



Is there still a need for gifted education? An examination of current research

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ABSTRACT

What recent research has been conducted about gifted and talented students and their learning experiences in school? As we complete the first decade of the new century we are entering a time when much attention is focused on remediation and test preparation; it only seems appropriate to reflect upon what has been learned about gifted education during the last few decades and consider the compelling evidence that may or may not support special services for gifted and talented. Consensus on which research themes and studies should be included in this type of examination would difficult to reach, but we have identified six important themes that are discussed in the article. This review of research strongly suggests that the need for gifted education programs remains critical during the current time period in American education when our nation's creative productivity is being challenged by European and Asian nations.

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What learning experiences do gifted and high potential students currently encounter in schools? Are they challenged and engaged in their classes and content areas? Is differentiated instruction given to them on a regular basis? Does research suggest that certain types of provisions result in higher engagement, motivation, and creative productivity? In this article, recent research related to gifted education is summarized across six important research themes: (a) expanded conceptions of giftedness and talent development; (b) the continued absence of challenge for gifted and high potential students; (c) grouping patterns for gifted students; (d) the effects of differentiation, acceleration, and enrichment on both achievement and other important outcomes; (e) the use of gifted education programs and pedagogy to serve gifted and high ability students from diverse populations as well as high potential students who underachieve or have learning disabilities; and (f) longitudinal effects of gifted education programs and pedagogy.

1. Expanded conceptions of giftedness and talent development

Research about gifted and talented learners points to the great diversity among this heterogeneous group of young people (Neihart, Reis, Robinson, & Moon, 2001) and the fact that many do not realize their potential, in part, because of school factors that contribute to underachievement. In recent years, research about the development of giftedness suggests that personality, environment, school, home, and chance factors all interact with demonstrated potential and whether or not that potential eventually develops into demonstrated gifts and talents (Renzulli, 2006; Sternberg & Davidson, 1986, 2005). Difficulty exists in finding one research-based definition to describe the diversity of the gifted and talented population, and the number of overlapping

definitions of giftedness that are proposed in educational research (Sternberg & Davidson, 2005) underlies the complexity of defining with certainty who is and who is not gifted. In describing this diverse group of learners, many educators interchangeably use expanded definitions of giftedness and talent. This was not always the case; for decades past, researchers and psychologists, following in the footsteps of Lewis Terman, equated "giftedness" with high IQ (Terman, 1925). More recently, however, definitions of giftedness or talent have become more multidimensional and include the interplay of culture and values on the development of talents and gifts (Sternberg & Davidson, 2005). Current research on the multiple perspectives of conceptions of giftedness ranges from general, broad characterizations to more targeted definitions of giftedness identified by *specific* actions, products, or abilities within domains (Sternberg & Davidson, 1986, 2005). This collection of research studies, conducted over the last few decades, supports a broader-based conception of giftedness which combines non-intellectual qualities and intellectual potential, such as motivation, self-concept, and creativity (Sternberg & Davidson, 2005) (Table 1).

1.1. Broadened multidimensional conceptions of giftedness

Current research has expanded to include a multidimensional construct of giftedness that incorporates a variety of traits, skills, and abilities which are manifested in multiple ways. This belief is particularly evident in *Conceptions of Giftedness* (Sternberg & Davidson, 1986, 2005) of conceptions of giftedness, in which most contributors proposed conceptions of giftedness that extended beyond IQ. Rapid learning as compared to others in the population; attention control, memory efficiency, and characteristics of perception; desire to develop one's gifts; and task commitment are all proposed as aspects of giftedness in and across the different models in this collection (Heller, Perleth, & Lim, 2005; Reis, 2005; Renzulli, 2005). Those labeled gifted as

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children and/or adults are found in every ethnic and socioeconomic group and in every culture (Sternberg, 2004). They exhibit an unlimited range of personal and learning characteristics and differ in effort, temperament, educational and vocational attainment, productivity, creativity, risk-taking, introversion, and extraversion (Renzulli & Park, 2000; Renzulli & Reis, 2003). They have varying abilities to self-regulate and sustain the effort needed to achieve personally, academically, and in their careers (Housand & Reis, 2009). And despite the label that this diverse population has been given, some do and some do not demonstrate high levels of accomplishment in their education or their chosen professions and work (Reis & McCoach, 2000; Renzulli & Park, 2000).

