# Exceptionally High Intelligence and Schooling

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*Exceptionally intelligent children differ qualitatively from their peers and often are socially isolated and underchallenged in the classroom. Research on educational options for these children shows existing programs to be effective. Little money is spent in the United States on education for gifted children, and distribution of special programs varies widely, with nonurban areas and disadvantaged children being the least likely to receive special services and with the most common option being the weakest one—the pullout program. There is a growing movement to disband existing programs. Instead of calling for more of the existing programs, it is argued that first, standards should be elevated for all children. Those children who still remain underchallenged should then receive advanced classes in their domain of ability. Thus, fewer children would be identified as being in need of special services, and those identified would be the more profoundly gifted children who would receive the strongest kind of intervention.*

Stories about Jonathan Estrada have appeared off and on in the national news, describing a young child with extraordinary abilities. Jonathan began to talk at nine months; by two-and-a-half years of age, he was reading at the second-grade level and speaking with an eight-year-old's vocabulary. At age seven, he had an intense intellectual curiosity and a passion for geography (Nieves, 1996).

When Jonathan was five years old, his parents tried to get him admitted into the gifted-and-talented program in their local school district. Jonathan refused to complete the necessary IQ test because he was upset that he was asked to do "easy" things with blocks. When his mother tried to explain to the school officials that he found the test too easy, they told her that there was nothing wrong with the test and that she probably had an inflated view of her child's intelligence. Had Jonathan been accepted into the program, he would have had two hours a week of "enrichment" activities outside of the regular classroom, activities designed for gifted children. Instead, his parents enrolled him in a school for gifted children, where he would get a challenging curriculum full time rather than once or twice a week.

When children like Jonathan reach school age, their parents face a crisis. It is difficult for schools to meet the needs of children who are so out of step with their age-mates in their abilities and interests. What educational choice is most likely to ensure that Jonathan will fulfill his intellectual potential? Should he be placed in a regular classroom so that he is with his age-mates? Would a two-hour enrichment program be an adequate way to deal with his special needs? Should he skip grades so that he is with his mental-age peers, even if that means he is many years younger than his classmates? Should schools have special classes for such children?

The difficulty Jonathan's parents faced in finding an appropriate school did not evoke sympathy in others. Most people thought the parents were bragging and suspected that Jonathan's prodigious abilities had been artificially created by pushy parents. This kind of reaction reflects people's deep-seated ambivalence about intellectual giftedness, arising perhaps from an anti-intellectual strain in American culture (de Tocqueville, 1945) as well as from America's democratic antielitist tradition, which leads to fear of hierarchies as a threat to the egalitarian American dream (Hofstadter, 1963). Although the belief that all people should be treated the same way is one way of interpreting the democratic ideal, another interpretation is that each person should be helped to fulfill his or her individual potential. These two interpretations of democracy lead to clashing visions of how exceptionally intelligent students should be educated.

## Gifted Children in Regular Classrooms

Exceptionally intelligent students (hereafter referred to as gifted students) face a variety of problems in ordinary classrooms. They often are ostracized as being different and weird and are labeled as *nerds* and *geeks* (Silverman, 1993a, 1993b). In addition, they face the problem of boredom due to lack of an appropriate level of challenge (Csikszentmihalyi, Rathunde, & Whalen, 1993; Gross, 1993). Teachers often make little accommodation to the needs of these children, and many teachers have little or no special training in how to teach such exceptional children (Westberg, Archambault, Dobyns, & Salvin, 1993). A gifted child in the regular classroom may be the only such child in the room; hence, he or she will not have the opportunity to learn with others of like ability. When such classrooms have been observed, the gifted students generally have been bored and inattentive (Westberg et al., 1993). Meta-analyses have shown only

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modest benefits for this kind of instruction (Bangert, Kulik, & Kulik, 1983).

Many eminent adults report that school was a negative experience for them; they were bored and often knew more than their teachers (Bloom, 1985; Cox, Daniel, & Boston, 1985; Goertzel & Goertzel, 1962). Of course, the lack of appropriate control groups makes it impossible to know whether such negative reconstructions of school are typical of all children or are particularly typical of gifted children. Nonetheless, although one might expect children who lack intellectual interests to find school boring, it is particularly disturbing that the most able students often dislike school and feel they get little out of it. The lack of appropriate instruction for high-ability students is especially problematic for economically disadvantaged children whose families do not have the resources for extracurricular lessons, concerts, museum visits, and so forth.

The findings about gifted children and schooling, discussed below, are almost always based on research with scholastically gifted children and with those who are moderately gifted. Moderately gifted children are very different from profoundly gifted children, like Jonathan Estrada. Moderately gifted children perform one or two years above the level of their age-mates; in IQ terms, which is often how such children are classified, a moderately gifted child has an IQ between about 130 and 150, whereas a profoundly gifted child has an IQ of about 180 or above. Recommendations derived from research with moderately gifted children cannot be assumed to apply to profoundly gifted children because these two kinds of children are as different from one another as are moderately gifted from average children.

