educators to encourage a student to enter school early.

Advantages of Early Entrance

Entering school early may provide the best match between the curriculum and the child's academic abilities, and therefore may make excellent sense academically (Robinson & Weimer, 1991). In addition, bright children who enter kindergarten or first grade early are less likely to be bored with school. In an appropriately challenging program, students are less likely to "breeze" through school, learning the bad habits ("I never have to work hard because everything is so easy for me") that may lead to underachievement and/or perfectionism in the future (Saunders & Espeland, 1991).

Also, early entrance to school is the least disruptive form of acceleration, both academically and socially. It avoids the gaps in knowledge that might occur if a student skips a grade later (Robinson & Weimer, 1991). In addition, since young students have not yet had the time to form close friendships with age peers, social disruptions are minimized (Assouline, et al., 2003; Robinson, this volume; Robinson & Weimer, 1991). Finally, in contrast to any other form of acceleration, issues of academic credit are not a problem if a child enters early.

Concerns about Early Entrance

In spite of these significant advantages, there are still some negative aspects to entering school early. One of the apparent difficulties with this decision is that it must be made when the child is quite young, before the child has had much experience with schooling or with peer relationships. In addition, the consequences of this decision are long term: it is difficult to change our minds and reverse the decision (Brody, Capurro, Jones, Olszewski-Kubilius, Renzulli, Robinson, & Southern, 2003; Robinson, this volume).

Perhaps because of a concern about the long-term ramifications of a decision to accelerate at this young age, many educators are reluctant to consider this option for a young gifted child. Educators are especially hesitant to have students enter kindergarten at a young age, perhaps because of a fear that

the consequences of such an intervention will not be known for years, and thus even seemingly positive short-term adjustments could 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, Daniel, & Boston, 1985; Robinson & Weimer, 1991). Reluctance to consider early entrance to school on the part of school personnel 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, Jones, & Fiscus, 1989).

There are many practical concerns with early entrance to kindergarten. For example, young children may become tired long before older classmates. They 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, or drawing. All of these concerns are valid reasons that school personnel and parents are likely to be cautious about having an individual child enter school early. These concerns seem cogent, but what does the research say?

Research on Early Entrance

The research conducted on early entrance to kindergarten and first grade portrays a positive picture for these young students. For example, in her meta-analysis on acceleration, Rogers (1992) reported that early entrants performed as well as or better than their older classmates did academically; accelerated students performed better on standardized achievement tests, teacher-developed tests, grades, teacher ratings of student performance, and attitude toward learning (see also Rogers, 2002). Kulik and Kulik (1984) reported similar findings in their meta-analyses on acceleration. (See chapters by Kulik and Rogers, this volume.)

When reporting the results of these research studies, 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, they may have a summer birthday) to regular-age kindergarten students. The second set of research involves comparisons between carefully selected early entrants (bright youngsters who 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, for studies comparing carefully selected early entrants to regular-age students, the picture is very positive 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 a recent study, Gagné and Gagnier (2004) 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, 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 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 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 2, 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 over estimate 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 to hesitate to use acceleration as an appropriate intervention for academically talented students, we suggest using an objective decision-making tool, the *Iowa Acceleration Scale*, to help minimize the chances of inappropriately recommending acceleration as an educational intervention.

Making the Decision: Helpful Information

Because few schools have a systematic process for screening potential early entrants (Cox, Daniel, & Boston, 1985), and few preschool teachers believe that early entrance to kindergarten is appropriate for young children (Sankar-DeLeeuw, 2002), most often it is the parents who bring 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 (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, Colangelo, Lupkowski-Shoplik, Lipscomb, & Forstadt, 2003a, p. 117), 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 (Roedell, 1989), and early reading (sometimes as early as age two or three) (Gross, 1992a; Jackson, 2003)
- Strong mathematical skills (for example, doing addition and subtraction at the age of three; Gross, 1992b; Assouline & Lupkowski-Shoplik, 2003)
- Long attention span (Silverman, 2000)
- Extraordinary memory (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 (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. Young children are not experienced at taking group tests. Also, as previously mentioned, the test administrator can gather important behavioral information by observing the child in a one-on-one setting (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* 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) and the age-appropriate Wechsler scales to measure intelligence. Useful measures of achievement include the Peabody Individual Achievement Test-Revised, the Woodcock-Johnson III Tests of Achievement, the Wechsler Individual Achievement Test, and the Stanford Diagnostic Mathematics Test—4th edition. 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 Manual* — 2nd ed, Assouline et al., 2003a, for a thorough discussion of recommended tests.)

Finally, looking at the curriculum used in the school the child may be entering is essential. Kindergartens vary greatly in their curricular orientations. Some are academic and require students to participate in a formal study of letters and numbers, while others are more "developmentally-oriented" and have many opportunities for free play, socialization, and explo-

Case Study

"Josh" recognized letters and numbers by 18 months, and was reading first-grade books by the age of three. He could tell time on a standard clock at age two-and-a-half years. When his parents approached their local public school to inquire about having him enter kindergarten early, the school refused to evaluate him. Fortunately, his parents found a private school that placed him in a joint kindergarten/first-grade class when he was 4 years 10 months old. He thrived in this setting, where he was allowed to progress at his own learning rate. In fact, by the fall of second grade, he was working on mathematics that was geared for fourth and fifth graders (Lupkowski & Assouline, 1992).

ration. 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 the child's work samples. These samples of the child's work 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 student's 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 in class or the most athletically capable students, it is still in their best interests to ensure that they are capable of "fitting in" with the other students socially and physically. Expectations for young students might need to be slightly different from their older classmates. 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 school 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, in this volume). In addition, we recommend that the best candidates for early entrance to kindergarten have already had experience in a preschool program. There they have had the opportunity to learn to take turns, to learn about school routines, to share an adult's attention with others, and to sit still for periods of time (Robinson & Weimer, 1991). 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.

Rather than considering this to be an all-or-nothing type of decision, we recommend that parents, school personnel, and the student recognize that a trial period is helpful. For example, it might be decided that a two- to six-week trial period be allowed before making the final decision about early entrance to school.

"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., 2003a). Adults should not expect a child who has advanced verbal or mathematical abilities to demonstrate equally advanced behavior in all areas. "It is unsettling to hold a high-level conversation with a 5-year-old who then turns around and punches a classmate who stole her pencil" (Roedell, 1989, p. 22). 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 states 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 the child in that school until completing first grade, and then transfer the child to the public school beginning in second grade.

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 for an "extra" year 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).

Conclusion

In this chapter, we have 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 a low-risk/high-success intervention for qualified students.

References

Assouline, S. G., Colangelo, N., Lupkowski-Shoplik, A., & Lipscomb, J. (1998). *The Iowa Acceleration Scale Manual*. Scottsdale, AZ: Great Potential Press.

Assouline, S. G., Colangelo, N., Lupkowski-Shoplik, A., Lipscomb, J., & Forstadt, L. (2003a). *The Iowa Acceleration Scale, 2nd Edition: Manual*. Scottsdale, AZ: Great Potential Press.

Assouline, S. G., Colangelo, N., Ihrig, D., Forstadt, L., Lipscomb, J., & Lupkowski-Shoplik, A.E., *The Iowa Acceleration Scale: Two Validation Studies*. Presentation at the 2003 National Association for Gifted Children Convention, Indiannapolis, IN, November 14, 2003(b).

Assouline, S.G., and Lupkowski-Shoplik, A.E. (2003). *Developing Mathematical Talent: A Guide for Challenging and Educating Gifted Students*. Waco, TX: Prufrock Press.

Bloom, B. S. (Ed.). (1985). *Developing talent in young people*. New York: Ballantine.

Brody, L., Capurro, M., Jones, E., Olszewski-Kubilius, P., Renzulli, J., Robinson, A., & Southern, T. (2003, May). *Templeton Summit on Acceleration, Discussion Focus Group*. The University of Iowa, Iowa City, IA.

Colangelo, N. (1997). Counseling gifted students: Issues and practices. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 353–365). Boston: Allyn & Bacon.

Colangelo, N. (1998, May). *Academically talented students: They don't think the way we think they think*. Paper presented at The Fourth Biennial Henry B. and Jocelyn Wallace National Research Symposium on Talented Development, Iowa City, IA.

Colangelo, N., Assouline, S. G., Chen, I., & Tsai, T. (1998). *Parental involvement in the academic and social lives of academically talented elementary school students.* Unpublished manuscript, The University of Iowa, Iowa City, IA.

Cox, J., Daniel, N., & Boston, B. A. (1985). *Educating able learners: Programs and promising practices*. Austin, TX: University of Texas Press.

Csikszentmihalyi, M., Rathunde, K., & Whalen, S. (1993). *Talented teenagers: The roots of success and failure*. Cambridge, MA: Cambridge University Press.

Davis, G. A., & Rimm, S. B. (1994). *Education of the gifted and talented* (3rd ed.). Englewood Cliffs, NJ: Prentice-Hall.

Feldhusen, J. F. (1992). Early admission and grade advancement for young gifted learners. *Gifted Child Today, 15*(2), 45–49.

Feldhusen, J. F., Proctor, T. B., & Black, K. N. (1986). Guidelines for grade advancement of precocious youth. *Roeper Review, 9* (1), 25–27.

Gagné, F., & Gagnier, N. (2004). The socio-affective and academic impact of early entrance to school. *Roeper Review, 26*(3), 128–139.

Gallagher, J. J. (1985). *Teaching the gifted child* (3rd ed.) Boston: Allyn & Bacon.

Gross, M. U. M. (1992a). The early development of three profoundly gifted children of IQ 200. In P. S. Klein and A. J. Tannenbaum (Eds.), *To be young and gifted* (pp. 94–138). Norwood, NJ: Ablex Publishing.

Gross, M. U. M. (1992b). The use of radical acceleration in cases of extreme intellectual precocity. *Gifted Child Quarterly, 36*(2), 91–99.

Gross, M. U. M. (1999). Small poppies: Highly gifted children in the early years. *Roeper Review, 21*(3), 207–214.

Hollingsworth, L. S. (1942). *Children above 180 IQ Stanford Binet: Origin and development*. Yonkers-on-Hudson, NY: World Book.

Jackson, N. E. (2003). Young gifted children. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (pp. 470–482). Boston: Allyn & Bacon.

Jackson, N. E., & Klein, E. J. (1997). Gifted performance in young children. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 460–474). Boston: Allyn & Bacon.

Kulik, J., & Kulik, C.-L. (1984). Effects of accelerated instruction on students. *Review of Educational Research, 54*(3), 409–425.

Linn, R. L., & Gronlund, N. E. (1995). *Measurement and assessment in teaching*. Upper Saddle River, NJ: Merrill.

Lipscomb, J. M. (May, 2003). *A validity study of the* Iowa Acceleration Scale. Unpublished doctoral dissertation.

Louis, B., & Lewis, M. (1992). Parental beliefs about giftedness in young children and their relation to actual ability level. *Gifted Child Quarterly, 36* (1), 27–31.

Lupkowski, A. E., & Assouline, S. G. (1992). *Jane and Johnny love math*. Unionville, NY: Trillium Press.

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

Maddux, C. D. (1983). Early school entry for the gifted: New evidence and concerns. *Roeper Review, 5*(4), 15–17.

Matarazzo, J.D. (1990). Psychological assessment versus psychological testing: Validation from Binet to the school, clinic, and courtroom. *American Psychologist, 45*, 999–1017.

Morelock, M.J., & Feldman, D.H. (2003). Extreme precocity: Prodigies, savants, and children of extraordinarily high IQ. In N. Colangelo & G.A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 455–469). Needham Heights, MA: Allyn & Bacon.

Murphy, L. L., Impara, J. C., & Plake, B. S. (1999). *Tests in print V: An index to tests, test reviews, and the literature on specific tests*. Lincoln, NE: Buros Institute of Mental Measurements, University of Nebraska—Lincoln (Distributed by the University of Nebraska Press).

Piper, S., & Creps. K. (1991). Practical concerns in assessment and placement in academic acceleration. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 162–180). New York: Teachers College Press.

Proctor, T. B., Black, K. N., & Feldhusen, J. F. (1986). Early admission of selected children to elementary school. A review of the research literature. *Journal of Educational Research, 80*, 70–76.

Robinson, N. M., & Weimer, L. J. (1991). Selection of candidates for early admission to kindergarten and first grade. In W.T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 29–50). New York: Teachers College Press.

Roedell, W. C. (1989). Early development of gifted children. In J. L. VanTassel-Baska, P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners: The home, the self, and the school*. (pp. 13–28). New York: Teachers College Press.

Roedell, W. C., Jackson, N. E., & Robinson, H.B. (1980). *Gifted young children*. New York: Teachers College Press.

Rogers, K. B. (1992). A best-evidence synthesis of research on acceleration options for gifted students. In N. Colangelo, S. G. Assouline, & D. L. Ambroson (Eds.), *Talent development: Proceedings of the 1991 Henry B. and Jocelyn Wallace national research symposium on talent development* (pp. 406–409). Unionville, NY: Trillium Press.

Rogers, K. B. (2002). Effects of acceleration on gifted learners. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 3–12). Waco, TX: Prufrock Press.

Sattler, J. M., (2001). *Assessment of children: Cognitive applications* (4th ed.). San Diego, CA, Author.

Sankar-DeLeeuw, N. (2002). Gifted preschoolers: Parent and teacher views on identification, early admission, and programming. *Roeper Review, 24*(3), 172–177. (Originally published in *Roeper Review, 21* (3), 174–179.)

Saunders, J. & Espeland, P. (1991). *Bringing out the best: A guide for parents of young gifted children*. Minneapolis: Free Spirit.

Schiever, S., W., & Maker, C. J. (2003). New directions in enrichment and acceleration. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (3rd ed., pp. 163–173). Boston: Allyn & Bacon.

Seigler, R. S., & Richards, D. D. (1988). The development of intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence* (pp. 901–974). New York: Cambridge University Press.

Silverman, L. K. (2000). Counseling families. In L. K. Silverman (Ed.), *Counseling the gifted and talented* (pp. 151–178). Denver: Love Publishing Company.

Silverman, L. K. (2002). Asynchronous development. In M. Neihart, S. M. Reis, N. M. Robinson, & S. M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 31–37). Waco, TX: Prufrock Press.

Snow, R. E., & Yalow, E. (1988). Education and intelligence. In R. J. Sternberg (Ed.), *Handbook of human intelligence* (pp. 493–585). New York: Cambridge University Press.

Sosniak, L. A. (1997). The tortoise, the hare, and the development of talent. In N. Colangelo & G. A. Davis (Eds.), *Handbook of gifted education* (2nd ed., pp. 207–217). Boston: Allyn & Bacon.

Southern, W. T., & Jones, E. D. (Eds.). (1992). The real problems with academic acceleration. *Gifted Child Today, 15*(2), 34–38.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989). Practitioner objections to the academic acceleration of gifted children. *Gifted Child Quarterly, 33* (1), 29–35.

Stanley, J. C. (1984). Use of general and specific aptitude measures in identification: Some principles and certain cautions. *Gifted Child Quarterly, 28*(4), (177–180).

Terman, L. M., & Oden, M. H. (1947). *Genetic studies of genius: The gifted child grows up*. Stanford, CA: Stanford University Press.

VanTassel-Baska, J. L. (1991). Identification of candidates for acceleration: Issues and concerns. In W.T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 148–161). New York: Teachers College Press.

VanTassel-Baska, J L., & Olszewski-Kubilius, P. M. (Eds.). (1989). *Patterns of influence on gifted learners: The home, the self, and the school*. New York: Teachers College Press.

Whitlock, M. S., & DuCette, J. P. (1992). Outstanding and average teachers of the gifted: A comparison study. *Gifted Child Quarterly, 33*(1), 15–21.

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Radical Acceleration

Introduction

Educators tend to be wary of any procedure that allows a child to pass through school earlier or more rapidly than age-peers (Southern, Jones, & Fiscus, 1989) and this is particularly the case when the acceleration is radical. Radical acceleration is 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). In general, this does not arise from a single three-year grade-skip, but through a carefully monitored accumulation of accelerative interventions which may include early school enrollment, grade advancement, acceleration in individual school subjects, Advanced Placement, or enrollment in two levels of school simultaneously, e.g., a middle school student attending high school for specific subjects.

Radical acceleration is particularly suited to young people who are exceptionally (IQ 160–179) or profoundly (IQ 180+) gifted. Students at this level of intellectual ability can move at an extremely fast pace through the prescribed curriculum. They tend to be multi-talented; the extraordinary superiority of extremely gifted children across a wide range of subject fields is well documented (see Gross, 2000, for a review of the literature). In general they are more mature than their age-peers in their affective development (although this may be masked by intellectual frustration and boredom when they are educationally misplaced), many prefer the company of older children or adults, and their play interests, reading interests, and friendship choices tend to be more akin to those of older children (Gross, 2003; Silverman, 1993).

When schools retain such children with age-peers they typically underachieve. Indeed, underachievement is imposed on them; few teachers can provide a radically differentiated curriculum in the regular classroom for a child whose reading or math ability is several years beyond that of the other students. Many experience negative affective outcomes, including lowered self-esteem, anxiety, and social isolation. The differences between extremely gifted children and their age-peers so far outweigh the similarities as to hinder the formation of productive social relationships. As early as 1931, Hollingworth identified an IQ of 160 as being the "danger point" beyond which the gifted child is particularly at risk for social rejection by age-peers.

For exceptionally and profoundly gifted students, interventions limited to enrichment and moderate degrees of acceleration, such as a single grade-skip, tend to be unsuccessful either for reversing underachievement or for improving affective well-being.

Individual Case Studies

Two multiple-case studies conducted in the mid-nineteenth and early twentieth centuries examined the lives of individuals renowned in history for remarkable achievement and influence in literature, science, music, art, politics, and many other fields. Both Galton (1869) and Cox (1926) viewed the early development and upbringing of their subjects as highly influential in the development of their talents, and documented details of their education. Many of the subjects were educated at home by tutors and this provided a much more sophisticated curriculum and speedier educational progress than would have been possible at school. Indeed, many were radically accelerated and entered university at aged 14 or younger. English philosopher Thomas Hobbes was admitted to Oxford shortly before his fifteenth birthday, William Pitt the Younger who became Prime Minister of Great Britain at age 24, entered Cambridge at 14, while Hugo Grotius, the founder of international law, received his Doctor of Laws degree from the University of Orleans at the remarkable age of 15, having entered the University of Leyden at age 11.

The studies of Galton and Cox were, of necessity, retrospective; indeed, they were conducted many years after the deaths of the subjects. Retrospective studies of living persons who have reached eminence in adulthood and who can analyze the interaction of environmental and psychological factors which contributed to the realization of their potential can be of great value; many autobiographies serve this function.

However, studies of the academic and social development of gifted young people conducted contemporaneously, when the young subjects are actually experiencing the upbringing, the school programs, the social relationships, and other influences that contribute to their overall development, can provide rich insights. Events and situations that impact on the child's development can be observed as they occur. The changing influences of family, school, and society can be observed, and can be analyzed and discussed with the children themselves and with others involved in their academic and personal growth. The young students can describe their feelings, impressions, or desires with an immediacy that is not possible from the more removed perspective of adulthood.

Some of the most valuable contemporary case studies of highly gifted, radically accelerated individuals have evolved through the Study of Mathematically Precocious Youth (SMPY), established by Dr. Julian Stanley at Johns Hopkins University in 1971. Stanley and his colleagues emphasize the importance of parental support for young accelerants. Colin Camerer, a remarkably gifted young man whose progress was monitored through SMPY, attributes the success of his program, which included enrolling in college at age 14 with 34 credits and sophomore standing, to ongoing support and encouragement both from his parents and from other adults, including Stanley, who served as friends and mentors (Holmes, Rin, Tremblay, & Zeldin, 1984). Colin was successfully completing fourth- and fifth-grade work while still in second grade. He skipped seventh grade, the last year of junior high, and the first year of senior high. He completed his Ph.D. in Behavioral Decision Theory at age 21, and was appointed as an assistant professor of business policy at the Kellogg Graduate School of Management at Northwestern University.

The importance of parental support and the value of informed mentorship is also illustrated in the school and college career of Australian Terry Tao. Terry gained his B.Sc. at age 15, M.Sc. at 17, and Ph.D. at age 21, and was appointed to a full professorship at the University of California-Los Angeles at age 24. He won the prestigious Bocher Prize for mathematics at age 25, and is regarded as one of the leading mathematical minds of his generation.

Terry's educational program in the early years was designed by his parents. Guided by his mother, who herself took first-class honors in mathematics and physics, he completed almost all the elementary school math curriculum before his 5th birthday (Gross, 1986). At age 6, he was enrolled in 3rd, 4th, 6th, and 7th grades for different subjects, and by age 7, having far outpaced the 7th-grade students in math, he was permitted to attend the local high school, working in math at an 11th-grade level with students seven years older. Dual enrollment at high school and university was the logical next step, commencing at age 12. His university studies included 4th-year algebra, 2nd-year physics, and 2nd-year computer science. Terry says the early exposure to university in math and science while still at high school helped him adapt more confidently to full-time college enrollment. He also acknowledges the mentorship of several educators with knowledge and experience in gifted education, including Julian Stanley.

Radical acceleration allows extremely gifted individuals to progress through schooling at their own pace. Of fourteen radical accelerants, whose progress was followed by SMPY (Charlton, Marolf, & Stanley, 1994), the majority finished college in less than four years and went on to graduate school. Many then pursued doctoral study in preparation for academic research careers. Students reported that their rapid educational acceleration increased their zest for learning, which effectively led to a reduction in boredom and positive emotional gains. They enjoyed good social relationships with their older classmates and reported no social disadvantages.

A 20-year longitudinal study of 60 young Australians of IQ 160+ includes 17 young people who have radically accelerated (Gross, 2003). In every case, these young people have been delighted with their educational programs and have attained outstanding, indeed quite remarkable, success at school and university. The radical accelerants have been more likely to take Masters and Doctoral degrees than equally gifted students who were permitted a single grade-skip or who were retained with age-peers. Those who have already graduated are highly successful in their professional careers. None regret having radically accelerated, whereas several of the young people who undertook more moderate degrees of acceleration wish they could have accelerated further.

During their school years, the radical accelerants were found to have higher levels of social and general self-esteem than subjects of equal intellectual ability who had been retained with age-peers or grade-skipped only a single year, many of whom experienced depressed or seriously depressed social self-esteem (Gross, 1992, 1993). By contrast, the academic self-esteem of radical accelerants was less advanced, averaging .7 of a standard deviation above the mean for their age-peers. However, this cannot readily be attributed to Marsh's "Big Fish in the Little Pond Effect" (see Robinson, this volume), as the BFLPE is predicated on an anticipated change in gifted students' class ranking when they are accelerated or ability grouped. By contrast, Gross's radical accelerants still outperformed all, or the considerable majority, of their classmates who were at least three years older (Gross, 2003). Rather, the more modest self-esteem of the radical accelerants reflected their realization, often for the first time, of the full extent of their remarkable potential and the full degree of their previous underachievement. It reflected an acceptance of how far they

had to go if they were to become all that they could be.

The importance of warm and supportive peer relationships is emphasized by this study. The considerable majority of Gross's subject group, who, in general, are now in their twenties, spent their entire elementary education and most of their secondary education in inclusion classes with age-peers, with little contact with other gifted students. While all 17 radical accelerants report that their social and emotional well-being significantly improved and warm friendships were formed with their older classmates, the majority of the children retained with age-peers experienced significant and lasting difficulties in finding friends, and a substantial proportion still, as adults, experience considerable difficulties with social relationships (Gross, 2003). Children form friendships on the basis of similarities rather than differences. The skills of friendship building are learned in childhood, and if the child is placed with age-peers with whom she has many more differences than similarities, and who reject her because of her differences, she may have little opportunity to develop these skills.

Students taking an unusually accelerated program should be actively involved in the planning and decision making regarding each stage in the program so that they may develop a sense of "ownership." Sally Huang, who entered a prestigious Australian university on scholarship at age 13 as one of the highest scoring students in her state, had personally negotiated elements of her radical acceleration, which included several grade-skips and subject accelerations, with her elementary and secondary school teachers and building principals (Gross, 2003). Sally's unusual maturity and foresight regarding her educational needs were an important factor in her teachers' support of her markedly accelerated program. She graduated with First Class Honours in her B.Sc. degree a few months before her 17th birthday, and won a prestigious scholarship to undertake her Ph.D. in theoretical physics at a major British university. She completed her Ph.D. with great success at age 22, with five publications in well-respected journals.

An unusual element of Sally's accelerated program was that she undertook a four-year grade-skip from 5th straight into 9th grade. This meant, incidentally, that she "leapfrogged" her sister, Hayley, entering 9th grade at the same time as Hayley, who was three years older but had chosen not to accelerate and had entered 7th grade through normal progression. Hayley, who was also academically gifted, understood that Sally's needs differed from hers, and was totally supportive of her sister's program; the sisters have a very close and mutually trusting relationship. Indeed, the thoughtful support of Sally's family and the staffs of her two schools—the school she was leaving and the school she was entering—was a major contributing factor in the success of her program.

Christopher Otway's program of radical acceleration, which was, like Sally's, a combination of grade-skips and subject acceleration, saw him in 11th grade at the age of 12 studying two math subjects, physics, chemistry, and economics with students five years older. He was on a path that would have seen him graduate high school just before his 14th birthday. However, unlike Sally, he felt that he did not want to enter university at such an early age and he designed a program that would allow him to stay at school for three more years, but with a considerably enriched curriculum. He proposed to his parents and to the school, that he "repeat" 11th grade the following year, but with five different subjects—English, biology, accounting, history, and legal studies. This proved highly successful, and the school agreed to Chris's request that he undertake the same procedure in 12th-grade. He extended his 10 subjects at 12th-grade level over two years, "graduating" in each of these years as one of the top students in his state with 10 major subjects under his belt rather than five. He entered university two months after his 16th birthday. Shortly before his 19th birthday he graduated with First Class Honours in his B.Sc. in Computer Science and Pure Mathematics, and the following year graduated again, this time with an Economics degree. Like Sally, he won a major scholarship to a leading British university, where he gained his Ph.D. in pure mathematics at the age of 23 (Gross, 2003).

Chris now works in London for a world-wide consultancy that specializes in advising financial institutions on short-term and long-term marketing and investment strategies. He finds his studies in math and economics invaluable.

Chris's reinvestment of two of the years "saved" through his acceleration was in no way motivated by a desire to reverse the acceleration; rather, it represents an alternative use of the time saved. Olszewski-Kubilius (1995), in her review of the academic and social outcomes for students who choose early entry to university, suggests that the reinvestment of time saved through acceleration may not be uncommon. She concludes that the majority of early entrants achieve worthy academic outcomes, go on to complete rigorous graduate study, and tend to use the time gained from early college entry to take advantage of further academic opportunities.

A retrospective study (Stanley, 1985) analyzed academic outcomes for accelerated students who had enrolled in Johns Hopkins University several years earlier. Those who had radically accelerated had better academic records than their non-accelerated classmates, received more honors and awards at both high school and university, graduated faster, and were accepted into prestigious graduate programs. Those who had received pre-college counseling through SMPY before they commenced accelerated university study tended to fare better than those who had no prior contact with SMPY. Stanley suggests that this counseling gave the students a realistic understanding

of what to expect from university study and assisted them to develop study and planning skills that facilitated the transition from school to university.

The success of radical accelerants, such as those reported above, challenges the still common societal belief that acceleration generally leads to social and emotional distress. However, it is still extremely important that close watch be kept on both the academic and socio-affective status of young people who radically accelerate and that their progress be monitored continuously.

A five-year longitudinal study compared two groups of 21 boys identified through SMPY talent searches and matched for age (13) and ability (their math and verbal scores on the Scholastic Aptitude Tests) at the start of the study (Pollins, 1983). At the start of the study, both groups were assessed on the California Psychological Inventory (CPI) and both presented as mature, academically advanced, and interpersonally effective. The experimental-group students were assisted to radically accelerate their passage through high school, generally through grade-skipping and subject acceleration, so that five years later the majority were 18-year-old college seniors.

At the close of the study the two groups were surveyed on a range of issues related to their educational and social experiences over the time of the study, their educational aspirations, the use they believed they had made of the educational opportunities available to them, the degree to which SMPY had assisted them, and the effect of acceleration (a number of the control group had moderately accelerated their education) on their social and emotional development. The radical accelerants had much higher educational aspirations than the control group; planning, on average, to take a doctoral degree, and they had much more positive feelings than the control group regarding how well they had used their educational opportunities. The radical accelerants believed their association with SMPY had positively influenced their social and emotional development. Both groups felt that acceleration (to the degree that the control group had experienced it) had slight positive influences on their social-emotional development. No negative social or emotional effects were identified, and there was some evidence for positive gains.

It is important to investigate accelerated students' long-term views of their acceleration. A ten-year study of 320 SMPY Talent Search participants identified as being in the top 1 in 10,000 of their age-peers in terms of mathematical or verbal reasoning were surveyed regarding their satisfaction with the type and amount of acceleration they had received (Lubinski, Webb, Morelock, & Benbow, 2001). More than 50% of these young people, who were now in their twenties, had taken college courses when still at high school. Fully 70% expressed satisfaction with the degree of acceleration they had undertaken, while of those who, in retrospect, said they would alter things if they had their time again, the majority stated that they would accelerate even more—an interesting parallel to Gross's (2003) Australian longitudinal findings!

Cohort Studies

Despite the outstanding success of the majority of radical accelerants, educators remain extremely cautious regarding the entry to university of students significantly younger than the usual age. One response to this has been the development by a growing number of colleges of programs of cohort acceleration. These programs enroll groups of gifted students who have, in general, not completed high school, and structure their initial college years as a community of early entrants, often with special residential accommodation and with enhanced access to career and personal counseling.

The chapter by Brody, Muratori, and Stanley in this volume provides an excellent review of the research on early college entrance, and discusses the broad findings on cohort acceleration. However, the considerable majority of early-entrance programs are designed for young people enrolling in college only one or two years early; among the few exceptions that enroll students three or more years younger than custom-ary are the University of Washington; California State University, Los Angeles; and Mary Baldwin College.

There are fewer empirical studies of cohort acceleration than one might wish; however, a considerable number of empirical studies have been conducted at the University of Washington, which inaugurated its early-entrance program (EEP) in 1977. This program, which enrolls highly gifted students aged 14 or younger, includes a formal Transition School designed to redress any academic gaps resulting from the students having skipped high school, and a counseling program. The EEP has its own home base on the University of Washington campus.

A three-part evaluation of the EEP, investigating the academic performance (Janos & Robinson, 1985), social and psychological adjustment (Robinson & Janos, 1986), and moral judgment (Janos, Robinson, & Lunneborg, 1989) of the accelerated students was initiated in 1982. The first two studies compared the academic performance and psychosocial devel-

opment of 13 female and 11 male early entrants with 24 regular students matched for scores on the Washington Pre-College Test (WPCT), but averaging four years older, who had entered university at the conventional age, and also with 24 National Merit Scholars. The EEPers' average Grade Point Average (GPA) far exceeded that of the regular students, and matched the average GPA of the National Merit Scholars. Additionally, early entrants expressed significantly greater satisfaction with the academic environment provided by the university, including the intellectual level of offerings, pace of instruction, and academic content, than did regular students.

In the parallel study, aspects of the socio-affective functioning of the three groups were assessed through the Minnesota Multiphasic Personality Inventory (MMPI) to assess serious psychopathology, the California Personality Inventory (CPI) to assess adjustment at higher levels of functioning, the Tennessee Self-Concept Scale (TSC), and the Inventory of Peer and Parent Attachments (IPPA) to assess the affective quality of students' parent and peer relationships (Robinson & Janos, 1986). No significant differences appeared on the MMPI. The regular students and National Merit Scholars scored significantly higher than the early entrants on the "dominance" subscale of the CPI, suggesting that they may have been more likely to exercise social leadership than the younger students. Interestingly, the EEPers scored higher on the "achievement through independence" and lower on the "conformity" CPI subscales, suggesting that they may have viewed themselves as less bound by conventional thinking than the other groups; as the authors suggest, this may account, in part, for their having chosen a more unusual route through college.

The third study, conducted over three years, followed 23 male and 23 female radical accelerants who enrolled in the EEP, aged 12 years or younger, on the basis of outstanding scores on the Washington Pre-College Test and scores well above the 85th percentile of college-bound 12th graders on the Scholastic Aptitude Tests—Math and Verbal (Janos et al., 1989). Following the format of the previous studies, accelerants were compared on aspects of intellectual functioning, social and personal adjustment, and maturity to 44 comparatively bright age-mates who qualified for enrollment in the EEP but who chose instead to attend high school, 43 typical undergraduate students who were, on average 4 years older than the EEP students, and 59 National Merit Scholars with similar academic ability to the EEP students, but also approximately 4 years older. Again, EEP students made excellent academic progress, attaining similar GPAs to the National Merit Scholars and significantly higher GPAs than the typical undergraduates. Additionally, the EEPers completed more honors courses than regular students. The authors found no association between early entry to university and psychological or social impairment. Indeed, in self-concept, perceptions of parent and peer relationships, self-acceptance, and sense of responsibility the EEPers were virtually indistinguishable from equally able age-peers, who had elected to follow the normal route through high school.

The participants' levels of moral judgment were assessed on the Defining Issues Test (Rest, 1979) which evaluates the degree to which individuals use moral principles to evaluate behavior. No significant differences appeared among the four groups, suggesting that the EEPers were developmentally well placed in their college course.

Some early entrants do, however, underachieve even in well-monitored programs. A University of Washington study investigated "underachievement" in a group of early-entry students, 25 females and 31 males, all aged younger than 15 (Janos, Sanfilippo, & Robinson, 1986). "Underachievement" was defined as a grade point average below 3 on a 4-point scale, and for the highly gifted young people for whom the EEP program is designed, this did indeed indicate a significant discrepancy between their ability as assessed by pre-entry testing and their course achievement. Underachieving students were found to take fewer credits in undergraduate and honors courses, withdrew from almost twice as many courses, and took incompletes twice as often. Underachieving males showed less psychological maturity; they tended to be caught up in adolescent concerns of fantasy, computer games, and struggling for personal autonomy, and they suffered more internal conflict than male achievers. By contrast, underachieving females showed greater psychological maturity than their achieving counterparts. The authors suggest that, paradoxically, this may have contributed to their over-commitment in extracurricular pursuits, including varsity sports, to the detriment of their academic work. A number of underachievers came from families that had "deeply rooted non-academic traditions" (p. 311), and the young people were unable to overcome the negative elements. The authors stress that selection procedures for early-entry programs should emphasize readiness for intense and sustained concentration.

Gregory and Stevens-Long (1986) identified difficulties faced by a small proportion of the highly gifted students who enrolled in the early-entry program at California State University, Los Angeles (CSULA) in the first years of this program. Brilliant students who have, for many years, experienced high levels of success in schooling without having to exert themselves significantly can be distressed at first when they experience the academic demands of fast-paced college study, particularly if their grades are lower than those they received in school. As Robinson (1983) noted earlier, with early entrants who underachieved, "Most of them have not learned to manage time well because they have never had to

do so. Indeed, with regard to schoolwork, they have generally had a great deal of time to waste; they have almost never had to study at home" (p. 151).

Gregory and Stevens-Long (1986) noted coping problems associated with low grades for students who have never before experienced academic difficulties, and recommended that students should be assisted to see these low grades less as a sign of "failure" than an urgent signal to reassess their study techniques. They identified lack of study skills as a major problem for students, and recommend that all early-entry programs should offer students structured opportunity to develop skills that are required for university study. For example, students who have skipped several years of school may not have learned the skills of note-taking. Few students, such as Robinson (1983) described in the previous paragraph, are likely to have developed time management skills; time management has never been an issue, as they have had so much time to spare. Counseling for such students might include discussions regarding the detail and specificity required on examinations and the level of accuracy and comprehension one must achieve when taking lecture notes.

As with studies of individual acceleration, Gregory and Stevens-Long identified parental support as a major factor influencing successful early entry to university. Parents must be provided with full and clear information about the process of early entry to university or college. Parents may also benefit from advice regarding the need to allow students to gain increased autonomy in the transition from school to college. It is difficult to gain peer acceptance, or indeed to accept oneself, as a college student if one's parents visibly treat one as a schoolchild. As in the case of the University of Washington, the CSULA program was adapted in light of the findings of this and other studies, with a resultant drop in psychological and academic problems.

A study surveying the personality adjustment of 33 students, of average age 14, enrolled in their first year of a residential early-entry program in a small liberal arts college for women, compared the results to those for 18 non-accelerated students of comparable age and intellectual ability who were enrolled in traditional high school programs (Cornell, Callahan, & Loyd, 1991a). Changes in personality adjustment were measured on the California Psychological Inventory. Early-entry students displayed a number of positive changes, becoming more independent, resourceful, self-assured, self-disciplined, and self-sufficient over the course of the year. They also became less self-centered and more interested in the lives of others. By contrast, non-accelerated students experienced significantly fewer personality changes as the year progressed, and those changes that did occur did not necessarily reflect healthy personality growth. In fact, the non-accelerants became less confident, less assertive, less independent, and less self-sufficient.

Disturbingly, however, a significant number of the accelerants experienced depression and other adjustment problems during the course of the year, and several dropped out of the program. A second study (Cornell, Callahan, & Loyd, 1991b) investigating a range of personality and family variables in 44 first-, second- and third-year students in the same program, some of whom were radical accelerants, found that more than half were reported by staff as suffering periods of depression during the year of the study. Thirteen of the 44 left the program for reasons judged as stress related. These results, however, are difficult to interpret, as there were no comparison groups in the study, making it impossible to judge whether findings for early-entry students were significantly worse than for other groups of university students. The program had admitted students with IQs as low as 115, and the authors acknowledge that some may have experienced emotional stress due to a mismatch between their intellectual or academic ability and the demands of the program. In later years, the selection procedures for this early-entry program were altered to meet more stringent admission requirements regarding intellective and academic ability, and subsequent studies of the program have reported a significant drop in the attrition rate (Olszewski-Kubilius, 1999).