In research on the characteristics of this diverse population, Frasier and Passow (1994) synthesized traits, aptitudes, and behaviors consistently identified by researchers as common to gifted students across cultures, noting that these basic elements of giftedness appear to be similar across cultures (though each is not displayed by every student). These traits, aptitudes, and behaviors include: motivation, advanced interests, communication skills, memory, insight, imagination, creativity, problem solving, inquiry, reasoning, and humor. Each of these common characteristics may be manifested in different ways in different students; educators should be especially careful in attempting to identify these characteristics in students from diverse backgrounds as behavioral manifestations of the characteristics may vary with context (Frasier & Passow, 1994; Tomlinson, Ford, Reis, Briggs, & Strickland, 2004).

Joseph Renzulli was one of the earliest theorists to propose a research-based multifaceted conception of giftedness. The theory of his three-ring conception has prompted widespread research and gained popular appeal. It supports the idea that “gifted behaviors” result from the interaction among distinct intrapersonal characteristics, as is outlined in the excerpt below.

Gifted behavior consists of behaviors that reflect an interaction among three basic clusters of human traits—above average ability, high levels of task commitment, and high levels of creativity. Individuals capable of developing gifted behavior are those possessing or capable of developing this composite set of traits and applying them to any potentially valuable area of human performance. Persons who manifest or are capable of developing an interaction among the three clusters require a wide variety of educational opportunities and services that are not ordinarily provided through regular instructional programs. (Renzulli & Reis, 1997, p. 8)

1.2. Underrepresentation of giftedness in diverse populations

The last few decades of the 20th century were marked by an increasing interest in diverse gifted students who can be described as ethnic, racial, and linguistic minorities, economically disadvantaged, gifted females, gifted underachievers, and the gifted/learning disabled. Despite this interest and the recent research cited above that expanded conceptions of giftedness, the majority of young people identified as gifted continue to represent the majority culture, as economically disadvantaged and other diverse student populations continue to be underrepresented in gifted programs (Donovan & Cross, 2002). For example, Frasier and Passow (1994) indicate that identification and selection procedures may be ineffective and inappropriate for the identification of these young people. Educator bias, for example, may occur when preconceived ideas about what constitutes giftedness results in teachers' failure to recognize and nominate indicators of giftedness in culturally, linguistically diverse (CLD) students with high potential (Ford & Grantham, 2003; Frasier & Passow, 1994). Groups that have been traditionally underrepresented in gifted programs could be better served (Ford & Grantham, 2003; Frasier & Passow, 1994) if the more expanded notions of giftedness and more flexible forms of identification are translated from research conducted to state and local guidelines and regulations. Little doubt

exists about the widening acceptance of a broadened conception of giftedness and talent in the research and scholarly literature (Sternberg & Davidson, 2005), however translating this research into policy and practice continues to remain an elusive goal.

2. Continuing absence of challenge for gifted and talented students

In *National Excellence: A Case for Developing America's Talent* (U.S. Department of Education, 1993), a federal report on the status of education for our nation's academically talented students, the education of talented students in the United States was described as a quiet crisis. The *National Excellence* report indicates the absence of attention paid to this population and the absence of challenge that confronts them:

Despite sporadic attention over the years to the needs of bright students, most of them continue to spend time in school working well below their capabilities. The belief espoused in school reform that children from all economic and cultural backgrounds must reach their full potential has not been extended to America's most talented students. They are under-challenged and therefore underachieve. (U.S. Department of Education, 1993, p. 5)

The report further indicates that our nation's talented students are offered a less rigorous curriculum, read fewer demanding books, and are less prepared for work or post-secondary education than top students in many other industrialized countries. Talented children from economically disadvantaged homes or from culturally or linguistically diverse groups were found to be especially neglected, the report indicates, and many of them will not realize their potential without some type of intervention.

Current research suggests that gifted and talented students fail to be challenged in school, especially in elementary and middle school (Archambault et al., 1993; Reis et al., 1993, 2004; Westberg, Archambault, Dobyms, & Salvin, 1993). Research conducted by researchers at the National Research Center on the Gifted and Talented has identified what occurs in American classrooms for high ability students and the results describe a disturbing pattern (Archambault et al., 1993). The Classroom Practices Survey was conducted to determine the extent to which gifted and talented students receive differentiated education in regular classrooms. Sixty-one percent of slightly more than 7300 randomly selected third- and fourth-grade teachers in public and private schools in the United States reported that they had never had any training in teaching gifted students. Classroom teachers, responding to a survey, reported making only minor modifications in curriculum and instruction on a very irregular basis to meet the needs of gifted students. This result was consistent for all types of schools sampled, for classrooms in various parts of the country, and for various types of communities (Archambault et al., 1993).