## The Nature of Giftedness

Researchers and educators differ in how they define *giftedness.* Traditionally, researchers have defined giftedness as high general intelligence as measured by a high global IQ score (Hollingworth, 1942; Terman, 1925). Since then, arguments have been advanced for expanding and differentiating conceptions of giftedness. For instance, Sternberg's (1981, 1985, 1991) triarchic theory of intelligence allows for three very different kinds of gifts: analytic, synthetic, and practical. Davidson and Sternberg's (1984) theory makes insight central to scholastic giftedness: Gifted children excel at solving insight problems because they are skilled at selectively encoding information (sifting out what is relevant to solve a problem) and selectively combining and comparing information. Renzulli's (1978) theory defines giftedness not only in terms of high ability but also by task commitment and creativity; Getzels and Jackson's (1962) theory makes creativity a part of giftedness. And Gardner's (1983, in press) theory of intelligence, which consists of eight independent abilities (linguistic, logical–mathematical, spatial, interpersonal, intrapersonal, musical, bodily kinesthetic, and naturalist), suggests that giftedness can occur separately in any one of these domains; this modular view of intelligence is inconsistent with a definition of giftedness in terms of general intelligence.

Because my concern here is with the problem of how gifted children should be schooled, I focus only on scholastic, or intellectual, forms of giftedness—that is, on giftedness in language, abstract logical thinking, and mathematics (in Gardner's [1983] terms, these would be gifts in the first two intelligences listed above; in other terms, these would be high-IQ children). Although children with artistic, musical, or athletic gifts also have special educational needs, America's schools do not even try to address these needs. Such children usually seek extra training outside of school (in the case of music and art) or in after-school, extracurricular programs (in the case of athletics).

Theorists of intellectual giftedness differ not only in how they define giftedness but also in terms of whether they view gifted children as differing qualitatively or just quantitatively from average children. In a review of studies investigating the quantitative versus the qualitative question, Rogers (1986) identified the following areas in which gifted children (identified by high IQ) excel: (a) higher order thinking processes, such as recognizing problems and generating and monitoring solutions; (b) encoding, mapping, inference, and justification on analogical-thinking tasks; and (c) transferring skills to new problems and solving insight problems (Davidson & Sternberg, 1984; Sternberg, 1981). In addition, Rogers found that gifted children differ from average children in cognitive style: They are more likely to think independently, to take an active approach toward problem solving, and to persist at tasks; furthermore, they have less need than do average children for structure and adult scaffolding, and they score higher on self-efficacy and internal locus of control.

One could argue that the aforementioned differences between gifted and average children are simply quantitative. Jackson and Butterfield (1986) have argued that there is no evidence for qualitative differences: For example, gifted children use the same memory strategies as do average children, but gifted children simply use these strategies more efficiently. However, many of the studies showing no qualitative differences have been based on artificial tasks such as memory for letters in series (Jackson & Butterfield, 1986), and, for the most part, the gifted children in these studies have been moderately rather than profoundly gifted (as defined by IQ). Moreover, when differences are large, they may lead to qualitative differences in thinking. It seems quite reasonable to assume that although moderately gifted children may not think in a qualitatively different way than ordinary children, profoundly gifted children like Jonathan Estrada may well do so. There have been reports that profoundly gifted children as young as three or four years of age have induced rules of algebra on their own (Winner, 1996), have memorized almost instantly entire musical scores (Feldman & Goldsmith, 1991) and have figured out on their own how to identify all prime numbers (Winner, 1996). Feats such as these just do not feel like faster

variants of normal processes; they seem qualitatively different.

I think it is useful to suggest two ways in which profoundly gifted children may think qualitatively differently than average children. One way in which they seem different is suggested by the aforementioned examples: their ability to intuit solutions to challenging problems without help and their striking memories for complex information in their domain. A second way in which they are different is in their passion, their "rage to master," and their intrinsic drive to immerse themselves in a domain (Winner, 1996). These children often cannot be torn away from work in their domain of ability, and they achieve flow by setting challenges for themselves (Kanevsky, 1992).

It should be noted that when educational interventions for scholastically gifted children are being considered, it is important to distinguish between moderately and profoundly gifted children; it also is important to distinguish among kinds of scholastically gifted children (e.g., those who excel in creativity and imagination and those who excel in analytic ability, speed of learning, and memory). Educational options that are ideal for one kind of scholastically gifted child may not work for children with other kinds of scholastic gifts.

## Indications of Scholastic (or Intellectual) Giftedness

Moderately as well as profoundly gifted children show early signs of being exceptional. Some of the indications of intellectual giftedness in infancy include long attention spans, good recognition memory, preference for novelty, overreactivity to sensations, and early onset of language (Bornstein & Sigman, 1986; Fagan & McGrath, 1981; Lewis & Brooks-Gunn, 1981; Piechowski, 1995). Indications of the unusual learning styles of these children also emerge early: They show intense curiosity, persistence, drive, obsessive interests, and a metacognitive awareness of their problem-solving strategies, making it possible for them to transfer strategies to new and unfamiliar problems (Kanevsky, 1992; Rogers, 1986; Shore & Kanevsky, 1993). School-related abilities also emerge early: Many (although not all) read one or more years before entering kindergarten, demonstrate a fascination with numbers and numerical patterns, and excel at abstract logical thinking (Jackson, 1992; Krutetskii, 1976).