It is important that young people seeking enrollment in a cohort program of radical acceleration are screened as carefully for intellectual and academic readiness, social readiness, and emotional maturity, as would be the case if they intended to pursue individualized programs of radical acceleration.

In general, programs of cohort acceleration have excellent results. The difficulties experienced by some students in the early years of their universities' cohort programs are not readily generalizable, and tended to diminish significantly as the programs' entry criteria were made more stringent. Sayler (1994), reviewing literature concerning early entry to college from as early as 1929, concluded that, despite fears of social and emotional problems, most students electing to enter college early experience excellent academic achievement, enjoy a large pool of friends, participate in extracurricular events and organizations, and enjoy normal social activities. Young, extremely bright accelerants can experience quite remarkable levels of academic success. A particular benefit of cohort acceleration is the structured access it provides to groups of young people who are both age-mates and ability peers and who are undertaking similar programs.

In their chapter in this volume, Brody, Muratori, and Stanley provide a practical set of recommendations for students considering early enrollment in college. Sayler, likewise, synthesized the information gleaned from his literature review into a series

of guidelines for parents, students, and school staff, listing 12 points for prospective early entrants to consider (Sayler, 1994).

- Contact the admission office, explain circumstances, and request information about policies regarding early entrance.
- Exhaust the challenging opportunities available in the school system, including Advanced Placement (AP) courses, honors courses, advanced-level coursework and part-time college courses.
- Attend university summer programs before leaving school as a way of developing skills in preparation for early college entrance.
- Be sure you have a sincere desire to accelerate and a realistic understanding of the consequences.
- Seriously consider attending cohort acceleration programs where a group of young students attend college together, as there are many advantages to having a student support network.
- Match career goals to the courses offered at particular colleges or universities.
- Do not select a college or university based on 'big-name' appeal, but rather concentrate on the offerings of programs and departments.
- Decide whether to commute or live on campus.
- Determine whether your aptitude and achievement measures are at least as high as the average for the freshman class.
- Assess the extent of your organizational skills.
- Visit the college or university campus and meet the admissions personnel, current early entrance students (if there are any) and academic staff. If possible tour the residence facilities.
- Avoid excessive publicity about the decision to enter college or university early, as a public profile might bring unreasonable expectations from others and create uncomfortable situations.

Some Predictors of Successful Radical Acceleration

Early educational response

As outlined above, exceptionally and profoundly gifted children retained in the regular classroom are at risk of severe academic underachievement, intellectual frustration, lack of motivation, and social isolation. The first in the series of acceleration provisions that combine to result in radical acceleration should commence as early as possible, ideally soon after the child's advanced intellectual ability and unusual learning needs become evident. In many of the most successful cases of radical acceleration, the first grade advancement has occurred in the early years of primary school (Charlton et al., 1994; Gross, 1986, 1993; Hollingworth, 1942). It is important to place the gifted student, earlier rather than later, with older children with whom he or she has a greater chance of developing positive social relationships.

Involvement of student in educational planning

Positive outcomes ensue when students are keenly motivated to achieve, show persistance, and are passionate about learning in at least one subject area. The potential accelerant should be directly and continuously involved in the planning of his or her educational program.

Family support

It is essential that students undertaking individualized radical acceleration have the support of parents and other family members, particularly siblings. This is particularly important where the younger child may "leapfrog" an older brother or sister. Families where the individual strengths of each child are valued and praised but where it is realistically accepted, and discussed, that the exceptionally gifted child requires a radically different educational program, are less likely to have problems with sibling rivalry than families where the other children are not allowed to be involved in their brother, or sister's educational planning (Gross, 2003).

Advice and support of mentors

As discussed above, the process of radical acceleration can be greatly assisted through the mentorship of educators with knowledge and experience in gifted education. Schools are often more willing to consider acceleration when it is promoted by an informed advocate for the student who does not have the presumed "investment" of being a member of his or her family.

Access to a range of acceleration options

Each gifted child is unique, with different learning patterns and different emotional needs. Students should have access to a variety of acceleration options so that they can choose the combination of options most suited to their circumstances. These options could include early school entry, subject acceleration, grade-skipping, concurrent enrollment in school and university or college, curriculum telescoping, Advanced Placement (AP) courses, part-time college courses, summer programs, and correspondence courses. It is important to consider the timing of implementation of these strategies, as appropriateness of timing will differ among students depending on their individual cognitive and affective needs.

Capacity for excellent performance in accelerated placement

As Feldhusen, Proctor, and Black (1986) and Assouline et al. (2003) have advised, students intending to accelerate must be able to achieve well above the average of the class they intend to enter—and this holds true for each stage in the process of radical acceleration. A number of grade advancements spaced out in the student's educational career may be more advisable than double grade-skips.

Access to advanced study prior to acceleration

Brody and Stanley (1991) link successful early college entrance to the number of Advanced Placement (AP) credits a student has accumulated; the amount of advanced coursework taken prior to acceleration; opportunities to develop skills necessary for university study; and the degree of subject or grade acceleration a student has experienced. Olszewski-Kubilius (1995) suggests that students considering early entry should study college or university subjects part time to gain experience of the demanding nature of tertiary study before committing to full time enrollment. In can be useful, before primary or elementary school children are accelerated, for them to have "visiting rights" for a few weeks in the grade into which they will be advanced. The child may spend a day or two per week with the prospective class and teacher to ensure comfort with the level of work which will be offered and to meet and socialize with prospective new classmates.

Thoughtful pre-planning

Students should examine their strengths, weaknesses, experiences, interests, and physical and emotional maturity before making a decision to radically accelerate. Brody and Stanley (1991) suggest that, where possible, it may be advisable to enroll at a college that offers a program of cohort acceleration, particularly where the program offers counseling for students. While research shows that students who enter college early achieve well, whether they live on site or commute to the campus, Brody and Stanley suggest that, in general, it might be best for younger students to consider living at home and commuting.

Conclusions

Gifted students pursuing individualized programs of radical acceleration achieve high, sometimes extraordinary, levels of academic success at college and university, and tend to enter high-status careers that provide ongoing intellectual challenge and stimulation, and in which they continue to excel.

Radical accelerants socialize well with their older classmates. The reduction of boredom and increase in motivation, which were almost the inevitable result of being held to the pace and level of curriculum designed for age-peers of average ability, leads to a re-awakening of their early delight in learning. There is no indication of social or emotional maladjustment arising from well-planned programs of radical acceleration.

Radical acceleration is a practical, cost-free, and indeed cost-saving intervention that can be easily implemented within existing educational settings and can be readily adapted to the needs of individual students. For the majority of gifted students for whom acceleration is indicated, a single grade skip is likely to be sufficient; however, exceptionally and profoundly gifted students such as Colin Camerer, Terry Tao, Chris Otway, and Sally Huang require programs significantly differentiated from those that might be offered to moderately gifted students. Radical acceleration provided these young people with developmentally appropriate educational and social placement.

Intellectually gifted children differ from their age-peers on many cognitive and affective dimensions. They are likely to engage in social comparisons significantly earlier than age-peers (Robinson, 1993), moving from a self-referenced perspective from which they view their achievements against the level of their own previous performance to a norm-referenced perspective from which they compare themselves with other children. This shift in perspective is more closely linked to mental age

than to chronological age; thus, a highly gifted child of four or five may have already reached a stage of norm-referenced behavior that her age-peers of average ability may not reach until the age of seven or eight. Many exceptionally or profoundly gifted children become aware of their difference from age-peers at surprisingly early ages.

However, contrary to popular belief, this awareness of difference rarely leads to conceit or feelings of superiority. Rather, highly gifted children may feel acutely uncomfortable and act swiftly to change their behavior in order to conform to the social or academic norms of their age-group (Silverman, 1993). "Dumbing down" for peer acceptance is almost endemic among very highly gifted children retained with age-peers (Gross, 1989, 2003; Hollingworth, 1926; Silverman, 1993).

Jessica, a profoundly gifted girl in Gross's study, is currently aged 12, but is based in 9th grade and taking several subjects with the 11th graders. She spent her first year of school in the mixed-ability classroom, where she was frustrated, lonely, and acutely aware that she was learning little that she did not already know. She was also painfully aware that she had virtually nothing in common, other than the accident of chronological age, with the children with whom she was placed. A grade-skip from 1st to 3rd grade placed her with children with whom she had somewhat more in common, and further carefully structured and monitored grade advancement and subject acceleration has resulted in a much more appropriate match, academically and socially, for this remarkable young woman. The following poem, which she wrote after her first grade-skip, in the shape of a tree, illustrates the emotional growth she experienced when she was able to leave behind her painful social isolation and her poignant awareness of her own difference and move towards the warm acceptance and friendship she enjoyed with her older classmates.

Difference
You are alone
In your long exploration
Of the world of difference.
Yet, as the light consoles the darkness,
And the flame consoles the desolate wick,
So a friend brightens the darkness in your heart
And makes life a joy.
(Jessica Bloom, aged 8 years, 10 months)

References

Assouline, S.G., Colangelo, N., Lupkowski-Shoplik, A.E., Lipscomb, J., Forstadt, L. (2003). *Iowa Acceleration Scale (2nd Ed.) Manual*. Scottsdale, AZ: Great Potential Press.

Brody, L.E., & Stanley, J.C. (1991). Young college students: Assessing factors that contribute to success. In W.T. Southern & Eric D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 102–132). New York: Teachers College Press.

Charlton, J.C., Marolf, D.M., & Stanley, J.C. (1994). Follow-up insights on rapid educational acceleration. *Roeper Review*, *17*(2), 123–130.

Cornell, D.G., Callahan, C.M., & Loyd, B.H. (1991a). Personality growth of female early college entrants: A controlled prospective study. *Gifted Child Quarterly*, *35*(3), 135–143.

Cornell, D.G., Callahan, C.M., & Loyd, B.H. (1991b). Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program. *Gifted Child Quarterly*, *35*(2), 58–66.

Cox, C.M. (1926). The early mental traits of 300 geniuses. *Genetic Studies of Genius* (Vol.2). Stanford, CA: Stanford University Press.

Feldhusen, J.F., Proctor, T.B., & Black, K.N. (1986). Guidelines for grade advancement of precocious children. *Roeper Review, 9*(1), 25–27.

Galton, F. (1869). *Hereditary genius: An enquiry into its laws and consequences.* London: Macmillan.

Gregory, E.H. & Stevens-Long, J. (1986). Coping skills among highly gifted adolescents. *Journal for the Education of the Gifted*, *9*(2), 147–155.

Gross, M.U.M. (1986). Radical acceleration in Australia: Terence Tao. *G/C/T*, *45*, 2–11.

Gross, M.U.M. (1989). The pursuit of excellence or the search for intimacy? The forced-choice dilemma of gifted youth. *Roeper Review*, *11*(4), 189–194.

Gross, M.U.M. (1992). The use of radical acceleration in cases of extreme intellectual precocity. *Gifted Child Quarterly*, *36*(2), 90–98.

Gross, M.U.M. (1993), *Exceptionally gifted children*. London: Routledge.

Gross, M.U.M. (2000). Issues in the cognitive development of exceptionally and profoundly gifted individuals. In K.A. Heller, F.J. Monks, R.J. Sternberg, & R.F. Subotnik (Eds). *International handbook of giftedness and talent* (pp. 179–192). Oxford: Pergamon Press.

Gross, M.U.M. (2003). *Exceptionally Gifted Children* (2nd edition.) London: RoutledgeFalmer.

Hollingworth, L.S. (1926). *Gifted children: Their nature and nurture*. New York: Macmillan.

Hollingworth, L.S. (1931). The child of very superior intelligence as a special problem in social adjustment. *Mental Hygiene*, *15*(1), 3–16.

Hollingworth, L.S. (1942). *Children above IQ 180: Their origin and development*. New York: World Books.

Holmes, J.S., Rin, L.H., Tremblay, J.M., & Zeldin, R.K. (1984). Colin Camerer: The early years of a radical accelerand. *Gifted Child Today*, *33*, 33–35.

Janos, P.M. & Robinson, N.M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly, 29*(4), 175–179.

Janos, P.M., Robinson, N.M., & Lunneborg, C.E. (1989). Markedly early entrance to college: A multi-year comparative study of academic performance and psychological adjustment. *Journal of Higher Education*, *60*(5), 495–518.

Janos, P.M., Sanfilippo, S.M., & Robinson, N.M. (1986). "Underachievement" among markedly accelerated college students. *Journal of Youth and Adolescence*, *15*(4), 303–311.

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.

Olszewski-Kubilius, P. (1995). A summary of the research regarding early entrance to college. *Roeper Review*, *18*(2), 121–125.

Olszewski-Kubilius, P. (1999). *Thinking through early entrance to college*. Retrieved March 26, 2002, from Northwestern University, Centre for Talent Development website: http://www.ctd.northwestern.education/resources

Pollins, L.D. (1983). The effects of acceleration on the social and emotional development of gifted students. In C.P. Benbow & J.C. Stanley (Eds.), *Academic precocity: Aspects of its development* (pp. 160–178). Baltimore: Johns Hopkins University Press.

Rest, J.R. (1979). *Development in judging moral issues*. Minneapolis: University of Minnesota Press.

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

Robinson, N.M. (1993). *Parenting the very young gifted child*. Storrs, CT: National Research Center on the Gifted and Talented

Robinson, N.M., & Janos, P.M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence, 15*(1), 51–60.

Sayler, M. F. (1994). Early college entrance: A viable option. In J.B. Hansen & S.M. Hoover (Eds.). *Talent development: Theories and practice* (pp. 67–79). Dubuque, IA: Kendall/Hunt.

Silverman, L.K. (1993). *Counseling the gifted and talented*. Denver: Love.

Southern, W.T., Jones, E.D., & Fiscus, E.D. (1989). Practitioner objections to the academic acceleration of gifted children. *Gifted Child Quarterly*, *33*(1), 29–35.

Stanley, J.C. (1978). Radical acceleration: Recent educational innovation at JHU. *Gifted Child Quarterly*, *22*(1), 62–67.

Stanley, J.C. (1985). Young entrants to college: How did they fare? *College and University*, *58*(4), 361–371.

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

Introduction

Throughout history, highly able high-school-aged students have entered college early in order to accelerate and enhance their educational programs. Eager for greater academic challenge than their high schools provide, these students look to colleges for advanced courses and a more stimulating academic environment. While the practice of young students enrolling in college remains controversial, primarily due to concerns about their social and emotional adjustment, it appears that the number of students who enter college at younger-than-typical ages may be increasing.

For many, the image of an early college entrant may be of a very young-looking student with no prior college experience heading off to live in a dormitory with students who are considerably older and more experienced. While some young college students may fit this picture, this scenario describes relatively few early entrants today. Early college entrants vary considerably in age, specific abilities, social and emotional maturity, family support, and personality traits. They also vary in their educational backgrounds and content knowledge. These characteristics can have important implications with regard to their readiness for college.

For example, students who participated in whole-grade and/or subject-matter acceleration earlier in their school years may have spent their final year in high school in classes with other college-bound seniors and may even have earned a diploma. In spite of their young age, such students enter college with content knowledge similar to regular-aged college freshmen. Many early entrants have also spent summers taking courses on college campuses, thus having lived away from home, or taken part-time college courses, thus having experienced attending class with older students.

In contrast, other early entrants may have remained in age-in-grade instructional programs throughout their school careers. Frustrated, finally, by the lack of challenge, these students may choose to leave high school several years early. Without having taken advanced courses and having had little interaction with older students, these young college students may have very different needs from the group described above.

Once early entrants enroll in college, their experiences can also vary considerably. While some early entrants live in dorms, many live at home and commute to college. Some enroll in highly competitive, selective colleges, while others attend "open-door" community colleges. Some participate in special early-entrance programs with age peers. Early entrants may be full-time college students, but there are also options for students to access college-level courses on a part-time basis while simultaneously remaining in high school. We even know of four boys who graduated from both high school and college at the same time at age 17 or 18, having studied concurrently in both.

With more accelerative opportunities becoming available for gifted students of all ages (e.g., summer programs, distance education, advanced classes), early entrance to college is likely to become the natural progression for increasing numbers of students who exhaust high school course offerings earlier than their age peers. At the same time, the availability of these options may allow other students to remain in high school and be adequately challenged. Since students have many choices today, an understanding of the factors that contribute to success among those who choose early college entrance should help guide decision making. Fortunately, much research has been done to evaluate the progress of early entrants to college in a variety of settings. This review will summarize research findings and their implications for counseling students about early college entrance as a strategy for meeting their educational needs.

Historical Overview

Early in America's history, young students were commonly found in colleges and universities. Many of them had been educated at home by tutors or in other settings (e.g., one-room schools) that allowed them to learn at their own pace, and they entered college when they were academically ready. After schools that grouped students together on the basis of chronological age were created, grade skipping and early college entrance were still sometimes recommended for advanced students (Daurio, 1979). Studies such as those by Gray (1930), Keys (1938), Terman and Oden (1947), Oden (1968), and Cronbach (1996) all attest to the presence of relatively young students attending America's colleges.

As enrichment programs were gradually established for gifted students in many schools, however, acceleration in general and early college entrance in particular were increasingly frowned upon and discouraged. Exceptions occurred during times in our history when young college entrants were recruited to meet particular societal needs, most notably during wartime (e.g., just before World War II and during the Korean War). For example, Ohio State University, the University of Illinois, and the University of Chicago established programs to enroll young college students prior to World War II (Daurio, 1979).

In 1950, the Ford Foundation supported the establishment of a program at Shimer College in Illinois to enroll students prior to high school graduation, and that program continues to this day. From 1951 to 1954, with the Korean War a concern, the Ford Foundation also provided scholarship support for students under 16 ½ to enroll full-time at one of 12 universities for two years before entering the military. After this initiative ended, the colleges that were part of the scholarship program continued, for the most part, to accept young students but without active recruitment or financial support. Meanwhile, in the mid-1950s the Ford Foundation helped establish the College Board Advanced Placement Program as a vehicle for offering advanced standing to entering college students (Daurio, 1979).

When Julian Stanley established the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University in 1971, he turned to acceleration as a vehicle for serving students with advanced academic abilities (Stanley, Keating, & Fox, 1974). The first few students with whom SMPY worked chose, because of a lack of suitable alternatives, to enter Johns Hopkins as young as age 13 without having completed high school. The success of these students led to considerable positive publicity about young entrants to college. However, SMPY's work also led to the development of a variety of programmatic alternatives for high school students not ready, or eager, to make such a move, but who needed access to accelerated coursework (Benbow & Stanley, 1983).

Recently, the popular media have drawn attention to the very youngest full-time college students, those who enter at age 10 or 12 or even younger, in some cases with parents accompanying them to class. While these cases are rare, colleges, especially the less prestigious ones eager to attract the best and brightest applicants, do seem more willing to accept extremely young students than they were in the past. Many more students enroll just a year or two earlier than is typical, often with few people realizing they are any younger than other entering students. Most colleges and universities report willingness to admit fully qualified young applicants on an individual basis (Fluitt & Strickland, 1984). However, concern about the social and emotional adjustment of early college entrants persists, especially with regard to the younger students. One response to this has been the creation of university-based early college entrance programs.

Early College Entrance Programs

While some of the initiatives described above admitted young students to college as a cohort (e.g., the University of Chicago and Ohio State University), there has been an effort of late by some colleges to institutionalize this practice by establishing special early entrance programs. These programs, which are designed primarily for students who have not completed high school before enrolling, provide much more academic counseling and social and emotional support than is typically available for regular-aged college students (Boothe, Sethna, Stanley, & Colgate, 1999). Although they share a common purpose, these programs differ in important ways as well. Selected early college entrance programs and pertinent characteristics are listed in Tables 1 and 2.

Some of these programs are intended for commuting students (see Table 2), while others are residential, with living arrangements designed to build a community of peers (see

TABLE 1.

SELECTED *RESIDENTIAL* EARLY ENTRANCE PROGRAMS IN THE U.S.

Program	Inception Date	Grade at Entry	Issues H.S. Diploma?	Special Characteristics
State University of West Georgia **Advanced Academy of Georgia**	1995	11th or 12th	No*	• All university programs are available to AAG students, who are automatically in Honors College. • AAG offers many leadership, social, and residence hall activities/opportunities. • AAG students reside in honors residence hall and are supervised by live-in staff.
University of North Texas **Texas Academy of Mathematics and Science**	1988	11th	Yes	• Strong emphasis is on math and science. • TAMS has a mostly required curriculum. • TAMS has approximately 25 clubs and service organizations. • TAMSters have their own large residence hall and are supervised by live-in staff. • TAMS admits only residents of Texas.
Middle Georgia College **Georgia Academy of Mathematics, Engineering, & Science**	1997	11th or 12th	No*	• Focus is on preparing GAMES students in technical fields. • GAMES offers students many enrichment activities (e.g., 10 field trips every semester). • GAMES students have their own residence hall and are supervised by live-in staff. • MGC is a 2-year college, so all GAMES graduates transfer to 4-year institutions.
Lamar University **Texas Academy of Leadership in the Humanities**	1994	Typically, 11th	Yes	• Emphasis is on the humanities and on the development of character and leadership skills. • TALH students have a community service requirement. • TALH arranges for students to attend plays, concerts, leadership programs, and cultural events, and offers students traditional high school activities. • TALH students reside in their own new privately operated, apartment-style, gated dormitory with live-in staff. • TALH admits only residents of Texas.
Northwest Missouri State University **Missouri Academy of Science, Mathematics, and Computing**	2000	11th	Yes	• Focus is on technical subjects. • MASMC students are required to study 2 hours/night Sunday-Thursday. • MASMC students are permitted to organize clubs under the guidance of a staff/faculty advisor. • Community service is encouraged. • MASMC students reside in a residence hall and have full-time staff to assist them.
Clarkson University **Clarkson School Bridging Year Program**	1978	12th	No**	• Focus is on meeting high school requirements and researching future college options. • CS sponsors "family dinners" for students and staff. • Field trips and special events are scheduled. • CS students live in suites in their own residence hall and are supervised by live-in staff.
Mary Baldwin College **Program for the Exceptionally Gifted**	1985	8th–11th	No	• PEG students are urged to take core college requirements during the first 2 years before pursuing specific majors/degree programs. • Students are not automatically in Honors Program. • PEG students have several leadership opportunities (e.g., committees, peer advising). • Staggered approach is used: PEG students gain more freedom over time. They reside on campus for 4 years. Younger PEG students receive more intensive supervision and support.

** Arrangements are made for the high school diploma to be granted by the student's high school.*
*** Students can earn a diploma from the state of New York.*

Table 1 (continued).

Selected *Residential* Early Entrance Programs in the U.S.

Program	Inception Date	Grade at Entry	Issues H.S. Diploma?	Special Characteristics
Bard College **Simon's Rock College**	1966	Typically, 11th or 12th	No*	• SRC is a fully accredited liberal arts college that offers associates or bachelors degrees in a variety of disciplines. • SRC has been affiliated with Bard College since 1979 (BC provides students with additional academic resources). **** • SRC promotes a holistic, interdisciplinary approach and offers small class sizes. • SRC sponsors cultural events and lecture/film series. • Students participate in community service and the Recreational Activities Program. • First-year students reside on campus.
University of Southern California **Resident Honors Program**	1961 (1984)***	12th	No*	• RHP students are encouraged to earn their undergraduate degrees from USC. • RHP students are automatically enrolled in the Honors Program and can take the Thematic Option honors core. • RHP students are incorporated into the larger USC community and are encouraged to participate in university-sponsored activities. • Some activities are sponsored by RHP. • RHP students reside with other honors students. Faculty-in-residence live in the residential learning community.
The University of Iowa **National Academy of Arts, Sciences, and Engineering**	1999	12th	No*	• NAASE students are encouraged to earn their undergraduate degrees from UI. • NAASE students take courses with other UI students from the time they enter the program. • NAASE students are automatically enrolled in the UI Honors Program. • NAASE students attend weekly study sessions. • NAASE students are encouraged to participate in UI clubs and activities as well as activities sponsored by NAASE and the Belin-Blank Center. • NAASE students reside in the honors residence hall and are supervised by live-in staff.

** Arrangements are made for the high school diploma to be granted by the student's high school.*
****Although RHP was established in 1961, a new administration implemented a scholarship program in 1984, and admissions standards were dramatically increased.*
***** But SRC is not near Bard College.*

Table 1). Some accept students at a much younger age (e.g., the Early Entrance Program at the University of Washington) than others (e.g., the National Academy of Arts, Sciences, and Engineering at The University of Iowa). 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, and the Bard High School Early College program is free of charge to New York City residents), and size (e.g., the Texas Academy of Mathematics and Science [TAMS] at the University of North Texas enrolls about 200 ex-tenth graders per year, while most others are much smaller). Simon's Rock College utilizes a whole campus (it is affiliated with Bard College, which is some distance away), while most other residential programs offer separate housing but are located on the campus of a regular university. Some programs are open to any qualified applicant, while others have restrictions (e.g., the Program for the Exceptionally Gifted at Mary Baldwin College is for females only; TAMS is restricted to Texas residents).

Programmatic components vary in important ways as well. Whereas certain programs are noted for their strengths in mathematics and science (e.g., TAMS), others emphasize the humanities (e.g., the Texas Academy of Leadership in the Humanities at Lamar University) or have a broad liberal arts

TABLE 2.

SELECTED *COMMUTER* EARLY ENTRANCE PROGRAMS IN THE U.S.

Program	Inception Date	Grade at Entry	Issues H.S. Diploma?	Special Characteristics
University of Washington **Early Entrance Program**	1977	Typically, 8th	No	• 2-step program: 1 year Transition School (TS) followed by early entrance into UW. • TS/EEP students have access to special support services (e.g., academic advising), activities (e.g., drama society), and resources (student lounge). • TS students must be no more than 14 years old; students are usually between 12–14 years old at entry.
University of Washington **UW Academy for Young Scholars**	2001	11th	No	• Students attend Jump Start, a two-week program that helps to prepare them for the demands of college. • UW Academy students take special classes during their 1st quarter and receive special support services. • Students are encouraged to form a close social network within the academy and become active in the UW Honors Program.
California State University Los Angeles **Early Entrance Program**	1983	Typically, 9th	No**	• All qualified EEP applicants complete provisional summer courses. • Students have access to EEP resources: student lounge, computer lab, library, counseling services, etc. • 4th- and 5th-year students are "elders" who informally mentor younger students. • EEP students are encouraged to complete undergraduate degrees at CSULA. • EEP students can enter the program between the ages of 11-16.
Boston University **Boston University Academy**	1993	Typically, 8th or 9th	Yes	• BUA students take high school courses through 11th grade. • BUA students attend college-level courses on a part-time basis in 11th grade and on a full-time basis in 12th grade. • BUA offers a wide range of extracurricular activities (sports, performing arts, Model UN, Debate Club, Robotics Team, etc.).
Guilford College **Early College at Guilford**	2002	9th	Yes	• ECG students complete high school and the first 2 years of college in 4 years. • School offers 25 extracurricular clubs/organizations plus enrichment activities. • ECG is open only to students from the Guilford County School System.
Bard College **Bard High School Early College**	2001	9th	No***	• BHSEC students complete high school and the first 2 years of college in 4 years. • BHSEC is located 50 miles from the Bard College campus. • School offers many extracurricular clubs and opportunities. • BHSEC is open only to students from the New York City public school system.
Alaska Pacific University **Early Honors Program**	2000	12th	No*	• EHP uses "Block and Session" format: intensive focus on few subjects. • Program does not offer extracurricular activities (students can participate in high school or university clubs). • Study Abroad experience is emphasized. • EHP students complete a year of transferable college credit (1-year program).

** Arrangements are made for the high school diploma to be granted by the student's high school.*
*** Arrangements can be made for students to take a high school proficiency examination.*
**** Students earn a Regents Diploma from the State of New York. In some early entrance programs that offer both high school and college courses, students are considered high school students through their senior year.*

focus (e.g., the Resident Honors Program at the University of Southern California). Some programs have the authority to grant students high school diplomas (e.g., TAMS), while other programs rely on the students' high schools to issue diplomas (e.g., the Advanced Academy of Georgia [AAG] at the State University of West Georgia) or take the position that a high school diploma is unnecessary (e.g., the Early Entrance Program at the University of Washington). Some programs include special classes for their early entrants (e.g., University of Washington's one-year Transition School), while most others are designed for students to take courses with other university students from the very start. In contrast to many of the other programs, TAMS has a mostly required curriculum. Prospective early entrants are wise to shop around for programs that are as tailored as possible to their unique needs and preferences.

Since one of the goals of early college entrance programs is to provide these students with social and emotional support, the participants are often encouraged to participate in a number of program-sponsored opportunities to enrich their lives, socially and culturally. Surrounded by other young college students, some of them may feel that they have at last met their true intellectual peers. Especially for those who have not had satisfying social relationships with peers in their high schools, early-entrance programs may be a welcome improvement to their social lives.

A new initiative, with a somewhat different purpose, is the Early College High Schools program funded by the Bill and Melinda Gates Foundation and others (including the Ford Foundation). This project plans to establish early college entrance programs for students who are at risk of dropping out of high school and/or not going to college. Participants enroll after two years of high school and aspire to obtain associate degrees after two years of college coursework. While the intended population differs somewhat, perhaps even radically, from that for which other early college programs were designed, the result could be similar: students skip two years of high school and move on to full-time college-level work at younger-than-typical ages. Along with other early college programs, this effort recognizes that comprehensive American high schools may not meet all of the academic and social needs of the diverse students they are intended to serve. Unless these students are selected carefully for their academic potential, however, the non-completion rate may be high.

Part-time Options

Many students who need accelerated coursework may not be ready for full-time enrollment in college. An alternative is to access college-level courses on a part-time basis while remaining in high school. Keeping a foot in the door of the high school allows students to participate in high school activities and competitions and to apply to college as freshmen, with or without advanced standing, which can greatly enhance their chances of being admitted to selective universities. High school students can access college-level work either by leaving the school to attend nearby colleges part-time or by taking college-level courses within the high school.

The latter is easier logistically, but may limit what is available. Some high schools invite college teachers to offer courses within the high school, but this is relatively rare. More commonly available are courses under the auspices of the Advanced Placement (AP) (Curry, MacDonald, & Morgan, 1999) and International Baccalaureate (IB) (Tookey, 1999) Programs, which are usually taught by high school teachers. These high school programs, whose effectiveness is assessed by outside examinations, are intended to provide college credit for participants when they enroll in college. Fortunately, the availability of both AP and IB programs has increased tremendously in recent years.

If students do not have access to AP courses, they can prepare for AP tests on their own, ideally under the supervision of a knowledgeable mentor. AP and other college-level courses are also increasingly available via computer-based distance learning. Although educators struggle with evaluating the quality of distance-education programs, technology has greatly increased the accessibility of college-level work for high school students.

Alternatively, students can enroll in a local college on a part-time basis, either during the academic year or in the summer. Eager to recruit talented students, many colleges are very willing to enroll local high school students with advanced content knowledge. In recent years, there has been a growth in dual-enrollment programs, with the establishment of cooperative arrangements between high schools and local colleges and even state-supported funding for the college courses taken by high school students in several states (McCarthy, 1999). Although researchers have observed problems related to college choice after high school (Myers, 1993) and some negative social issues (McConnaha, 1997) as a result of dual enrollment, this option offers the benefit of allowing students to remain in high school with age peers while still being able to take challenging college courses, possibly even gaining credit that can

be transferred later to the college they will attend after high school. Summer programs on college campuses also provide students with access to college-level coursework not available in high schools, perhaps avoiding the logistical issues related to scheduling and transportation that can arise during the academic year.

The Academic and Occupational Success of Early Entrants

Collectively, investigations of the academic adjustment of students who entered college early present a picture of high achievement (Brody & Stanley, 1991). For example, Gray (1930) found that younger college students suffered fewer failures, were awarded more academic honors, and gained more recognition in athletic and non-athletic extra-curricular activities than did a comparison group of older students. 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 showed positive results. More recently, a summary of the research on early college entrance concluded that the evidence regarding early entrants' academic success is "overwhelmingly positive" (Olszewski-Kubilius, 1995, p. 122). However, Olszewski-Kubilius (1995) cautions 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.

The progress of students who entered college early through the guidance of the Study of Mathematically Precocious Youth (SMPY) has been studied extensively, lending much credence to early entrance to college as a strategy for meeting the needs of highly gifted students (e.g., Brody, Assouline, & Stanley, 1990; Brody, Lupkowski, & Stanley, 1988; Stanley, 1985a, Stanley, 1985b; Stanley & Benbow, 1983; Stanley & McGill, 1986). Most impressively, a follow-up study 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 studies of larger cohorts, however, variability in performance among the young entrants was found even though the majority of them excelled (e.g., Stanley & McGill, 1986).

Consequently, Brody et al. (1990) sought to identify factors that contribute to academic success among early entrants. In a study of 65 young college students who entered a selective university over a number of years, prior experience with AP coursework was found to be the strongest predictor of academic success, thus affirming the importance of content knowledge and academic rigor prior to enrolling in college.

Research has also been done to assess student performance in some of the early-entrance programs, with the most extensive work being conducted by researchers associated with the Early Entrance Program at the University of Washington. One of the first programs established, this commuter-based one accepts students much younger (less than age 15) than most of the other early-entrance programs. An early study of participants in this program identified a fairly large number of underachievers (Janos, Sanfillippo, & Robinson, 1986). However, a longitudinal follow-up study that compared the radically accelerated students who entered the Early Entrance 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). For other research on the University of Washington early entrants see Janos, Robinson, and Lunneborg, 1989; Noble and Drummond, 1992; and Noble and Smyth, 1995.

Empirical studies of other early-entrance programs are rather limited. However, there is considerable evidence of participants' earning excellent grades in rigorous courses, being accepted as transfer students with scholarships to prestigious universities, and/or being accepted to prestigious graduate programs (e.g., see Sayler & Lupkowski, 1992; Sethna, Wickstrom, Boothe, & Stanley, 2001). Schmacker, Sayler, and Bembry (1995) found study skills and appropriate learning strategies to be relevant for academic success among a group of early college entrants.

The National Academy of Arts, Sciences, and Engineering (NAASE) of The University of Iowa is one of the more recent additions to the early college program scene. A study of the performance of its inaugural class 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, even within this small class, two students 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 small study, 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 (Muratori, 2003).

The Social and Emotional Adjustment of Early Entrants

Expecting every young college student to be successful academically and socially may be unrealistic, since many regular-aged college students fail to adjust to the college environment (Arnold, 1994). However, with young college students, in particular, parents and educators worry about their social and emotional adjustment—how well will they relate to the older, more experienced college students they will encounter in classes and/or in dormitories, and will they have the maturity to make sound decisions? Unfortunately, though much of the research on the social and emotional adjustment of early college entrants has been positive, the literature has not painted the clear or compelling picture of success that educators and parents arguably need in order to feel comfortable with this curricular option.

Numerous studies have demonstrated that many early entrants are able to navigate their way through college successfully and seem to be satisfied (e.g., Brody et al., 1988; Janos et al., 1988; Janos et al., 1989; Noble et al., 1993; Noble, Arndt, Nicholson, Sletten, & Zamora, 1999; Noble & Smyth, 1995; Robinson & Janos, 1986; Sethna et al., 2001; Swiatek, 1993). Pollins (1983) found that, even without special program support, there were no major negative effects of acceleration on social and emotional development among radical early entrants. Similarly, Brody et al. (1988) examined the first-year adjustment of SMPY participants who entered college early, and concluded that the students were satisfied socially. Those who had minor complaints about their social experiences tended to be commuters who usually had little collegiate social life, while residential students reported being very comfortable socially. Nevertheless, rare tragic case studies such as that of William James Sidis (see Montour, 1977, and Wallace, 1986), coupled with less-than-perfect success rates among groups studied, have fueled the myth of "early ripe, early rot" (Brody & Stanley, 1991). Obviously, society expects more from early entrants than from regular-age college students.

Early college entrance programs were designed specifically to minimize adjustment problems by providing counseling and social support. Among other things, participants have the advantage of sharing their unique early-entrance experience with agemates who are essentially all "in the same boat." Research and anecdotal reports on the social adjustment of students from TAMS (e.g., Lupkowski, Whitmore, & Ramsey, 1992; Sayler, 1994; Sayler & Lupkowski, 1992), NAASE (Muratori 2003; Muratori et al., 2003), AAG (e.g. Sethna et al., 2001), and the University of Washington EEP (e.g. Janos et al., 1988; Janos et al., 1989; Janos & Robinson, 1985; Noble et al., 1999; Noble & Drummond, 1992; Noble & Smyth, 1995; Robinson & Noble, 1992) support the notion that many young entrants in these programs succeed in developing satisfying social relationships. In fact, the following statement made by a graduate of Simon's Rock College suggests that early college entrance may actually enhance social prospects for some academically talented students, since the implicit and explicit norms of early-entrance programs promote intellectual curiosity rather than hinder it:

> *High school was the flat, black-and-white landscape of Dorothy Gale's Kansas. Simon's Rock was the wonderful land of Oz, in color. Instead of being ashamed of my curiosity about what was going on over the rainbow, I could wear that curiosity proudly and openly. I left a culture that promoted ignorance and traded it for a culture that promoted learning (Dean Olsher in Olszewski-Kubilius, 1998, p. 231).*

Despite evidence of the positive social/emotional adjustment of many students in early-entrance programs, negative outcomes have also been reported, which, not surprisingly, promote skepticism and fear about early college entrance. One frequently cited study (Cornell, Callahan, & Loyd, 1991), which stimulated controversy due to its methodological weaknesses (Stanley, 1991), found an alarming rate of depression (57%) and attrition due to stress (30%) among female early entrants enrolled in one residential program. In a later study of students in this same program, presumably after selection of students had been refined, Ingersoll and Cornell (1995) reported that the participants appeared to have relatively good psycho-social adjustment, although many complained of a lack of social opportunities provided by this program.