The Classroom Practices Observational Study (Westberg et al., 1993) examined instructional and curricular practices in 46 regular elementary classrooms throughout the United States. Two students, one identified gifted student and one average ability student, were selected for each of two observation days and the types and frequencies of instruction that both students received through modifications in curricular activities, materials, and teacher–student verbal interactions were documented by trained observers. The results indicated little differentiation in the instructional and curricular practices, including grouping arrangements and verbal interactions, for gifted students in the regular classroom. Over 92 observation days, gifted students rarely received instruction in homogeneous groups (only 21% of the time), and more alarmingly, the target gifted students experienced no instructional or curricular differentiation in 84% of the instructional activities in which they participated.

Table 1
Research studies.

Author and date	Title of study	Sample	Major results and findings
<i>The needs of gifted and talented students are not often addressed in American classrooms</i>			
Archambault et al. (1993)	The Classroom Practices Survey	N = 7300 randomly selected 3rd and 4th grade teachers	Sixty-one percent of approximately 7300 randomly selected third and fourth-grade teachers in public and private schools in the United States reported that they had never had any training in teaching gifted students. The major finding of this study is that classroom teachers make only minor modifications on a very irregular basis in the regular curriculum to meet the needs of gifted students. This result was consistent for all types of schools sampled and for classrooms in various parts of the country and for various types of communities.
Westberg et al. (1993)	Classroom Practices Observational Study	N = 46 teachers N = 96 students E	Systematic observations conducted in 46 third or fourth-grade classrooms with two students, one high ability student and one average ability student, found that little differentiation in the instructional and curricular practices, including grouping arrangements and verbal interactions, for gifted students in the regular classroom. In all content areas in 92 observation days, gifted students rarely received instruction in homogeneous groups (only 21% of the time), and targeted gifted students experienced no instructional or curricular differentiation in 84% of the instructional activities in which they participated.
Reis and Purcell (1993); Reis et al. (1998)	An analysis of content elimination and strategies used by elementary classroom teachers in the curriculum compacting process.	N = 46 3rd–4th grade classroom teachers; N = 150 students; random assignment E	The use of curriculum compacting was examined to modify the curriculum and eliminate previously mastered work for high ability/gifted students. When classroom teachers eliminated between 40–50% of the previously mastered regular curriculum for high ability students, no differences were found between students whose work was compacted and students who did <i>all</i> the work in reading, math computation, social studies and spelling. Almost all classroom teachers learned to use compacting, but needed coaching and help to substitute appropriately challenging options.
Reis et al. (2004)	Reading instruction for talented readers: Case studies documenting few opportunities for continuous progress	N = 12 teachers; N = 350 students E, M	Research was conducted in 12 different third and seventh grade reading classrooms in both urban and suburban school districts over a 9-month period. Results indicated that little purposeful or meaningful differentiated reading instruction was provided for talented readers in any of the classrooms. Above-grade level books were seldom available for these students in their classrooms, and they were not often encouraged to select more challenging books from the school library. Talented readers seldom encountered challenging reading material during regular classroom instruction. Even less advanced content and instruction was made available for urban students than for suburban.
Moon et al. (1995)	Academic diversity in the middle school: results of a national survey of middle school administrators and teachers	N = 449 teachers (61% response rate); N = 500 principals (25% response rate)	Teachers and principals admitted that academically diverse populations receive very little, if any, targeted attention in their schools. Teachers report the use of little differentiation for gifted middle school students. Both principals and teachers hold beliefs that may deny challenge to advanced middle school students, as the overwhelming majority believes that these students are more social than academic. Half of the principals and teachers believe that middle school learners are in a plateau learning period when little new learning takes place—a theory which supports the idea that basic skills instruction, low level thinking, and small assignments are appropriate.
Hébert and Reis (1999); Reis and Diaz (1999)	Case studies of talented students who achieve and underachieve in an urban high school	N = 35 high school students S	Half of the 35 students who participated in this longitudinal study conducted in an urban high school were underachieving in school. Some of the high achieving students also experienced periods of underachievement in school. Talented students who achieve in school acknowledged the importance of being grouped together in honors and advanced classes for academically talented students. Underachievement for the other students began in elementary school when they were not provided with appropriate levels of challenge and never learned to work.
Renzulli and Park (2000)	Gifted dropouts: The who and the why	N = 12, 625 high school students S National Education Longitudinal Study (NELS: 1988)	Approximately 5% of a large, national sample of gifted students dropped out of high school. Gifted students left school because they were failing school, didn't like school, got a job, or were pregnant, although there are many other related reasons. Many gifted students who dropped out of school participated less in extracurricular activities. Many gifted students who dropped out of school were from low SES families and racial minority groups, and had parents with low levels of education.
<i>Benefits of gifted programs for gifted students with LD and special needs</i>			
Baum (1988)	An enrichment program for gifted learning disabled students	N = 7 E	Participants who were both gifted and learning disabled had the opportunity to participate in gifted education programs and work on advanced projects, resulting in improved behavior, self-regulation and self-esteem.