These children differ socially and affectively in three major respects from the norm. First, they are more likely to be solitary and introverted than are typical children. They like playing alone because they are stimulated by their own minds. When they do play with others, they prefer older children, for obvious reasons, but they have difficulty finding like-minded peers of any age with whom to play (Albert, 1978; Csikszentmihalyi et al., 1993; A. Gallagher, 1990; Janos & Robinson, 1985b; Silverman, 1993b; Storr, 1988). Perhaps because of their sense of isolation and sometimes because of their ostracism, children who are extremely gifted have a rate of social and emotional problems about twice as high as that of average children; more moderately gifted children with less extreme abilities seem to have a slightly lower than average rate of emotional difficulties (Janos & Robinson, 1985b). In one study comparing popular and unpopular gifted children, Cornell (1990) found that these two groups did not differ in academic achievement. However, he noted that the achievement tests used may not have been sensitive enough to pick out profoundly gifted children. In addition, he reported that several children in the unpopular group had IQs higher than 148. Thus, it does appear likely that with extreme levels of ability, social and emotional problems can develop (Hollingworth, 1931, 1942).

Second, these children are often fiercely independent and nonconforming (Janos & Robinson, 1985b; Silverman, 1993a, 1993c; Winner, 1996). And finally, these children are intrinsically motivated to achieve mastery, they derive pleasure from work, and they often have high self-esteem about their intellectual capacities (Bloom, 1985; Csikszentmihalyi et al., 1993; Gross, 1993; Janos & Robinson, 1985b). Those children whose families combine nurturance and stimulation appear to be most likely to remain motivated to achieve, and those who persist in their area of ability report being more engaged and satisfied in high school (Csikszentmihalyi et al., 1993). Some very highly gifted children underachieve, however, often because of lack of appropriate challenges in school. Underachievers are not motivated, and they develop low self-esteem about their intellectual capacities (Butler-Por, 1987).

This picture of giftedness does not, of course, fit all gifted children. To begin with, many eminent adults were late bloomers (Darwin is an oft-cited example) who did not show many of these signs in childhood (Simonton, 1994). As children, their gifts were hidden. In addition, many children present a more one-sided, uneven profile of giftedness. Although many gifted children are globally gifted in the academic realm and balanced in their intellectual skills, it appears that at least as many, if not more, gifted children have a domain-specific gift in either language or mathematics (Benbow & Minor, 1990; Detterman & Daniel, 1989; Mueller, Dash, Matheson, & Short, 1984; Silver & Clampit, 1990; Wilkinson, 1993). For instance, among a thousand intellectually gifted adolescents, more than 95% showed a sharp disparity between their mathematical and verbal abilities (Achter, Lubinski, & Benbow, 1996). And a study of intellectually gifted middle school students revealed three separate kinds of gifts: linguistic, logical–mathematical, and social (D. J. Matthews & Keating, 1995). The kinds of memories and information-processing skills possessed by mathematically gifted children are different than those possessed by verbally gifted children (Dark & Benbow, 1991). Thus, educational interventions need to be tailored to the kind of gift the child possesses. Mathematically gifted children should not be treated the same way as linguistically gifted children. In addition, gifted children who are highly creative and imaginative may benefit from certain kinds of educational interventions, whereas those who are highly

analytic or who excel in memory and speed of learning may benefit from other kinds of educational interventions. In short, there are different kinds of intellectual gifts; hence, there must be different kinds of interventions.

Gifted children also may possess a combination of intellectual giftedness in one area and learning disability in another. A common combination is a gift in a spatial area as well as a language-based disability such as dyslexia (Feiring & Taft, 1985; Fox, 1983; Reis, Neu, & McGuire, 1995; Yewchuk, 1985). Students with a combination of gifts and disabilities face particular problems in school: They are excluded from gifted programs (their unevenness can lower overall IQ scores) but are considered too smart for remedial education (Reis et al., 1995). And because they excel in some areas, teachers sometimes write them off as simply being unmotivated.

## The Lifetime Course of Giftedness

It is tempting to argue that intellectually gifted children need special schooling so that they can become eminent and creative geniuses as adults. The development of any kind of gift is a long-term endeavor, fostered by early identification, supportive and encouraging parents, and teachers who are at first nurturant and later demanding and tough (Bloom, 1985). However, most gifted children do not grow into eminent adults and do not ever make major contributions to the way people think about a particular domain (Richert, 1997). The lack of correlation between childhood giftedness and adult eminence was first revealed in Terman's longitudinal study of high-IQ children (Terman & Oden, 1959). Most of the participants in this study grew up to be successful but not major creators. And those participants with IQs of 170 or above were no more likely to become eminent than were those with lower IQs (Feldman, 1984). Above the level of 120, IQ cannot predict adult eminence (Barron & Harrington, 1981; Guilford, 1967). And the correlation between school achievement and eminence is either zero or only weakly positive (Cohen, 1984; Hudson, 1958; McClelland, 1973).