A few studies have sought to identify variables that predict social adjustment among early entrants. Janos et al. (1986) found underachieving males in an early entrance program to be less psychologically mature than high-achieving students,

although underachieving females were more mature. Caplan, Henderson, Henderson, and Fleming (2002) found family environment factors (e.g., cohesion, conflict, and expressiveness) and overall self-concept relevant to adjustment to college among early entrants. Muratori (2003) found that some students continued patterns of underachievement from high school and/or were plagued with homesickness or other socio-emotional issues, causing them to leave the program. These studies point to the importance of including social and emotional factors in the selection process prior to admitting students to early college entrance programs.

Conclusion and Recommendations

Clearly, the research on groups of early entrants, whether they were regularly admitted college students or participants in an early entrance program, strongly suggests that many were highly successful academically without experiencing concomitant social or emotional difficulties. On the other hand, there is also evidence that some individual students who entered college at younger-than-typical ages have had difficulty adjusting and failed to achieve at the level one might have expected. While there is no way to be sure these students would have been more successful if they had entered college at a later age, one is tempted to wish they had had more time to develop academically and to mature socially and emotionally before entering college.

The literature certainly suggests that having a high IQ alone does not guarantee success as a young college student. Content knowledge, motivation, and emotional maturity seem to be important factors in contributing to high achievement and good social adjustment among young college students. Students who go to college just to avoid problems in their home and school environments often find that they take their problems with them to college.

The following recommendations may help guide students considering early college entrance:

- Before enrolling in college, students should take advantage of the challenging opportunities their high schools have to offer, including local, regional, and national competitions. They should strive for a broad and deep high school education, not just the minimum needed to get into college.
- Students should complete some rigorous college-level coursework before enrolling in college full-time (e.g., AP or IB, 12th-grade honors, or suitably difficult part-time college courses).
- While still in high school, students should seek opportunities to interact with older students through advanced coursework, summer programs, and activities in preparation for being with this age group in college.
- Students' SAT I (aptitude) and SAT II (achievement) scores should be at least average for the particular college they plan to attend, and preferably in the top quarter of the entering class.
- Students should be sure their written language, critical reading, mathematics, computer, and study skills are at the level needed to succeed in college.
- Students should be highly motivated to enroll in college, not be going just to avoid problems in their current home or school environments.
- Students should consider whether they will regret missing extracurricular opportunities in high school (e.g., being editor of the school paper or president of the student body, or participating in varsity sports or national competitions).
- Students should consider whether they will have any regrets if entering early means they must attend a less selective college than they might otherwise, or if they must continue to live at home and commute to college.
- If they enter college early, students should avoid publicity so that unreasonable expectations and distractions do not foster emotional difficulties.

Since many students adjust well to full-time early college entrance, it should remain a viable and important option for students eager for more advanced academic work. The establishment of early college entrance programs makes college a more realistic option for some young students who might have had difficulty trying to navigate a regular college program. However, full-time college entrance should be only one of many options for providing access to advanced coursework for students who need it (Southern, Jones, & Stanley, 1993). Students in a hurry to go to college should remember that education is not a timed race such as the Olympic Games' 100-meter run. Winning a gold medal in the Olympics is the goal, whereas graduating early from college is just the start of progression toward adult development and success.

Since many new special educational opportunities have been created in recent years to supplement the offerings of public and private schools, it is no longer necessary to become a regular freshman at age 13 at colleges such as Johns Hopkins, as Stanley's first two prodigies did in an effort to avoid aca-

demic boredom. There are many excellent alternatives, including summer programs, distance education, challenging extracurricular activities, and various part-time college options. Most notably, the 34 examinations of the College Board's Advanced Placement Program courses provide an almost unbelievably rich array of opportunities to get a really broad and deep high school education while earning college credits and advanced standing.

Perhaps the chief message of this analysis is that intellectually talented students vary considerably in their circumstances and needs. Students, parents, and educators must plan continuously for each individual the proper fit of accelerative options optimal for producing the cumulative educational advantage that intellectually talented students need. For some advanced students, this will include full-time college entrance at a young age; for many others, remaining in high school while accessing advanced content in other ways will be the more appropriate choice.

References

Arnold, K. D. (1994). The Illinois valedictorian project: Early adult careers of academically talented male high school students. In R. F. Subotnik & K.D. Arnold (Eds.), *Beyond Terman: Contemporary longitudinal studies of giftedness and talent* (pp. 24–51). Norwood, NJ: Ablex.

Benbow, C. P., & Stanley, J. C. (Eds). (1983). *Academic precocity: Aspects of its development*. Baltimore: Johns Hopkins University Press.

Bloom, B. S., & Ward, F. C. (1952). The Chicago Bachelor of Arts degree after ten years. *Journal of Higher Education*, *23*, 459–467.

Boothe, D., Sethna, B. N., Stanley, J. C., & Colgate, S. D. (1999). Special opportunities for exceptionally able high school students: A description of eight early-college-entrance programs. *Journal of Secondary Gifted Education*, *10*, 195–202.

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

Brody, L. E., Lupkowski, A. E., & Stanley, J. C. (1988). Early entrance to college: A study of academic and social adjustment during the freshman year. *College and University*, *63*, 347–359.

Brody, L. E., & Stanley, J. C. (1991). Young college students: Assessing factors that contribute to their success. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 102–132). New York: Teachers College Press.

Caplan, S. M., Henderson, C. E., Henderson, J., & Fleming, D. L. (2002). Socioemotional factors contributing to adjustment among early-entrance college students. *Gifted Child Quarterly*, *46*, 124–134.

Cornell, D.G., Callahan, C.M., & Loyd, B.H. (1991). Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program. *Gifted Child Quarterly*, *35*, 58–66.

Cronbach, L. J. (1996). Acceleration among the Terman males: Correlates in midlife and after. In C. P. Benbow & D. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 179–191). Baltimore: Johns Hopkins University Press.

Curry, W., MacDonald, W., & Morgan, R. (1999). The Advanced Placement Program: Access to excellence. *Journal of Secondary Gifted education*, *11*, 17–23.

Daurio, S. P. (1979). Educational enrichment versus acceleration: A review of the literature. In W. C. George, S. J. Cohn, & J. C. Stanley (Eds.), *Educating the gifted: Acceleration and enrichment* (pp. 13–63). Baltimore: Johns Hopkins University Press.

Fluitt, J. L., & Strickland, S. M. (1984). A survey of early admission policies and procedures. *College and University*, *59*, 129–135.

Fund for the Advancement of Education. (1953). *Bridging the gap between high school and college*. New York: Research Division of the Fund, Ford Foundation.

Gray, H. A. (1930). Some factors in the undergraduate careers of young college students. *Contributions to Education, No. 437*. New York: Teachers College, Columbia University.

Ingersoll, K.S., & Cornell, D.G. (1995). Social adjustment of female early college residents in a residential program. *Journal for the Education of the Gifted*, *19*, 45–62.

Janos, P. M., & Robinson, N. M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly*, *29*, 175–180.

Janos, P.M., Robinson, N.M., Carter, C., Chapel, A., Cufley, R., Curland, M., Daily, M., Guilland, M., Heinzig, M., Kehl, H., Lu, S., Sherry, D., Stoloff, J., & Wise, A. (1988). Social relations of students who enter college early. *Gifted Child Quarterly*, *32*, 210–215

Janos, P.M., Robinson, N.M., & Lunneborg, C.E. (1989). Markedly early entrance to college. *Journal of Higher Education*, *60*(5), 495–518.

Janos, P.M., Sanfillippo, S.M., & Robinson, N.M. (1986). "Underachievement" among markedly accelerated college students. *Journal of Youth and Adolescence*, *15*, 303–311.

Keys, N. (1938). The underage student in high school and college. *University of California Publications in Education*, *7*, 145–271.

Lupkowski, A., Whitmore, M., & Ramsay, A. (1992). The impact of early entrance to college on self esteem: A preliminary study. *Gifted Child Quarterly*, *36*, 87–90.

McCarthy, C. R. (1999). Dual-enrollment programs: Legislation helps high school students enroll in college courses. *Journal of Secondary Gifted Education*, *11*, 24–32.

McConnaha, W.R. (1997). An analysis of dual enrollment as an acceleration option for high school students. *Dissertation Abstracts International Section A: Humanities & Social Sciences*, 58(3-A), 0809.

Montour, K.M. (1977). William James Sidis, the broken twig. *American Psychologist*, *32*, 265–279.

Muratori, M.C. (2003). *A multiple case study examining the adjustment of ten early entrants*. Unpublished doctoral dissertation, The University of Iowa, Iowa City.

Muratori, M., Colangelo, N., & Assouline, S. (2003). Early entrance students: Impressions of their first semester of college. *Gifted Child Quarterly*, *47*, 219–238.

Myers, W.A. (1993). Two plus two does not always equal four (years): A guide to dual-enrollment and early college entrance. *Journal of Secondary Gifted Education*, *5*(2), 27–30.

Noble, K. D., Arndt, T., Nicholson, T., Sletten, T., & Zamora, A. (1999). Different strokes: Perceptions of social and emotional development among early college entrants. *Journal of Secondary Gifted Education*, *10*, 77–84.

Noble, K. D., & Drummond, J. E. (1992). But what about the prom? Students' perceptions of early college entrance. *Gifted Child Quarterly*, *36*, 106–111.

Noble, K.D., Robinson, N.M., & Gunderson, S.A. (1993). All rivers lead to the sea: A follow-up study of gifted young adults. *Roeper Review, 15*, 124–130.

Noble, K.D., & Smyth, R.K. (1995). Keeping their talents alive: Young women's assessment of radical, post-secondary acceleration. *Roeper Review*, *18*, 49–55.

Oden, M.H. (1968). The fulfillment of promise: Forty-year follow-up of the Terman gifted group. *Genetic Psychology Monographs*, 77, 3–93.

Olszewski-Kubilius, P. (1995). A summary of research regarding early entrance to college. *Roeper Review*, *18*, 121–126.

Olszewski-Kubilius, P. (1998). Early entrance to college: Students' stories. *Journal of Secondary Gifted Education, 10*, 226–247.

Pollins, L.D. (1983). The effects of acceleration on the social and emotional development of gifted students. In C.P. Benbow & J.C. Stanley (Eds.), *Academic precocity: Aspects of its development* (pp. 160–178). Baltimore: Johns Hopkins University Press.

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

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence*, *15*, 51–60.

Robinson, N.M., & Noble, K.D. (1992). Acceleration: Valuable high school to college options. *Gifted Child Today*, *15*(2), 20–23.

Sayler, M. F. (1994). Early college entrance: A viable option. In J. B. Hansen & S. M. Hoover (Eds.), *Talent development: Theories and practice* (pp. 67–79). Dubuque, IA: Kendall/Hunt Publishing Co.

Sayler, M.F., & Lupkowski, A.E. (1992). Early entrance to college: Weighing the options. *Gifted Child Today*, *15*(2), 24–29.

Schumacker, R. E., Sayler, M., & Bembry, K. L. (1995). Identifying at-risk gifted students in an early college entrance program. *Roeper Review*, *18*, 126–129.

Sethna, B. N., Wickstrom, C. D., Boothe, D., & Stanley, J. C. (2001). The Advanced Academy of Georgia: Four years as a residential early-college-entrance program. *Journal of Secondary Gifted Education*, *13*, 11–21.

Southern, W.T., Jones, E. D., & Stanley, J. C. (1993). Acceleration and enrichment: The context and development of program options. In K. A. Keller, F. J. Mönks, & A. H. Passow (Eds.), *International handbook of research and development of giftedness and talent* (pp. 387–409). Oxford, England: Pergamon Press.

Stanley, J. C. (1985a). How did six highly accelerated gifted students fare in graduate school? *Gifted Child Quarterly*, *29*, 180.

Stanley, J. C. (1985b). Young entrants to college: How did they fare? *College and University*, *60*, 219–228.

Stanley, J.C. (1991). Critique of "Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program." *Gifted Child Quarterly*, *35*, 67–70.

Stanley, J. C., & Benbow, C. P. (1983). Extremely young college graduates: Evidence of their success. *College and University*, 58, 361-371.

Stanley, J. C., Keating, D. P., & Fox, L. H. (Eds.). (1974). *Mathematical talent: Discovery, description, and development*. Baltimore: Johns Hopkins University Press.

Stanley, J. C., & McGill, A. M. (1986). More about "Young entrants to college: How did they fare?" *Gifted Child Quarterly*, *30*, 70–73.

Swiatek, M.A., (1993). A decade of longitudinal research on academic acceleration through the Study of Mathematically Precocious Youth. *Roeper Review*, *15*, 120–124.

Terman, L. M., & Oden, M. H. (1947). The gifted child grows up: Twenty-five year follow-up of a superior group. *Genetic studies of genius, Vol. 4*. Stanford, CA: Stanford University Press.

Tookey, M.E. (1999). The International Baccalaureate: A program conducive to the continued growth of the gifted adolescent. *Journal of Secondary Gifted Education*, *11*, 52–66.

Wallace, A. (1986). *The prodigy: A biography of William James Sidis, America's greatest child prodigy*. New York: E.P. Dutton.

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Acceleration and Twice-Exceptional Students

Introduction

Giftedness is an exceptionality—something that is by definition different from the norm. Some gifted children are twice-exceptional. They are exceptional both because they are gifted and because they have one or more disabilities. Empirical research on twice-exceptional children has accumulated slowly, in part because educators have been slow to recognize that gifted children can have co-occurring disabilities, and in part because the small number of persons in the various subpopulations of twice-exceptional students creates logistical problems for researchers. Nonetheless, there are a number of published papers on twice-exceptional students that can be utilized to make recommendations for practice. The purpose of this chapter is to summarize the research on twice-exceptional students in order to make recommendations for accelerating these students.

In writing our chapter, we have grouped twice-exceptional students into three subcategories: learning disabled, emotional and behavioral disordered, and physically disabled. We review the largest and most substantial literature first—the literature on high-ability students with learning disabilities. Then we discuss the very small, and fairly recent, literature on gifted students with emotional and behavioral disorders. Finally, we report on the somewhat older literature on gifted children with physical disabilities. At the conclusion of the chapter, we make general recommendations for educators on the acceleration of twice-exceptional students.

High Ability Students with Learning Disabilities

Although increasing attention has been given in the last two decades to the perplexing problem of high-ability/talented students who also have learning disabilities, little research has specifically addressed the topic of whether and how various forms of acceleration can be used to enhance their educational experiences. Admittedly, the need for various acceleration options for some students with learning disabilities and their ability to succeed in these options may be obscured by some of the disability characteristics of these students.

Characteristics That May Obscure the Need for Acceleration

Baum and Owen (1988) conducted one of the first data-based studies in this area. They investigated 112 gifted and talented (GT) and/or learning disabled (LD) students in grades four through six, and found that the major characteristic distinguishing GT/LD students from both average/LD and high GT/non-LD students was their heightened sense of inefficacy in school. The GT/LD students in their study displayed high levels of creative potential, but also had a tendency to behave disruptively and achieve low levels of academic success. It is important to understand that these and other characteristics of GT/LD students may actually reduce their opportunities to be considered for various types of acceleration options, as the known characteristics suggest that these students may experience lower confidence and less success in school. In fact, "because of their dual set of seemingly contradictory characteristics, gifted learning-disabled students may develop feelings of depression and inadequacy and consequently may demonstrate acting-out behaviors to disguise their feelings of low self-esteem and diminished academic self-efficacy" (Baum, Cooper, & Neu, 2001, p. 478).

Gifted students with LD may also demonstrate emotional intensity as described by Dabrowski and Piechowski (1977), unrealistic expectations of self, a tendency toward intense frustration with difficult tasks that often produces a general lack of motivation, as well as disruptive or withdrawn behavior, feelings of learned helplessness and low self-esteem (Baum & Owen, 1988; Baum, Owen, & Dixon, 1991; Reis, Neu, & McGuire,

Table 1.

Characteristics of Gifted Students with Learning Disabilities

Characteristics That Hamper Identification as Gifted
- Frustration with inability to master certain academic skill
- Learned helplessness
- General lack of motivation
- Disruptive classroom behavior
- Perfectionism
- Supersensitivity
- Failure to complete assignments
- Lack of organizational skills
- Demonstration of poor listening and concentration skills
- Deficiency in tasks emphasizing memory and perceptual abilities
- Low self-esteem
- Unrealistic self-expectations
- Absence of social skills with some peers

Characteristics That Enhance Identification as Gifted
- Advanced vocabulary use
- Exceptional analytic abilities
- High levels of creativity
- Advanced problem-solving skills
- Ability to think of divergent ideas and solutions
- Specific aptitude (artistic, musical, or mechanical)
- Wide variety of interests
- Good memory
- Task commitment
- Spatial abilities

Social and Emotional Characteristics of GT/LD Students:
- Exhibit feelings of inferiority
- Show an inability to persevere in the accomplishment of goals
- Demonstrate a general lack of self-confidence
- Exhibit confusion as they struggle to understand why they can know an answer but are not able to say it or write it correctly
- Have their abilities mask their disabilities
- Have their disabilities mask their giftedness
- Demonstrate a strong, personal need for excellence in performance and in outcomes that nears and often embodies unhealthy perfectionism
- Exhibit an intensity of emotions
- Have unrealistic expectations of self
- Also have a tendency to experience intense frustration with difficult tasks that often produces a general lack of motivation
- Experience feelings of learned helplessness
- Exhibit low self-esteem

(Reis, et al., 1995)

1995). Rather than qualifying for accelerated-learning options, another data-based study of college students classified as both gifted and learning disabled (Reis, et al., 1995) found that half had been retained for one grade in school and that they considered this retention a source of shame. In the same study, half of the postsecondary gifted students with learning disabilities sought counseling for social and emotional problems, ranging from mild depression to contemplating suicide, and many discussed their shame about knowing that they were smart, but performing below their potential in school. Reis, et al., conducted a comprehensive literature review incorporating the information from their literature review along with the results of the study, led to the conclusion that there are more negative than positive characteristics of GT/LD students (see Table 1).

Students who exhibit characteristics of both the gifted and learning disabled populations pose challenges for educators and dilemmas for parents, for the misconceptions and expected outcomes complicate the match of appropriate programming opportunities, including acceleration (Baum, et al., 1991; Silverman, 1989; Vespi & Yewchuk, 1992; Whitmore & Maker, 1985).

Strategies, Programming, and Environments that Promote Academic Success

Virtually every article written about GT/LD students indicates that they require unique educational programs and services to enhance both their academic and affective development. These articles suggest GT/LD students are more likely to succeed in academic and home settings that are positive and that pay attention to their gifts as well to the compensation strategies needed to address their disabilities. In the last few years, several authors have mentioned the types of environments and academic programs that foster a desire to succeed. McCoach, Kehle, Bray, and Siegle (2001) suggested that grade acceleration could be accompanied by remediation, if necessary, because gifted students with disabilities do not need as much repetition. Robinson (1999), citing Renzulli (Renzulli, 1992) suggested that interests, learning styles, and abilities must be taken into account to maximize student success in school. Baum (1988) has been promoting that recommendation for well over a decade. Reis, Burns, and Renzulli (1992) suggested that curriculum compacting should occur for gifted, learning disabled students, with some modifications in the process to pay attention to the talents, while using multiple options to address the disabilities.

Olenchak and Reis (2001), in a review of recent research for a task force of the National Association of Gifted Children, specifically suggested acceleration as an appropriate strategy for increasing academic challenge for these students. Mentorships can also be used to present advanced content to students in supportive relationships as well as to help change student perceptions of the school from one oriented toward remediation to one targeting individual growth (Olenchak, 1994; 1995). Opportunities to provide instruction in higher-order problem solving and information processing can be used to develop academic coping strategies, and improve students' self-esteem as problem-solvers as well as their academic performance (Hansford, 1987; Reis, McGuire, & Neu, 2000). Furthermore, because some GT/LD students have learned to be more resourceful and strategic in approaching problems than non-gifted students who have learning disabilities, classroom activities that emphasize these skills may improve self-esteem (Coleman, 1992), as well as academic performance. Almost all authors who have written anecdotally about this population (Kennedy, Higgins, & Pierce, 2002; Winebrenner, 2003) suggest that acceleration can occur, but few have actually conducted research on what happens when acceleration does occur and how it can be most effectively implemented.

Current research suggests that when a learning disability can be regarded as a personal attribute for which compensatory strategies can be learned and exercised, students can learn to increase individual persistence, emphasize their abilities, and de-emphasize their disabilities (Baum, 1988; Baum, Owen, & Dixon, 1991; Reis, Neu, & McGuire, 1995). When this process occurs, they are more likely to be successful in challenging academic settings. Baum, Owen, and Dixon (1991) were among the first to suggest that educators must implement comprehensive programs that identify and develop individual gifts and talents and help to enable GT/LD pupils to behave socially, emotionally, and academically more like gifted students without disabilities than like non-gifted students with learning disabilities. These findings, later corroborated by Bender and Wall (1994) and Olenchak (1994), indicate that as educators diminish attention to the disability and concentrate instead on the gifts, GT/LD students become more successful in school. Reis, Neu, and McGuire (1997) also found evidence of the need to focus on gifts and talents, including accelerated-learning opportunities, in successful university students with learning disabilities who had experienced opportunities to develop their talents out of elementary and secondary school.

In the last few years, several other researchers and practitioners have suggested the need for students with high abilities and learning disabilities to focus on advanced content and some have suggested acceleration, but little research has investigated the effects of these various types of acceleration initiatives. Olenchak (1995) did find positive outcomes, such as more positive self-concept, attitude toward school, and creative productivity, when advanced enrichment opportunities were provided to gifted students with learning disabilities. Approximately 25% of the students with learning disabilities who were also identified as gifted in Olenchak's study were able to engage in advanced curricular work.

Compensation and Support Systems Used in Accelerated Learning Environments

The consensus that seems to be emerging in this area calls for the need to pay attention to students' advanced curricular needs and content strengths, while simultaneously providing opportunities to gain the compensation strategies necessary to address their weaknesses (Baum, 1988; Baum & Owen, 1988; Baum, Cooper, & Neu, 2001; Olenchak, 1994; Reis, et al., 1995), a process that has been labeled dual differentiation (Neu, 1996). Specific strategies to help increase academic success for this population have not been based on research with elementary and secondary students. However, research on postsecondary students with similar challenges provides some suggestions for strategies that may benefit younger students, as outlined in Table 2.

Baum and Owen (1988), after almost a decade of work with this population, summarized most of what has been found in this review of literature with four identified recommendations

TABLE 2.

STRATEGIES TO INCREASE ACADEMIC CHALLENGE FOR GT/LD STUDENTS

Strategies	References
Academic Strategies	
Develop a clear understanding of specific student learning disabilities	(Brinckerhoff, McGuire, & Shaw, 2002; Cowen, 1993; Field & Hoffman, 1996)
Learn about one's legal rights • learn about changes in legal rights under Section 504; ADA; and IDEA • learn about accommodations provided by law	(Brinckerhoff, Shaw, & McGuire, 1993; Heyward, 1998; Latham & Latham, 1998; Vogel, 1997; Vogel & Reder, 1998)
Select courses to prepare for academically challenging college and future career choices • encourage college preparatory courses; consider quality and advanced content • avoid modified or simplified courses • attempt completion of a wide array of courses and avoid course waivers if possible • use a multi-year educational plan • involve parents and students as part of the educational team	(Barr, Hartman, & Spillance, 1998; Cowen, 1993; Koehler & Kravets, 1998; McGuire, Hall, & Litt, 1991; Reis, et al., 1995; Whitmore, 1980)
Explore career & postsecondary options • explore ways to incorporate strengths & weaknesses into a career plan • participate in a career exploration program • explore careers through extracurricular activities, hobbies & work experiences • explore colleges that do not require the SAT or ACT if scores are lower due to LD • use college resource guides / directories / Web sites, including specialized LD sources • explore college options with comprehensive LD programs versus LD services	(Brinckerhoff, et al., 2002; Cowen, 1993; DuChossois & Stein, 1992; Patton & Dunn, 1998)
Self-Regulation and Compensation Strategies	
Focus on development and internalization of a wide array of personalized compensation strategies of high practical utility • self-evaluation; organizing material; transforming material (e.g., use flashcards); goal-setting and planning; seeking information; keeping records & monitoring; structuring environment; using self-consequating (i.e., self-rewards); rehearsing & memorizing; reviewing records • help a student begin to learn and employ generalizable study skills • help a student begin to develop a personalized set of compensation strategies to promote academic success • avoid traditional remediation resource room models • explore the benefits of assistive technology	(Bryant, Bryant, & Rieth, 2002; Bursuck & Jayanthi, 1993; Butler, 1998; Crux, 1991; Deshler, Ellis, & Lenz, 1996; Pintrich, 1995; Reis, McGuire, & Neu, 2000; Shaw, Brinckerhoff, Kistler, & McGuire, 1991)
• seek environmental & social support and study skills: learn how to get around campus; where to go for the services; when it is appropriate to ask for assistance; ask teachers for lecture notes; ask teaching assistants for help; use office hours to clarify assignments; ask others which professors are more understanding of LDs & more accommodating • learn study strategies: learn library skills; develop personalized strategies for taking exams; learn ways to manage course materials (e.g., use color-coded binders) • use and practice cognitive, memory & study strategies: time management; chunking material & time; monitoring assignments; using weekly & monthly organizers; using mnemonics; rehearsal; flashcards • use note taking and written expression strategies: note taking; condensing notes; clustering material for exams; using graphical organizers in notes and with the help of computer programs; highlighting in notes; color-coding notes & flashcards	(Baum, 1984; Bursuck & Jayanthi, 1993; Crux, 1991; Deshler, et al., 1996; Hodge & Preston-Sabin, 1997; McGuire, et al., 1991; Schumaker & Deshler, 1984; Reis, et al., 2000; Shaw, et al., 1991; Vogel & Adelman, 1993)

Table 2 (continued).

Strategies to Increase Academic Challenge for GT/LD students

Strategies and Goals	References
Self-Regulation and Compensation Strategies (continued)	
• learn performance strategies for written expression, reading, comprehension, and mathematical processing: concept maps to organize material & see connections among concepts; SQ3R method (survey, question, read, recite, review); repeated readings if necessary; write one's own essays to ensure deep understanding of material; teach material to peers • explore the nature of one's own LD • through an individualized assessment, understand one's own profile of strengths and weaknesses • understand connection between one's own LD and academic performance (teachers)	(Baum, 1984; Bursuck & Jayanthi, 1993; Crux, 1991; Deshler, et al., 1996; Hodge & Preston-Sabin, 1997; McGuire, et al., 1991; Schumaker & Deshler, 1984; Reis, et al., 2000; Shaw, et al., 1991; Vogel & Adelman, 1993)
<u>Foster self-determination</u> • help develop self-advocacy skills • help set goals and then implement the plan • teach assertive communication, understanding oneself as a learner • encourage appropriately challenging classes	(Brinckerhoff, et al., 2002; Eaton, 1996; Price, 1988; Tessler, 1997; Wilson, 1994)
<u>Develop independence</u> • consider taking a summer job to establish work ethic • refine academic skills and career options • help understand the psycho-educational report • become aware of accommodations available for taking standardized tests	(Anderson, 1993; Aune & Ness, 1991; Cowen, 1993; Eaton & Coull, 1998; Vogel & Reder, 1998)
Social-Emotional Strategies	
<u>Develop a variety of support systems for healthy social and emotional growth</u> • develop emotional support systems and encouragement if negative interaction with teachers or peers occurs (parents; counselors; professionals) • provide parent advocacy in the school settings (parents) • learn the importance of education and raise an adolescent's aspirations (parents) • seek support outside of school (parents) • obtain help with schoolwork if needed • help avoid associating compensation strategies with negative stigma • involve both parents in academic and non-academic activities • nurture talents and interests • foster healthy self-concept and self-esteem	(Baldwin, 1999; Baum & Olenchak, 2002; Baum, et al., 1991; Hebert & Olenchak, 2000; Reis, et al., 2000; Tannenbaum & Baldwin, 1983; Whitmore, 1980)
Talent Development and Enrichment Strategies	
<u>Participate in opportunities for advanced content, enrichment, and talent development</u> • take appropriately challenging AP, Honors classes or other opportunities for accelerated learning if appropriate • participate in extracurricular activities to broaden horizons • participate in summer mentorship and accelerated programs • encourage development of advanced independent projects • encourage involvement in extracurricular clubs, team sports, theatrical performances • evaluate career interests through extracurricular activities, hobbies & work experiences • explore interests through interest & career inventories • create and maintain Personal Talent Portfolio • participate in an advanced enrichment program based on student's strengths and interests	(Baldwin, 1999; Baum & Olenchak, 2002; Baum & Owen, 1988; Baum, et al., 1991; Purcell & Renzulli, 1998; Reis, et al., 1995; Reis, et al., 2000; Renzulli & Reis, 1997; Silverman, 1989; Vogel & Reder, 1998)

(Table 2 adapted from Reis & Ruban, 2004; Reis, et al., 1995)

for gifted students with specific learning disabilities: encourage compensation strategies, encourage awareness of strengths and weaknesses, focus on developing the child's gift, and provide an environment that values individual differences.

High-Ability Students with Emotional and Behavior Disorders

The most common disorder in the category of emotional and behavior disoders is attention deficit hyperactivity disorder (AD/HD). The first issue that must be addressed when considering acceleration of a child who has been diagnosed as having AD/HD is accuracy of the diagnosis. Sometimes a highly intellectually or creatively gifted child is misdiagnosed with AD/HD because they exhibit AD/HD-like symptoms in regular school environments that are not suited to their learning needs (Baum & Olenchak, 2002; Baum, Olenchak, & Owen, 1998; Cramond, 1995). Although there have been no studies investigating the effects of acceleration on such misdiagnosed children, it seems logical to assume that providing more challenging instruction through acceleration would be helpful to these students, especially if it can be provided when the children are young; that is, before negative school behaviors become ingrained habits.

Minimal research has been conducted on the effects of accelerated learning environments on children who are correctly diagnosed with AD/HD (Baum, 2001; Moon, Zentall, Grskovic, Hall, & Stormont, 2001; Reis, et al., 1997; Zentall, Moon, Hall, & Grskovic, 2001). There are problems with this research literature. All of the studies utilized case study designs, which do not permit robust generalizations. Most of the case studies are retrospective, with problems of sampling bias and distorted remembrances. Many studies do not clearly distinguish between students with learning disabilities, those with AD/HD, and those with both disorders. No experimental or longitudinal studies have been conducted to determine the differential effects of accelerated and non-accelerated educational environments on gifted children with AD/HD. In addition, we were unable to find any studies of the effects of grade acceleration on gifted children with AD/HD.

One of the few empirical studies focusing specifically on accelerated gifted students with AD/HD compared this gifted AD/HD sample, who had been placed in a self-contained gifted classroom, to (a) gifted students without AD/HD in the same instructional environment and (b) average students with AD/HD in a regular classroom setting (Moon, et al., 2001; Zentall, et al., 2001). The investigators found that the GT-AD/HD students achieved at levels commensurate with their abilities when accelerated, but had difficulties with group work, peer interactions, and management of long-term projects because of their disability. Results from these investigations suggest that gifted students with AD/HD may be at risk for problems with social/emotional development if they are accelerated with their GT peers without further accommodation for their AD/HD disability.

A project in a large, diverse, urban school district identified twice-exceptional students with multiple exceptionalities-including learning disabilities (60%), behavior disorders (10%), communication disorders (2%), and multiple exceptionalities (22%) (Nielsen, Higgins, Hammond, & Williams, 1993). Once students were identified, educators provided special classes for these students at the elementary and middle school levels that simultaneously provided accelerated and challenging instruction and strategies for coping with disabilities. At the high school level, the twice-exceptional project developed three components designed to enable the students to mainstream back into the regular educational environment: (a) transition planning; (b) collaboration with respect to case management and general education modifications to accommodate disabilities; and (c) an integrated series of accelerated and differentiated courses in math, general science, and computer science designed to meet the needs of twice-exceptional students (Nielsen, Higgins, Wilkinson, & Webb, 1994). This program blended the principles of special education and gifted education. Unfortunately, no evaluation data have yet been published on this ambitious project. Anecdotal reports suggest that it was effective in helping gifted children with behavior disorders achieve their potential, which in turn suggests that gifted children with behavior disorders can succeed in accelerated learning environments *if* they are provided with teachers trained in both gifted and special education and a curriculum that simultaneously develops their talents and provides accommodations for their disability. Similar conclusions have been reached in investigations of gifted children with other disabilities (Baum, 2001; Johnsen & Corn, 1989; Whitmore & Maker, 1985).

Even less attention has been paid in the research literature to other emotional and behavioral disorders. We could not find any research on the effects of acceleration on these populations. Gifted children with Asperger syndrome, for example, have been described in the literature, but have not

yet been investigated empirically (Neihart, 2000). Therefore, it is not possible to make empirically grounded recommendations on the acceleration of gifted children with concomitant emotional and behavioral disorders at this time.

High-Ability Students with Physical Disorders

The research on gifted children with physical disabilities is also sparse, in part because the giftedness of these children may be masked by their disability (Willard-Holt, 1998). Hence, identification of giftedness is the first hurdle that must be cleared for these students to be considered for accelerated instruction.

As with gifted children with learning disabilities, most of the published literature on the population of high-ability students with physical disorders consists of descriptive, anecdotal reports of specific children or experimental programs (Eason, Smith, & Steen, 1978; Hackney, 1986; Johnsen & Corn, 1989; Johnson, 1987; Whitmore & Maker, 1985; Willard-Holt, 1998). Accelerative approaches that have been reported in these experimental programs include independent study in a talent area (Johnson, 1987), mentoring (Hackney, 1986; Johnson, 1987), and mainstreaming into gifted education programs with adaptive accommodations for the disability (Paskewicz, 1986). A survey conducted in 1985 of services for gifted students who are hearing impaired reported that acceleration was one of several accommodations provided for gifted students in schools for the hearing impaired (Gamble, 1985).

Sample Program Reports

Historically, one of the most well-developed programs for gifted handicapped children was the RAPHYT program developed at the University of Illinois in the 1970s (Karnes, 1978, 1979). This individualized program focused on preschool children and provided extensive diagnostic assessment, followed by interventions to foster talent development in combination with assistance with adaptive skills such as organization and goal-directedness. This program was one of the first to promote the notion that accelerative options for young handicapped children should be linked to their strengths and talent areas.

At the Texas School for the Blind, a six-week summer program was developed for gifted students with visual handicaps (Hackney, 1986). The program provided high expectations for visually handicapped students in a program that combined accelerated content, instruction in critical thinking and problem solving, and mentorships, in combination with numerous interventions to increase independence and self-confidence, including group counseling, an outdoor risk-taking program, and training in independent living. The program was described as successful, but no evaluation of the program was reported.

A different approach to programmatic intervention was developed at the University of New Orleans Perceptual Motor Development Center (Eason, et al., 1978). This program focused solely on remediation. The students who participated had scored high conceptually and low on perceptual motor tasks. The goal of the program was to improve their perceptual and basic motor abilities, as well as their physical fitness. The program involved preassessment followed by sequenced progressions of tasks designed to strengthen motor weaknesses. The program developers found that their remediation protocols needed to be differentiated when working with gifted students. They differentiated their program by (a) ensuring that repetitious activities were fun and challenging; (b) providing guided discovery through problem solving in the later stages of skill mastery and; (c) enabling gifted students to monitor their own progress. Evaluation was conducted through anecdotal records on each child that compared pre- and post-assessments.

One of the most interesting multiple case studies of gifted persons with physical handicaps was conducted almost 30 years ago (Maker, Redden, Tonelson, & Howell, 1978), and is described extensively in *Intellectual Giftedness in Disabled Persons* (Whitmore & Maker, 1985). This retrospective case study used critical incident methodology to examine self-perceptions of coping strategies that enabled gifted persons with four categories of physical handicaps (legally blind, legally deaf, cerebral palsied, mobility impaired) to be successful in science. Participants were asked to describe the three events in their lives that were most influential in helping them realize their potential. The majority of the events reported involved positive attitudes of others towards their ability, leading the investigators to conclude that it is important for teachers to set high expectations for these students. Providing accelerative options might be one way to encourage teachers to hold high expectations for disabled gifted persons, especially when accompanied by teacher training on behaviors that convey positive expectations (Whitmore & Maker, 1985). Further support for accelerating these students was provided by the finding in this study that strategies that involved the use or development of ability were perceived as important coping mechanisms that enabled disabled gifted persons to succeed in science.

This study also supports the need for personal talent interventions for gifted persons with handicapping conditions. Personal talent is exceptional ability to select and achieve difficult life goals that are consistent with an individual's values, interests, abilities, and contexts (Moon, 2003). The physically handicapped scientists in this study mentioned numerous instances of the development and utilization of personal talent strategies that facilitated success. These included developing persistence, learning to reduce task difficulty, seeking support and assistance from others, and cultivating personal attitudes that facilitated success, such as self-confidence and the willingness to take risks. This multiple case study of successful scientists suggests a combination of high positive expectations, strength-based accelerated education, and individualized personal talent development interventions would be highly effective in facilitating optimal development among gifted handicapped persons.

A qualitative case study of an eleven-year-old boy with multiple exceptionalities, including verbal giftedness, mathematical learning disability, and health impairment, investigated the effectiveness of home schooling for such children (Moon & Dillon, 1995). The home schooling context this child experienced allowed rapid acceleration in his areas of strength, but did not provide sufficient remediation of weaknesses or development of personal talent skills to enable the child to integrate into normal social contexts or learning environments. The study suggests that acceleration is a necessary, but not sufficient, condition for optimal development in disabled gifted children.