There are many reasons why childhood giftedness does not typically grow into adult eminence. Eminence requires drive, and although gifted children are driven, not all of them persist in the kind of hard work that is one of the preconditions for achieving eminence (Ericsson, Krampe, & Tesch-Romer, 1993). Eminence requires creativity, dissatisfaction with the status quo, and a desire to shake things up, and these personality traits are not necessarily reflected in high academic achievement or high IQ (Gardner, 1993). Eminence also is associated with higher than average rates of psychopathology (Eysenck, 1995; Jamison, 1993; Ludwig, 1995; Simonton, 1994). Perhaps the high-IQ children in Terman and Oden's (1959) study did not achieve eminence because to be admitted into the study, they first had to be nominated by their teachers, a procedure that may have weeded out odd children with psychopathological tendencies (Simonton, 1997). Finally, extremely gifted children may have social and emotional difficulties, as mentioned above, and these difficulties can lead to maladaption and dropping out. Numerous individual case studies of maladjusted prodigies exist: One famous case is that of William James Sidis, a math prodigy who dropped out of math after graduating from Harvard University at age 15 (Montour, 1977).

## The Case for Special Education for Gifted Children

Although the most appropriate kind of schooling cannot ensure that intellectually gifted children become eminent adults, for some of the reasons just cited, it is certainly likely that inappropriate schooling, in which instruction is not matched to children's needs, will result in less than optimal intellectual development (as well as an unhappy school experience). The most gifted students in the United States perform far worse than high-ability students in other countries, and about half of the top U.S. students (in the top 5% of the IQ range) are underachieving (Reis, 1994; VanTassel-Baska, 1991). Although international comparisons suggest that most U.S. children are underachieving because at all ability levels they perform poorly as compared with the children in many European and East Asian nations (Stevenson, Chen, & Lee, 1993; Stevenson, Lee, & Stigler, 1986; Stevenson & Stigler, 1992), the gap between potential and performance is probably the greatest for the most gifted children (Ross, 1993). Thus, the most intellectually gifted students are the most underchallenged group, and cross-cultural comparisons suggest that these students could be performing at a far higher level.

If America's democratic ideals are interpreted to mean that each child should receive an education that matches his or her intellectual needs, then it is clear that children like Jonathan should not be placed in ordinary classrooms. Whether more moderately gifted children should be placed in ordinary classrooms is a matter for more debate and is a question I address later in this article.

## Existing Options for Gifted Children

Schools have considered and attempted a variety of options for educating children who are years ahead of their peers in abilities and interests. In the first half of the 20th century, a few special schools for gifted children existed, but it was far more common to accelerate gifted children than to group them together (Kulik & Kulik, 1997). The movement to establish formal "gifted programs" in which gifted children of the same age are grouped together began in reaction to Sputnik in 1957 (Tannenbaum, 1993).

Policies for educating gifted children are determined by states; thus, they vary considerably. During the past 25 years, the number of programs for gifted children offered by the public school system has grown considerably. According to a federal report in 1972, only 4% of gifted children were getting any kind of special service

(Marland, 1972), and 20 years ago, only 7 states had legislation and funding for gifted education (Ross, 1993). However, by 1990, 38 states served more than two million gifted children in Grades kindergarten through 12; the other 12 states did not report figures, but every state offers some programs. According to the 1988 National Education Longitudinal Study, 75% of 8th graders in public schools had some opportunities for gifted education, and almost 9% of 8th graders in public schools participated in some gifted-and-talented programs (Ross, 1993). However, selection for such programs was unevenly distributed across ethnic backgrounds (18% of Asians, 9% of Whites, 8% of African Americans, 7% of Hispanics, and 2% of Native Americans were selected) and income levels (only 9% of identified children came from the bottom quartile of family income in contrast to 47% from the top quartile). In addition, school districts in small towns and rural areas had the fewest such programs (Ross, 1993). The federal Jacob K. Javits Gifted and Talented Students Act of 1988 was passed to address this disparity: The act provides support for research on gifted education, with priority given to efforts to serve gifted children with economic disadvantages or with disabilities.

Although the number of gifted programs has grown dramatically since the 1970s, only 2 cents out of every 100 government dollars allocated for education are spent on gifted programs (Ross, 1993). The number of children participating in some kind of gifted school program is also only about half the number of children participating in some kind of special program for children with disabilities. According to a report by the U.S. Department of Education (1996), in the 1993–1994 school year, 6% of children in Grades kindergarten through 12 in public schools participated in some gifted program, as compared with 12% of children ages 0–21 years who were enrolled in federally supported programs for disabled persons (a category that includes, among other things, individuals with learning disabilities, mental retardation, and emotional disturbances).

Today, there is a growing movement to disband special programs for gifted children (Purcell, 1993; Renzulli & Reis, 1991). The arguments for and against gifted programs are polarized and bitter, and sharp clashes occur between those in favor of ability grouping and those who see it as racist and elitist and who argue for heterogeneous grouping with cooperative learning and between those in favor of grade skipping and those who insist that such acceleration stunts children's social development and robs them of a normal childhood. Even among those who favor special education for gifted children, disagreements form between advocates of enrichment and advocates of acceleration and between those who favor grade skipping, which means placing a gifted child with nongifted older children, and those who promote ability grouping, which means grouping together gifted children who are similar in age. There is no unified approach to gifted education in the United States, which is not surprising given that there also is no unified approach to education in general, no national standards, and no central educational philosophy. Various kinds of services for gifted children can be found in school districts, although many schools have no services at all and only some programs have been adequately evaluated. Next, I describe the major kinds of approaches and review the evidence for the effectiveness of each type.

It is useful first to distinguish between two broad classes of programs: (a) those that supplement education in the regular classroom and thereby help to improve a gifted child's educational experience and (b) those that make fundamental alterations. In the former category are pullout programs (the most common kind of elementary school gifted programs) and out-of-school summer (and sometimes weekend) programs for children selected by talent searches. In the latter category are full-time ability grouping—clustered within a regular classroom, in a special classroom, or in a special school—and acceleration in the form of early school entrance, grade skipping, and courses taken at an above grade level without grade skipping. With some exceptions, including the talent searches for out-of-school programs, gifted children are typically selected for special programs on the basis of global test scores (whether IQ or some other aptitude test).

## Programs That Supplement

### *Pullout Programs*

Most children selected for gifted programs spend the bulk of their time in regular classrooms but are pulled out for up to several hours a week to participate in programs for gifted children. Seventy-two percent of elementary school districts have adopted this kind of solution for gifted children (Ross, 1993). These children are identified on the basis of global IQ scores (the cutoff may be 130 or somewhat lower) or by some other kind of aptitude or achievement test. Often, other measures such as teacher recommendations and checklists also are used. For the most part, participants are moderately, not profoundly, gifted.

Pullout programs, often called enrichment programs, come in a number of varieties. Schiever and Maker (1997) identified three kinds: (a) Process-oriented programs teach creative problem solving and critical thinking but often not in the context of any particular kind of subject matter, (b) content-oriented approaches offer minicourses or mentorships in a specific subject area, and (c) product-oriented approaches involve students in projects culminating in reports and presentations.

One of the most widely used approaches to pullout education is the schoolwide enrichment model (SEM) developed by Renzulli and Reis (1997). SEM has three phases: exposure, the development of critical and creative thinking skills, and the opportunity to pursue a self-selected area of study. Children are identified by multiple criteria (including creativity and commitment). Up to 20% of children in a school may be admitted to Phase 1, and these children have been shown to do as well in

Phase 3 as the top 3%–5% identified by traditional IQ measures (Renzulli & Reis, 1997).

Pullout programs have been criticized for generally not leading to the development of a systematic knowledge base in the area in which a child is gifted because these programs are not grounded in a particular subject area. For the same reason, they have been criticized for not being tailored to the student's particular area of giftedness. Informal research on these programs suggests they are not highly effective: Children often show poor recall of what they did in these sessions (Fetterman, 1988), and schools with such programs often are dissatisfied with them, dismissing them as too superficial and unsystematic (Cox et al., 1985; J. J. Gallagher, Weiss, Oglesby, & Thomas, 1983). The main problem seems to be that even the most exciting curriculum cannot accomplish much if students are exposed to it for only several hours a week. Thus, such programs are weak solutions to large problems (Feldhusen, 1997; Gagné, 1995; Winner, 1996).

Yet, these programs do have some positive effects. Children in these programs show moderately higher achievement gains on standardized tests as compared with children with equal abilities who are not in such programs (Delcourt, Loyd, Cornell, & Goldberg, 1994; Treffinger, Callahan, & Baughn, 1991; Vaughn, Feldhusen, & Asher, 1991). In Vaughn et al.'s study, for example, students gained in achievement, critical thinking, and creativity, and achievement gains were greatest when the curriculum in the pullout program extended that in the regular classroom. Evaluations of SEM have shown that participation in this program improved attitudes toward learning and helped underachievers and that students who went through all three phases remained interested in the same subject areas in college (Renzulli & Reis, 1997). However, students in such studies were not always randomly assigned to an enrichment class; thus, some of the gains shown may have been due to preexisting ability. More important, it is probable that students of all ability levels would benefit from such programs. Thus far, there certainly is no evidence that they would not. Renzulli (1994) argued that the best features of enrichment programs should be taken (e.g., project-based learning) and infused into school for all children.

### *Talent Searches for Summer and Weekend Programs*

A very different kind of selection for special programs was pioneered by Julian Stanley with the founding of the Study of Mathematically Precocious Youth (SMPY) at Johns Hopkins University. Students selected for this program were identified on the basis of a domain-specific achievement test rather than a high overall score on an IQ test or another aptitude test (which cannot predict the specific academic area or areas in which a student may excel). Middle school students were given an "out-of-level" test (the Scholastic Assessment Test [SAT] designed for college-bound seniors in high school) to qualify for fast-paced summer courses in which an entire year of a high school course is compacted into three weeks. There are now four regional centers that conduct talent searches based on out-of-level SATs: the Center for Talented Youth at Johns Hopkins University (now a part of the Institute for the Advancement of Academically Talented Youth), the Talent Identification Program at Duke University, the Center for Talent Development at Northwestern University, and the Rocky Mountain Talent Search at the University of Denver. Many other local talent-search programs can now be found in every state and even in some other countries, such as China. Middle school students are eligible to participate in talent searches if they score in the upper 3% on a standardized achievement test (elementary school students qualify in the upper 5%). They then take the SAT. Many of these students do extraordinarily well. Twenty percent of these seventh graders do as well or better than average college-bound seniors (Assouline & Lupkowski-Shoplik, 1997; Center for Talented Youth, 1995).