In their book, *Intellectual Giftedness in Disabled Persons*, Whitmore and Maker (1985) provided in-depth case studies of gifted persons with different types of physical disabilities, including hearing impairment, visual impairment, and severe physical impairment, as well as specific learning disabilities. After describing all of the individual cases, they developed recommendations for meeting both the affective and cognitive needs of gifted persons with such disabilities. Their recommendations included placements that are flexible enough to provide both challenge and remediation. They viewed accelerative options as appropriate for these populations, providing that the options are flexible enough to also provide specific instruction in coping strategies for addressing the disability. Also, they advocated for a balance between focusing on strengths and weaknesses, with a primary emphasis on raising the level of cognitive development and instruction in adaptive cognitive skills such as creative problem solving. To be successful in gifted programs, these students need well-trained teachers, within-program differentiation, and supportive peers. They may have difficulty with accelerative programs that emphasize competition or require advanced skills in their area of disability.

In a more recent multiple case study of academic and personality characteristics of high-ability students with cerebral palsy, Willard-Holt (1998) explored the experiences of two talented students with cerebral palsy who were not able to communicate with speech. Using qualitative cross-case methodology, she found that these students demonstrated the following characteristics of giftedness: advanced academic abilities (especially math and verbal skills), broad knowledge base, quickness of learning and recall, sense of humor, curiosity, insight, desire for independence, use of intellectual skills to cope with disability, and maturity (shown in high motivation, goal orientation, determination, patience, and recognition of their own limitations). Several educational factors contributed to the development of these characteristics in these students such as willingness of the teachers to accommodate for the disabilities, mainstreaming with non-disabled students, individualization and opportunities for student choice, advanced and accelerated content, and hands-on experiences. Willard-Holt recommended that educational programming for such students include accelerated content in combination with various accommodations for the disability, such as compacted assignments, provision of additional time for work requiring motor skills, and allowance of alternate response modalities.

Summary and Conclusions

Most of the existing research on twice-exceptional children focuses on high-ability students with learning disabilities. There have been far fewer studies of gifted children with emotional, behavioral, and physical disorders. Much of the research on twice-exceptional students focuses on describing the characteristics and needs of twice-exceptional students, rather than on the efficacy of specific interventions. As a result, there is little empirical research on the effects of specific accelerative strategies with different subpopulations of twice-exceptional students. However, we believe it is possible to develop tentative, general recommendations for accelerating twice-exceptional students from the evidence summarized in this chapter, even though that evidence is based primarily on program evaluation reports, retrospective case studies, qualitative studies, and a handful of investigations of talent development programs for twice-exceptional students. There is general consensus that twice-exceptional students benefit from acceleration when accelerative strategies are geared to their interests and are provided in a positive learning environment that combines challenge and support. Support for twice-exceptional students means more than emotional support and caring. It means providing accommodations for disabilities and teaching compensatory strategies and skills. Personal talent development (Moon, 2002, 2003) is important for all gifted students, but essential for twice-exceptional ones, because these twice-exceptional individuals must be resilient in order to overcome their handicaps and fulfill their potential.

References

Anderson, P. L. (1993). Issues in assessment and diagnosis. In L. C. Brinckerhoff, S. F. Shaw, & J. M. McGuire (Eds.), *Promoting postsecondary education for students with learning disabilities* (pp. 89–136). Austin, TX: PRO-ED.

Aune, E., & Ness, J. (1991). *Tools for transition: Preparing students with learning disabilities for postsecondary education*. Circle Pines, MN: American Guidance Service.

Baldwin, L. (1999). USA perspective. In A. Y. Baldwin & W. Vialle (Eds.), *The many faces of giftedness: Lifting the masks* (pp. 103–134). Albany, NY: Wadsworth.

Barr, V., Hartman, R., & Spillance, S. (1998). Getting ready for college: Advising high school students with disabilities. Retrieved September, 2003, from the World Wide Web:

Baum, S. (1984). Meeting the needs of the learning disabled gifted students. *Roeper Review, 7*, 16–19.

Baum, S. (1988). An enrichment program for gifted learning disabled students. *Gifted Child Quarterly, 32*(1), 226–230.

Baum, S. (2001). Dual differentiation: An approach for meeting the curricular needs of gifted students with learning disabilities. *Psychology in the Schools, 38*(5), 477–490.

Baum, S., & Owen, S. (1988). High ability/learning disabled students: How are they different? *Gifted Child Quarterly, 32*, 321–326.

Baum, S. M., Cooper, C. R., & Neu, T. W. (2001). Dual differentiation: An approach for meeting the curricular needs of gifted students with learning disaiblities. *Psychology in the Schools, 38*(5), 477–490.

Baum, S. M., & Olenchak, F. R. (2002). The alphabet children: GT, ADHD, and more. *Exceptionality*, 10(2), 77–91.

Baum, S. M., Olenchak, F. R., & Owen, S. V. (1998). Gifted students with attention deficits: Fact and/or fiction? Or, can we see the forest for the trees? *Gifted Child Quarterly, 42*, 96–104.

Baum, S. M., Owen, S. V., & Dixon, J. (1991). *To be gifted and learning disabled: From identification to practical intervention strategies*. Mansfield Center, CT: Creative Learning Press.

Bender, W. N., & Wall, M. E. (1994). Social-emotional development of students with learning disabilities. *Learning Disabilities Quarterly,* 17(4), 323-341.

Brinckerhoff, L. C., McGuire, J. M., & Shaw, S. F. (2002). *Postsecondary education and transition for students with learning disabilities* (2nd ed.). Austin, TX: PRO-ED.

Brinckerhoff, L. C., Shaw, S. F., & McGuire, J. M. (1993). *Promoting postsecondary education for students with learning disabilities: A handbook for practitioners*. Austin, TX: PRO-ED.

Bryant, B. R., Bryant, D. P., & Rieth, H. J. (2002). The use of assistive technology in postsecondary education. In L. C. Brinckerhoff, J. M. McGuire, & S. F. Shaw (Eds.), *Postsecondary education and transition for students with learning disabilities* (2nd ed., pp. 389–430). Austin, TX: PRO-ED.

Bursuck, W. D., & Jayanthi, M. (1993). Strategy instruction: Programming for independent study skills usage. In S. A. Vogel & P. B. Adelman (Eds.), *Success for college students with learning disabilities* (pp. 177–205). New York: Springer-Verlag.

Butler, D. L. (1998). A strategic content learning approach to promoting self-regulated learning by students with learning disabilities. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulated learning: From teaching to self-reflective practice* (pp. 160–183). New York: Guilford Press.

Coleman, M. R. (1992). A comparison of how gifted/LD and average/LD boys cope with school frustration. *Journal for the Education of the Gifted, 15*(3), 239–265.

Cowen, S. (1993). Transition planning for LD college-bound students. In S. A. Vogel & P. B. Adelman (Eds.), *Success for college students with learning disabilities* (pp. 39-56). New York: Springer-Verlag.

Cramond, B. (1995). *The coincidence of attention deficit hyperactivty disorder and creativity*. Storrs, CT: National Research Center on the Gifted and Talented.

Crux, S. C. (1991). *Learning strategies for adults: Compensations for learning disabilities*. Middletown, OH: Wall & Emerson.

Dabrowski, K., & Piechowski, M. M. (1977). *Theory of levels of emotional development*. Oceanside, NY: Dabor.

Deshler, D. D., Ellis, E. S., & Lenz, B. K. (1996). *Teaching adolescents with learning disabilities: Strategies and methods* (2nd ed.). Denver: Love.

DuChossois, G., & Stein, E. (1992). *Choosing the right college: A step-by-step system to aid students with learning disabilities in selecting the suitable college for them*. New York: New York University.

Eason, B. L., Smith, T. L., & Steen, M. F. (1978). Perceptual motor programs for the gifted-handicapped. *Journal for the Education of the Gifted*, 2(1), 10–21.

Eaton, H. (1996). *How students with learning disabilities can make the transition from high school to college*. Santa Barbara, CA: Excel Publishing.

Eaton, H., & Coull, L. (1998). *Transitions to postsecondary learning: Self-advocacy handbook.* Vancouver, BC: Eaton Coull Learning Group.

Field, S., & Hoffman, A. (1996). Increasing the ability of educators to support youth and self-determination. In L. E. Powers, G. H. S. Singer, & J. Sowers (Eds.), *Promoting self-competence in children and youth with disabilities: On the road to autonomy* (pp. 171–187). Baltimore: Brookes.

Gamble, H. W. (1985). A national survey of programs for intellectually and academically gifted hearing-impaired students. *American Annals of the Deaf, 130*(6), 508–518.

Hackney, P. W. (1986). Education of the visually handicapped gifted: A program description. *Education of the Visually Handicapped, 18*(2), 85–95.

Hansford, S. J. (1987). *Intellectually gifted learning disabled students: A special study.* Washington, DC: U.S. Department of Education, Educational Information Center.

Hebert, T. P., & Olenchak, F. R. (2000). Mentors for gifted underachieving males: Developing potential and realizing promise. *Gifted Child Quarterly*, 44(3), 196-207.

Heyward, S. (1998). *Disability and higher education: Guidance for Section 504 and ADA compliance*. Horsham, PA: LRP Publications.

Hodge, B. M., & Preston-Sabin, J. (1997). *Accommodations--or just good teaching? Strategies for teaching college students with disabilities*. Westport, CT: Praeger.

Johnsen, S. K., & Corn, A. L. (1989). The past, present, and future of education for gifted children with sensory and/or physical disabilities. *Roeper Review, 12*(1), 13–23.

Johnson, L. (1987). Teaching of the visually impaired youngster. *Journal of Visual Impairment and Blindness, 81*(2), 51–52.

Karnes, M. B. (1978). Identifying and educating gifted/talented nonhandicapped and handicapped preschoolers. *Teaching Exceptional Children, 78*(10), 114–119.

Karnes, M. B. (1979). Young handicapped children can be gifted and talented. *Journal for the Education of the Gifted, 1*(3), 157–171.

Kennedy, K. Y., Higgins, K., & Pierce, T. (2002). Collaborative partnerships among teachers of students who are gifted and have learning disabilities. *Intervention in School and Clinic, 38*(1), 36–49.

Koehler, M., & Kravets, M. (1998). *Counseling secondary students with learning disabilities*. Paramus, NJ: Prentice-Hall.

Latham, P. S., & Latham, P. H. (1998). Legal issues regarding AD/HD at the postsecondary level: Implications for service providers. In P. Quinn & A. McGormick (Eds.), *Re-thinking AD/HD: A guide to fostering success in students with AD/HD at the college level* (pp. 102–107). Bethesda, MD: Advantage Books.

Maker, C. J., Redden, M. R., Tonelson, S., & Howell, R. M. (1978). *The self-perceptions of handicapped scientists*. Albuquerque, NM: The Department of Special Education.

McCoach, D. B., Kehle, T. J., Bray, M. A., & Siegle, D. (2001). Best practices in the identification of gifted students with learning disabilities. *Psychology in the Schools, 38*(5), 403–411.

McGuire, J. M., Hall, D., & Litt, A. V. (1991). A field-based study of the direct service needs of college students with learning disabilities. *Journal of College Student Development, 32*, 101–108.

Moon, S. M. (2002, October). *Developing personal talent*. Paper presented at the European Council for High Ability, Rhodes, Greece.

Moon, S. M. (2003). Personal talent. *High Ability Studies, 14*(1), 5–21.

Moon, S. M., & Dillon, D. R. (1995). Multiple exceptionalities: A case study. *Journal for the Education of the Gifted, 18*, 111–130.

Moon, S. M., Zentall, S. S., Grskovic, J. A., Hall, A., & Stormont, M. (2001). Emotional and social characteristics of boys with AD/HD and/or giftedness: A comparative case study. *Journal for the Education of the Gifted, 24*(3), 207–247.

Neihart, M. (2000). Gifted children with Asperger's syndrome. *Gifted Child Quarterly*, 44(4), 222-230.

Neu, T. W. (1996, April). *The dually-differentiated curriculum: Key to meeting the educational needs of gifted learning disabled students*. Paper presented at the Association for the Education of Gifted Underachieving Students, Denver, CO.

Nielsen, M. E., Higgins, L. D., Hammond, A. E., & Williams, R. A. (1993). Gifted children with disabilities. *Gifted Child Today, 16*(5), 9–12.

Nielsen, M. E., Higgins, L. D., Wilkinson, S. C., & Webb, K. W. (1994). Helping twice-exceptional students to succeed in high school. *Journal of Secondary Gifted Education, 5*(3), 35–39.

Olenchak, F. R. (1994). Talent development: Accommodating the social and emotional needs of secondary gifted /learning disabled students. *Journal of Secondary Gifted Education, 5*(3), 40–52.

Olenchak, F. R. (1995). Effects of enrichment on gifted/learning disabled students. *Journal for the Education of the Gifted, 18*, 385–399.

Olenchak, F. R., & Reis, S. M. (2001). Gifted students with learning disabilities. In M. Neihart & S. M. Reis & N. M. Robinson & S. M. Moon (Eds.), *The social and emotional development of gifted children* (pp. 267–289). Waco, TX: Prufrock Press.

Paskewicz, M. (1986). Mainstreaming the gifted visually handicapped child. *Journal of Visual Impairment and Blindness, 80*(9), 937–938.

Patton, J., & Dunn, C. (1998). *Transition from school to young adulthood*. Austin, TX: PRO-ED.

Pintrich, P. R. (1995). Understanding self-regulated learning. In R. J. Menges & M. D. Svinicki (Eds.), *New directions for teaching and learning* (Vol. 63, pp. 3–12). San Francisco: Jossey-Bass.

Price, L. (1988). Support groups work! *Journal of Counseling and Human Services Professions, 2*, 35–46.

Purcell, J. H., & Renzulli, J. S. (1998). *Total talent portfolio: A systematic plan to identify and nurture gifts and talents*. Mansfield, CT: Creative Learning Press.

Reis, S. M., Burns, D. E., & Renzulli, J. S. (1992). *Curriculum compacting: The complete guide to modifying the regular curriculum for high ability students*. Mansfield Center, CT: Creative Learning Press.

Reis, S. M., McGuire, J. M., & Neu, T. W. (2000). Compensation strategies used by high-ability students with learning disabilities who succeed in college. *Gifted Child Quarterly, 44*(2), 123–134.

Reis, S. M., Neu, T. W., & McGuire, J. M. (1995). *Talents in two places: Case studies of high ability students with learning disabilities who have achieved*. Storrs, CT: National Research Center on the Gifted and Talented.

Reis, S. M., Neu, T. W., & McGuire, J. M. (1997). Case studies of high ability students with learning disabilities who have achieved. *Exceptional Children, 63*(4), 463–479.

Reis, S. M., & Ruban, L. (2004). Compensation strategies used by high ability students with learning disabilities. In R. Sternberg & T. Newman (Eds.), *Gifted students with learning disabilities*. Austin, TX: PRO-ED, 155–198.

Renzulli, J. S. (1992). A general theory for the development of creative productivity through the pursuit of idea acts learning. *Gifted Child Quarterly, 4*, 170–182.

Renzulli, J. S., & Reis, S. M. (1997). *The Schoolwide Enrichment Model: A how-to guide to educational excellence.* Mansfield Center, CT: Creative Learning Press.

Robinson, N. M. (1999). Meeting the needs of students who are gifted and have learning disabilities. *Intervention in School and Clinic, 34*(4), 195–204.

Schumaker, J. B., & Deshler, D. D. (1984). Setting demand variables: A major factor in program planning for the LD adolescent. *Topics in language disorders, 4*(2), 22–40.

Shaw, S. F., Brinckerhoff, L. C., Kistler, J. K., & McGuire, J. M. (1991). Preparing students with learning disabilities for postsecondary education: Issues and future needs. *Learning Disabilities: A Multidisciplinary Journal, 2*, 21–26.

Silverman, L. K. (1989). Invisible gifts, invisible handicaps. *Roeper Review, 12*, 37–42.

Tannenbaum, A. J., & Baldwin, L. J. (1983). Giftedness and learning disability: A paradoxical combination. In L. H. Fox , L. E. Brody, & D. Tobin (Eds.), *Learning disabled/gifted children* (pp. 11–36). Baltimore: University Park Press.

Tessler, L. (1997, September/October). How college students with learning disabilities can advocate for themselves. *LDA Newsbriefs*.

Vespi, L., & Yewchuk, C. (1992). A phenomenological study of the social/emotional characteristics of gifted learning disabled children. *Journal for the Education of the Gifted, 16*(1), 55–72.

Vogel, S. A. (1997). *College students with learning disabilities: A handbook*. Pittsburgh: ADA.

Vogel, S. A., & Adelman, P. B. (1993). *Success for college students with learning disabilities.* New York: Springer-Verlag.

Vogel, S. A., & Reder, S. (1998). *Learning disabilities, literacy, and adult education*. Baltimore: Brookes.

Whitmore, J. R. (1980). *Giftedness, conflict, and underachievement*. Boston: Allyn & Bacon.

Whitmore, J. R., & Maker, C. J. (1985). *Intellectual giftedness in disabled persons*. Rockville, MD: Aspen Publications.

Willard-Holt, C. (1998). Academic and personality characteristics of gifted students with cerebral palsy: A multiple case study. *Exceptional Children*, 65(1), 37-50.

Wilson, G. L. (1994). Self-advocacy skills. In C. A. Michaels (Ed.), *Transition strategies for persons with disabilities* (pp. 153–184). San Diego, CA: Singular.

Winebrenner, S. (2003). Teaching strategies for twice-exceptional students. *Intervention in School and Clinic*, *38*(3), 131–137.

Zentall, S. S., Moon, S. M., Hall, A. M., & Grskovic, J. A. (2001). Learning and motivational characteristics of boys with AD/HD and/or giftedness: A multiple case study. *Exceptional Children*, *67*, 499–519.

Biographies

About the Editors

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Susan G. Assouline is the Belin-Blank Center's Associate Director. She received her B. S. in general science with a teaching endorsement, her Ed.S. in School Psychology, and her Ph.D. in Psychological and Quantitative Foundations, all from The University of Iowa. Upon completion of her doctorate, she was awarded a two-year post-doctoral fellowship at the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University, and upon completion joined the Belin-Blank Center in 1990. She is especially interested in identification of academic talent in elementary students and is co-author (with Ann Lupkowski-Shoplik) of *Developing Mathematical Talent: A Guide for Challenging and Educating Gifted Students*. As well, she is co-editor with Nicholas Colangelo of the series *Talent Development: Proceedings from the Wallace Research Symposia on Giftedness and Talent Development*, and co-developer of *The Iowa Acceleration Scale – 2nd Edition*, a tool designed to guide educators and parents through decisions about grade-skipping students. She has consulted on over 100 acceleration cases and conducted numerous acceleration workshops and presentations for parents and educators. Dr. Assouline has presented at national and international conferences. Currently, she is lead investigator on a national study on twice-exceptional children.

Miraca U. M. Gross is Professor of Gifted Education, and Director of the Gifted Education Research, Resource and Information Centre (GERRIC), at the University of New South Wales in Sydney, Australia. She is a leading international authority on the education of gifted and talented children. She is particularly well known in the United States where she has made a sustained contribution to the education of gifted and talented students over twenty years advising Education Departments and school districts on issues related to acceleration, programming and curriculum development. Dr. Gross is one of the leading experts on the use of acceleration with academically gifted students. She undertook her M.S.E. and Ph.D. degrees, both specializing in gifted education, at Purdue University. In subsequent years she has won several international research awards. In 1987 she became the first non-American to win the Hollingworth Award for Excellence in Research in Gifted Education. In 1988 and 1990 she was awarded Mensa International Education and Research Foundation Awards for Excellence. In 1995 the American National Association

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About the Authors

Linda E. Brody directs the Study of Exceptional Talent (SET) at the Johns Hopkins University Center for Talented Youth (CTY). SET provides counseling services to extremely gifted students who need more challenging academic programs than their schools typically provide, studies their progress over time, and publishes *Imagine*, an award-winning magazine that spotlights educational opportunities and resources for academically talented students. Linda also co-directs CTY's Diagnostic and Counseling Center, which provides individual assessment and counseling services and specializes in assisting gifted students who also have learning disabilities. Her research interests focus on special populations of gifted students, particularly the highly gifted, gifted females, and twice exceptional students. She is interested in identifying and evaluating strategies and programs that facilitate talent development, and has done extensive research on acceleration. Linda has published several books, as well as numerous book chapters and articles in professional journals, on acceleration and other topics. Most recently, she is the editor of *Grouping and Acceleration Practices in Gifted Education*, a volume in the *Essential Readings in Gifted Education* series edited by Sally Reis. Having earned her doctorate in the Education of the Gifted from Johns Hopkins, she has also taught graduate courses in gifted education there for many years. She presents regularly at national and international conferences and is a reviewer for *Gifted Child Quarterly*, *Roeper Review*, *Journal for Secondary Gifted Education*, and *Journal for Research in Mathematics Education*.

James J. Gallagher is currently a senior investigator for the Frank Porter Graham Child Development Institute. He served for seventeen years as director of this institute at the University of North Carolina at Chapel Hill. He has written many articles, book chapters and texts in gifted education including *Teaching the Gifted Child 4th edition* Allyn & Bacon 1994, with his daughter Shelagh. He has recently finished a policy monograph for the National Research Center on the Gifted and Talented entitled *Society's Role in Educating Gifted Students: The Role of Public Policy* (2002). He has been president of the Council for Exceptional Children, The Association of the Gifted (TAG), the National Association of Gifted Children (NAGC) and the World Council for Gifted and Talented. He has also written an introductory textbook for special education, *Educating Exceptional Children*, published by Houghton Mifflin, now in its tenth edition.

Eric D. Jones, is a professor of education at Bowling Green State University. He teaches graduate and undergraduate classes in special education and is co-director of the Center for Evaluation Services. Dr. Jones was recently appointed Director of the School of Intervention Services at BGSU. He also provides 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.

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David Lubinski received both his B.A. (1981) and Ph.D. (1987) in psychology from the University of Minnesota. From 1987-1990 he was a fellow in the Postdoctoral Training Program in Quantitative Methods, Department of Psychology, University of Illinois (Champaign). He is Professor of Psychology in the Department of Psychology and Human Development, Vanderbilt University; and Associate Editor, *Journal of Personality and Social Psychology: Personality Processes and Individual Differences*. With Camilla Benbow, he co-directs the Study for Mathemati-

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Ann Lupkowski-Shoplik is the Founder and Director of the Carnegie Mellon Institute for Talented Elementary and Secondary Students (C-MITES). She earned a Ph.D. in educational psychology from Texas A&M University and then completed a three-year postdoctoral fellowship at the Study of Mathematically Precocious Youth at Johns Hopkins University. She was an assistant professor and director of the Study of Mathematically Precocious Youth at the University of North Texas. In 1992, she founded C-MITES at Carnegie Mellon University, where she continues to conduct research and develop programs on behalf of academically talented youth. She conducts the annual Elementary Student Talent Search throughout Pennsylvania and oversees the C-MITES Summer Programs and Weekend Workshops for academically talented students in ninth grade and younger. Her research interests include identifying mathematically talented students younger than age 12 and studying their characteristics and academic needs. She has published many articles in gifted education in scholarly journals. Together with Susan Assouline, she wrote *Jane and Johnny Love Math* and *Developing Mathematical Talent*. She is also a co-author of the *Iowa Acceleration Scale* with Susan Assouline, Nicholas Colangelo, Jonathan Lipscomb, and Leslie Forstadt.

Sidney M. Moon is Professor of Educational Studies and Director of the Gifted Education Resource Institute (http://www.geri.soe.purdue.edu) at Purdue University. She has been active in the field of gifted education for more than 25 years as a parent, counselor, teacher, administrator, and researcher. In that time, she has contributed more than 60 books, articles, and chapters to the field. Her most recent book is an edited volume in the *Essential Readings in Gifted Education* series on *Social/Emotional Issues, Underachievement, and Counseling of Gifted and Talented Students*. Sidney is active in the National Association for Gifted Children where she currently serves on the Board of Directors, the Publications Committee, and the Affective Curriculum Task Force. Her research interests include talent development in the STEM disciplines (science, technology, engineering, and mathematics), secondary gifted education, underserved populations of gifted students, differentiated counseling services, and personal talent development.

Michelle C. Muratori is a Senior Counselor and Research Associate at the Center for Talented Youth at Johns Hopkins University, where she works with highly gifted students who participate in the Study of Exceptional Talent (SET) and their families. Michelle received her Ph.D. in Counselor Education from The University of Iowa (UI). As a doctoral student, she held a position at the Belin-Blank Center for four years and developed her research and clinical interests in the field of gifted education. While serving as the graduate student coordinator of the National Academy of Arts, Sciences, and Engineering (NAASE), an early college entrance program at UI, she felt inspired to study the academic, social, and personal adjustment of the NAASE students. This research earned her recognition from the Iowa Talented and Gifted Association as well as the National Association for Gifted Children. Michelle earned several other awards as a doctoral student including the 2003/2004 Howard R. Jones Achievement Award, the 2001/2002 Albert Hood Promising Scholar Award, and the 2001 First in the Nation in Education (FINE) Scholar Award. In 2004, she earned the Excellence Research Award for MENSA.

Paula Olszewski-Kubilius is the director of the Center for Talent Development at Northwestern University. She has worked at the Center for over 20 years during which she has conducted research and published over 60 articles on issues of talent development, particularly the effects of accelerated educational programs and the needs of special populations of gifted children. She was named Early Scholar by the National Association for Gifted Children in 1987 and was selected as the Esther Katz Rosen Speaker for the 1997 American Psychological Association Convention in Chicago. She has designed and conducted educational programs for learners of all ages, particularly accelerated programs using a fast paced model of

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Sally M. Reis is a Professor and the Department Head of the Educational Psychology Department at the University of Connecticut where she also serves as Principal Investigator of the National Research Center on the Gifted and Talented. She was a teacher for 15 years, 11 of which were spent working with gifted students on the elementary, junior high, and high school levels. She has authored more than 130 articles, nine books, 40 book chapters, and numerous monographs and technical reports and has conducted research about policies related to acceleration. In addition, her other research interests are related to special populations of gifted and talented students, including: those who underachieve, students with learning disabilities, gifted females and culturally diverse groups of talented students. She is also interested in extensions of the Schoolwide Enrichment Model for both gifted and talented students and as a way to expand offerings and provide general enrichment to identify talents and potentials in students who have not been previously identified as gifted. Sally serves on several editorial boards, including the *Gifted Child Quarterly*, and is a past President of the National Association for Gifted Children.

Nancy M. Robinson, is Professor Emerita of Psychiatry and Behavioral Sciences at the University of Washington. She is the former Director of what is now known as the Halbert and Nancy Robinson Center for Young Scholars. Among the several programs of that center are the UW Early Entrance Program, which admits students no older than age 14 to a one-year Transition School, after which they become full-time UW students; the Washington Academy, which admits students after their sophomore year of high school to the Honors Program of the UW; a Diagnostic and Counseling Service for families of gifted children; and extensive summer programs for gifted fifth through ninth grade students. Professor Robinson attained the Ph.D. in developmental and child-clinical psychology from Stanford University in 1958 and held faculty positions at the University of North Carolina at Chapel Hill before moving to the University of Washington in 1969. Known for many years for her work in the field of mental retardation as well as giftedness, her research interests include the effects of marked academic acceleration, the behavioral and family adjustment of gifted children, and verbal and mathematical precocity in very young children. She was named Distinguished Scholar by the National Association for Gifted Children in 1998. Professor Robinson is currently co-chair of one of UW's Human Subjects Review committees, chair of the Board of Advanced Academy of the University of West Georgia, chair of the Advisory Committee on Exceptional Children for the U.S. Department of State Office of Overseas Schools, member of the Board of Trustees of the Open Window School, and a member of the editorial boards of the *Gifted Child Quarterly* and the *Journal of Youth and Adolescence*.

Karen B. Rogers, is a Professor of Gifted Studies and Chair of the Department of Curriculum & Instruction at the University of St. Thomas in Minneapolis, Minnesota, where she has worked and taught for the past 20 years. She is author of the widely disseminated *The Relationship of Grouping Practices to the Education of Gifted Learners*, a technical paper, first in the series of *Research-Based Decision Making* papers published by the National Research Center on the Gifted and Talented. In 2002, she published the book, *Re-forming Gifted Education: Matching the Program to the Child*, which capsulized her last 10 years of research synthesis work on all practices used in gifted education to enhance academic achievement, as well as social and emotional development. Professor Rogers sits on the Publications Review or Advisory Boards of every major gifted journal, including *Roeper Review*, *Gifted Child Quarterly*, *Journal for Secondary Gifted Education*, *Journal for the Education of the Gifted*, and *Gifted Education International*. She spent 11 years in a variety of elected positions (board member, board of governors representative, vice president, president, past president) with The Association for the Gifted, a division of the Council for Exceptional Children. She presents and consults widely across the United States, Canada, and Australia. Her current research follows several directions: (a) social interactions among Pre-Raphaelite painters and poets; (b) longitudinal study of the impact of educational planning for gifted and highly gifted children; (c) updated research synthesis of research-based "best practices" in gifted education; and (d) applications of fMRI brain studies in gifted adolescents. The basis for the current contribution to *A Nation Deceived* stems from her doctoral dissertation in which she conducted a best evidence synthesis (meta-analysis) of all the research on 11 forms of academic acceleration, published in 1991. The synthesis contributed in the current chapter represents an update of that original work.

W. Thomas Southern is a professor of education and Coordinator of Special Education at Miami University of Ohio where he is developing a gifted education program. Formerly, he was a member of the faculty in the special education department at Bowling Green State University. He serves as a consultant on gifted education to the Ohio and Indiana State Departments of Education. Dr. Southern is also a member of the Mid-West Talent Search. He was recently elected vice-President of the Association for the Gifted Division of the Council for Exceptional Children. His current research interests include: acceleration, mentoring, curriculum based assessment, and the identification and programming needs of special populations of gifted children.

Julian C. Stanley, Professor Emeritus of Psychology at Johns Hopkins University, founded the Study of Mathematically Precocious Youth (SMPY) there in 1971. It has grown into a large national movement, with annual regional talent searches and academic programs, chiefly during summers, conducted by Johns Hopkins (Center for Talented Youth), Duke University (Talent Identification Program), Northwestern University (Center for Talent Development), and the University of Denver (Rocky Mountain Talent Search). Dr. Stanley received his master's and doctoral degrees from the Harvard Graduate School of Education in 1946 and 1950, respectively. He is a past president of the American Educational Research Association, the National Council on Measurement in Education, and two divisions of the American Psychological Association. Also, he is a member of the National Academy of Education and of Phi Beta Kappa and a Fellow of several national professional associations. His latest book, co-authored with Diane Boothe, and published by Prufrock Press is *In the eyes of the beholdler: Critical issues for diversity in gifted education*.

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The National Association for Gifted Children (NAGC) Position Paper on Acceleration (1992)

ACCELERATION

The National Association for Gifted Children (NAGC) periodically issues policy statements dealing with issues, policies, and practices that have an impact on the education of gifted and talented students. Policy statements represent the official convictions of the organization.

All policy statements approved by the NAGC Board of Directors are consistent with the organization's belief 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 is fully committed to national goals that advocate both excellence and equity for all students, and we believe that the best way to achieve these goals is through *differentiated* educational opportunities, resources, and encouragement for all students.

The practice of educational acceleration has long been used to match appropriate learning opportunities with student abilities. The goals of acceleration are to adjust the pace of instruction to the student's capability, to provide an appropriate level of challenge, and to reduce the time period necessary for students to complete traditional schooling. When acceleration has been effective in achieving these goals, highly capable individuals are prepared to begin contributing to society at an earlier age. Although instructional adaptations, such as compacting, telescoping, and curriculum revision, which allow more economic use of time are desirable practices for exceptionally talented students, there are situations in which such modifications are insufficient in fulfilling the academic potential of highly capable children. Personal acceleration is called for in these cases.

Personal acceleration involves moving a student through the traditional educational organization more quickly and includes such practices as grade skipping, concurrent enrollment in two grades, early entrance into kindergarten or college, credit by examination, combining three years of middle school into two, acceleration in particular content areas, and dual enrollment in high school and college. Students may be accelerated in one discipline or across disciplines.

Research documents the academic benefits and positive outcomes of personal acceleration for carefully selected students. Decisions about the appropriateness of personal acceleration and the extent of acceleration for a given student should include examination of student preferences and disposition relative to the decision, the student's intellectual and academic profile, and social readiness. Other factors which enhance the success of personal acceleration are positive attitudes of teachers, timeliness of the decision, parent support, and the careful monitoring of new placements with a clearly articulated option to return to the earlier setting without penalty.

Opportunities to learn must be offered to all children. Accordingly, highly able students with capability and motivation to succeed in placements beyond traditional age/grade parameters should be provided the opportunity to enroll in intellectually appropriate classes and educational settings.

An Annotated Bibliography on Acceleration

Introduction

This annotated bibliography is current through June 2004. It contains 263 references. They have been organized according to 12 categories. The categories, and number of references for each are as follows:

1. Survey/Interview, 31
2. Experimental/Correlational, 26
3. Longitudinal, 25
4. Case Study, 15
5. Review of Literature, 8
6. General Discussions/Thought Piece, 55
7. Math/Science Acceleration, 33
8. Meta-analysis, 6
9. Validation Study, 1
10. Book or Book Chapter, 34
11. Instrument, 1
12. International, 29

1. Survey/Interview

Archambault Jr., F. X., Westberg, K. L., Brown, S. W., Hallmark, B. W., Emmons, C. L., & Zhang, W. (1993). *Regular classroom practices with gifted students: Results of a national survey of classroom teachers*. Storrs, CT: The University of Connecticut.

The Classroom Practices survey was conducted by The National Research Center on the Gifted and Talented (NRC/GT) to determine the extent to which gifted and talented students receive differentiated education in regular classrooms across the United States. The survey samples included a general sample of 3,993 third and fourth grade teachers working in public school settings. A survey instrument called the Classroom Practices Questionnaire (CPQ) was developed to obtain background information on the teachers, their classroom, and their school districts as well as their perceptions of their teaching behavior related to gifted and average students in their classes. The major finding of this study is that 3rd and 4th grade teachers make only minor modifications in the regular classroom to meet the needs of gifted students. Some classroom teachers also attempt to eliminate material that students have mastered, provide the opportunity for more advanced level work, give students some input into how classroom time is allocated, and expose gifted students to higher level thinking skills, however, these modifications are not used widely. The survey also revealed that the regular classroom services provided to gifted students in schools with formal gifted programs are similar to those provided in schools without formal programs.

Belcastro, F. P. (1995). *Richardson study: U.S. vs. Iowa*. (ERIC Documents Reproduction Service No. ED385960).

Using a questionnaire developed for a 1985 national survey of educational practices for gifted students in both public and parochial schools (the Sid W. Richardson Study), this study surveyed 273 Iowa school districts in 1993 to determine types of programs in existence in Iowa schools and how Iowa schools differed from the nation's schools in its responses. The study gathered information on 16 program types, which constitute practices or approaches judged appropriate for gifted students. Program types are: (1) enrichment in the regular classroom, (2) part-time special class, (3) full-time special class, (4) independent study, (5) itinerant teacher, (6) mentorship, (7) resource rooms, (8) special schools, (9) early entrance, (10) continuous progress, (11) nongraded school, (12) moderate acceleration, (13) radical acceleration, (14) College Board and Advanced Placement participation, (15) fast-paced courses, and (16) concurrent or dual enrollment. Comparison with the Richardson findings suggested that, overall, Iowa schools had more negative significant results than positive significant results. These negative results included significantly fewer supervisory staff responsible

for gifted programs, significantly lower per pupil expenditures, and significantly fewer schools with special funding for gifted students. Positive results included significantly more schools in which all teachers participated in in-service training and significantly more use of libraries.

Birch, J. W. (1954). Early school admission for mentally advanced children. *Exceptional Children*, *21*, 84–87.

An evaluation by principals and teachers made over a two-year period of the educational and social adjustments of 43 children admitted early to the first grade is reported. In 30 instances, the evaluations were completely positive; in only five instances were any negative evaluations obtained, and these did not totally characterize the five children. The examining, counseling, and evaluative procedures are described.

Bower, B. (1990). Academic acceleration gets social lift. *Science News*, *138*(14), 212–222.

Reported are the findings of a study of the effects of academic acceleration on the social and emotional adjustments of students. Subjects included 1,247 12 to 14 year olds who scored in the top 1% on a national mathematics examination. The advantages of academic acceleration are emphasized.

Brody, L. E., Lupkowski, A., & Stanley, J. C. (1988). Early entrance to college: A study of academic and social adjustment during the freshman year. *College & University*, *63*(4), 347–359.

A study investigated the freshman year experience of exceptionally able students entering colleges at least two years early. Academic achievement and social adjustment were considered in relation to college type, student residence at home or away from home, degree and beginning of academic acceleration, and student adjustment mechanisms.

Caplan, S. M., Henderson, C. E., Henderson, J., & Fleming, D. L. (2002). Socioemotional factors contributing to adjustment among early-entrance college students. *Gifted Child Quarterly, 46*(2), 124–134.

A study investigated the influence of self-concept and perceived family environment on psychosocial adjustment among 180 early-entrance college students (ages 14-17). Family cohesion, conflict, and expressiveness and overall self-concept were predictive of adjustment to college. Family cohesion, organization, control, conflict, and overall self-concept predicted first semester grade-point average.

Cognard, A. M. (1996). *The case for weighting grades and waiving classes for gifted and talented high school students (Report)*. Storrs, CT: National Research Center on the Gifted and Talented.

This monograph discusses two studies that investigated weighting grades and waiving classes for gifted students. Data were gathered from 19 interviews with teachers, counselors and administrators in four high schools, questionnaires filled out by 189 high school administrators, 80 school policies on weighting grades and 19 policies on waiving classes, and attitudes of 15 college admission directors. Research results indicated that the majority of schools weighted some classes, although there is no consistency among schools as to which classes or grades are weighted. However, all schools which weighted grades had one thing in common: a commitment to defining excellence and to giving credence to what excellence means to them through the process of weighting grades. Respondents stated a correlation between their decision to weight grades and their interest in reinforcing able students to take demanding courses. The study on waiving classes also showed a lack of national consistency on how classes are waived. One constant did occur: no class is waived unless students show mastery of materials. When students are allowed to skip/waive lower-level classes, such classes usually generate no credit and students are often required to take more advanced classes in the same academic discipline.