Originally, the courses offered were in mathematics, but now courses in all areas of the curriculum are offered. About 150,000 students per year participate in these programs, which are mostly residential summer programs but sometimes are offered on weekends during the school year. Students who participate find the experience to be very positive, particularly because of the opportunity to have social and intellectual contact with like-minded peers, which for many of them may be a first-time experience (Benbow & Lubinski, 1997; Enersen, 1993).

Currently, SMPY is conducting a longitudinal study of 5,000 students who enrolled in these fast-paced courses (Benbow & Lubinski, 1997; Lubinski & Benbow, 1994). Preliminary findings have shown that these students have maintained a positive self-concept about work and that 85% of the first cohort of SMPY graduated from college with excellent academic records. Thus, students as young as 13 can be identified as having high mathematical abilities and as being likely to go on to be high scholastic achievers. SMPY students also took advanced-placement exams earlier, were more likely to take college courses in high school, and attended more selective colleges than did students matched in gender and SAT scores who chose not to participate (Barnett & Durden, 1993). Thus, students who participate in these summer courses continue to be high achievers in high school and college. And the greatest benefit, in terms of a commitment to advanced courses, higher education, and a full-time career, has been for girls who took courses in math (Fox, Brody, & Tobin, 1985; Olszewski-Kubilius & Grant, 1994). One cannot conclude, however, that the high achievement of these students is causally related to SMPY participation, because those who chose not to participate in SMPY may have been less achievement oriented to begin with.

## Programs That Make Fundamental Alterations

### *Ability Grouping in the Classroom*

Classroom ability grouping for gifted children can take a number of forms. It can mean placing children in self-

contained classes for gifted children, grouping high-ability children together within a classroom (or even across grades) for specific subject matters (cluster grouping), or placing children in schools designed only for gifted children.

Ability grouping is often confused with tracking, a term that evokes strong controversy. *Tracking* usually refers to the practice of assigning high school students to a college preparatory, general, or vocational track on the basis of career goals (Kulik & Kulik, 1997). Although students often choose the track that they prefer (Jencks, 1972), once they are assigned, it is difficult to move into a different track. Critics of tracking, such as Oakes (1985), have argued that such practice leads to segregation by class and race and that the curriculum for the low-tracked students is boring and unchallenging and is taught by the poorest quality of teachers. However, although Oakes showed that low-tracked students learned little, she did not have a control group of similar ability students who were not tracked. Would these students have learned more if they had been in a mixed-ability classroom? It is possible that the lower level of challenge may have been appropriate for the lower ability levels of these students.

Ability grouping is more flexible than tracking, as students can be readily regrouped when appropriate. In addition, grouping may occur only for specific subject matters or for the entire curriculum, as in self-contained classrooms for gifted children. Although ability grouping is also often attacked as being elitist and robbing lower ability students of high-achieving role models (R. Good & Brophy, 1993), it is surprising how common ability grouping actually is. Some form of within-class ability grouping is used in about 90% of elementary schools (McPartland, Coldiron, & Braddock, 1987), and most teachers favor some kind of ability grouping (National Education Association, Research Division, 1968; Slavin, 1989/1990; Wilson & Schmits, 1978).

Meta-analyses of evaluations of self-contained classes for gifted children have shown that ability grouping per se, without appropriate curriculum modifications, leads either to very minimal gains (Kulik, 1992; Kulik & Kulik, 1982, 1991, 1992) or to no gains at all (Slavin, 1987, 1990). But when curriculum is appropriately strengthened, the effects are quite positive. Kulik (1992) found that (a) the typical gain for gifted students in accelerated, ability-grouped classes was almost one year more on standardized tests than gains made by equivalent-ability students in heterogeneous classrooms and (b) the typical gain for gifted students in enriched, ability-grouped classes was about four to five months greater than gains by matched students in regular classrooms (see also Allan, 1991; Feldhusen, 1989; Fiedler, Lange, & Winebrenner, 1993; Rogers, 1991, 1993, for research showing positive gains made by ability-grouped students).

Meta-analyses of within-class and cross-grade groupings by subject matter again show benefits. More than 80% of studies analyzed by Kulik (1992) reported a positive gain, and the average gain was two to three months greater than that made by equivalent students who were not grouped. Slavin (1987) also reported positive effects of such subject-matter grouping. Even students in middle- and low-ability groups apparently benefit but to a lesser degree (Kulik & Kulik, 1997). The argument that nongifted children will do worse because they lack the role models of the high-achieving students is thus not supported. Perhaps this is because high-ability students cannot serve as effective role models for those who do not feel similar enough to these students to try to emulate them (Schunk, 1987).

Critics of ability grouping argue that cooperative learning in heterogeneous classrooms is a fairer solution (Slavin, 1989/1990). But research demonstrating positive effects of cooperative learning is typically based on a comparison between a cooperative-learning classroom and a traditional classroom with a basic-skills orientation (A. Robinson, 1990a, 1990b, 1991, 1997). Thus, these studies cannot indicate what the effects are of cooperative learning per se on gifted children. Cooperative learning can, of course, be used in a heterogeneous or an ability-grouped classroom, and it is not known whether cooperative learning among equally high-ability students is more or less beneficial than an individualistic approach. However, although most studies of cooperative learning have not looked separately at how this style affects gifted students, one study has shown that gifted high school students dislike cooperative learning, preferring both individualistic and competitive approaches (Li & Adamson, 1992). In addition, qualitative studies of gifted students in cooperative-learning groups report that these students are frustrated by having to explain concepts to uninterested students and feel that they do all of the work (Clinkenbeard, 1991; M. Matthews, 1992; Mulryan, 1992). Gifted students dominate in such groups, and lower ability students remain passive (T. L. Good, Reys, Grouws, & Mulryan, 1989–1990). Even some high-ability students become passive in such groups because they are bored or feel slowed by others (Mulryan, 1992).

### Special Schools for Gifted Children

There always have been special schools for gifted children. Many private schools do not label themselves as such, but because they require achievement (or even IQ tests) for admission, they are, in effect, schools for high-ability students. Some private schools officially designate themselves as schools for gifted children and require IQ scores of at least 125 or 130 for admission. Public magnet schools for gifted children at the elementary and middle school level (such as Hunter College Elementary School in New York City) are rare, but state-supported high schools for gifted students are more common (e.g., Bronx High School of Science, Stuyvesant High School, Hunter College High School). In the 1970s, a number of state-supported residential high schools for juniors and seniors began to develop (see Cox et al., 1985; Eilber, 1987; Kolloff, 1997; Stanley, 1987). The North Carolina School of Science and Math, founded in 1980, has served as a model for such schools, and now a number of others have

been founded (e.g., Texas Academy of Math and Science; Illinois Math and Science Academy; Louisana School for Math, Science, and the Arts). These high schools are for the most highly gifted students—those for whom advanced-placement and honors courses in regular high schools are insufficient. Teachers at these schools are specialists in their subject area (often they have PhDs); classes are often longer than in regular schools; and students engage in independent, in-depth research. These schools have high-achieving students and typically place a large number of students in the annual Science Talent Search sponsored by Westinghouse (Stanley, 1987). At the Illinois Math and Science Academy, 33% of the students recently were National Merit semifinalists (Kolloff, 1997).

The successful outcome of the graduates speaks well for these schools. But no research has compared students of equally high ability randomly assigned to such schools versus ordinary schools, and no such studies are likely. It seems unreasonable to suggest, however, that high-ability students would do just as well in less rigorous schools. Such a suggestion would mean that there are no benefits to being challenged by one's teachers and peers.

### *Acceleration*

Acceleration can mean taking a fast-paced course (in a regular or special class), early entrance to school, or grade skipping. Although acceleration is often pitted against enrichment as an alternative approach to gifted education, this is not a necessary dichotomy—a class can be fast-paced and enriched (Davis & Rimm, 1994).

Grade skipping is one of the cheapest ways to accommodate gifted students, and evidence for the effects of modest acceleration is positive. Terman (1925) believed that gifted children should be allowed to skip several grades and enter college by age 16. He opposed more radical grade skipping for his high-IQ participants, fearing its negative social effects. Students in the Terman sample who skipped grades went on to achieve more in their careers (Terman & Oden, 1947). Of course, these are correlational data, and it is not known whether the grade skipping led to the achievement or whether the most able students chose to skip grades. But this comparison at least suggests that moderate acceleration is not harmful in the long run. As mentioned, Kulik (1992) showed in a meta-analysis that gifted students who were accelerated outperformed nonaccelerated students (matched in age and IQ) by one year on achievement tests. Many other studies have corroborated these conclusions (e.g., Brody & Stanley, 1991; Feldhusen, 1989; Janos & Robinson, 1985a; Rogers, 1991; Swiatek & Benbow, 1991).

But grade skipping has potential problems. The major concern is that it involves placing children with others who are more physically advanced and with others who are very different socially and emotionally. Schools often resist grade skipping for fear of causing social maladjustment (Gross, 1993; Southern, Jones, & Fiscus, 1989). Although some studies have reported no social or emotional problems for accelerated students (Brody & Benbow, 1987; N. M. Robinson & Janos, 1986), one study of girls in a residential early college entrance program reported an alarming amount of stress and depression (Cornell, Callahan, & Loyd, 1991). These findings do not show that acceleration causes problems, but they do suggest caution and the need to evaluate the individual child before deciding on whether he or she should be accelerated.

Acceleration also is based on the assumption that gifted children are not different but rather just faster than their peers, that is, just like older average children. Moreover, although many studies have shown positive effects of a 1- or 2-year grade skip, a profoundly gifted child like Jonathan, who was described earlier, would need a far more radical grade skip. This would mean placing him with children many years older (as in the much-publicized case of Michael Kearney, who attended college between the ages of 6 and 10; Castro & Grant, 1994). In addition, if profoundly gifted children are more likely to think in qualitatively different ways than older average students, then placing a 6-year-old prodigy with a 12-year-old average child may not accomplish the intended goal of grouping the prodigy with others of like ability. Grade skipping, then, seems to be a riskier solution for children with extreme levels of intellectual ability who would require radical acceleration. In addition, a gifted child who is very creative and imaginative might have more difficulty with acceleration than a gifted child who is not particularly creative but who is a rapid learner with an excellent memory. Assouline, Colangelo, and Lupowski (1993) pointed out the importance of evaluating the child for acceleration not only in terms of academic ability but also in terms of the child's social and emotional maturity and the child's own attitude toward acceleration.