Cornell, D. G., Callahan, C. M., & Loyd, B. H. (1991). Socioemotional adjustment of adolescent girls enrolled in a residential acceleration program. *Gifted Child Quarterly*, *35*(2), 58–66.

The prospective study of adolescent girls enrolled in a residential early college entrance program investigated whether socioemotional adjustment could be predicted by prior personality and family characteristics. Adjustment was assessed from staff, student, and peer perspectives over the course of one academic year. Results indicate consistent predictive relationships between the Jackson Personality Inventory, the Self-Perception Profile for Adolescents, the Family Environment Scale, the Parent Adolescent Communication Scale, and four outcome adjustment measures. The importance of studying individual differences in how students adjust in acceleration programs is emphasized.

Cox, J., & Daniel, N. (1984). The MacArthur fellows look back. *Gifted Child Today*, *35*, 18–25.

The article describes replies to a questionnaire by recipients of the MacArthur Fellows Program, an award given to individuals with uncommon abilities across a wide spectrum of creative pursuits. Replies touch on school and family backgrounds, acceleration, importance of grades,

recognition of achievement, extracurricular activities, and significant teachers.

Gilbert, L. H. (1998). An investigation of the relationships between high school experiences and educational attainment for high achieving students. *Dissertation Abstracts International*, *58*(7-A). U.S.: University Microfilms International.

The purpose of this study was to determine the relative influence of each of seven variables in predicting educational attainment, and by inference, adult economic success for high achieving, academically gifted students. A secondary analysis was performed using longitudinal data from the base year and a third from follow-up reports of the 1980 High School and Beyond senior cohort survey. A total of 1,227 subjects were selected for the secondary analysis who met the following criteria: graduation from a public high school, self-reported grades indicating high achievement, self-reported participation in an academic or college preparatory program. Educational attainment, a reliable predictor of adult economic success, served as the dependent variable. A backwards stepwise logistic regression was conducted. Independent variables included academic acceleration, extracurricular participation, personological factors (self-concept, locus of control, educational attainment one thinks one will achieve, educational attainment with which one will be satisfied), and parental expectations. These variables were previously identified as individually related to educational attainment. Three control variables were included throughout the regression: socioeconomic status, sex, and academic achievement as a composite measurement of four tests. Three of the seven independent variables remained in the final logistic regression model. These were, in order of significance, educational attainment one thinks one will achieve, parental expectations, and educational attainment with which one will be satisfied. Within this model, socioeconomic status and sex had no effect in predicting Bachelor's degree attainment, although academic achievement test score did. Within this sample and model, the odds of Bachelor's degree attainment for a subject who thought he/she would obtain a Bachelor's degree were 5.38 times the odds for subjects who did not foresee Bachelor's degree attainment. The odds of Bachelor's degree attainment for a subject whose parents indicated the subject should go to college were 2.84 times the odds of attainment for subjects whose parents did not indicate college. The odds of Bachelor's degree attainment for a subject who believed he/she would not be satisfied with less than a Bachelor's degree were 1.81 times the odds of attainment for subjects who indicated they would be satisfied with less than a Bachelor's degree.

Janos, P. M., et al. (1989). Markedly early entrance to college: A multi-year comparative study of academic performance and psychological adjustment. *Journal of Higher Education*, *60*(5), 495–518.

Certain highly able and motivated young adolescents can successfully pursue full-time college-level studies without unreasonable compromises to psychological and social adjustment. Ways in which an adequate program facilitating early college entrance might be structured are suggested.

Janos, P. M., Robinson, N. M., Carter, C., Chapel, A., Cufley, R., Curland, M., et al. (1988). Social relations of students who enter college early. *Gifted Child Quarterly*, *32*, 210–215.

Students (n=63) who entered college by age 14 supplied data on the number and ages of friends, time spent together, and degree of shared intimacy. By junior year, early entrants appeared to have established relations with older students of breadth and depth equivalent to those already existing with age mates.

Janos, P. M., Sanfilippo, S. M., & Robinson, N. M. (1986). Underachievement among markedly accelerated college students. *Journal of Youth and Adolescence*, *15*(4), 303–311.

This study investigated those few lackluster achievers as could be identified, using loose criteria, in a college-level program of academic acceleration. Underachieving males appeared less psychologically mature and appeared to suffer more internal conflict than achieving males, but underachieving females evidenced greater maturity than their counterparts.

Jones, E. D., et al. (1990). *Attitudes of gifted underachievers toward accelerative options*. Paper presented at the Annual Convention of the National Association for Gifted Children, Little Rock, AR.

This study surveyed underachieving gifted students and their parents in order to: determine the extent and sources of positive and negative attitudes toward educational acceleration; compare the views of parents and students for congruence; and compare the perceptions of successful students and their parents with the views of identified underachieving students and their parents. Data from 15 students and their parents indicated few concerns that acceleration would have negative effects on leadership, academic achievement, or creativity. The overriding concern of parents and students was for the potentially negative effects that acceleration would have on social and emotional development. Eight of the parents indicated that they had considered acceleration for their children, seven of these decided to accelerate their children, and all but

one of the seven stated that the decision to accelerate worked out well. Parents and students from the underachieving sample held generally similar perceptions of potential harm compared to a sample of successful students and their parents.

Jones, E. D., & Southern, W. T. (1992). Programming, grouping, and acceleration in rural school districts: A survey of attitudes and practices. *Gifted Child Quarterly*, *36*(2), 112–117.

Interviews with the coordinators of 37 gifted education programs (20 rural and 17 urban) indicated that rural school districts are less likely to use ability grouping or academic acceleration and are more likely to use sporadic extracurricular activities. An earlier survey of 171 teachers also found fewer program options in rural areas.

Lynch, S. J. (1992). Fast-paced high school science for the academically talented: A six-year perspective. *Gifted Child Quarterly*, *36*(3), 147–154.

This study of 905 academically talented students (ages 12-16) who completed a 1-year course in high school biology, chemistry, or physics in a 3-week summer program found that the fast-paced courses effectively prepared subjects to accelerate in science, and that talented students could begin high school sciences earlier than generally allowed.

Montgomery, J. L. (1990). *Factors that influence the career aspirations of mathematically precocious females*. Presented at the Asian Conference on Giftedness: Growing up gifted and talented, Taipei, Taiwan.

The career aspirations and the factors influencing career decisions were investigated for a group of extremely precocious females to determine why some enter math/science careers and others do not. Using the multiple-case study approach, 15 mathematically precocious females' career paths were characterized. These females had scored before age 13 at least 700 on the Scholastic Aptitude Test-Mathematics (SAT-M) (frequency top 1 in 60,000). Questionnaires completed at age 13, in 8th grade, and after high school graduation were used; in-depth telephone interviews at 19 to 21 years provided further data. Extremely mathematically precocious females have focused career goals by age 18; two-thirds had entered math/science fields by age 19–21. These math talented females viewed their career choice as a reflection of interests, which stemmed from early family influences and educational opportunities.

Noble, K. D., & Drummond, J. E. (1992). But what about the prom? Students' perceptions of early college entrance. *Gifted Child Quarterly, 36*(2), 106–111.

This study interviewed students (n=24) participating in the University of Washington's Early Entrance Program. Students were unanimous in their satisfaction with their choice to forego major high school social events and found attitudes toward them sometimes annoying.

Noble, K. D., Robinson, N. M., & Gunderson, S. A. (1993). All rivers lead to the sea: A follow-up study of young adults. *Roeper Review*, *15*, 124–129.

This follow-up study of gifted students who had either entered the University of Washington before age 15 (n=61), qualified for early entrance but chose the normal high school path (n=36), or were nonaccelerated National Merit Scholarship finalists (n=27) found that early entrants entered graduate school in greater numbers than did the other groups.

Noble, K. D., Arndt, T., Nicholson, T., Sletten, T., & Zamora, A. (1999). Different strokes: Perceptions of social and emotional development among early college entrants. *Journal of Secondary Gifted Education*, *10*(2), 77–84.

Describes an early-entrance program that enables gifted adolescents to enter college without attending high school. A study involving 31 participants indicated varying degrees of comfort in diverse social situations; however, all believed themselves to be more mature than had they gone to high school.

Reis, S. M., & Westberg, K. L. (1994). An examination of current school district policies: Acceleration of secondary students. *Journal of Secondary Gifted Education*, *5*(4), 7–18.

This study investigated policies about the use of content acceleration and grade skipping for gifted students in middle and secondary schools by 105 school districts. Results indicated that only 15% of responding districts had formal policies about grade skipping, whereas 57% had informal policies effectively preventing grade skipping. Formal content acceleration policies were likewise rare and/or vague.

Rimm, S. B. (1992). The use of subject and grade skipping for the prevention and reversal of underachievement. *Gifted Child Quarterly*, *36*(2), 100–105.

Fourteen sets of parents and 11 gifted students who had been accelerated (early kindergarten entrance, grade skipping, and subject skipping) were interviewed. All parents and students indicated they would make the same decision

again. Administrator attitudes became more positive, but teachers perceived some student adjustment problems.

Robinson, N. M., & Janos, P. M. (1986). Psychological adjustment in a college-level program of marked academic acceleration. *Journal of Youth and Adolescence*, 15(1), 51–60.

The questionnaire responses of 24 markedly accelerated young students at the University of Washington were compared with those of 24 regular-aged university students, 23 National Merit Scholars, and 27 students who had qualified for acceleration but instead elected to participate in high school. Accelerants appeared as well adjusted as all comparison groups.

Sankar-DeLeeuw, N. (2002). Gifted preschoolers: Parent and teacher views on identification, early admission, and programming. *Roeper Review*, *24*(3), 172–177.

This reprinted article originally appeared in 1999 in *Roeper Review*, *2*(13), 174–179. (The following abstract of the original article.) An exploration of the issues and concerns of the parents of gifted preschoolers and preschool kindergarten teachers surrounding early identification and programming for giftedness was undertaken using a survey. The response rate was 51% for 91 parents and 52% for 44 teachers. The majority of parents reported that early identification can (91%) and should (74%) be done, while teachers acknowledged each at 78% and 50% respectively. The practice of differentiated curriculum was supported by 76% of parents and 32% of teachers surveyed, while the educational option of early entrance was supported by 37% of parents and 7% of teachers. The physical domain was superseded by both social-emotional and intellectual domains in the levels of importance for early entrance consideration by both respondent groups. Parental requests for information were categorized as resources for additional challenge, disciplinary techniques, educational options, and parenting guidelines. Teachers required information on balancing differing development rates. A comment on this article by a group of guest editors is appended.

Sayler, M. F., & Brookshire, W. K. (1993). Social, emotional, and behavioral adjustment of accelerated students, students in gifted classes, and regular students in eighth grade. *Gifted Child Quarterly*, *37*(4), 150–154.

This study found that accelerated students (n=365) and students (n=334) in gifted classes had better perceptions of their social relationships and emotional development and fewer behavior problems than did regular students (n=323). The accelerated eighth graders who entered school early or skipped elementary grades did not report social isolation, emotional difficulties, or behavior problems.

Sethna, B. N., Wilkinstrom, C. D., Boothe, D., & Stanley, J. C. (2001). The Advanced Academy of Georgia: Four years as a residential early-entrance college program. *Journal of Secondary Gifted Education*, *13*(1), 11–21.

This study discusses goals and objectives of the Advanced Academy of Georgia at the State University of West Georgia, a residential early-college-entrance program for gifted juniors and seniors. Included is a comprehensive progress report, entering SAT scores, student academic performance, retention rates, and scores on the Dimensions of Self-Concept. (Contains references.)

Shahzadi, J. B. (1984). A study of adult attitudes of resistance to the use of acceleration for gifted students. *Dissertation Abstracts International*, *44*(11-A). U.S.: University Microfilms International.

No abstract available.

Southern, W. T., Jones, E. D., & Fiscus, E. D. (1989). Practitioner objections to the academic acceleration of gifted children. *Gifted Child Quarterly*, *33*(1), 29–35.

Coordinators of gifted education, school psychologists, principals, and teachers (554 respondents) were surveyed concerning their attitudes toward early admission and acceleration. Though negative reactions were weak along some dimensions, practitioners from each category expressed consistently conservative sentiments toward the value of acceleration and viewed the process as potentially hazardous.

Stanley, J. C. (1973). Accelerating the educational progress of intellectually gifted youths. *Educational Psychologist*, *10*, 133–146.

Contends that aptitude and achievement tests designed for much older students are invaluable for finding extremely high ability at younger ages. Results of the first two years of the Study of Mathematically and Scientifically Precocious Youth are examined to show that considerable educational acceleration is not only feasible but also desirable for gifted young people who are eager to move ahead. Skipping school grades, taking college courses part-time, studying in special courses, and entering college early are inexpensive supplements to regular school practices. The usual in-grade, non-accelerative "enrichment" procedures often recommended for intellectually gifted children are not advocated. An heuristic overview of the main assumptions and findings of the study thus far is presented.

Stanley, J. C., et al. (1996). Educational trajectories: Radical accelerates provide insights. *Gifted Child Today*, *19*(2), 38–39.

This article describes common student traits found from analysis of self-reported experiences of six radically accelerated gifted youths. It concludes that intellectual ability far above the average and student eagerness to accelerate are prerequisites for successful radical acceleration. Descriptions by two students of their accelerated programs are included.

Willis, W. G. (1987). Retention/promotion decisions: Selective use of data? *Perceptual and Motor Skills*, *64*, 287–290.

No abstract available.

2. Experimental/Correlational

Adler, M., Pass, L., & Wright, E. (1963). A study of the effects of acceleration programs in Toronto secondary schools. *Ontario Journal of Educational Research*, *6*, 1–22.

No abstract available.

Arends, R., & Ford, P. M. (1964). *Acceleration and enrichment in the junior high school: A follow-up study.* Olympia, WA: Washington Office of the State Superintendent of Public Instruction. (ERIC Document Reproduction Service No. ED028558).

To test the effectiveness of a program of acceleration and enrichment, five ninth grade classes of students (25 in each class, IQ's 120 or above) who had been in this program for 2 years were compared to two control (C) classes of academically talented students who had not had the program. All students were given a series of standardized achievement tests and were asked to complete a school attitude questionnaire. Two experimental (E) classes were significantly superior in all comparisons in mathematics, in two of three comparisons in reading, and in one of three comparisons in science (p=.05). In school systems A and B the E-groups were significantly superior in only two of six comparisons with the C-groups. An analysis of the total performance of all the experimental classes revealed that they were significantly superior to the controls in only 10 of 21 cases (p=.05). The performances of average E-groups from the same schools were significantly different from C's in only four of 30 comparisons. Responses from questionnaires did not indicate a significant difference in attitudes between the groups. Conclusions were that the acceleration and enrichment program did not hurt either academically talented or average students, that the special program could be improved, and that the program was more appealing to students and teachers than a more traditional approach.

Bereiter, C. (1967). *Acceleration of intellectual development in early childhood (Final Report: 210).* Urbana, IL: University of Illinois.

The child's capacity for self-actuated intellectual growth and the possibility of speeding up intellectual growth through improved opportunities and increased stimulation were studied. Six exploratory studies carried out during the first two years of this project were reported. The three main areas of learning that were investigated with the idea of locating promising approaches were reading, creativity, and logical operations. These studies concerned (1) exploring the teaching of reading to very young children, (2) a teaching machine approach which showed some promise in the first study, (3) preferences for high-frequency versus low-frequency word use occurring in children's speech, (4) construction activities involving independent problem-solving and guided construction, (5) a method of inducing conservation of substance in kindergarten children, and (6) teaching formal logical operation to preschool children. Two other studies were discussed, including (1) instruction of direct verbal instruction in language, arithmetic, and reading to four-year old disadvantaged children, and (2) comparison of a direct verbal instruction with a Montessori program for four-year olds. Results and conclusions were many and varied.

Brody, L. E., Assouline, S., & Stanley, J. (1990). Five years of early entrants: Predicting successful achievement in college. *Gifted Child Quarterly*, *34*(4), 138–142.

This study evaluated the achievements of 65 young entrants as beginning undergraduates in a highly selective university. The group as a whole was found to be quite successful. Compared to non-accelerants, the early entrants tended to graduate in a shorter period of time and earn more honors at graduation. For the early entrants, starting college with a large number of Advanced Placement Program credits was found to be the best predictor of outstanding academic achievement. It seems advisable for young college entrants to have Scholastic Aptitude Test scores and content knowledge equal to or greater than that of the typical freshman at the college the student will attend.

Hobson, J. (1948). Mental age as a workable criterion for school admission. *Elementary School Journal*, *48*, 312–321.

Ten years of experience with a system for admitting under-age children to kindergarten and Grade I by test are evaluated as measured by teacher's marks, promotions, achievement test results, and grade by grade progress, in comparison with other children. The under-age group admitted by test showed superior academic performance on the basis of all the criteria given, except for kindergarten where different standards existed. A consistently higher percentage of A's and B's, a lower percentage of failure, and higher achievement test results characterized the under-age group. Recommendations made to the board concerning continuance of the program are presented.

Janos, P. M., & Robinson, N. M. (1985). The performance of students in a program of radical acceleration at the university level. *Gifted Child Quarterly*, *29*(4), 175–179.

Comparison of academic performance of 24 accelerated students and two groups of college students averaging four years older (24 matched on readiness scores and 24 National Merit Scholars) indicated that accelerated subjects earned cumulative grade point averages comparable to those earned by Merit Scholars and significantly higher than readiness-matched subjects.

Justman, J. (1954). Academic achievement of intellectually gifted accelerants and non-accelerants in junior high school. *School Review*, *62*, 142–150.

The present study seeks to assess the part that the special-progress class plays in fostering academic achievement in mathematics, science, social studies, work-study skills, and creative expression in language arts.

Long, B. H. (1973). *Acceleration in science for achieving high school women*. Project RISE (Final Report). Washington, DC: National Science Foundation.

This study demonstrates that a population of high-achieving young women with sufficient motivation and ability for acceleration in science may be readily identified and that acceleration in science is practical for such a group. To test the effects of participation in a research-oriented multi-disciplinary college course (Research Introduction to Science) by high-achieving female high school juniors, 324 students selected on the basis of grades and achievement test scores were administered the Strong Vocational Interest Blank for Women and the Careers Attitudes and Plans Survey. They were also offered the possibility of taking a free multidisciplinary college course. The 137 students definitely interested in taking the course were randomly divided into two groups: experimental (enrolled in the course) and control (not enrolled). They differed significantly from the 187 not interested on 32 of the 69 variables. Fifty-eight students (85%) successfully completed the course, and their grades and ratings of enjoyment of the course correlated significantly with 42 pre and post measures. Those sufficiently motivated for the course were significantly higher on "science" factor scores and more interested in careers in general than those not motivated.

Lupkowski, A. E., Whitmore, M., & Ramsay, A. (1992). The impact of early entrance to college on self-esteem: A preliminary study. *Gifted Child Quarterly*, *36*(2), 87–90.

This study compared differences in self-esteem scores at college entrance and one semester later of 109 early entrants to the Texas Academy of Mathematics and Science at the University of North Texas. Findings indicated slight negative changes in self-esteem after one semester, possibly because of normal college adjustment and changes in social comparisons.

McConnaha, W. R. (1997). An analysis of dual enrollment as an acceleration option for high school students. *Dissertation Abstracts International*, *58*(3-A). U.S.: University Microfilms International.

The purpose of this study was to provide a psychoeducational portrayal of students who selected dual enrollment as an educational option. This research was conducted to compare the relationship between the program components of background and characteristics, academic and logistical decisions, social and behavioral impact, and attitude and self-concept of dual enrollment students. The study also assessed if these students were being accelerated at a pace and level which they viewed as contributing to their academic and social success. The primary data collection activities involved semi-structured interviews of twenty high school students involved in dual enrollment. All questions were designed to be open-ended and to stimulate further activity or thought. All interviews were based on a semi-structured protocol. This loosely crafted instrument was designed to accommodate a funneling technique. These data, along with secondary sources of information including informal interviews with the students' high school and university instructors, counselors and parents were also analyzed. A combination of procedures was used in the analysis of data gathered during this study. Included were analytical procedures associated with pattern coding and memorizing. These procedures were utilized during the data-gathering phase. Following

the collection of data, but before an attempt was made to display the conclusions, triangulation was used to assess data trustworthiness. Finally, the data was displayed using an informant-by-variable matrix. An examination of the results of this analysis led to the conclusions that students participating in dual enrollment as a form of acceleration were highly motivated. These students also possessed positive attitudes and self-concepts. However, participation in dual enrollment had a negative social and behavioral impact on most of the students' lives. Furthermore, there was a strong correlation between the decisions to participate in dual enrollment.

Olenchak, R. F., & Renzulli, J. S. (1989). The effectiveness of the Schoolwide Enrichment Model on selected aspects of elementary school change. *Gifted Child Quarterly*, 33(1), 36–46.

Examined the effects of the Schoolwide Enrichment Model of J. S. Renzulli and S. M. Reis (1985) that applied some of the technology of gifted education to the school wide enrichment process. Subjects were 1,698 elementary students, 236 teachers, and 120 parents at 11 elementary schools. The service delivery components that constituted the major focus of the experimental treatment included curriculum compacting, assessment of student strengths, and three types of enrichment activities. Results show that student attitudes toward learning were positively enhanced by participation in the school wide enrichment treatment. Participation in the treatment did not negatively influence teacher attitudes toward teaching.

Olszewski-Kubilius, P., Laubscher, L., Wohl, V., & Grant, B. (1996). Issues and factors involved in credit and placement for accelerated summer coursework. *Journal of Secondary Gifted Education*, *8*(1), 5–15.

Examines ways in which the home schools of 287 gifted students credited students' participation in accelerated high school courses sponsored by university summer programs. After program accreditation, the number of positive responses by the students' schools increased significantly, including giving course credit, appropriate placement within the content area, and placement in a special program.

Peterson, N. M., et al. (1988). Evaluation of college level coursework for the gifted adolescents: An investigation of epistemological stance, knowledge gain, and generalization. *Journal for the Education of the Gifted*, *12*(1), 46–61.

A college-level introductory psychology course was completed by gifted adolescents. Post-course and remote-post-course measures for the 100 participants and controls demonstrated that knowledge gain from course participation was substantial and long-lived, affecting the quality of the students' understanding, their ability to generalize and apply psychological concepts, and their epistemological stance.

Plowman, P. D., & Rice, J. P. (1967). *Demonstration of differential programming in enrichment, acceleration, counseling, and special classes for gifted pupils in grades 1–9 (Final Report)*. Sacramento, CA: State Department of Education.

California Project Talent was a three-and-one-half-year project that demonstrated four types of programs for gifted children and youth. The enrichment demonstration analyzed the needs for in-service training of teachers and developed appropriate workshops and also invented, field tested, and disseminated special pupil units in (1) scientific discovery, methodology, and investigation through a study of graphic representation of statistical information using the Bloom Taxonomy, (2) creative expression through a study of the literary element of characterization using Guilford's Structure of Intellect model, and (3) critical appreciation through a study of the fundamental forms of music using Burner's process of education. The acceleration demonstration involved individual placement procedures and accelerated pupils from grades 2 to 4 by using a special summer session and by employing extensive case studies, counseling, and tutoring. The counseling- instructional demonstration showed interrelated goals, processes, and contents of English, social sciences, guidance, and small group counseling designed to improve communication skills, encourage development of values and philosophy of life, and promote more effective learning in social sciences and in English in grades 7 to 9. The special class demonstration showed the unique value of the all day, full week special class setting in improving problem solving, the ability to apply facts and principles, and insight into the nature of learning. Overall, (1) four new programs were invented, adopted, demonstrated, and disseminated, (2) related consultant, teacher, and counselor roles were described, (3) products produced included a film series, filmstrip, and program guidelines, and (4) gifted child programs were promoted, enriched, and expanded. A reference list cites 62 items. Appendices provide project reports and case studies, list project developed films and guidelines, and present research related materials.

Plucker, J. A., & Taylor, J. W. V. (1998). Too much too soon? Non-radical advanced grade placement and the self- concept of gifted students. *Gifted Education International*, *13*(2), 121–135.

This study investigated the relationship between advanced-grade placement and the self-concept of 600 gifted adolescents. No differences were found in any facet of self-concept between grade-advanced and non-advanced students or in interactions of advanced status and gender and/or grade level. Caucasian students were significantly more likely to be grade advanced than Hispanic or African-American students.

Pyryt, M. C. (1993). The fulfillment of promise revisited: A discriminate analysis of factors predicting success in the Terman study. *Roeper Review*, *15*(3), 178–179.

The author reexamined M. Oden's (1968) comparison of the 100 most and 100 least successful men in the Genetic Studies of Genius of L. M. Terman et al. (1925–1959), using three predictor variables: IQ, amount of acceleration (AOA), and educational attainment (EA). Results indicate that each of the three variables contributed to the discrimination between the two groups of subjects. EA was the major discriminator, with AOA and IQ making small contributions to group discrimination. Results reaffirm the importance of EA as a strong correlate of vocational achievement.

Reis, S., et al. (1993). *Why not let high ability students start school in January? The curriculum compacting study* (Research Monograph 93106). Storrs, CT: National Research Center on the Gifted and Talented.

This study examined the effects of curriculum compacting, a curriculum modification technique for gifted and talented students, with approximately 436 elementary teachers and 783 students in 27 school districts throughout the United States. The study was designed to investigate the types and amount of curriculum content that could be eliminated for high ability students by teachers who received various levels of staff development. It also examined effects of curriculum compacting on students' achievement, content area preferences, and attitudes toward learning. Teachers were randomly assigned to one of four groups, three treatment groups that received increasing levels of staff development or a control group. After receiving staff development services, teachers in each of the treatment groups implemented curriculum compacting for one or two high ability students in their classrooms. A battery of pre/post achievement tests and a questionnaire regarding attitude toward learning were administered to identified students. Results indicated that the compacting process can be implemented in a wide variety of settings with positive effects for both students and teachers. Results also identified effective and efficient methods for training teachers to make appropriate curricular modifications for gifted and talented students. Appendices provide information on treatment and control group instrumentation and eight statistical tables.

Reis, S. M., & Purcell, J. H. (1993). An analysis of content elimination and strategies used by elementary classroom teachers in the curriculum compacting process. *Journal for the Education of the Gifted*, *16*(2), 147–170.

This study examined effects of three increasing levels of curriculum compacting on the instructional practices of 470 elementary school teachers with gifted students in regular classes. Teachers were able to eliminate between 24% and 70% of the curriculum across content areas for more capable students but required assistance in designing challenging replacement activities.

Reis, S. M., & Renzulli, J. S. (1992). Using curriculum compacting to challenge the above-average. *Educational Leadership*, *50*(2), 51–57.

A major problem facing schools is lack of curricular differentiation and academic challenge for the most academically able students. Also, contemporary textbooks have been "dumbed down." Curriculum compacting is a flexible, research-based technique enabling high-ability students to skip work they already know and substitute more challenging content. A recent study and program development advice are included.

Reis, S. M., Westberg, K. L., Kulikowich, J. M., & Purcell, J. H. (1998). Curriculum compacting and achievement test scores: What does the research say? *Gifted Child Quarterly*, *42*(2), 123–129.

Examined the effects of curriculum compacting on the achievement test scores of a national sample of 336 high ability students from second through sixth grade heterogeneous classrooms in rural, suburban, and urban settings. Teachers from three treatment and control groups in this experimental study selected one to two students from their classes who demonstrated superior ability and advanced content knowledge prior to instruction. They were able to eliminate between 40–50% of curricula for these students across content areas. Pre- and post- student achievement was examined using the Iowa Tests of Basic Skills, and out-of-grade-level (one grade higher) tests were used to guard against ceiling effects. Results indicate that the achievement test scores of students whose curriculum was compacted did not differ significantly from students whose curriculum was not compacted.

Reynolds, R. A. (1993). The relationship between early school entrance and eighth-grade school success. *Dissertation Abstracts International*, *54*(5-A). U.S.: University Microfilms International.

No abstract available.

Shayer, M. (1997). *Cognitive acceleration through science education (CASE)*. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL.

"Thinking Science," the Cognitive Acceleration through Science Education (CASE) curriculum, is a program designed for 11-14 year olds (in the first two years of secondary school) which encourages them to reflect on their own thinking and to develop their reasoning power in tackling novel problems. This study presents results that represent the first large-scale long-term test of the process of raising standards in schools by concentrating on a thinking skill approach. Overall, about 4,500 pupils in the CASE schools have been featured in the data in this report. Seventeen schools' data have been compared with added-value data from a greater number of control schools. Results indicate that the CASE methodology, even when tried for the first time, produced an average increase on the order of half as much gain in the percentage of pupils obtaining C-grade and above at the GCSE examination (an increase from a national average of 44% to 63% for science in 1996, and an increase from 43% to 57% in science for 1995. In addition, there was the same relative order of increase in achievement in mathematics and a somewhat lower improvement, though still substantial, in English. In schools where teachers had two or more previous years of experience with this approach, the schools more than doubled the proportion of their pupils showing National Curriculum achievement at level six or above in all three subjects.

Stanley, J. C. (1976). *Brilliant youth: Improving the quality and speed of their education*. Proceedings from the Annual Meeting of the American Psychological Association, Washington, DC.

The three phases (finding seventh and eighth grade mathematically talented students, studying them, and helping them educationally) of the Study of Mathematically Precocious Youth (SMPY) are detailed, and examples of the superiority of educational acceleration over educational enrichment are pointed out. Results of standardized intelligence tests are seen to be less helpful than scores on the mathematics part of the College Entrance Examination Board's Scholastic Aptitude Test in identifying gifted students for SMPY. Four types of enrichment (busy work, irrelevant academic, cultural, and relevant academic) are described and contrasted with academic acceleration. Presented is the case of 11-and-one-half-year-old boy who was helped educationally by entering college before completing high school. Stressed is the need for flexibility that makes a variety of educationally accelerative possibilities (such as grade skipping and college courses for credit) available for the student.

Stanley, J. C. (1988). Some characteristics of SMPY's 700–800 on SAT-M before age 13 group. *Gifted Child Quarterly*, *32*(1), 205–209.

Statistics are presented concerning background characteristics of 292 students who scored well on the mathematical sections of the Scholastic Aptitude Test at age 12 or younger. Discussed are the ratio of girls to boys, geographic distribution, verbal ability, parents' education level and occupational status, siblings, and educational acceleration.

Thomas, T. A. (1993). *The achievement and social adjustment of accelerated students: The impact of academic talent search after seven years*. Sacramento, CA: California State University. (ERIC Document Reproduction Service No. ED368146). EDRS Availability: Microfiche.

Academic Talent Search (ATS) provided advanced instruction in a 6-week summer school for talented middle school students on the campus of California State University, Sacramento. A survey was conducted to examine the long-term impact of the ATS program on students over a period of 7 years. Data were collected pertaining to high school and college achievement, career aspirations, personal values, self-awareness, and personality self-descriptions, from students who participated in accelerated classes in mathematics, writing, and foreign languages in 1983, 1984, or 1985. Results indicated that these students continued to excel academically during the 7-year period after ATS participation. Students reported high academic achievement, high aspirations for advanced degrees, and impressive career objectives. Their responses reflected healthy self-concepts, strong personal values, and inner-directed locus of control. They described themselves as independent, practical, and stable. There was no indication of any systematic negative impact from academic acceleration or from participation in the ATS summer school. Students reported fond memories of and satisfaction with their experiences in the program.

Witham, J. H. (1994). *Acceleration: Does it happen more frequently for gifted students in private or public schools?* Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

As part of a larger study on differences between public and private schools in the education of gifted students, this study examined use of acceleration as an educational approach. The paper notes that although the weight of research evidence strongly supports the position that acceleration is a highly effective intervention technique with intellectually gifted students, many educators have negative attitudes toward this approach. This study examined programs in 23 private and public schools that serve gifted students. Directors and teachers were surveyed, school documents were analyzed, and classrooms were observed to see the extent that acceleration was used. Questions were asked on early entrance, skipping grades, use of texts and materials beyond grade level, different content, and faster-paced classes. Results suggest that the private schools had more flexibility to set standards on acceleration. However, the overall frequency concerning acceleration of skipping classes (25.9 percent) and starting school earlier (43.5 percent) reported by both public and private schools was quite low. Accelerated texts and materials were found much more frequently than skipping grades or early entrance (public, 76.1 percent; private, 76.9 percent). Teachers in both types of schools strongly (92 percent) believed they offered a fast-paced classroom to gifted children.

3. Longitudinal

Barnett, L. B., & Durden, W. G. (1993). Education patterns of academically talented youth. *Gifted Child Quarterly*, *37*(4), 161–168.

Students who participated in the Johns Hopkins University Center for Talented Youth (CTY) Academic Programs were compared, over five years, with nonparticipating eligible students. Both groups exhibited high academic achievement, but the CTY youth took more advanced courses at an earlier age and enrolled in more college courses while in high school.

Benbow, C. P., Lubinski, D., Shea, D. L., & Eftekhari-Sanjani, H. (2000). Sex differences in mathematical reasoning ability at age 13: Their status 20 years later. *Psychological Science*, *11*(6), 474–480.

Reported is the 20-year follow-up of 1,975 mathematically gifted adolescents whose assessments at age 12-14 yrs revealed robust gender differences in mathematical reasoning ability. Both sexes became exceptional achievers and perceived themselves as such; they reported uniformly high levels of degree attainment and satisfaction with both their career direction and their overall success. The earlier sex differences in mathematical reasoning ability did predict differential educational and occupational outcomes. The observed differences also appeared to be a function of sex differences in preferences for a) inorganic versus organic disciplines and b) a career-focused versus more-balanced life. Because profile differences in abilities and preferences are longitudinally stable, males probably will remain more represented in some disciplines, whereas females are likely to remain more represented in others. These data have policy implications for higher education and the world of work.

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*(4), 217–224.

An evaluation of the Advanced Placement (AP) program from the point of view of intellectually precocious youth and their subsequent educational-vocational outcomes, analyzing normative and idiographic longitudinal data collected over the past three decades from 3,700 participants. Most took AP courses in high school, and those who did frequently nominated an AP course as their favorite. Students who took AP courses, compared to their intellectual peers who did not, appeared more satisfied with the intellectual caliber of their high school experience and, ultimately, achieved more. Overall, this special population placed a premium on intellectual challenge in high school, and found the lack of such challenge distressing. These findings can inform contemporary educational policy debates regarding the AP program; they also have general implications for designing and evaluating educational interventions for students.

Brody, L. E., & Benbow, C. P. (1987). Accelerative strategies: How effective are they for the gifted? *Gifted Child Quarterly*, *31*(3), 105–110.

The long-term effects of various accelerative options were evaluated using a group of 510 students identified as highly gifted in junior high. Their academic achievements, extracurricular activities, goals and aspirations, and social and emotional adjustment were assessed after completing high school. No discernible negative effects of accelerative strategies were found.

Fearn, L. (1982). Underachievement and rate of acceleration. *Gifted Child Quarterly*, *26*(3), 121–135.

Over a 2-year period underachieving gifted students achieved at an accelerated rate when given attention to basic skills featured in the gifted education program of the San Diego Unified School District.

Ingersoll, K. S., & Cornell, D. G. (1995). Social adjustment of female early college entrants in a residential program. *Journal for the Education of the Gifted*, *19*(1), 45–62.

This study assessed the social adjustment of female early college entrants using standard measures of adjustment and two comparison groups (traditional college students and boarding school students). Early entrants evidenced higher social conformity and solitary activity than boarding students. They evidenced social adjustment similar to college students but reported a high level of dissatisfaction with their social lives.

Janos, P. M. (1987). A fifty-year follow-up of Terman's youngest college students and IQ-matched agemates. *Gifted Child Quarterly*, *31*(2), 55–58.

When high ability students (N=19) who had entered college before 15 years of age were compared, 50 years later, with equally intelligent students who entered college between 16 to 20 years of age, results found both groups equal in psychosocial adjustment and long term achievement though younger college students were more often rated as high achievers in early adulthood.

Janos, P. M., Robinson, N. M., & Lunneborg, C. E. (1989). Academic performance and adjustment status of early college entrants, non-accelerated peers, and college classmates. *Journal of Higher Education*, *60*, 495–518.

Certain highly able and motivated young adolescents can successfully pursue full-time college-level studies without unreasonable compromises to psychological and social adjustment. Ways in which an adequate program facilitating early college entrance might be structured are suggested.

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*(4), 718–729.

Adolescents identified before the age of 13 (N = 320) as having exceptional mathematical or verbal reasoning abilities (top 1 in 10,000) were tracked over 10 years. They pursued doctoral degrees at rates over 50 times base-rate expectations, with several participants having created noteworthy literary, scientific, or technical products by their early 20s. Early observed distinctions in intellectual strength (viz., quantitative reasoning ability over verbal reasoning ability, and vice versa) predicted sharp differences in their developmental trajectories and occupational pursuits. This special population strongly preferred educational opportunities tailored to their precocious rate of learning (i.e., appropriate developmental placement), with 95% using some form of acceleration to individualize their education.

Lubinski, D., Perrson, C. P., Shea, D. L., Eftenkhari-Sanjani, H., & Halvorson, M. B. J. (2001). Men and women at promise for scientific excellence: Similarity not dissimilarity. *Psychological Science 12*(4), 309–317.

U.S. math-science graduate students possessing world-class talent (368 males, 346 females) were assessed on psychological attributes and personal experiences to examine how their talents emerged and developed. Comparisons were made with mathematically talented students (528 males, 228 females) identified around age 13 and tracked into adulthood by the Study of Mathematically Precocious Youth (SMPY). Well before college, both samples were academically distinguished; however the graduate students could be identified during adolescence as a subset of mathematically talented youths based on their nonintellectual attributes. Their profiles corresponded to what earlier psychological studies found to characterize distinguished (and exclusively male) scientists: exceptional quantitative reasoning abilities, relatively stronger quantitative than verbal reasoning ability, salient scientific interests and values, and persistence in seeking out opportunities to study scientific topics and develop scientific skills. On these attributes, sex differences were minimal for the graduate students (but not for the SMPY comparison groups). Developing exceptional scientific expertise apparently requires special educational experiences, but these necessary experiences are similar for the two sexes.

Noble, K. D., Subotnik, R. F., & Arnold, K. D. (1999). To thine own self be true: A new model of female talent development. *Gifted Child Quarterly*, *43*(3), 140–149.

The article describes an innovative model of female talent development based upon the life experiences of gifted women from a wide variety of backgrounds and talent domains. Key issues addressed by the model are the personal, professional, and cultural challenges common to gifted females and strategies for coping with them.

Olszewski-Kubilius, P. (2002). A summary of research regarding early entrance to college. *Roeper Review*, *24*(3), 152–157.

This reprint of an article on how students who enter college early perform academically and socially is preceded by a commentary that discusses the need to provide gifted students with the option of entering college early because of the lack of college-level courses at the high school level.

Sayler, M. F. (1996). *Differences in the psychological adjustment of accelerated 8th grade students*. Paper presented at the Annual Meeting of the American Educational Research Association, New York, NY.

The academic, social, and emotional benefits of acceleration are widely known, yet criticism and reluctance to use this educational intervention persist. Some school personnel and families fear that children who accelerate through grades will experience serious social or emotional adjustment problems. This research project compared a nationally representative sample of well-adjusted and poorly-adjusted accelerants so as to examine the differences in adjustment among individual accelerants. The sample was drawn from the National Longitudinal Study: 88 database. Surprisingly, results showed that the best-adjusted and least adjusted accelerants were similar in many ways. There were no significant differences for gender, race, family size, birth order, family composition, income, educational level of parents, kind of school, percentage of minority students in their school, serious behavior difficulties, certain out-of-school activities, community type, or community location. However, parental involvement in a child's school and education, and access to accelerated, advanced, enriched, or gifted classes were more often associated with healthy adjustment. Therefore, the differences in well-adjusted and poorly adjusted accelerants appear to be related to the ways that parents and schools interact with their students.

Shea, D. L., Lubinski, D., & Benbow, C. P. (2001). Importance of assessing spatial ability in intellectually talented young adolescents: A 20-year longitudinal study. *Journal of Educational Psychology*, 93(3), 604-614.

At age 13, 393 boys and 170 girls scoring at the top 0.5% in general intelligence completed the Scholastic Assessment Test Mathematics (SAT-M) and Verbal (SAT-V) subtests and the Differential Aptitude Test (DAT) Space Relations (SR) and Mechanical Reasoning (MR) subtests. Longitudinal data were collected through follow up questionnaires completed at ages 18, 23, and 33. Multivariate statistical methods were employed using the SAT-M, SAT-V, and a DAT (SR+MR) composite to predict a series of developmentally sequenced educational-volitional outcomes: (a) favorite and least favorite high school class, (b) undergraduate degree field, (c) graduate degree field, and (d) occupation at age 33. Spatial ability added incremental validity to SAT-M and SAT-V assessments in predicting educational-volitional outcomes over these successive time frames. It appears that spatial ability assessments can complement contemporary talent search procedures. The amount of lost potential for artistic, scientific, and technical disciplines that results from neglecting this critical dimension of nonverbal ideation is discussed.

Solano, C. H., & George, W. C. (1975). *College courses: One method of facilitating the intellectually talented*. Presented at the Annual meeting of American Educational Research Association, Washington, DC.

A follow-up study involving 2,021 students identified as academically gifted by the Study of Mathematically Precocious Youth (SMPY) was conducted to determine the effectiveness of college courses for facilitating the education of intellectually talented junior and senior high school students. Advantages of a college course over acceleration, student requirements for participation in the college course program, and college enrollment procedures were considered when advising a student eligible for college courses. Of the 1,510 students returning the College Information Questionnaire, 83 students had taken college courses. Among findings were that students' grade-point average (GPA) for the college courses taken was 3.57 (on a four-point scale) and that SMPY students rarely encountered social difficulties in the college classroom.

Stanley, J.C. (1978). Educational non-acceleration: An international tragedy. *Gifted Child Today*, *1*(3), 2–5, 53.

The article focuses on educational acceleration as one means of providing for gifted children. The Study of Mathematically Precocious Youth (SMPY) is explained to allow for individual differences and to be resolutely interventional, longitudinal, and accelerative.

Stanley, J. C. (1985). How did six highly accelerated gifted students fare in graduate school? *Gifted Child Quarterly*, *29*(4), 180.

This article reports follow-up information on six very young college graduates. The myth of "early ripe, early rot" is clearly refuted by the outstanding success of each of these six young accelerants.

Stanley, J. C. (1985). Young entrants to college: How did they fare? *College and University*, *60*(3), 219–228.

A follow-up study of Johns Hopkins University students who began college two or more years ahead of their age group examined their academic progress, ages at graduation, majors, course loads, grades, program length, and the progress of a special group of subjects identified through a study of mathematically precocious youth.

Stanley, J. C. (1989). A look back at educational non-acceleration: An international tragedy. *Gifted Child Today*, *12*(4), 60–61.

This article reviews events subsequent to a 1977 Julian Stanley speech on the topic of educational non-acceleration. It describes the evolution of the Study of Mathematically Precocious Youth, focusing on program development, student identification through talent searches, criteria for student selection, and the need for additional funding.

Stanley, J.C., & McGill, A. M. (1986). More about young entrants to college: How did they fare. *Gifted Child Quarterly*, *30*(2), 70–73.

The study reports on a group of 25 educationally accelerated entrants to Johns Hopkins University. Findings support the ability of students who enter a highly selective college two to five years early to make good grades, win honors, and graduate promptly.

Stanley, J. C., Plotinak, A., & Cargain, M. J. (1996). Educational trajectories: Radical accelerations provide insight. *Gifted Child Today*, *19*(2), 18–21, 38–39.

No abstract available.

Swiatek, M. A. (2002). A decade of longitudinal research on academic acceleration through the Study of Mathematically Precocious Youth. *Roeper Review*, *24*(3), 141–144.

This paper describes longitudinal studies on three cohorts of students accelerated academically as part of the Study of Mathematically Precocious Youth. Results do not support critics' contentions that acceleration produces academic gaps and early "burn out" but instead show positive psychosocial outcomes and high levels of participant satisfaction.

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*(4), 528–538.

Identified by a study of mathematically precocious youth, 107 academically accelerated gifted students were compared with 107 nonacademically accelerated gifted students. At age 23–25 years, the two subject groups exhibited few significant differences, and no evidence of harmful effects of academic acceleration were found

Swiatek, M. A., & Benbow, C. P. (1992). Nonintellectual correlates of satisfaction with acceleration: A longitudinal study. *Journal of Youth and Adolescence*, *21*(6), 699–723.

Survey results from cohorts of 511 and 222 gifted and accelerated students surveyed at ages 13, 18, and 23 years and a subset of 73 students indicate that students generally express positive feelings about acceleration. Nonintellectual personal attributes commonly used to select students for acceleration may be inappropriately used.

Thomas, T. A. (1989). *Acceleration for the academically talented: A follow-up of the Academic Talent Search class of 1984*. (ERIC Documents Reproduction Service No. ED307303).

The purpose was to investigate the long-term impact of the California State University, Sacramento Academic Talent Search Summer School (ATSSS) by means of a longitudinal follow-up of students at an interval of 4 years. A group of 100 academically talented middle school students (grades 7 through 9) were selected from the 350 participants in the ATSSS at California State University in 1984. Qualifications for the program were based on scores on the Scholastic Aptitude Test or equivalent test scores. During the summer, students studied fast-paced mathematics, writing, and/or Latin. Four years later, in 1988, a questionnaire was mailed to the selected students to determine their high school experiences. A response rate of 80% of the 100 locatable students gave a sample that compared favorably with the 1984 summer school group. Responses were analyzed descriptively using frequency distribution and cross-tabulation tables. Results indicate that: (1) program participants viewed the experience as highly positive; (2) academic acceleration through the program was associated with positive changes in school grades as indicated by grade point averages, interest in school and learning, and in students' abilities to get along with intellectual peers, age peers, and adults; (3) the program contributed to self-esteem and feelings of self-control; and (4) participants performed well in sports as well as academics. No pattern of social maladjustments or harmful results from the acceleration was found.

Boothe, D., Sethna, B. N., Stanley, J. C., & Colgate, S. D. (1999). Special opportunities for exceptionally able high school students: A description of eight residential early-college-entrance programs. *Journal of Secondary Gifted Education*, *10*(4), 195–202.

Describes eight innovative four-year and two-year residential college programs that allow exceptionally able high school students early entrance to college. Programs are compared in terms of admission requirements, tuition, curricula, residential components and requirements, enrichment and leadership activities, gender restriction, and grade of entry.

Charlton, J. C., Marolf, D. M., & Stanley, J. C. (1994). Follow-up insights on rapid educational acceleration. *Roeper Review*, *17*(2), 123–129

This article provides information about educational and career outcomes of 12 youths, identified in the Study of Mathematically Precocious Youth and Center for Talented Youth, who received rapid educational acceleration. Also, three young adults who were accelerated share their experiences, concluding that such advancement was optimal for them but may not be the ideal path for others.

Fisher, M. A. (1994). Problem solved. *Currents*, *20*(7), 56–60.

The creative solutions found by four colleges and universities to specific student recruitment dilemmas are described. Two dilemmas involved clarification of the campus' geographic location, one addressed recruitment of minority group engineering students, and the fourth concerned recruitment of exceptionally gifted 13- to 16-year-old girls to an accelerated program.

Hermann, K. E., & Stanley, J. C. (1983). Thoughts on nonrational precocity: An exchange. *Gifted Child Today*, *30*, 30–36.

A former child "prodigy" recounts her experiences at school to suggest that intellectual achievement is not always due to extraordinary analytic reasoning ability and that precocity may be nonrational. J. Stanley responds by citing others' work on the topic and suggesting the construct may not survive strong scrutiny.

Holmes, J., Rin, L., Tremblay, J., & Zeldin, R. (1984). Colin Camerer: The early professional years of a radical educational accelerant. *Gifted Child Today*, *33*, 33–35.

The article describes a gifted child identified by the Study for Mathematically Precocious Youth who graduated from college at 17 and received his PhD at 22. Suggestions are offered regarding acceleration, and the need for individualized educational acceleration is stressed.

Keating, D. P., & Stanley, J. C. (1972). *From eighth grade to selective college in one jump: Case studies in radical acceleration*. Baltimore: Johns Hopkins University Press.

The paper examines the problem of highly gifted junior high school students who are intellectually ready for college-level study before beginning high school. The term radical accelerates is used to describe gifted students who jump from junior high to college education, bypassing the high school years. Briefly described are two widely known and successful radical accelerates, Norbert Wiener and Charles Fefferman. Presented in greater detail are case histories of two boys who are current radical accelerates. Methods used by the authors in seeking out mathematically and scientifically precocious students of junior high school age are explained. Possible disruptive effects of academic acceleration are considered, with particular reference to social and emotional development. Previous literature on acceleration is referred to, although little study has been done on radical acceleration. Radical acceleration is seen as the method of choice for some, but not all, extremely able students; alternate possibilities are also mentioned.

Lewis, G. (2002). Alternatives to acceleration for the highly gifted child. *Roeper Review*, *24*(3), 130–133.

This reprinted article originally appeared in 1984 in *Roeper Review*, *6*(3), 133–136. Presents case studies of a male and a female preschooler (both aged 5 yrs 9 mo [Stanford-Binet Intelligence Scale IQs 159 and 158+, respectively]) enrolled in a university summer program to show that acceleration is not enough to meet the needs of such children. It is concluded that assessment, flexible scheduling, and counseling are required for successful programs for children with advanced intellectual gifts. A comment on this article by a group of guest editors is appended.

McAdamis, S. (2000). A district-wide plan for acceleration and enrichment. *Gifted Child Today*, *23*(3), 20–27.

This article profiles the Rockwood School District, a district that has adopted a differentiated instruction to accommodate learning differences in children. Tiered assignments are described, along with the benefits of differentiation and the impact on student learning. Suggestions for educators wanting to develop a district-wide plan for differentiation are provided.

Montour, K. (1977). William James Sidis: The broken twig. *American Psychologist*, *32*(4), 265–279.

The case history of William James Sidis is as concerned with the adverse impact his sorry example has had on special education for the intellectually gifted as it is with the dynamics that led to his tragic outcome. Sidis, the archetypal father-exploited prodigy, is examined in his social and historical context and is contrasted to another famous prodigy who had a similar background, Norbert Wiener. By presenting cases of prodigies who entered college as early as Sidis but who succeeded, the author attempts to dissuade the public from its opposition to educational acceleration for precocious children, to which the "Sidis fallacy" has helped give rise.

Muratori, M.C. (2003). A multiple case study examining the adjustment of ten early entrants.

Unpublished doctoral dissertation, The University of Iowa, Iowa City. No abstract available.

Olszewski-Kubilius, P. (1998). Early entrance to college: Students' stories. *Journal of Secondary Gifted Education*, *10*(1), 226–247.

Presents essays that describe the fears, anxieties, hopes, problems, and triumphs of 11 students who chose to go to college early. Difficulties faced included initial academic failures due to immaturity and a lack of well-developed study skills; however, overall achievement was high and the experience was perceived as positive.

Stanley, J. C. (1978). Radical acceleration: Recent educational innovation at JHU. *Gifted Child Quarterly*, *22*(1), 62–67.

The author describes several of the "radical accelerants" who were identified in a study of mathematically precocious youth and who entered Johns Hopkins University in early adolescence.

Stanley, J. C., & Sandhofer, L.S. (1997). *College graduation before age 19, especially at Johns Hopkins University, 1876–1997*. (ERIC Document Reproduction Service No. ED454773).

This paper describes some students, especially at Johns Hopkins University, Maryland, who have graduated from college three or more years before the usual age of 22 or older. Such early graduation is not common, but neither is it extremely rare. Some young graduates seem to have been propelled through college under parental pressure, while others have had facilitative parents who simply helped the child use his or her intellectual precocity well. At Johns Hopkins University, a study was reported in 1982 that described the accomplishments of a number of young graduates. Since that time, 25 more students have completed a bachelor's degree before their 19th birthday. The youngest to graduate from Hopkins graduated at age 15 years 7 months, having graduated from high school at age 12. Young men are more likely to graduate from Hopkins early than are young women; Johns Hopkins did not graduate its first female undergraduates until 1972. Johns Hopkins had led most other major universities in its flexible age admissions policies. Young applicants are screened carefully, but they need not be high school graduates. Overall, these young graduates have gone on to successful careers, often in academia or medicine.

Stark, E. W., & Stanley, J. C. (Eds.) (1978). Bright youths dispel persistent myths about intellectual talent: Panel discussion with parents and educators. *Gifted Child Quarterly*, *22*(2), 220–234.

Reports on a panel discussion held in 1975 as part of the Terman Memorial Symposium on Intellectual Talent at Johns Hopkins University in Baltimore, Maryland. The panel consisted of 16 mathematically gifted young people (12 boys and 4 girls) aged 12-20 yrs, with one 6-yr-old boy. They varied greatly in background and abilities and interests other than in mathematics. In a 2-hr session they responded to questions from the audience, providing insights as to their feelings about mathematics, educational acceleration and its effect on their social adjustment, teacher reactions to mathematically precocious pupils, and relations with their parents. A follow-up of the panelists 2 yrs later is appended to the main discussion.

Williams, M. (1984). Diamond in the rough: A story of acceleration. *Gifted Child Today, 33*, 21–23.

A talented and gifted instructor discusses the background and effects of deciding to accelerate a gifted seven-year-old into the fourth grade. The move was accomplished with special attention to transition stages and resulted in the child's successful emotional and academic adjustment.

DeLacy, M. (1996). *Acceleration of gifted students: A background paper created for the Portland Public School District Talented and Gifted Advisory Committee*. [One-line]. Available: http://home.pacifier.com/~mdelacy/margaret/accelera.htm

No abstract available.

Feldhusen, J. F., & Moon, S. M. (1992). Grouping gifted students: Issues and concerns. *Gifted Child Quarterly*, *36*(2), 63–67.

This article reviews the literature on grouping and argues for flexible grouping of students according to ability and achievement levels and maintains that grouping gifted students heterogeneously and providing cooperative learning leads to lowered achievement and motivation and poorer attitudes toward school for gifted students.

Gallagher, J. J. (1966). *Research Summary on Gifted Child Education*. IL: Department of Program Development for Gifted Children, Office of the Superintendent of Public Instruction.

Research is summarized and analyzed in this revision of the author's 1960 "Analysis of Research on the Education of Gifted Children," which was used as a guide in the construction and implementation of the Illinois Plan for Program Development for Gifted Children. Information is provided on identification and definition and on characteristics of gifted children. Also discussed are the highly creative child and the underachieving gifted child (attention is given to talent from culturally different groups). Consideration of intervention includes research design and stresses three areas of intervention: the administrative, instructional, and adjunctive. Needed personnel and research development programs in Illinois are treated. Additional research is cited. The bibliography contains over 200 items, dated from approximately 1925 through 1966, and the reference list annotates 32 items.

Gross, M. U. M., & van Vliet, H. E. (2003). *Radical acceleration of highly gifted children: An annotated bibliography of international research*. Sydney, Australia: Templeton Foundation.

This annotated bibliography summarizes and critiques a range of academic articles concerning the incidence and effects of radical educational acceleration. They comprise research papers, descriptive articles, personal accounts, literature reviews, conference papers, book chapters, and a guidebook. Research papers outline individual case studies, multiple case studies, cohort studies, and biographical accounts of radical acceleration. Some studies are longitudinal in nature, while others are cross-sectional and comparative. Methodologies employed in the studies reported include questionnaires, surveys, interviews, tests of achievement, tests of ability, personality and self-esteem inventories, and measures of social adjustment.

Reynolds, M. (Ed.) (1962). *Early school admission for mentally advanced children*. Washington, DC: Council for Exceptional Children.

Research and school system policies on early admission are reviewed in this publication. Articles include (1) "The Early Admission Issue" by Maynard C. Reynolds, (2) "Review of Research on Early Admission" by Maynard C. Reynolds and others, (3) "The Brookline Massachusetts Program of Early Admission to Kindergarten" by James R. Hobson, (4) "The Early Admission Program in Evanston, Illinois" by Vera V. Miller, (5) "The Early Admission Program in Minneapolis, Minnesota" by Sarah F. Holbrook, and (6) "Twelve Years of Early Admission in Nebraska" by Marshall S. Hiskey. A 110-Item bibliography is included.

Rogers, K. B. (2002). Grouping the gifted and talented: Questions and answers. *Roeper Review*, *24*(3), 102–107.

Five questions about the academic, psychological, and socialization effects on gifted and talented learners of grouping for enrichment, of cooperative grouping for regular instruction, and of grouping for acceleration are addressed. Analysis of 13 research syntheses supports sustained periods of instruction in like-ability groups for gifted and talented students.

Slavin, R. E. (1987). Grouping for instruction in the elementary school. *Educational Psychologist*, *22*(2), 109–127.

Focuses on two major categories (between class and within class) found in research on the achievement effect of grouping. Among between-class ability grouping plans, research supports the achievement effects of the Joplin Plan (described by C. Floyd, 1954) and related programs in which students are regrouped across grade lines for reading and/or mathematics only. In contrast, research on ability-grouped class assignment, where students are assigned to self-contained classes by ability, consistently fails to support this practice. Research on special programs for the gifted and for students with mild academic handicaps tends to support acceleration and mainstreaming, respectively. Use of cooperative, heterogeneous learn-

ing groups also has consistently positive achievement effects if the groups are rewarded based on the learning of all group members.

Tomlinson, C. A. (1994). Middle school and acceleration: Guidance from research and the kids. *Journal of Secondary Gifted Education*, *5*(4), 42–51.

This article examines available literature on a variety of options for accelerated learning in middle school. Different forms addressed include concurrent enrollment, guided independent study, combined enrollment, out-of-school acceleration, self-paced instruction, grade skipping, and differentiated or advanced class enrollment. A list of questions for educators and parents to ask in examining a student's accelerated learning options is provided.

6. General Discussion/Thought Piece

American Educational Research Association (1977). *Educational acceleration of intellectually talented youths: Prolonged discussion by a varied group of professionals*. Presented at the American Educational Research Association Symposium on Educational Acceleration of Intellectually Talented Youths, New York, NY.

Provided are 17 papers presented at the American Educational Research Association's (AERA) 1977 Symposium on Educational Acceleration of Intellectually Talented Youths. Following introductory comments by H. James are entries with the following titles and authors: "Educational Acceleration of Intellectually Talented Youths—The Gifted and the Creative: Acceleration or Enrichment?" (R. Havighurst); "Acceleration-Simplistic Gimmickry" (M. Gold); "A.E.R.A. Symposium on Intellectually Talented Youth" (H. Robinson, et al.); "Educational Acceleration of Intellectually Talented Youths" (S. Daurio); "Selection of Appropriate Criteria and Comparison Groups for Use in the Evaluation of Educational Provisions for the Gifted and Talented" (A. Branch); "Acceleration—A Varied Approach" (E. Kearney); "Acceleration and Enrichment for the Gifted in New York City Public Schools" (V. Ehrlich); "A Possible Economic Correlation of Acceleration for the Individual and for Society" (D. Jackson); "Super Students, Average Schools" (S. Anderson); "Acceleration and the Excellent Mathematical Reasoner" (W. George); "Sexism, Democracy, and the Acceleration Versus Enrichment Controversy" (L. Fox); "The Acceleration/Enrichment Debate—Basic Issues" (D. Keating); "Educational Acceleration of Intellectually Talented Youths—The Mathematical and Physical Sciences" (E. Gibb); "Some Reflections on the Acceleration-Enrichment Controversy" (A. Anastasi); "Brief Paper for Symposium on the Educational Acceleration of Intellectually Talented Youth" (J. Stark); and "Acceleration Versus Enrichment—The Tenth Rule of Three Cubed" (A. Kurtz).

Arizona State University, Dept. of Special Education (1983). *Chronicle of Academic and Artistic Precocity*, *2*(1–6).

This document combines all 1983 issues of a newsletter that focused on issues of giftedness and talent. Among the major articles are discussions of the talent search conducted at five universities across the country; personal counseling approaches; the transition from high school to college; comparisons among Japanese, Soviet, and U.S. schools; Advanced Placement Program credits; counseling needs of gifted females; study suggestions; challenges of serving mathematically able girls; computer contributions to gifted education; gifted preschoolers; the international baccalaureate program; science and the young gifted child; advantages of acceleration; a college for high school age students; use of standardized tests in identifying gifted children; and suggestions for artistically precocious students. Brief biographical sketches of Robert Heinlein, Jon von Neumann, Flannery O'Connor, Thomas Paine, and Marie Curie are included.

Benbow, C. P. (1992). Meeting the needs of the gifted in rural areas through acceleration. *Gifted Child Today*, *15*(2), 15–19.

This article provides research-based suggestions for developing educational options based on acceleration to meet the needs of gifted students in rural areas. Accelerative options offered by both the home school and universities in Iowa are described.

Benbow, C.P. & Stanley, J.C. (1983). Constructing educational bridges between high school and college. *Gifted Child Quarterly*, *27*(3), 111–113.

To offset low challenge in high school courses, the Study of Mathematically Precocious Youth encourages intellectually talented students to choose from seven alternative

acceleration options. Also offered are four reasons for taking college credit courses in high school.

Benbow, C. P., & Stanley, J. C. (1983). Opening doors for the gifted. *American Education 19*(3), 44–46.

Curriculum must be adapted to match the ability and developmental stages of the academically gifted. The Study of Mathematically Precocious Youth at Johns Hopkins University determined that curriculum flexibility, not change, is the best approach.

Benbow, C. P., & Stanley, J. C. (1996). Inequity in equity: How "equity" can lead to inequity for high-potential students. *Psychology, Public Policy, and Law*, *2*(2), 249–292.

Over the past three decades, the achievement of waves of American students with high intellectual potential has declined as a result of inequity in educational treatment. This inequity is the result of an extreme form of egalitarianism within American society and schools, which involves the pitting of equity against excellence rather than promoting both equity and excellence; anti-intellectualism; the "dumbing down" of the curriculum; equating aptitude and achievement testing with elitism; the attraction to fads by schools; and the insistence of schools to teach all students from the same curriculum at the same level. In this article we provide recommendations for creating positive change—recommendations that emphasize excellence for all, that call for responsiveness to individual differences, and that suggest basing educational policies on well-grounded research findings in psychology and education. Educational policies that fail to take into account the vast range of individual differences among students—as do many that are currently in us—are doomed to be ineffective.

Boothe, D., Sethna, B. N., & Stanley, J. C. (1996). The Advanced Academy of Georgia: A unique collaboration of high school with college. *National Consortium of Specialized Secondary Schools of Mathematics, Science and Technology Journal*, *2*(2), 3–6.

Describes a unique model that provides challenging collegiate opportunities for academically talented high school juniors and seniors. The program is residential and students are enrolled in regular college coursework.

Callahan, C. M. (1992). To accelerate or not to accelerate: Evaluation gives the answer. *Gifted Child Today*, *15*(2), 50–56.

This article examines issues of student and program evaluation in determining the appropriateness of acceleration of gifted students. Intellective and nonintellective factors in identifying students for acceleration are discussed as are factors in monitoring student success. Specific program evaluation questions and design issues are also addressed.

Elkind, D. (1988). Mental acceleration. *Journal for the Education of the Gifted*, *11*(4), 19–31.

Use of the term "acceleration" to describe interventions to enhance children's intellectual potential is inappropriate, as the term cannot be justified from the standpoint of mental measurement, mental growth, genetics, or education. Maximizing a child's potential through creation of stimulating environments is recommended rather than concentration on early attainment of skills.

Feldhusen, J. F. (1992). Early admission and grade advancement for young gifted learners. *Gifted Child Today*, *15*(2), 45–49.

This article looks at decision factors in early admission or grade advancement for young gifted children. Specific criteria are offered for determining the appropriateness of both early admission and grade advancement. Special training for teachers and parents of gifted children is encouraged.

Feldhusen, J. F., Proctor, T. B., & Black, K. N. (2002). Guidelines for grade advancement of precocious children. *Roeper Review*, *24*(3), 169–171.

This reprint of an article on using grade advancement as a method for meeting the needs of some intellectually or academically gifted students is preceded by a commentary that concludes that popular sentiment and negative folklore about grade advancement are unfounded. Grade advancement guidelines are provided.

Feldhusen, J. F., & Wood, B. K. (1997). Developing growth plans for gifted students. *Gifted Child Today*, *20*(6), 48–49.

The article discusses the need for gifted and talented students to develop annual talent growth plans with the assistance of their counselors or program coordinators. It lists potential talent development services (such as mentorships, Odyssey of the Mind, and grade advancement), and describes the components of a sample growth plan used with approximately 600 gifted students.

Glass, L. W. (1979). A cooperative university-high school project for talented students. *Gifted Child Quarterly*, *23*(3), 532–537.

The article describes an Iowa State University summer project for gifted and talented high school juniors, which encompassed aspects of both the enrichment and acceleration models. Students were chosen on the basis of laboratory investigations into selected energy problems.

Gould, J. C., Thorpe, P., & Weeks, V. (2001). An early childhood accelerated program. *Educational Leadership*, *59*(3), 47–50.

Describes the Early Childhood Accelerated Program, an innovative pilot program in Wichita, Kansas, focusing on high-ability children ages 3–5 from culturally diverse groups.

Gubbins, J. E., & Siegle, D. L. (Ed.) (1991-1997). *The National Research Center on the Gifted and Talented (NRC/GT) Newsletter*. Storrs, CT: National Research Center on the Gifted and Talented.

These 15 newsletters from the National Research Center on the Gifted and Talented (NRC/GT) contain the following articles: (1) "National Research Needs Assessment Process" (Brian D. Reid); (2) "NRC/GT: Update of Year 2 Activities" (E. Jean Gubbins); (3) "Parents: Their Impact on Gifted Adolescents" (Julie L. Sherman); (4) "Cluster Grouping Fact Sheet: How To Provide Full-Time Services for Gifted Students on Existing Budgets" (Susan Winebrenner and Barbara Devlin); (5) "But You're a Man!!!' Exploring the Role of Identification in Role Model and/or Mentor Relationships" (Jonathan Plucker); (6) "Thinking Skills in the Regular Classroom" (Deborah E. Burns); (7) "Dynamic Assessment and Its Use with High Ability Students" (Robert J. Kirschenbaum); (8) "When 'Differentiated' Becomes Disconnected from Curriculum" (E. Jean Gubbins); (9) "Changing the Way We Perceive 'Creativity'" (Jonathan A. Plucker); (10) "Examining a Tool for Assessing Multiple Intelligences" (Cheryll M. Adams and Carolyn M. Callahan); (11) "Gender Differences between Student and Teacher Perceptions of Ability and Effort" (Del Siegle and Sally M. Reis); (12) "Motivating Our Students: The Strong Force of Curriculum Compacting" (Heather Allenback); (13) "Extending the Pedagogy of Gifted Education to All Students" (Sally M. Reis, Marcia Gentry, and Sunghee Park); (14) "Valuing, Identifying, Cultivating, and Rewarding Talents of Students from Special Populations" (David St. Jean); and (15) "A Parent's Guide to Helping Children: Using Bibliotherapy at Home" (Mary Rizza).

Hendricks, M. (1997). Yesterday's whiz kids: Where are they today? *Johns Hopkins Magazine*, *49*, 30–36.

No abstract available.

Hoffman, S. G. (1989). What the books don't tell you about grade skipping. *Gifted Child Today*, *12*(1), 37–39.

A parent who is also an educator describes her concerns about her gifted daughter's lack of challenge in school in spite of accelerated activities. After the student skipped a grade, other concerns resulted, such as the impact on academic adjustment, social adjustment, peer acceptance, motivation, gaps in skills, etc.

Horne, D. L., & Dupuy, P. J. (1981). In favor of acceleration for gifted students. *Personnel & Guidance Journal*, *60*(2), 103–106.

The article reviews the advantages and disadvantages of two types of programs for intellectually gifted students, enrichment and acceleration. A number of studies on this issue are cited, and it is concluded that acceleration is preferable. It challenges the student as much as enrichment, is less expensive, and is helpful to students whose families move often. The claimed social damage to accelerated students has not been substantiated. Accelerants achieve more in school and in life, and their mental health, social life, and family adjustment compares favorably with the average.

Howley, A. (2002). The progress of gifted students in a rural district that emphasized accelerations strategies. *Roeper Review*, *24*(3), 158–160.

This reprinted article originally appeared in 1989 in *Roeper Review*, *11*(4), 205–207. This article discusses one rural district's experiences with the use of various acceleration strategies in different elementary schools. Though the programs varied, they all achieved similar success. That success may be attributed to four common characteristics: (1) planning for each student focused on individual needs; (2) instructional materials closely approximated students' instructional levels; (3) teachers monitored students' progress on a routine basis; and (4) students' progress was documented through pre and post testing with the Woodcock-Johnson Psycho-Educational Battery: Tests of Achievement. A comment on this article by a group of guest editors is appended.

Howley, C. B. (1987). It's controversial, but "acceleration" could bring gifted kids up to full speed. *American School Board Journal*, *174*(6), 32–33, 40.

The article discusses acceleration for gifted students as a relatively cheap, highly effective method rarely used in public schools. Recent research supports both grade skipping and acceleration in selected subjects, depending on a particular student's interest, ability, and maturity. Two sidebars highlight the Gessell Institute's curriculum enrichment alternative and a successful Baltimore acceleration program.

Howley, A., et al. (1986). *Acceleration as a means of individualizing instruction for gifted students in rural schools: A preservice rural special education module: 121*. Bellingham, WA: Western Washington University, National Rural Development Institute.

This teaching module instructs preservice teachers about accelerating the progress of rural gifted students. Acceleration consists of various provisions that allow early completion of school, including grade skipping, cross-grade placement, early entry, dual attendance, special class placement, and radical acceleration. In rural areas, the practice of acceleration is especially critical because of its cost-effectiveness in comparison to enrichment programs. However, the literature suggests that rural teachers and administrators express many concerns about acceleration. Therefore, this module aims to prepare preservice teachers to address concerns about acceleration and to implement effective acceleration programs for rural gifted students.

Howley, C. B., & Howley, A. A. (1985). A personal record: Is acceleration worth the effort? *Roeper Review*, *8*(1), 43–45.

Parents of three gifted children describe their advocacy that has resulted in procuring appropriate education for their children by acceleration despite school opposition.

Karnes, F. A., & Chauvin, J. (1982). Almost everything that parents and teachers of gifted secondary school students should know about early college enrollment and college credit by examination. *Gifted Child Today*, *24*, 39–42.

Acceleration approaches for gifted secondary students are described in terms of dual enrollment (attending a post-secondary institution on a part-time basis), early admission, or participation in the College Level Examination Program or the International Baccalaureate Program.

Laycock, F. (1979). College programs for the gifted. *Roeper Review*, *2*(1), 10–14.

College practices such as acceleration, grouping, and enrichment are discussed regarding their effect on gifted students. Also considered are opening classes to high school students, conducting recruitment and remedial programs for minority students, and offering cross-disciplinary courses and majors.

Lubinski, D., & Benbow, C. P. (2000). States of excellence. *American Psychologist*, *55*(1), 137–150.

Research from the individual-differences tradition pertinent to the optimal development of exceptional talent is reviewed, using the theory of work adjustment (TWA) to organize findings.

Lynch, S. J. (1992). Fast-paced high school science for the academically talented: A six-year perspective. *Gifted Child Quarterly*, 36(3), 147–154.

This study of 905 academically talented students (ages 12-16) who completed a 1-year course in high school biology, chemistry, or physics in a 3-week summer program found that the fast-paced courses effectively prepared subjects to accelerate in science, and that talented students could begin high school sciences earlier than generally allowed.

Lynch, S. J. (1994). *Should gifted students be grade advanced?* (Report). Reston, VA: Council for Exceptional Children.

No abstract available.

McCluskey, K. W., Massey, K. J., & Baker, P. A. (1997). Early entrance to kindergarten: An alternative to consider. *Gifted and Talented International*, *12*, 27–30

No abstract available.

Mirman, N. (1962). Are accelerated students socially maladjusted? *Elementary School Journal*, *62*, 273–276.

No abstract available.

NAGC, (1992). *Acceleration position paper*. Washington, DC: National Association for Gifted Children.

The NAGC policy statement deals with acceleration, an issue that impacts the education of gifted and talented students. It concludes opportunities must be offered to all children. Accordingly, highly able students with capability and motivation to succeed in placements beyond traditional age/grade parameters should be provided the opportunity to enroll in intellectually appropriate classes and educational settings.

Noble, K. D., Subotnik, R. F., & Arnold, K. D. (1999). To thine own self be true: A new model of female talent development. *Gifted Child Quarterly*, *43*(3), 140–149.

Describes an innovative model of female talent development based upon the life experiences of gifted women from a wide variety of backgrounds and talent domains. Key issues addressed by the model are the personal, professional, and cultural challenges common to gifted females and strategies for coping with them.

Olszewski-Kubilius, P. (2003). Is your school using best practices for instruction of gifted students? *Talent*, *Winter*(1), 3–4.

Review of the talent search model, ability grouping, acceleration, and curriculum compacting.

Passow, H. A. (1989). Needed research and development in educating high ability children: An editorial. *Roeper Review*, *11*(4), 223–229.

Suggests two areas for research and development in educating high-ability children. They include (1) what kinds of education and socialization opportunities are needed to transform potential into performance, and (2) how to identify and nurture giftedness in "disadvantaged" populations. Other topics for research include curriculum issues, identifying the gifted, components of general education, acceleration and enrichment, affective needs, underachievement, and equity and excellence.

Paulus, P. (1984). Acceleration: More than grade skipping. *Roeper Review*, 7(2), 98–100

The definition of acceleration for gifted students is expanded to include early entrance, partial acceleration, compressing curricula, advanced courses, and mentors and tutors. Popular theories about the social and emotional harm to accelerants are disproved.

Portes, P. R. (1984). *A review of programs for young gifted children*. KY: State of the Art Research Papers. (ERIC Documents Reproduction Service No. ED282377).

No abstract available.

Pressey, S. (1955). Concerning the nature and nurture of genius. *Science*, 31, 123-129.

Illustrations from athletics and music introduce the hypothesis "that a practicing genius is produced by giving a precocious able youngster early encouragement, intensive instruction, continuing opportunity as he advances, a congruent stimulating social life, and cumulative success experiences." Proposals are made for meeting these conditions in schools and colleges. 24 references.

Pyryt, M. C. (1999). *Acceleration: Strategies and benefits*. Presented at the Annual Conference of the Society for the Advancement of Gifted Education (SAGE), Calgary, Alberta, Canada. [On-line]. Available: http://www.acs.ucalgary.ca/~gifteduc/resources/articles/pyryt2.html.

Highlights some of the major benefits of acceleration. Pioneered by Stanley and colleagues; this model has generated significant research pointing to its effectiveness. IAS is introduced as a tool for decision-making.

Reisberg, L. (1998). Child prodigies find a home on campuses. *Chronicle of Higher Education*, *45*(17), A35–A36.

Early-entrance programs for academically gifted students aged 10 to 14 are offered at a number of colleges and universities. Admissions officials and experts on gifted children worry that some students are not mature enough, that their social development will suffer, and that they will experience social isolation. Highly selective colleges may be reluctant to accept the students despite their abilities.

Renzulli, J. S., et al. (1982). Curriculum compacting: An essential strategy for working with gifted students. *Elementary School Journal*, *82*(3), 185–194.

Presents a plan for compacting and streamlining the regular curriculum in order to relieve gifted students of the boredom that often results from unchallenging work and to provide the time gifted students need to pursue acceleration and enrichment activities after prerequisite competencies have been mastered.