## Conclusions

Special educational programs for scholastically gifted students have been shown to have positive effects, and a strong case can be made that intellectually gifted students need more than what most regular classrooms in the United States can offer today. One major problem that gifted students face is that American schools hold low expectations for students in general and make minimal demands, as compared with, say, schools in many Western European and East Asian countries. In my view, if America's schools were able to be modeled on the more rigorous approaches in such countries, it seems likely that many of America's moderately gifted students, currently bored and languishing, would be appropriately challenged in regular classrooms. Perhaps it is for this reason that countries such as France and Japan, whose schools are more demanding than are U.S. schools, have far fewer gifted programs than the United States does. There is certainly evidence that when standards in classrooms are raised, many students, not just the brightest ones, rise to meet the challenge (Edmonds, 1982; Levin, 1987; Rutter, Maughan, Mortimore, & Ouston, 1979).

International comparisons also show that higher standards lead to higher achievement for all ability levels.

If the standards were raised for all students, I believe the gap between high- and low-achieving students would be narrowed. In my view, gifted education requires a two-pronged approach. First, standards for all students need to be radically elevated. If this endeavor were successful, then the children who still remained bored and underchallenged could be identified, and they could be offered advanced classes. Instead of the term *gifted class,* the more precise and less precious term *advanced class* might be used. Students should be identified as needing advanced instruction in mathematics or reading, for instance, rather than be labeled as *gifted* in general.

Even with a more challenging curriculum, the research on ability grouping suggests that students at all levels would benefit from being so grouped. Ideally, students might be placed in flexible, non-age-graded ability groups for all subjects. Children in elementary school who need more advanced courses in a specific subject matter could take courses in middle school; those in high school could take college courses while still in high school. This recommendation for domain-specific, advanced classes also has been made by Stanley and Benbow (1986) and by Feldhusen (1993), who called for accelerated, enriched, challenging instruction in a child's particular talent area. Similarly, Renzulli (1994) argued for making the regular curriculum more challenging, forming enrichment clusters for children with similar interests, and also retaining special services for those at the highest level—services such as independent work and mentors. Furthermore, Ross (1993) recommended that all children be given more challenging material and be allowed to proceed at their own pace with flexible ability grouping.

In my view, young children do not need to be given an IQ test to determine what group they should be placed in. Instead, curriculum-based identification should be used. When children are given a challenging curriculum, high abilities make themselves visible (Ramos-Ford & Gardner, 1997). Teachers can look for signs of boredom, curiosity, drive, and a desire for more work. A 10-year-old boy whom I know, after quickly and effortlessly completing his homework one afternoon, turned to his mother and said, "I think I need more work!" I would take such a statement as a clear sign that this child needed a higher level of challenge. No IQ test would be called for. And groups can and should be flexible; children who are overwhelmed can be regrouped. The use of such curriculum-based identification seems more likely to lead to a fairer representation of minority and poor students in high-ability groups than there are now, given the problems that such students often have with paper-and-pencil tests (Richert, Alvino, & McDonnel, 1982).

But none of these alterations will help children like Jonathan Estrada. Profoundly gifted children are often underchallenged in gifted programs (including special schools for gifted children, which have many moderately gifted children) and do not find their appropriate level of stimulation until they reach college (Winner, 1996). Children like this will continue to need special classrooms or special schools.

When schools cannot or will not meet the needs of high-ability students, families can seek mentors for their children. Highly successful adults often report having had mentors who played a very important role in their intellectual development (Bloom, 1985; Gardner, 1993; Kaufman, 1981), and mentors have been shown to play a particularly important role for disadvantaged students and for girls who enter traditionally male fields (Clasen & Clasen, 1997; McIntosh & Greenlaw, 1990).

Most researchers in the area of gifted education recommend identifying more students as gifted and providing more special services. Because the most common kind of special service is a pullout program, this recommendation can be taken to mean more of the same. In conclusion, I offer a different recommendation, one that does not represent the mainstream of those in the field of gifted education. I suggest that the expectations for all students be considerably elevated and that children be flexibly grouped by subject matter within regular classrooms. Furthermore, special full-time classrooms or special schools should be provided for those children who continue to be underchallenged despite the greater rigor.

This would likely mean that fewer children would be identified as being in need of gifted programming, because many more of the moderately gifted children would be appropriately challenged in regular classrooms if the curriculum were genuinely altered in favor of higher standards. Those identified would then be the more highly gifted children. This solution also would mean that children like Jonathan would not be taught in the same way as moderately gifted children. The difference between children like Jonathan and moderately gifted children should be recognized to be as great or greater than the difference between an average and a moderately gifted child.

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