Robeck, M. C. (1968). *California Project Talent: Acceleration programs for intellectually gifted pupils*. Sacramento, CA: California State Department of Education.

A description of Project Talent includes discussions of preceding research indicating that acceleration was effective and beneficial and outlines provisions utilized for acceleration (early admission, ungraded primary and elementary, individual and advanced placement, grade skipping, combination grades, and time compression). Detailed are the administrative procedures involving the advantages and problems of the program and the establishment of new programs, as well as the identification and placement of pupils in connection with the role of psychologists, counselors, and psychometrists, plus the counseling of pupils, parents, and teachers. The curriculum for the grade 3 summer session, with its goals, content, organization, and evaluation is provided. Functions and selections of case studies as used in the process of identification, and the study of intellectual development of the accelerate are discussed along with counseling methods. Evaluations are presented of the California Project Talent program, Pasadena's acceleration program, the Ravenswood program, and the placement of individuals in the California program. Also included are eight recommendations for the future, research suggestions, appendixes, and tables of results.

Robinson, H. B. (1985). College without high school: The University of Washington's Early Entrance Program. *Academic Talent*, *2*(1), 9–10.

No abstract available.

Robinson, N. M., & Noble, K. D. (1992). Acceleration: Valuable high school to college options. *Gifted Child Today*, *15*(2), 201–223.

A variety of accelerative options for gifted high school students is described, including part-time college programs and full-time early entrance programs. The University of Washington's Transition School and Early Entrance Program is presented as an option for teenagers to enter university without attending high school at all.

Rogers, K. B., & Kimpston, R. D. (1992). Acceleration: What we do vs. what we know. *Educational Leadership*, *50*(2), 58–61.

Although previous reviews of acceleration outcomes have been markedly positive, practitioners have markedly negative perceptions of acceleration's efficacy. This article reviews and evaluates academic, social, and emotional benefits of early school entrance, grade skipping, nongraded classrooms, curriculum compacting, grade telescoping, concurrent enrollment (in school and college), subject acceleration, advanced placement, mentorship, credit by examination, and early college admission.

Rothschild, E. (1995). Aspiration, performance, reward: The Advanced Placement Program at 40. *College Board Review*, *176–177*, 24–32.

The history of the College Entrance Examination Board's Advanced Placement Program is chronicled from its inception in 1951 through early developmental stages and 40 years of implementation. Issues discussed include test development, funding, administration at the institutional level, expansion of curriculum areas and testing options, teacher involvement, and inclusion of precocious youth in instructional and testing programs.

Sayler, M. F. (1992). *Early college entrance for gifted high school students: Experiences and guidelines*. Paper presented at the Annual Meeting of the Council for Exceptional Children, Baltimore, MD.

No abstract available.

Southern, W. T., & Jones, E. D. (1992). The real problems with academic acceleration. *Gifted Child Today*, 15(2), 34–38.

This article identifies problems commonly attributed to acceleration for gifted students. Specific student concerns (such as friendships) and administrative concerns (such as difficulties in awarding course credits) are addressed. Five suggestions are made to help districts plan for providing accelerative options.

Stanley, J. C. (1954). Is the fast learner getting a fair deal in your school? *Wisconsin Journal of Education*, *86*, 5–6.

Discusses identifying gifted children and improving their educational opportunities. "We cannot afford to neglect individualization of instruction for any of our school children, whatever their learning rate may be. Certainly, this includes the fast learner."

Stanley, J. C. (1954). Identification of superior learners in grades 10 through 14. *Supplementary Educational Monograph*, *December*(81), 31–34.

No abstract available.

Stanley, J. C. (1980). On educating the gifted. *Educational Researcher*. *9*(3), 8–12.

Explores current thinking on ways to improve the identification and education of intellectually talented youth. Discusses the problems of meeting the needs of individuals with many different abilities and describes a model program at Johns Hopkins University for mathematically precocious youth.

Stanley, J. C. (1990). Leta Hollingsworth's contributions to above-level testing of the gifted. *Roeper Review*, *12*(3), 166–171.

The pioneering work of Leta Hollingsworth (1886-1939) in using above-level testing with highly intellectually talented young people is recounted and related to contemporary activities of the Study of Mathematically Precocious Youth.

Stanley, J. C. (1991). A better model for residential high schools for talented youths. *Phi Delta Kappan*, *72*(6), 471–473.

Describes the Texas Academy of Mathematics and Science, a residential school for youths talented in mathematics and science. TAMS students, who come as eleventh graders, take only regular college courses taught by university faculty members. They complete the last two years of high school and the first two years of college in just two academic years.

Stanley, J. C. (1997). Varieties of intellectual talent. *Journal of Creative Behavior*, *31*(2), 93–119.

Discusses the identification of intellectually talented youth and, to some extent, their educational facilitation. Although the "abilities" view of talent is emphasized, more qualitative approaches such as those of B. S. Bloom, K. A. Ericsson, H. Gardner, D. K. Simonton, and R. J. Sternberg receive attention. Life outcomes of mathematically and/or verbally precocious youth identified across the nation by talent searches, including the Study of Mathematically Precocious Youth (SMPY) emanating since 1971 from Johns Hopkins University (J. C. Stanley et al.) which is described here, may help clarify relationships between intellectual precocity, creativity, and achievement.

Stanley, J. C., & Benbow, C. P. (1983). Extremely young college graduates: Evidence of their success. *College and University*, *58*(4), 361–371.

Students, it is argued, who have used combinations of entering college early and forging ahead fast in the curriculum have led or are leading highly effective lives. Parents and educators should have less fear when attempting to accelerate a child.

Swanson, J. D. (1995). *Project SEARCH: Selection, enrichment, and acceleration of rural children*. (Final Report). Columbia, SC: South Carolina Department of Education.

This final report describes the activities of Project Search (Selection Enrichment and Acceleration of Rural Children), a project funded by a federal Javits grant to address the identification of young gifted and talented students from underrepresented populations and to develop a model for providing appropriate services for young, potentially gifted children. The project focused on three pilot school sites in rural areas of the Charleston County School District in South Carolina. All three schools served a majority of African American children. The project began with kindergarten classrooms and then added second and third grade classrooms. By the end of the project, staff directly affected more than 450 students and 26 teachers and principals. Assessment instruments were used to evaluate students' intelligence, academics, creativity, and social leadership; student portfolios were also used for identification of the top 10–15 percent of students. The project developed an inclusive classroom model for nurturing giftedness that involved curriculum development and teacher training. Classroom strategies included higher level questioning and dialog, open-ended and project-based assignments, varied materials and hands-on activities with students, and opportunities for self-directed activities. The report includes the final dissemination packet on promising practices, information about assessment instruments, and an evaluation.

7. Math/Science Acceleration

Bell, D., & Leroux, J. (1992). Acceleration: A case study of home schooling. *Canadian Journal of Special Education*, *8*(2), 167–175.

This paper describes an accelerative instructional program in algebra provided to a sixth-grade boy, highly able in mathematics, by parental home tutoring. The boy's high intrinsic motivation and teaching sensitive to his needs and abilities led to successful achievement.

Charlton, J. C., Marolf, D. M., & Stanley, J. C. (1994). Follow-up insights on rapid educational acceleration. *Roeper Review*, *17*(2), 123–129.

Too little is known about what happens to youths who reason extremely well mathematically. This article discusses mathematically precocious youth. A comment on this article by a group of guest editors is appended.

George, W. C., & Stanley, J. C. (1979). The study of mathematically precocious youth. *Gifted Child Quarterly*, *23*, 518–525.

The article describes the Johns Hopkins University Study of Mathematically Precocious Youth (SMPY), which identifies and studies mathematically precocious seventh graders to provide information on which to base special education efforts on their behalf. Some SMPY publications are listed, and several books on SMPY activities and findings are described.

Holmes, J. E. (1970). Enrichment or acceleration? *Math Teacher*, *63*(6), 471–473.

No abstract available.

Kolitch, E. R., & Brody, L. E. (1992). Mathematics acceleration of highly talented students: An evaluation. *Gifted Child Quarterly*, *36*(2), 78–86.

This study examined the precollege mathematics preparation of first-year college students (n-69) with very high mathematical aptitude. Despite most students' radical acceleration (as part of the Study of Mathematically Precocious Youth), achievement in coursework was high. Gender differences were found in degree of acceleration and choice of college major.

Lupkowski-Shoplik, A. E., & Assouline, S. G. (1994). Evidence of extreme mathematical precocity: Case studies of talented youths. *Roeper Review*, *16*(3), 144–151.

This article presents four case studies of extreme mathematical precocity in two boys and two girls. Problems in providing appropriately challenging instruction for these children are noted. The article concludes with 11 recommendations for programming for exceptionally talented students.

Lynch, S. J. (1990). Credit and placement issues for the academically talented following summer studies in science and mathematics. *Gifted Child Quarterly*, *34*(1), 27–30.

Students (n=570, aged 12–16) who attended university-sponsored science and mathematics summer classes reported on their subsequent status at their regular schools pertaining to credit and placement issues. Advanced placement was given more often than credit, although in most cases both were awarded, particularly for high school level coursework.

Ma, X. (2000). Does early acceleration of advanced students in mathematics pay off? An examination of mathematics participation in the senior grades. *Focus on Learning Problems in Mathematics*, *22*(1), 68–79.

Examines advanced students' course taking procedures and their senior year mathematics participation. Concludes that students who took early algebra demonstrated a substantially higher participation rate in advanced mathematics in the later grades of high school than students who did not.

McKnight, C. C. (1979). *Acceleration vs. sophistication in mathematics: An either/or case? Development Report Number 2*. Urbana, IL: Illinois University at Urbana Curriculum Laboratory

This document discusses the importance of acceleration vs. sophistication in mathematics programs and curricula for gifted students. The discussion proceeds through three steps. First, an attempt is made to model how various kinds of gifted students interact with three dimensions of the curriculum. These dimensions are acceleration, sophistication (depth), and enrichment (breadth). Second, a description is given of the way in which one program has tried to respond to this model. This program is the mathematics program for gifted students at the University High School, the laboratory school of the University of Illinois. Finally, an attempt is made to draw a few conclusions and practical guidelines for dealing with gifted students.

Mezynski, K., & Stanley, J. C. (1980). Advanced placement oriented calculus for high school students. *Journal for Research in Mathematics Education*, *11*(5), 347–355.

Two supplementary calculus classes for high school students are described. Both classes were projects sponsored by the Study of Mathematically Precocious Youth (SMPY) of Johns Hopkins University.

Partenheimer, P. R., & Miller, S. K. (2001). *Eighth grade algebra acceleration: A case study of longitudinal effects through the high school pipeline*. Paper presented at the Annual Meeting of the American Educational Research Association, Seattle, WA.

This study features a program evaluation of a policy that allows gifted 8th-grade mathematics students to take algebra. The study is longitudinal and looks at the effects of taking algebra in the 8th grade and the subsequent four years of mathematics in high school. Among the specific research questions in the study are: (1) To what degree do students in 8th-grade algebra progress through upper level mathematics after early entry? (2) To what extent do some of these accelerated students have negative experiences? and (3) Does the elementary school mathematics curriculum (self pacing versus traditional) affect the mathematics profile for 8th-grade algebra and subsequent mathematics courses? The study concludes that the policy of accelerating students in mathematics at this particular school had a negative impact for many of those students.

Ravaglia, R., Suppes, P., Stillinger, C., & Alper, T. M. (1995). Computer-based mathematics and physics for gifted students. *Gifted Child Quarterly*, *39*(1), 7–13.

Computer-based instruction allows gifted middle school and early high school students to complete advanced

mathematics and physics courses several years early. The progress of three groups of students (grades 7–12) who took Advanced Placement level calculus or physics courses at an education program for the gifted was examined. Advanced Placement examination scores were high, and attrition rates were low. Gender differences were not apparent. It is concluded that acceleration is appropriate for gifted students if they are allowed to move at their own pace and required to demonstrate mastery of the material throughout. If students are able to learn material faster, keeping them from doing so does not appear to improve their education.

Schrecongost, J. (2000). *An analysis of the selection criteria for the eighth grade algebra I accelerated mathematics program in Harrison County, West Virginia*. Master of Arts Thesis, Salem-Teikyo University.

This study analyzed the criteria used in Harrison County, WV, to select students to participate in an accelerated mathematics program. The program's main component is an eighth grade Algebra I course that enables the students to complete five years of college preparatory mathematics, ending with calculus. The scores used as selection criteria, CTBS concepts, CTBS computation, and pre-algebra grades, were all found to be good predictors of success. The results indicate, however, that the current standards need to be raised. Requiring higher scores would eliminate a significant number of program dropouts (currently 51%). A fourth selection criterion, a 65th percentile on the Iowa Algebra Aptitude Test, could not be evaluated since there was no record of such test results. However, other studies indicate that both an algebra prognosis test and an assessment of interest would be helpful.

Stanley, J. C. (1976). Identifying and nurturing the intellectually gifted. *Phi Delta Kappan*, *58*(3), 234–238.

Describes a program that identifies gifted mathematics students and places them in an accelerated program.

Stanley, J. C. (1976). The case for extreme educational acceleration of intellectually brilliant youths. *Gifted Child Quarterly*, *20*(1), 66–75.

Presents several detailed case studies demonstrating good effects of acceleration in educating mathematically precocious youth who had been identified in a longitudinal study.

Stanley, J. C. (1976). Special fast-mathematics classes taught by college professors to 4th–12th graders. In D.P. Keating (Ed.), *Intellectual talent: Research and development*. Baltimore: Johns Hopkins University Press.

Stanley, J. C. (1976). The student gifted in mathematics and science. *Bulletin of the National Association of Secondary School Principles*, *60*, 28–37.

No abstract available.

Stanley, J. C. (1976). Youths who reason extremely well mathematically: SMPY's accelerative approach. *Gifted Child Quarterly*, *20*(3), 237–238.

Statistics are presented concerning background characteristics of 292 students who scored well on the mathematical sections of the Scholastic Aptitude Test at age 12 or younger. Discussed are the ratio of girls to boys, geographic distribution, verbal ability, parents' education level and occupational status, siblings, and educational acceleration.

Stanley, J. C. (1979). The study and facilitation of talent for mathematics. In A.H. Passow (Ed.), *The gifted and the talented: Their education and development* (pp. 169–185). Chicago: University of Chicago Press.

Brief discussions of general vs. special ability and of mathematical reasoning ability form the introduction of this paper on the education of mathematically gifted students. The second section of the paper describes the annual mathematics talent searches conducted by the Study of Mathematically Precocious Youth (SMPY). The third section covers SMPY's special educational provisions for the mathematically talented, including the basic components of the program, importance of fast pace, and other aspects of the offerings (skipping grades, part-time college study, credit by examination, early college entrance, college graduation in less than four years, and by-passing the bachelor's degree). Two illustrations of how selected students progressed through the program comprise the fourth section of this paper, while the final section summarizes SMPY's position concerning the education of mathematically precocious youth.

Stanley, J. C. (1985). Finding intellectually talented youths and helping them educationally. *Journal of Special Education*, *19*(3), 363–372.

Discusses the first 14 yrs (1971–1985) of the Study of Mathematically Precocious Youth at Johns Hopkins University. Many youths who reasoned exceptionally well mathematically were identified, studied further, and

aided. Issues discussed include the need for longitudinal teaching teams, the identification of students with high mechanical reasoning, and use of the Scholastic Aptitude Testing in screening.

Stanley, J. C. (1987). Making the IMO team: The power of early identification and encouragement. *Gifted Child Today*, *10*(2), 22–23.

No abstract available.

Stanley, J. C. (1987). State residential high schools for mathematically talented youth. *Phi Delta Kappan*, *68*(10), 770–773.

Proposes that states promote the preparation of mathematically and scientifically talented high school students through the establishment of special residential high schools.

Stanley, J. C. (1991). An academic model for educating the mathematically talented. *Gifted Child Quarterly*, *35*(1), 36–42.

This article traces the origin and development of special educational opportunities offered to students who are exceptionally able in mathematics, focusing on the Study of Mathematically Precocious Youth at Johns Hopkins University and the Center for the Advancement of Academically Talented Youth.

Stanley, J. C. (1993). Boys and girls who reason well mathematically. In G. Bock & K. Ackrill (Eds.), *The origins and development of high ability*. (pp. 119-138). New York: Wiley.

No abstract available.

Stanley, J. C. (1996). In the beginning: The Study of Mathematically Precocious Youth. In C. P. Benbow & D. Lubinski (Eds.), *Intellect and talent: Psychology and social issues* (pp. 225–235). Baltimore: Johns Hopkins University Press.

This paper contains a brief description of the founding and early years of the Study of Mathematically Precocious Youth (SMPY) from 1968 to the present. Several of the guiding principles behind SMPY are discussed. SMPY led to the formation of strong regional, state, and local centers that now blanket the United States with annual talent searches and academic summer programs. Among their main tools are the assessment tests of the College Board including the SAT, high school achievement tests, and Advanced Placement Program (AP) examinations. Identifying, via objective tests, youths who reason exceptionally well mathematically and/or verbally is the initial aim of SMPY and its sequels. The 12- or 13-year-old boys and girls who score high are then provided the special, supplemental, accelerative educational opportunities they sorely need.

Stanley, J. C. & Benbow, C. P. (1982). Educating mathematically precocious youths: Twelve policy recommendations. *Educational researcher*, *11*(5), 4–9.

Presents recommendations based on 13 years of work by the Study of Mathematically Precocious Youth. Holds that mathematically talented students are essential to our country's scientific and technological progress and that their abilities must be cultivated to a far greater extent than is permitted by current educational programs.

Stanley, J. C., & Benbow, C. P. (1983). SMPY's first decade: Ten years of posing problems and solving them. *Journal of Special Education*, *17*(1), 11–25.

The Study of Mathematically Precocious Youth (SMPY) began in 1971 with the purpose of devising ways of identifying and facilitating the education of such students. The solutions and their longitudinal evaluation are described. Use of the Scholastic Aptitude Test (SAT) was shown to be an effective way of identifying students in the 7th grade who would achieve academically at a superior level in high school. Moreover, acceleration was deemed an effective alternative for educating gifted children. Curricular flexibility rather than special programs for the gifted has proved the most effective way to facilitate the education of precocious students. For the mathematically precocious, SMPY devised fast-paced mathematics classes. These were shown to have long-term effects. SMPY has also discovered large sex differences in mathematical reasoning ability and in mathematics and science achievements in high school.

Stanley, J. C., & Benbow, C. P. (1986). Youths who reason exceptionally well mathematically. In R. J. Sternberg and J. E. Davidson (Eds.), *Conceptions of giftedness* (pp. 361–387). Cambridge, England: Cambridge University Press.

No abstract available.

Stanley, J. C., Keating, D. P., & Fox, L. H. (Eds.) (1974). *Mathematical talent: Discovery, description, and development*. Baltimore: Johns Hopkins University Press.

No abstract available.

Stanley, J. C., Lupkowski, A. E., & Assouline, S. G. (1990). Eight considerations for mathematically talented youth. *Gifted Child Today*, *13*(2), 2–4.

The article considers how accelerative and enrichment options complement each other to provide appropriate challenges for mathematically talented students. Eight principles of educating such youth are presented, based on experience of the Study of Mathematically Precocious Youth at Johns Hopkins University.

Stanley, J. C., & Stanley, B. S. K. (1986). High school biology, chemistry, or physics learned well in three weeks. *Journal of Research in Science Teaching*, *23*(3), 237–250.

At ages 11–15, 25 intellectually highly-able youths studied high school biology and 12 studied chemistry intensively for 3 summer weeks, after which their median score on the College Board's achievement test was 727 (biology) and 743 (chemistry). Implications of these and other results for science instruction are discussed.

Swiatek, M. A., & Benbow, C. P. (1991). A 10-year longitudinal follow-up of participants in a fast-paced mathematics course. *Journal for Research in Mathematics Education*, *22*(2), 138–150.

Participants in a fast-paced mathematics course and qualified nonparticipants were surveyed 10 years later with respect to undergraduate record, graduate experience, attitudes toward mathematics/science, and self-esteem. In general, participation was associated with stronger undergraduate records for all students and with more advanced graduate accomplishment for females.

Thomas, T. A. (1989). *Acceleration for the academically talented: A follow-up of the academic talent search class of 1984*. (ERIC Documents Reproduction Service No. ED307303).

This paper reviews and synthesizes the results from 42 research reports dealing with acceleration of mathematics programs for talented junior high school students. The effects of acceleration and enrichment are compared, and it is concluded that acceleration is preferable. The question of optimal grade level for initiating accelerated programs, and that of the advisability of providing slower paced programs for low achievers are raised. Annotations are provided for each of the reports reviewed. Each annotation gives bibliographic information, a brief description of the study, and a list of findings.

8. Meta-analysis

Kent, S. D. (1995). The effects of acceleration on the social and emotional development of gifted elementary students: A meta-analysis. *Dissertation Abstracts International*, *54*(2-A). U.S.: University Microfilms International.

No abstract available.

Kulik, J. A. (1993). An analysis of the research on ability grouping. *NRC/GT Newsletter*, *Spring*, 8–9.

This research review summarizes two major sets of meta-analyses on five kinds of ability grouping programs: (1) XYZ classes (high, middle, and low classes); (2) cross-grade grouping; (3) within-class grouping; (4) accelerated classes; and (5) enriched classes. One group of meta-analyses concluded that the strongest benefits from grouping were found in programs in which there was a great deal of adjustment of curriculum for highly talented learners. The other meta-analysis did not find any strong positive benefits of grouping, but did not examine grouping programs designed for highly talented students. Re-analysis of all studies included in both sets of meta-analyses confirmed that higher aptitude students usually benefit academically from ability grouping. Benefits are in proportion to the amount of curriculum adjustment, with programs entailing acceleration of instruction resulting in the most gain on standardized tests. Grouping was found to have less influence on the academic achievement of middle and lower aptitude students. Analysis of noncognitive outcomes suggests that the effects of grouping on self-esteem measures measure for all ability groups are small and may even be rather positive. Results are contrasted with the conclusions of J. Oakes ["Keeping Track: How Schools Structure Inequality" (1985)]. The review concludes that American education would be harmed by the wholesale elimination of programs that group learners for instruction by ability.

Kulik, J. A., & Kulik, C. L. C. (1984). The effects of accelerated instruction on students. *Review of Educational Research*, *54*(3), 409–425.

Results from a meta-analysis of 26 controlled studies on the effects of accelerated instruction on elementary and secondary school students are presented. The examination performance of accelerates surpassed the performance of equivalent age and intelligence nonaccelerates and equaled the performance of same-grade but older, talented nonaccelerates.

Kulik, J. A., & Kulik, C. L. C. (1984). Synthesis of research on effects of accelerated instruction. *Educational Leadership*, *42*(2), 84–89.

A meta-analysis of 26 studies shows that accelerated gifted students outperform students of the same age and ability who are not accelerated and achieve as well as equally gifted older students in the higher grades. Correlational studies suggest that accelerates are equally successful later in life.

Kulik, J. A., & Kulik, C. L. C. (1992). Meta-analytic findings on grouping programs. *Gifted Child Quarterly*, *36*(2), 73–77.

Meta-analytic reviews have shown that gifted students gain little from programs of minimal instructional modification (multilevel classes), more from greater modifications (cross-grade and within-class programs) and the most from those involving the greatest amount of curricular adjustment (enrichment and acceleration).

Rogers, K. B. (1991). *The relationship of grouping practices to the education of the gifted and talented learner (Executive Summary)*. Storrs, CT: National Research Center on the Gifted and Talented.

This executive summary reports on a study which utilized meta-analysis and best-evidence synthesis techniques to evaluate 13 research studies on the academic, social, and psychological effects upon learners who are gifted and talented of three grouping practices: (1) ability grouping for enrichment; (2) mixed ability cooperative grouping for regular instruction; and (3) grouping for acceleration. It concluded that the research showed strong, consistent support for the academic effects of most forms of ability grouping for enrichment and acceleration, but that the research is scant and weak concerning the socialization and psychological adjustment effects of these practices. Claims for the academic superiority of mixed ability grouping or for whole group instructional practices were not substantiated for gifted and talented learners. Guidelines are offered suggesting that: students who are gifted and talented should spend most of their school day with others of similar abilities and interests; cluster grouping of gifted students within an otherwise heterogeneously grouped classroom can be considered when a full time gifted program is not feasible; a cross-grade grouping option could be offered in the absence of a full time gifted program enrollment; gifted and talented students should be offered a variety of acceleration and enrichment based options; and mixed ability cooperative learning should be used sparingly for students who are gifted and talented.

9. Validation Study

Lipscomb, J. M. (2003). *A validity study of the Iowa Acceleration Scale*. Dissertation, The University of Iowa.

The *Iowa Acceleration Scale (IAS)* was designed to aid educators in determining whether an elementary or secondary student would benefit from whole-grade acceleration (also known as grade skipping). The 20-item scale addresses a student's measured intellectual ability and achievement, motivation, attitudes towards learning, and relationships with peers and teachers, as well as the attitudes of educators, parents, and the student toward acceleration. Between 1992 and 1998, complete data on 103 *IAS* cases were amassed by the Belin-Blank Center. These data were utilized to generate information about how well components of the *IAS* function together (part of internal structure evidence for validity). Results of the study suggest that each of the *IAS*'s four subscales contribute to a distinct set of information to the total score. The subscales and 13 of the 20 items function as intended by positively contributing to the total *IAS* score. The findings also suggest changes that could increase the ability of the *IAS* to distinguish among the small and potentially homogenous group of students who are nominated for acceleration.

10. Book or Book Chapter

Arnold, K. D., Noble, K. D., & Subotnik, R.F. (1996). *Remarkable women: Perspectives on female talent development*. Chestnut Hill, MA: Boston College Press.

This book consolidates and expands existing knowledge about highly capable women and the internal and external forces that lead them to extraordinary adult accomplishment. The collected studies include women from a wide variety of backgrounds and talent domains whose paths to exceptional achievement illuminate the nature of female talent development and provide models to help more women fulfill their promise in adulthood.

Benbow, C. (1991). Meeting the needs of gifted students through use of acceleration. In M. C. Wang, M. C. Reynolds, & H. J. Walberg (Eds.), *Handbook of special education: Research and practice, Vol. 4: Emerging programs*. (pp. 23-36). New York: Pergamon Press.

The chapter provides a rationale for why programming for the gifted is needed and then describes what acceleration entails, the practical benefits of acceleration, and educators' skepticism about its use. The chapter details the theoretical underpinnings of acceleration as a program option for the gifted; explores whether results from empirical investigations bear out the positive theoretical predictions regarding use of acceleration; covers both those studies examining academic benefits and those that focus on social and emotional development; and closes with several suggestions for practice and research.

Benbow, C. P., & J. C. Stanley (Eds.) (1983), *Academic precocity: Aspects of its development*. Baltimore: Johns Hopkins University Press.

Revised, expanded, and updated proceedings of the Tenth Annual Hyman Blumberg Symposium on Research in Early Childhood Education focus on the Study of Mathematically Precocious Youth (SMPY).

Brody, L. E. (Ed.) (2004). Grouping and acceleration practices in gifted education. In S. Reis (Series Ed.), *Essential readings in gifted education: Vol. 3*. Thousand Oaks, CA: Corwin Press.

Articles in Volume 3 of this series are reprints of highly cited articles from *Gifted Child Quarterly*.

Brody, L. E., & Stanley, J. C. (1991). Young college students: Assessing factors that contribute to success. In W. T. Southern & E. D. Jones (Eds.), *The academic acceleration of gifted children* (pp. 102–132). New York: Teacher's College Press.

No abstract available.

Clark, B. (1997). *Growing Up Gifted, 5th Edition*. Columbus, OH: Merrill.

Acceleration in schooling is necessary to meet the educational needs of exceptionally gifted students. Acceleration results in the student completing formal school in less time than is usually required, and may be accomplished by early entrance to kindergarten, skipping grades, advanced placement, or receiving credit by examination. Barbara Clark reviews the research on acceleration; including the studies of Alexander & Skinner, 1980; Anderson, 1960; Bish & Fliegler, 1959; Braga, 1969; Brody & Benbow, 1987; Fund for the Advancement of Education, 1957; Gallagher, 1966; Justman, 1953, Lehman, 1953; Lucito, 1964; Morgan, Tennant, & Goldman, 1980; Plowman & Rice, 1967; Pressey, 1955; Reynolds, 1962; Terman & Oden, 1947; Worcester, 1955.

Cohn, S. J., George, W. C., & Stanley, J. C. (1979). Educational acceleration of intellectually talented youths: Prolonged discussion by a varied group of professionals. In W. C. George, S. J. Cohn, & J. C. Stanley (Eds.), *Educating the gifted: Acceleration and enrichment* (pp. 183-238). Baltimore: Johns Hopkins University Press.

No abstract available.

Cronbach, L. J. (1996). Acceleration among the Terman males: Correlates in midlife and after. In C. P. Benbow & D. J. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 179–191). Stanford, CA: Stanford University Press.

What can be said about those who were markedly accelerated in schools when we can look at nearly their whole lives? Terman began before 1920 to collect records on able young people and in 1922 began a large-scale search. The present analysis covers male responses from 1950 to 1977. This reanalysis of the Terman files, which followed subjects from about 1922 to 1977 and have compared those who finished high school at about age 15 or 16 with those who graduated near age 18. In many aspects of their adult lives those who were accelerated did not differ as a group from the roughly equated controls. Every non-

trivial difference that did appear on a value-laden variable showed those who had been accelerated at an advantage. Variation within groups far exceeded variation between groups. It appears that their personal qualities or the encouragement and tangible boost given by acceleration, or both, produced a lasting increment of momentum

Fox, L. (1974). Facilitating education development of mathematically precocious youth. In J. Stanley, D. P. Keating, & L. H. Fox (Eds.), *Mathematical talent: Discovery, description, and development* (pp. 47–69). Baltimore: Johns Hopkins University Press.

No abstract available.

Gallagher, J. J. (1996). Educational research and educational policy: The strange case of acceleration. In C. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 83–92). Baltimore: Johns Hopkins University Press.

No abstract available.

George, W. C., Cohn, S. J., & Stanley, J. C. (Eds.) (1977). *Educating the gifted: Acceleration and enrichment*. Baltimore; Johns Hopkins University Press.

Revised and expanded proceedings of the Seventh Annual Hyman Blumberg Symposium on Research in Early Childhood Education.

Gross, M. U. M. (1992). The early development of three profoundly gifted children of IQ 200. In P. S. Klein & A. J. Tannenbaum (Eds.), *To be young and gifted* (pp. 94–138). Norwood, NJ: Ablex Publishing Corporation.

No abstract available.

Gross, M. U. M. (1993). *Exceptionally gifted children*. London: Routledge.

No abstract available.

Karnes, F. A., & Johnson, L. J. (1991). Differentiating instruction for preschool gifted children. In R. M. E. Milgram (Ed.), *Counseling gifted and talented children: A guide for teachers, counselors, and parents* (pp. 179–205). Norwood, NJ: Ablex Publishing Corporation.

This chapter provides an up-to-date report of the status of gifted education at the preschool level. Describes the characteristics of these children, the specific problems they are likely to encounter, and approaches used to differentiate curriculum and to individualize instruction for them. It considers the competencies required by teachers of preschool gifted children and highlights the importance of fostering positive attitudes toward young gifted children. It also suggests means of involving parents in providing the required enrichment and acceleration of their gifted preschool children.

Lehman, H. (1953). *American Philosophical Society memoirs: Vol. 33. Age and achievement*. Princeton, NJ: Princeton University Press.

No abstract available.

Maker, C. J. (Ed.) (1993). *Critical issues in gifted education*. Austin, TX: PRO-ED.

This book presents 29 papers addressing critical issues in the education of the gifted.

Olszewski-Kubilius, P. (1989). Development of academic talent: The role of summer programs. In J. VanTassel-Baska & P. Olszewski-Kubilius (Eds.), *Patterns of influence on gifted learners: The home, the school, and the self* (pp. 214–230). New York: Teacher's College Press.

No abstract available.

Passow, H. A. (1996). Acceleration over the years. In C. P. Benbow & D. J. Lubinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 93–98). Ames, IA: Iowa State University of Science and Technology.

Discusses the history of and present-day issues in educational acceleration of gifted students.

Robinson, H. B. (1983). A case for radical acceleration: Programs of the Johns Hopkins University and the University of Washington. In C. P. Benbow & J. C. Stanley (Eds.), *Academic precocity: Aspects of its development* (pp. 139–59). Baltimore: Johns Hopkins University Press.

No abstract available.

Robinson, N. M. (1996). Acceleration as an option for the highly gifted adolescent. In C. P. Benbow & D. J. Lupinski (Eds.), *Intellectual talent: Psychometric and social issues* (pp. 169–178). Baltimore: Johns Hopkins University Press.

Discusses a highly successful program of radical acceleration at the University of Washington, where 14-yr-olds and under are given the opportunity to enter college through the Early Entrance Program.

Robinson, N. M., & Harsin, C. (2001). *Early college entrance guidebook*. Reno, NV: Davidson Institute for Talent Development.

No abstract available.

Robinson, N. M., & Noble, K. D. (1992). A radical leap from middle school to college: Can it work? In N. Colangelo, S. G. Assouline, & D. L. Ambroson (Eds.), *Talent development: Proceedings from the 1991 Henry B. and Jocelyn Wallace National Research Symposium on Talent Development* (pp. 267–77). New York: Trillium.

No abstract available.

Robinson, N. M., & Robinson, H. B. (1982). The optimal match: Devising the best compromise for the highly gifted student. In D. Feldman (Ed.), *Developmental approaches to giftedness and creativity* (pp. 79–94). San Francisco: Jossey-Bass.

No abstract available.

Rogers, K. B. (2002). Effects of acceleration on gifted learners. In M. Neihart, S. Reis, N. Robinson, & S. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 3–12). Waco, TX: Prufrock Press.

Discusses the emotional and social effects of academic acceleration on intellectually or academically gifted children. To address these issues, the chapter discusses three educational provisions that must be in place for choosing acceleration and predicting successful acceleration: (1) placement with others of like ability when the learning is "serious," (2) exposure to progressively more complex tasks in a prestructured continuum of learning experiences based on mastery and readiness, and (3) flexible progression at an appropriately rapid pace.

Rogers, K. B. (2002). *Re-forming gifted education: Matching the program to the child*. Scottsdale, AZ: Great Potential Press.

Because current educational programs for gifted students are often inadequate and do not fit the particular gifted child, parents of gifted children need to present schools with educational plans. Rogers explains various programs for acceleration and enrichment, as well as grouping practices. For each educational option, she delineates what current research says about the benefit or lack of benefit to which types of gifted children, and she explains how to arrange each option. This book is an eye-opener for educators and parents unfamiliar with the full body of research in the field of gifted education curriculum.

Sayler, M. F. (1994). Early college entrance: A viable option. In J. B. Hanson & S. M. Hoover, *Talent development: Theories and practice* (pp. 67–79). Dubuque, IA: Kendall-Hunt.

No abstract available.

Silverman, L. (1993). What happens to the gifted girl? In J. Maker (Ed.), *Critical issues in gifted education: programs for the gifted in regular classrooms, Vol. III*. Austin, TX: PRO-ED.

Dr. Silverman makes a good case for early entrance to kindergarten or first grade being preferable to letting girls go "underground" academically to fit in, as they often do at around age 9.

Shore, B. M., Cornell, D. G., Robinson, A., & Ward, V. S. (1991). *Recommended practices in gifted education*. New York: Teachers College Press.

The authors have identified 101 recommended practices in gifted education chosen from 100 books and "discuss the sources of the advice to carry out each practice, the research—especially empirical research—which supports or refutes each practice, the implication of the state of knowledge for practice, and the research still needed to strengthen our knowledge base."

Southern, W. T., & Jones, E. D. (Eds.). (1991). *The academic acceleration of gifted children*. New York: Teachers College Press.

No abstract available.

Stanley, J. C., George, W. C., & Solano, C. H. (Eds.) (1977). *The gifted and the creative: A fifty-year perspective*. Baltimore: Johns Hopkins University Press.

No abstract available.

Stanley, J. C., George, W. C., & Solano, C. H. (Eds.) (1978). *Educational programs and intellectual prodigies*. Baltimore: Johns Hopkins University Study of Mathematically Precocious Youth.

No abstract available.

Subotnik, R. F., & Arnold, K. D. (Eds.) (1994). *Beyond Terman: Contemporary longitudinal studies of giftedness and talent*. Norward, NJ: Ablex Publishing Company.

No abstract available.

Worcester, D. (1955) *The education of children of above-average mentality*. Lincoln, NE: University of Nebraska Press.

Briefly discussed, primarily for school administrators and teachers, are acceleration, enrichment, special classes, and problems relating to such provisions. In large part, informally reported research findings are presented in support of the possibilities explored. While Nebraska has been the locale of much of the research, particularly on early admission, and a cutoff point of IQ 110 was employed, broader implications are suggested.

11. Instrument

Assouline, S., Colangelo, N., Lupkowski-Shoplik, A., & Lipscomb, J. (2003). *Iowa Acceleration Scale manual: A guide for whole-grade acceleration K–8, 2nd Ed.* Scottsdale, AZ: Great Potential Press.

The *Iowa Acceleration Scale (IAS)* has been developed to guide educators in making important decisions regarding whether or not particular students are good candidates for whole-grade acceleration (grade-skip). The IAS is designed for use with students in grades K–8. It is an appropriate guide for early entrance to kindergarten or first grade. The IAS Manual is an easy-to-read monograph that is designed to be used as a reference guide in conjunction with the IAS Form, since the manual contains explanations and instructions for filling out each item in the Form.

12. International

Arnove, R. F., & Zimmerman, E. (1999). Dynamic tensions in ability grouping: A comparative perspective and critical analysis. *Educational Horizons*, 77(3), 120–127.

Compares types of ability grouping (mixed, homogenous, acceleration/retention) used in educational systems in the United States, China, Japan, South Korea, France, Germany, and Quebec and how they reflect cultural patterns and shape educational outcomes. Discusses tensions between the competing demands of excellence and equity.

Callow, R. W. (1994). Classroom provision for the able and the exceptionally able. *Support for Learning*, 9(4), 151–154.

Discusses methods of providing for exceptionally bright (IQ of 160 and above) children in the British schools. Two methods, enrichment and acceleration, work well especially if the enrichment material challenges the child to develop independent thought and action. Acceleration is ideally made to a group 2 or 3 yrs older. Employment of a mentor can make a valuable contribution to a gifted child's progress. A case history is presented of a gifted child from the age of 3 yrs to 10.5 yrs. The program involved a mother-toddler group, early evaluation by a psychologist of an IQ of 160, acceleration into a 5-yr-old class at the age of 4 yrs, and attending a secondary school at the age of 9 yrs for science and French. At age 10.5 yrs, the child was well adjusted socially.

Clark, G., & Zimmerman, E. (2002). Tending the special spark: Accelerated and enriched curricula for highly talented art students. *Roeper Review*, *24*(3), 161–168.

This reprint of an article on Israel's proposed residential high school for students gifted in the arts and sciences is preceded by a commentary that highlights the use of alternative methods of assessment for identifying talented students in the arts and the development of a coherent sequence of art skills.

Council of Europe (1991). Gifted children and adolescents—Research and education in Europe. *Secretariat Report on the Educational Research Workshop*. Nijmegan, The Netherlands: Council for Cultural Cooperation's Educational Research Workshop.

This paper summarizes the proceedings of a 1991 meeting of the Council for Cultural Cooperation's Educational Research Workshop on gifted children and adolescents. Introductory material briefly summarizes the nature of the meeting, aims of the workshop, and opening addresses (by the Rector of the University of Nijmegan (The Netherlands), the Dean of the Faculty of Social Sciences, the Chairman of the Workshop, and a representative of the Council of Europe). Then, the seven commissioned papers are listed, as are reports from: Austria, Bulgaria, Czechoslovakia, Denmark, Finland, France, Germany, Malta, Romania, Spain, Switzerland, Turkey, United Kingdom, the Soviet Union, and Yugoslavia. Ten recommendations of the meeting are given. These are addressed: the importance of individual differences, the special problems of gifted females, provisions within the regular school system, instructional development, teacher training, acceleration, special classes, research needs, and parents' associations. Appendices list the participants and present the reports of the three discussion groups.

Craig, J. K. (1979). Die hantering van die begaafde kind [Handling gifted pupils]. *Suid-Afrikaanse Tydskrif vir die Pedagogiek, 13*(2), 43–54: South Africa, Universiteit van Pretoria.

Points out that because the term "gifted" is so comprehensive, it cannot be equated with "highly intelligent." An understanding adult who does not necessarily have to be gifted must handle the gifted pupil as a whole, but who must have certain special characteristics. Many procedures for handling gifted pupils are discussed, e.g., acceleration, attending extracurricular activities, and individualized education.

Eales, C., & dePaoli, W. (1991). Early entry and advanced placement of talented students in primary and secondary schools. *Gifted Education International*, 7(3), 140–144.

This paper examines possibilities in allowing accelerated progression of talented students in the New South Wales (Australia) education system. The concept of acceleration is supported by a review of the research evidence showing that accelerated students have usually been more successful than nonaccelerated peers.

Freeman, J. (1992). Education for the gifted in a changing Europe. *Roeper Review, 14*(4), 198–201.

The European approach to education for the gifted is less structured than the American approach. Superficially, differentiated education for the gifted barely exists in Europe; however, there are teaching procedures and programs to help pupils. These include individual acceleration, specialist advisory teachers, national competitions and activity centers, and special schools for instruction in the arts.

Freeman, J. (1996). Self-reports in research on high ability. *High Ability Studies*, 7(2), 191–201.

Self-reports are particularly suitable for research with the gifted, who are often self-aware and articulate. By this means, features which could otherwise be missed by standardized tests and observations can add greatly both to the richness of the data and to their validity. However, because of the great variety, and the unexpectedness and complexity of responses, there are problems of collection and analysis, such as distortion by reporter or researcher. Verbal protocol analysis is suggested as one solution. A 14-yr study in Britain using self-reports, along with a battery of standardized tests, compared 70 gifted (aged 5–14 yrs) and 140 nongifted controls. This supplied information, unobtainable by other means, on, for instance, the subjective aspects of academic acceleration, teacher-pupil relationships, the effects of labeling, and intellectual strategies of the gifted. These insights are valuable for care of the gifted and for policy making.

Freeman, J. (1998). *Educating the very able: Current international research*. London: The Stationary Office.

No abstract available.

George, D. (1992). Gifted education in England. *Roeper Review, 14*(4), 210–204.

Examines the state of gifted education in England. Data were obtained from a National Association for Gifted Children survey of 63 local education authorities. Forty-two subjects said they made special provision for the gifted. Enrichment was the most popular means of provision, cited by 37 subjects. Sixteen encouraged the use of a support teacher in classes and enrichment. Eighteen encouraged acceleration and early transfer. Provisions and teacher training remain limited, however.

Gross, M. U. M. (1986). Terence Tao: Radical acceleration in Australia. *Gifted Child Today*, 9(4), 2–11.

A case study of a profoundly gifted 11-year old in Australia recounts his early reading, his interest in mathematics, and his failure at early schooling because of inadequate school readiness. His parents are now considering when he should begin college. Comments of three gifted educators are included.

Gross, M. U. M. (1989). Not waving but drowning: The exceptionally gifted child in Australia. In S. Baily, E. Braggett, & M. Robinson (Eds.), *The challenge of excellence: A vision splendid* (pp. 25–36). Sydney: Australian Association for the Education of the Gifted and Talented.

No abstract available.

Gross, M. U. M. (1992). The use of radical acceleration in cases of extreme intellectual precocity. *Gifted Child Quarterly, 36*(2), 91–99.

This paper reviews the school histories of five extremely gifted Australian children (IQs 160–200) who had been radically accelerated. A combination of grade skipping and radical subject matter acceleration gave the children access to curricula commensurate with their abilities as well as healthier levels of social self-esteem.

Gross, M. U. M. (1994). Radical acceleration: Responding to academic and social needs of extremely gifted adolescents. *Journal of Secondary Gifted Education*, 5(4), 27–34.

This paper examines the impact of multiple grade skipping on social adjustment and self-esteem of extremely gifted students. A survey of the literature and research in Australia and the United States on well-planned and carefully monitored radical acceleration finds no evidence that students suffered social or emotional problems; to the contrary, maladjustment was more often found among highly gifted students who were not accelerated.

Gross, M. U. M. (1999). *From the "saddest sound" to the D Major chord: The gift of accelerated progression*. Presented at the 3rd Biennial Australian International Conference on the Education of Gifted Students, Melbourne, Australia. [On-line]. Available: http://www.eddept.wa.edu.au/gifttal/EAGER/Miraca%20Gross.html

Although the academic acceleration of gifted and talented students is probably the most comprehensively studied and evaluated of all educational interventions, many teachers are reluctant to accelerate gifted students for fear they will suffer social or emotional damage. Yet research suggests that "the bird that's tethered to the ground" is at much greater risk of social isolation and emotional maladjustment through inappropriate grade placement with age-peers. This session looks at how gifted students differ from their age-peers in many aspects of their social and emotional development and explains why well-planned programs of acceleration enhance these students' self-esteem, their love of learning, their acceptance of themselves and their gifts, and their capacity to form warm and supportive friendships. For many gifted students, acceleration replaces discord with harmony.

Heinbokel, A. (2002). Acceleration: Still an option for the gifted. *Gifted Education International*, *16*(2), 170–178.

In response to an article (Hany, 2001) discouraging the practice of acceleration through grade skipping for gifted students, this article defends acceleration as one option for gifted students, describes use of acceleration in Germany including early school entrance, individual grade skipping, acceleration in one subject, and acceleration in special classes.

Heinbokel, A. (1997). Acceleration through grade skipping in Germany. *High Ability Studies*, *8*(1), 61–77.

Reviews research on grade skipping in German primary and grammar schools, including data gathered from interviews with parents of grade skippers and pupils who had decided against grade skipping and from interviews with students who had skipped grades. Although public and professional opinion on grade skipping is quite negative, there are no German studies that support this view. Schools, parents, and grade skippers themselves reported few academic problems; if there were emotional and social problems, it was not clear whether they were actually caused by this form of acceleration, by individual private problems, or by an unsympathetic environment. This is an area that calls for more research. Attempts to increase the number of grade skippers in grammar schools were not successful.

Heller, K. A., Mönks, F. J., & Passow, A. H. (Eds.) (1993). *International handbook of research and development of giftedness and talent*. Oxford: Pergamon Press.

This international handbook provides a synthesis and critical review of the significant theory and research dealing with all aspects of giftedness. Each article is designed to reflect the state-of-the art from an international perspective, to offer a comprehensive review, and to comprise the forefront of knowledge and thought about the gifted. The 53 chapters are divided into seven parts with the following titles, and prominent themes within each part are indicated in parentheses: (1) "Historical Perspectives and Perennial Issues Related to Giftedness and Talent" (history of giftedness and national/state policies); (2) "Conceptions and Development of Giftedness and Talent" (structural tendencies, models, developmental theories, genetic influence, brain research, thinking processes, longitudinal studies, and prodigies and savants); (3) "Identification of Giftedness and Talent" (alternative "metaphors of mind," methodological problems, visual arts and music, young children, and prediction); (4) "Programs and Practices of Nurturing the Gifted and Talented" (differentiated education, curriculum development, acceleration, enrichment, verbal talents, mathematics, science and technology, leadership, socioemotional development, moral development, creativity, administrative issues, ability grouping, special programs, and evaluation programs); (5) "Other Components of Nurturing Giftedness and Talent" (teachers of the gifted, counseling needs, underachieving gifted, families, disadvantaged and culturally different, gender differences, gifted disabled, mentoring, and community resources); (6) "Examples of Country Efforts, Policies, Programs and Issues" (United States, Canada, Europe, Asia, People's Republic of China, Australia and New Zealand, Africa, and Central and South America); and (7) "Present and Future of Education of the Gifted and Talented" (research and education). Each paper contains references.

Heller, K. A., Mönks, F. J., Sternberg, R. J., & Subotinik, R. F. (Eds.) (2000). *International handbook of research and development of giftedness and talent, 2nd Edition*. Oxford: Elsevier Science Ltd.

Updated edition of the *International Handbook for Gifted Education*; originally published in 1993.

Passow, H. A. (1984). *Education of the gifted in world perspective*. Paper presented at the International Conference: Education for the Gifted "Ingenium 2000", Stellenbosch, Republic of South Africa.

Various approaches to educating the gifted and talented around the world are illustrated through descriptive reviews of gifted education in selected countries, including: Australia, Poland, England, Scotland, and Wales; and Israel. Following these reviews is an examination of several issues in gifted education around the world. This examination encompasses: the domination of intellectual giftedness within the concept of giftedness; identification procedures which involve assessment of intellectual or academic aptitude; the use of special classes or integrated classes; acceleration versus enrichment; curricular and instructional differentiation; teacher education; out-of-school provisions for gifted education; affective development of the gifted; the gifted disadvantaged; and research and evaluation in gifted education. The paper concludes with the observations that gifted education has a cyclical history in many countries and seems to be an esoteric endeavor rather than part of the educational mainstream.

Prado, T. M., & Schiebel, W. (1995). Grade skipping: Some German experiences. *European Journal for High Ability*, *6*(1), 60–72.

Investigated the frequency, circumstances, and effects of grade skipping in gifted secondary school (n=63) and comprehensive school (n=8) students in Germany. A survey was administered to collect information including how often grade skipping took place in the individual grades; the principal's assessment of measures regarding the requirements; the consequences and appropriateness of grade skipping; and skipped students' characteristics and development of school performance within the first year after their advanced placement. Results indicate that grade skipping in academic secondary and comprehensive schools over the four academic years of the study was a rare occurrence. According to the results of the survey, many instructors are very skeptical about grade skipping, and promote other educational targets rather than high achievement. A wide variety of requirements is expected from the student who is to be accelerated including outstanding ability, willingness to work, high social, emotional, and physical development. The students who had skipped a grade in the previous year, could, as a rule, cope relatively well with work in the higher grade. The necessary support on the part of the school, however, remained limited.

Robinson, N. M. (1992). Radical acceleration in the People's Republic of China: Early entrance to university. *Roeper Review*, *14*(4), 189–192.

Describes two early college admission programs for gifted students in the People's Republic of China. The programs are located at the University of Science and Technology of China in Hefei and at the South East University in Nanjing. The programs have provided an option in which the students find academic challenge that is a good match for their readiness, with positive results and without apparent undue negative fallout.

Sisk, D. A. (1990). Expanding worldwide awareness of gifted and talented children and youth. *Gifted Child Today*, *13*(5), 19–25.

This article documents the growing worldwide concern for identifying and serving gifted students, primarily via curriculum and instructional differentiation through special classes, enrichment, and acceleration. Programs in Brazil, Canada, Australia, the Middle East, Israel, the Philippines, the Soviet Union, Bulgaria, Poland, Indonesia, Taiwan, and the United Kingdom are noted.

Soriano d Alencar, E. M. (1974). A comparative study of education of gifted children in various countries. *Arquivos Brasileiros de Psicologia Aplicada* [Portuguese], *26*(4), 92–102.

In the U.S. and England, tests are the main tool for identifying gifted children, but in the USSR grades and teacher evaluations are used. Acceleration and enrichment in the schools are provided for gifted children in the U.S., segregation in to certain schools is used in England. Extracurricular activities provide enrichment in the USSR, where segregation is provided only for people with artistic talent, and acceleration is forbidden.

Stanley, J. C. (1986). Radical acceleration in Australia: Insights. *Gifted Child Today*, *9*(4), 10–11.

No abstract available.

Stevenson, H. W. (1994). Education of gifted and talented students in China, Taiwan, and Japan. In P. O. Ross (Ed.), *National excellence: A case for developing America's talent. An anthology of readings.* (ERIC Document Reproduction Service No. ED372582).

This paper, commissioned for the development of the national report, "National Excellence: A Case for Developing America's Talent," analyzes the policies and practices for educating high-ability students in Japan, Taiwan, and China. It reports on studies over the past 11 years of East Asian children's academic achievement. In the first section, the report looks at governmental policies and practices concerning the education of three types of students: (1) those who display high levels of intelligence, (2) those who are talented in the arts, and (3) those who are high academic achievers. Special programs both in and out of school are described. In the second part, the report describes the characteristics of students who have participated in the authors' studies and compares their performance and personal characteristics with those of American peers. Discussion focuses on students who demonstrate high levels of cognitive ability and on students who display exceptional ability in mathematics. The paper notes that programs for gifted and talented children in East Asia are new; the majority, especially in China and Taiwan, established only during the last decade. Japan supports no programs specifically for gifted students prior to the high school level. There is a greater emphasis in East Asian cultures on effort, rather than ability.

Townsend, M. A., & Patrick, H. (1993). Academic and psychosocial apprehensions of teachers and teacher trainees toward the educational acceleration of gifted children. *New Zealand Journal of Educational Studies*, *28*(1), 29–41.

Assessed the attitudes toward acceleration for gifted children in a group of 152 primary school teachers and a group of 140 teacher trainees. Subjects completed a 22-item scale encompassing beliefs about the effects of acceleration on academic adjustment, social and emotional development, and leadership skills. Subjects were moderately positive but conservative in their views about acceleration, and expressed greater concern about the social and emotional effects than about the academic effects. It is concluded that the apprehensions of the teachers and teacher trainees, although based on well-intentioned common sense beliefs, appear unfounded in terms of recent research.

Vialle, W., Ashton, T., Carlon, G., & Rankin, F. (2001). Acceleration: A coat of many colours. *Roeper Review*, *24*(1), 14–19.

This article synthesizes three research projects conducted in New South Wales, Australia, exploring forms of acceleration for gifted students. The first involved early entry for gifted children, the second examined experiences of students who had skipped at least one grade, and the third examined a vertical programming system that allowed acceleration within subjects at an academically selective high school.

Wollam, J. (1992). Equality versus excellence: The South Korean dilemma in gifted education. *Roeper Review*, *14*(4), 212–217.

As an emerging democratic nation, South Korea has struggled to provide equal opportunities to all of its people and is only now considering that some especially capable and accelerated students may not be served by emphasizing the same curriculum and instructional strategies for all students. Current options for gifted students include grade acceleration, science high schools, music and art high schools, and the support services provided by the Korean Association for Gifted Children.

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Iowa Acceleration Scale Validation Studies

Introduction

(Portions of the introduction are excerpted from the Manual for the Iowa Acceleration Scale, 2nd Edition*)*

The Iowa Acceleration Scale (IAS) was developed over a fifteen-year period from the research and clinical experiences of professional staff at the Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development at The University of Iowa. The *IAS* has been used for successful acceleration decisions with hundreds of students in school districts throughout the United States, as well as in other countries.

The *IAS* is meant to be used in a child-study team meeting to discuss strengths and potential difficulties for the child being considered for acceleration through data, such as test scores, school history, observed adult and peer relationships, attitudes toward learning, and other factors that have bearing on a decision to accelerate. Team members will typically consist of the child's parents, one or more teachers, a counselor or school psychologist, an administrator, and a gifted teacher or coordinator.

The team approach ensures that all who have relevant knowledge of the child will have input in rating the child on various questions about important factors such as ability, attendance, motivation, and attitude toward learning. The underlying rationale for the *IAS* is to bring objective data to the discussion, and minimize any potential bias for or against whole-grade acceleration. The *IAS* also requires input from the student, although the student does not sit in on the team meeting, but rather conveys to a team member his or her views about acceleration as a possibility.

When the child-study team has completed all sections of the instrument, numerical responses from all the subscale areas are added, and a final score is obtained. This score then becomes the primary guideline for predicting how successful the student will be as a candidate for grade skipping. In some cases, the student will not score high enough to be an "excellent" or "good" candidate to skip a grade, but will be a "marginal" or a "poor" candidate. In such cases, the team should continue the discussion, however, and use the *IAS* as a tool to determine whether other accommodations might be made for the student. These could, for example, include mentoring, single-subject acceleration, enrichment, or perhaps no special accommodation at this time.

The *IAS*, as a guidance tool, provides educators and parents with a systematic and defensible way to generate recommendations and guidelines that will help make educated and appropriate placement decisions for students who demonstrate high ability, and who have the capacity to process greater amounts of information and knowledge than required in their present learning environments.

After several years of field-testing the items, the *IAS* was published in 1992 (Assouline, Colangelo, & Lupkowski-Shoplik, 1992). The 1992 *IAS* is referred to as the Green Form. During the subsequent decade, there have been two revisions of the *Iowa Acceleration Scale (IAS)* and two validation studies. The first validation study (Lipscomb, 2003) was conducted on the Green Form (1992) of the *IAS*. Highlights from this study are reported below, in *Study 1: A Validity Study of the Internal Structure of the Iowa Acceleration Scale* (Lipscomb, 2003).

In 1998, a revision of the Green Form of the *IAS* and the first edition of an *IAS* manual were published (Assouline, Colangelo, Lupkowski-Shoplik, & Lipscomb, 1998); the second validation study was conducted on that version, known as the Blue Form, First Edition (Assouline, Colangelo, Ihrig, Forstadt, Lupkowski-Shoplik, & Lipscomb, 2003). Highlights are reported in *Study 2: Effectiveness of the* IAS *in the Decision-Making Process of Whole-Grade Acceleration*.

The IAS

The *Iowa Acceleration Scale (IAS)* is a 20-item survey, divided into 10 sections, and designed for completion during a child-study team meeting. Its key purpose is to standardize the decision-making procedure for whole-grade acceleration as an educational intervention for students in grades K–12. This is primarily accomplished by including as items the major factors for consideration in making acceleration decisions. Each item on the *IAS* has categorical responses, which have been assigned a weighted score based on the clinical experience of the authors, interviews with educational experts, and a review of the literature on acceleration. Items are scored such that the higher scores result in stronger recommendations for whole-grade acceleration as the educational intervention of choice. Although the *IAS* is comprised of 10 sections, the core of the instrument is encompassed by 4 of the sections. These four sections, (1) Academic Ability and Achievement; (2) School Information; (3) Interpersonal Skills; and (4) Attitude and Support, are central to each of the editions of the *IAS*. The four sections, or subscales, are added together to generate a Grand Total Score. From the Grand Total Score, a recommendation regarding acceleration as an intervention is generated.

Study 1: A Validity Study of the Internal Structure of the *Iowa Acceleration Scale* (Lipscomb, 2003)

The purpose of Study 1 was to evaluate the internal structure of the *IAS* and the effectiveness of the four *IAS* subscales for the recommendation regarding acceleration as an educational intervention. Secondarily, the relationship between the items and gender was investigated.

From 1992–1998, 103 completed *IAS* Green Forms were submitted to the Belin-Blank Center for evaluation. Forms were completed for 56 males and 47 females. For students in grades K–2, 21 forms were completed for boys, and 18 forms were completed for girls. For students in grades 3–5, 22 forms were completed for boys and 22 for girls. For grades 6–9; 13 forms were completed for boys and 7 forms were completed for girls.

Administrators in the 103 schools where the students were enrolled were contacted regarding the outcome of the recommendation (i.e., whether or not the school followed through on the recommendation). Fourteen schools did not respond; however, 89 administrators did respond yielding information about 89 cases.

- In 71 cases, acceleration was the recommended intervention, of these 71 cases:
  - 54 were accelerated, as recommended;
  - 15 were NOT accelerated even though acceleration was recommended;
  - 2 students moved before the acceleration could be implemented.
- In 14 cases, acceleration was NOT recommended, of these 14 cases:
  - 12 cases were not accelerated, as recommended;
  - 2 were accelerated, despite the recommendation against acceleration;
- 4 cases did not yield a clear recommendation and in 3 of those cases the student was not accelerated and in 1 case, the student was accelerated.

The data from the 103 *IAS* Green Forms were used to evaluate the effectiveness of the four subscales in contributing a distinct set of information to the *IAS* Total Score. Frequency distributions were calculated for each item, each subscale, and the total *IAS* score. As well, discrimination indices were calculated for each item to evaluate the effectiveness of an item in differentiating the groups by recommendation for acceleration. Finally, Pearson product-moment correlations were generated to evaluate the relationship between gender and recommendation for acceleration as well as the relationship between previous experience with acceleration and the recommendation for acceleration. The main conclusions from this validation study are:

- The four subscales comprising the *IAS* (1) Academic Ability and Achievement; (2) School Information; (3) Interpersonal Skills; and (4) Attitude and Support each make a distinct contribution to the *IAS* Total Score.
- Two subscales, Interpersonal Skills and School Information, had the highest correlation with the total score (0.7778 and 0.7463, respectively).
- The subscales of Academic Ability and Achievement and Attitude and Support were moderately correlated with the total score (0.4905 and 0.5925, respectively).
- The Academic Ability and Achievement subscale had a moderate (0.2088) correlation with reports of previous acceleration experiences (e.g., higher group for math or reading).

- Seven items were ineffective at discriminating between students recommended for acceleration from students not recommended. These include: achievement, grade-placement, school attendance, extracurricular activities, relationships with teachers, parent involvement, and grade placement of siblings.
- Thirteen of the 20 items were determined to be moderately effective-to-effective for discriminating students for whom acceleration was recommended, from students who were not recommended for acceleration. Effectiveness for 6 of these items differed by gender. These were:
  1. **Physical size**—this item did not effectively discriminate for females, due to the high percentage of girls with low total scores who were considered "larger than their grade peers."
  2. **Extracurricular activities** was only moderately effective as an item for females because relatively few students were rated as "holding leadership positions."
  3. **Relationship with peers** was more effective as an item for males because of the relatively greater number of boys with low total scores who were rated as having undeveloped social skills.
  4. **Emotional development** was ineffective as an item for females because all students in each category were rated as having a positive and realistic self-concept.
  5. **Behavior** was moderately effective as an item for the girls because, when compared to boys, relatively few females were rated as having even occasional discipline problems.
  6. **School system support for acceleration** was only moderately effective as an item for the boys.

Study 2: Effectiveness of the *IAS* in the Decision-Making Process of Whole-Grade Acceleration (Assouline, Colangelo, Ihrig, Forstadt, Lipscomb, Lupkowski-Shoplik, 2003)

The primary purpose of Study 2 was to determine the effectiveness of the *IAS* in the decision-making process for whole-grade acceleration. The data for Study 2 were obtained from completed Blue Forms, 1st edition, and additional surveys, entitled "Validation Forms." Validation Forms were mailed separately to individuals who had purchased the *IAS* and who expressed an interest in participating in the study. One hundred and thirty-three copies of the *Iowa Acceleration Scale, 1st Edition* that were completed between December 1, 2000, and October 31, 2002, and 99 copies of the returned Validation Forms were used for Study 2. Not all items were completed by all respondents, as reflected in the tables.

Study 2 Participants

Of the completed and returned *IAS*, 57% were from the state of Iowa (see Table 1 for all participating states and countries). Of the 133 cases, 56% were male, 43% female, and 1% did not specify; the ages of the students ranged from 4 years, 8 months, to 14 years, 2 months. Table 2 details the grade level for students considered for acceleration.

Table 1.

Respondents by Location

Location	Number of Cases	Percentage
Australia	1	0.8
Colorado	1	0.8
Connecticut	1	0.8
Georgia	13	9.8
Iowa	76	57.1
Illinois	9	6.5
Indiana	3	2.3
North Dakota	2	1.5
New Jersey	2	1.5
Ohio	10	7.5
Pennsylvania	1	0.8
Washington State	5	3.8
Wisconsin	4	3.0
Unspecified	5	3.8
Total	**133**	**100**

Table 2.

Grade Level Indicated by Respondents

Grade Level for Acceleration	Number of Cases Per Grade
PK	4
K	20
1	25
2	8
3	6
4	9
5	6
6	6
7	1
8	4
Unspecified	44
Total	**133**

The *IAS* and the Decision Making Process

The *IAS* is a guidance tool to assist in decision-making concerning the academic trajectory of a student. A recommendation is made based upon a single score, called the Grand Total, which is calculated based on the sum of four subscale scores. The Grand Total falls into one of four recommendation score ranges:

- **70–90 points:** Student is an **excellent** candidate, and whole-grade acceleration is recommended.
- **54–69 points:** Student is a **good** candidate, and whole-grade acceleration is recommended.
- **43–53 points:** Student is a **marginal** candidate; the case must be carefully reviewed as there is no clear recommendation.
- **42 or fewer points:** Student is a **poor** candidate; whole-grade acceleration is not recommended, and other interventions (e.g., single-subject acceleration, enrichment, individualized programs), should be considered.

Table 3 illustrates the percentage of cases in each of the four categories. Of the 133 cases, 86 indicated the Grand Total.

Eighty-five percent of respondents fell into the "good" or "excellent" candidate category. Since such a small percentage of students fell into the "poor candidate" category, we assume that there is much screening initially that takes place prior to implementing the *IAS* process.

Table 4 reports the percentages of recommendations. Data were available for 83 forms. Some form of acceleration was recommended in 95% of the cases; whole-grade acceleration was recommended in 76% of the cases, and single-subject acceleration was recommended in 19% of the cases. In 4% of the cases "no alteration of academics" was the decision made by the team, and enrichment was the recommendation for 1% of the cases.

Table 5 illustrates the usefulness of the *IAS* process for the family, the child-study team, and the school system. A large majority (96% to 99%) found the *IAS* process useful for the family, child-study team, and school system. Overall, the feedback we have received about the process of completing the *Iowa Acceleration Scale* has been very positive. Members of the child-study teams appreciated the opportunity to discuss a student's case in-depth, and have found it "useful for me to show the administration so that there is accountability."

Table 3.

***IAS* Grand Total Scores (n = 86)**

	Poor	Marginal	Good	Excellent
IAS Grand Total	1%	19%	65%	15%

Table 4.

Decision Made During the *IAS* Process (n = 83)

	No Alteration	Enrichment	Single-Subject Acceleration	Whole-Grade Acceleration
Decision Made	4%	1%	19%	76%

Table 5.

Was the *IAS* Process Helpful for the Family, Child-Study Team, or the School System? (n = 84)

Was the IAS process helpful for the:	Yes	Somewhat	No
Family	96%	0%	4%
Child-Study Team	96%	4%	0%
School System	99%	1%	0%

Outcomes of Acceleration

An indication that the *IAS* has functioned well is evidenced through performance of the student after the choice of acceleration has been implemented as a program option.

Table 6.

Post-Acceleration Achievement Score Percentiles (n = 49)		
1st-74th	**75th-94th**	**95th or above**
0%	29%	71%

As presented in Table 6, 100% of the subjects for whom post-acceleration scores were submitted, scored **above** the 75th percentile on a grade-level achievement test after they were accelerated. There were no students who were accelerated who scored below the 75th percentile.

Educators and parents are concerned about the student's academic and social adaptation to the acceleration. The research on this topic shows evidence counter to both of these concerns, and our research on the Validation Study of the *IAS* suggests this as well. Tables 7 and 8 reflect our findings concerning academic performance and social adjustment of students who were accelerated.

Table 7.

Evaluation of the Academic Performance of the Student (Post-Acceleration) (n = 80)			
Not Adapted Well	**Still Not Challenged**	**Some Difficulty—Changes Made**	**Has Adapted Well**
10%	1%	5%	84%

Table 8.

Evaluation of the Social Adjustment of the Student (Post-Acceleration) (n = 79)		
Not Adapted Well	**Some Difficulty—Changes Made**	**Has Adapted Well**
12%	14%	74%

Summary

The *Iowa Acceleration Scale (IAS)* is an exceptionally effective tool for schools and families. It operates as it was designed, to assist members of child-study teams in making decisions about whole-grade acceleration for students. Users find that the *IAS* process is a positive one, and the decisions that are made are considered appropriate.

The **Iowa Acceleration Scale** is available through Great Potential Press, Scottsdale, AZ.
www.giftedbooks.com

References

Assouline, S. G., Colangelo, N., Lupkowski-Shoplik, A., Lipscomb, J., & Forstadt, L. (2003). *The Iowa Acceleration Scale, 2nd Edition: Manual*. Scottsdale, AZ: Great Potential Press.

Assouline, S. G., Colangelo, N., Ihrig, D., Forstadt, L., Lipscomb, J., & Lupkowski-Shoplik, A.E., *The Iowa Acceleration Scale: Two Validation Studies*. Presentation at the 2003 National Association for Gifted Children Convention, Indiannapolis, IN, November 14, 2003.

Lipscomb, J. M. (May, 2003). *A validity study of the* Iowa Acceleration Scale. Unpublished doctoral dissertation.

The Templeton Summit on Acceleration and the John Templeton Foundation

The May 2003 Summit for The Templeton National Report on Acceleration

The Belin-Blank Center (B-BC), in partnership with the Gifted Education Resource, Research and Information Center (GERRIC) at The University of New South Wales, Australia, received a grant from the John Templeton Foundation of Pennsylvania to develop a major report on academic acceleration as a curricular option for gifted students.

Convening a national summit of experts in education was an important first step. The purpose of the Summit was to have discussions and focus groups on the need for such a report and to provide direction on the structure of the report.

The Summit provided the basis for a national constituency to generate a national report. We gathered valuable advice during and subsequent to the Summit which was a foundation for the structure of the report. We gratefully acknowledge the following experts for their participation in the summit.

Kathy Andersen, Coordinator of Gifted Education, Iowa City Community School District

Susan Assouline, Associate Director, Belin-Blank Center, The University of Iowa

Clar Baldus, Administrator, Belin-Blank Center, The University of Iowa

Camilla Benbow, Dean, Peabody College of Education, Vanderbilt University

James Borland, Professor, Columbia University

Robert Brennan, Professor and Director of the Center for Advanced Studies in Measurement and Assessment, College of Education, The University of Iowa

Linda Brody, Director, Study for Exceptional Talent, Johns Hopkins University

Marie Capurro, Davidson Institute for Talent Development

Nicholas Colangelo, Director, Belin-Blank Center, The University of Iowa

Laurie Croft, Administrator, Belin-Blank Center, The University of Iowa

Jan Davidson, Founder and Director, Davidson Institute for Talent Development

Jerilyn Fisher, Administrator, Belin-Blank Center, The University of Iowa

Leslie Forstadt, Graduate Assistant, Belin-Blank Center, The University of Iowa

James Gallagher, Professor, University of North Carolina, Chapel Hill

Miraca U. M. Gross, Director, GERRIC, The University of New South Wales, Sydney, Australia

Bryce Hansen, Principal (retired) Iowa City Community School District

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Jame Kulik, Professor, The University of Michigan

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Sidney Moon, Director of Gifted Education Resource Institute, Purdue University

Kathleen Noble, Director, Halbert and Nancy Robinson Center for Young Scholars, University of Washington

Paula Olszewski-Kubilius, Director of Center for Talent Development, Northwestern University

Lane Plugge, Superintendent, Iowa City Community School District

Lauren Reece, President of Iowa City Community School District Board of Directors

Joseph Renzulli, Director, National Research Center on Gifted and Talented, University of Connecticut

Ann Robinson, Professor, University of Arkansas

Nancy Robinson, Professor Emerita, University of Washington

Karen Rogers, Professor, St. Thomas University

Michael Sayler, Professor, University of North Texas

Arthur Schwartz, John Templeton Foundation

Andrew Sheehy, Administrator for Development, Belin-Blank Center, The University of Iowa

Brian Douglas Sponcil, Administrator, Belin-Blank Center, The University of Iowa

W. Thomas Southern, Professor, Miami University of Ohio

Julian Stanley, Professor Emeritus, Founder of the Study of Mathematically Precocious Youth (SMPY), Johns Hopkins University

Rena Subotnik, Director of Esther Rosen Katz Center for Gifted Education Policy, American Psychological Association

Paula Thompson, The John Templeton Foundation

The John Templeton Foundation

The mission of the John Templeton Foundation is to pursue new insights at the boundary between theology and science through a rigorous, open-minded, and empirically focused methodology, drawing together talented representatives from a wide spectrum of fields of expertise. Using "the humble approach," the Foundation typically seeks to focus the methods and resources of scientific inquiry on topical areas which have spiritual and theological significance ranging across the disciplines from cosmology to healthcare. In the human sciences, the foundation supports programs, competitions, publications, and studies that promote character education and the exploration of positive values and purpose across the lifespan. It supports free enterprise education and development internationally through the Templeton Freedom Awards, new curriculum offerings, and other programs that encourage free-market principles.

http://www.templeton.org/

About the Belin-Blank Center and the Gifted Education Research, Resource and Information Centre

The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development

Our vision is to inspire and serve the worldwide gifted community of students, educators, and families through exemplary leadership in advocacy, programming, and research.

The Belin-Blank Center focuses on:

- Identifying gifted and talented learners
- Providing specialized opportunities for students
- Conducting comprehensive research on giftedness
- Supporting professional development for educators
- Disseminating information through conferences and publications
- Assessing and counseling gifted students and their families
- Enhancing educational opportunities through technology
- Leading in local, national, and international policy formation
- Promoting equity and access in developing talent
- Consulting with schools and professionals
- Advocating for children and families
- Evaluating gifted programs

http://www.education.uiowa/belinblank

The Gifted Education Research, Resource and Information Centre

Meeting the educational, social and emotional needs of gifted children and adolescents by conducting and fostering research and by providing services to these children, their families and schools.

Our objectives are as follows:

- to foster and conduct research on effective education of gifted and talented children.
- to develop and conduct a range of teacher inservice programs to assist educators in catering for the educational, social and emotional needs of gifted students,
- to establish and administer workshops and specialist seminars for teachers, counsellors and parents of gifted students.
- to be responsible for the administration of University of New South Wales programs for gifted and talented school students, and to establish and administer additional and complementary programs for gifted students.
- to publish a range of professional development materials designed to assist educators to identify and respond to the needs of gifted and talented students.

http://gerric.arts.unsw.edu.au/

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Quotes from the Experts

W. Thomas Southern, Miami University of Ohio; Eric D. Jones, Bowling Green State University
"Although academic acceleration options can provide educational opportunities for gifted students they also can run afoul of the schooling bureaucracy." [p. 11]

James A. Kulik, The University of Michigan
"No other arrangement for gifted children works as well as acceleration..." [p. 21]

David Lubinski, Vanderbilt University
"...learning environments that move too quickly frustrate, whereas those that move too slowly result in boredom." [p. 35]

James J. Gallagher, University of North Carolina at Chapel Hill
"There is little doubt that educators have been largely negative about the practice of acceleration, despite abundant research evidence attesting to its viability..." [p. 40]

Karen B. Rogers, University of St. Thomas
"Research on grade-skipping comprises one of the strongest and most consistent bodies of research in the field of gifted education." [p. 55]

Nancy M. Robinson, University of Washington
"...for many gifted students, accelerative options can provide a better personal maturity match with peers than do non-accelerated programs, to say nothing of a better cognitive match." [p. 61]

Paula Olszewski-Kubilius, Northwestern University
"The information yielded from Talent Search testing is very useful for educational placement." [p. 71]

Nicholas Colangelo, The University of Iowa; Susan G. Assouline, The University of Iowa; Ann E. Lupkowski-Shoplik, Carnegie Mellon University
"We have the evidence and the mechanisms to make whole-grade acceleration a low-risk/high-success intervention for qualified students." [p. 85]

Miraca U.M. Gross, The University of New South Wales
"Radical acceleration allows extremely gifted individuals to progress through schooling at their own pace." [p. 88]

Linda E. Brody, Johns Hopkins University; Michelle C. Muratori, Johns Hopkins University; Julian C. Stanley, Johns Hopkins University
"Collectively, investigations of the academic adjustment of students who entered college early present a picture of high achievement." [p. 103]

Sidney M. Moon, Purdue University; Sally M. Reis, University of Connecticut
"There is general consensus that twice-exceptional students benefit from acceleration when acceleration strategies are geared to their interests and are provided in a positive learning environment..." [p. 117]