Table 1 (continued)

Author and date	Title of study	Sample	Major results and findings
<i>Benefits of gifted programs for gifted students with LD and special needs</i>			
Baum et al. (1999)	Students who underachieve	N = 17 E, M	When given gifted programming options (self-selected independent study with a mentor), 82% of gifted underachieving students reversed their underachievement when they had the opportunities for strength-based gifted programming.
Reis et al. (2003)	Music and minds: Using a talent development approach for young adults with Williams syndrome	N = 16 S	The use of participants' interests and the opportunity to participate in advanced training in music was found to significantly increase achievement in math, enhance all participants' understanding of mathematics and to provide opportunities for the further development of their interests and abilities, especially their potential in music.
<i>Longitudinal benefits of gifted programs</i>			
Hébert (1993)	Reflections at graduation: The long-term impact of elementary school experiences in creative productivity	N = 9 S	Gifted programs had a positive effect on subsequent interests of students affect post-secondary plans; early advanced project work serves as important training for later productivity; non-intellectual characteristics with students remain consistent over time.
Lubinski et al. (2001)	Top 1 in 10,000: A 10-year follow-up of the profoundly gifted	N = 320 students PS	Follow-up studies found that 320 gifted students identified as adolescents pursued doctoral degrees at over 50× the base rate expectations. The base rate expectation for the general population is 1%–1 in 100.
Westberg (1999)	A longitudinal study of students who participated in a program based on the Enrichment Triad Model in 1981–1984	N = 15 E, S	Students maintained interests and were still involved in both interests and creative productive work after they finished college and graduate school.
Delcourt (1993)	Creative productivity among secondary school students: Combining energy, interest, and imagination.	N = 18 S	Benefits of gifted programs indicate that students maintained interests over time and were still involved in creative productive work. Students who had participated in gifted programs, maintained interests and career aspirations in college. Students' gifts and talents could be predicted by their elementary school creative/productive behaviors.
Taylor (1992)	The effects of the Secondary Enrichment Triad Model on the career development of vocational-technical school students	N = 60 S	Students' involvement in gifted programs in high school enabled them to explore potential career interests and allow students to see themselves in the role of practicing professionals and visualize a different sense of self. Students had increased post-secondary education plans (from attending 2.6 years to attending 4.0 years).
Moon et al. (1994)	Long-term effects of an enrichment program based on the Purdue Three-Stage Model	N = 23 students N = 22 parents E	This retrospective study investigated the effects of an elementary pull-out program gifted program based on the Purdue Three-Stage Model. Students and their families indicated the program had a long-term positive impact on the cognitive, affective, and social development of most participating students.
Lubinski et al. (2006)	Tracking exceptional human capital over two decades	Participants: 286 males, 94 females	Talent-search participants scoring in the top .01% on cognitive-ability measures were identified before age 13 and tracked over 20 years. Their creative, occupational, and life accomplishments are compared with those of graduate students (299 males, 287 females) enrolled in top-ranked U.S. mathematics, engineering, and physical science programs in 1992 and tracked over 10 years. By their mid-30s, the two groups achieved comparable and exceptional success (e.g., securing top tenure-track positions) and reported high and commensurate career and life satisfaction.
Park et al. (2007)	Contrasting intellectual patterns predict creativity in the arts and sciences: tracking intellectually precocious youth over 25 years	N = 2409 PS	A sample of 2409 intellectually talented adolescents (top 1%) who were assessed on the SAT by age 13 was tracked longitudinally for more than 25 years. Their creative accomplishments, with particular emphasis on literary achievement and scientific-technical innovation, were examined and results showed that distinct ability patterns identified by age 13 portend contrasting forms of creative expression by middle age.
<i>Student achievement increases/gains using gifted education curriculum and/or grouping strategies</i>			
Reis et al. (1998)	Curriculum compacting and achievement test scores: What does the research say?	N = 336 E, M	Teachers using curriculum compacting for gifted students could eliminate 40%–50% of regular curriculum for gifted students and produced achievement scores that were either the same as a control group or higher math and science, regardless of what they did instead (independent study in a different content area).
Reis et al. (2007)	The Schoolwide Enrichment Model in Reading	N = 1500 E, M	All students, including gifted students, were randomly assigned to the SEM-R intervention or to continue with the regular reading program as control students. Those who participated in the enriched and accelerated SEM-R program had significantly higher scores in reading fluency and attitudes toward reading than students in the control group, who did not participate. Students in the SEM-R treatment group scored statistically significantly higher than those in the control group in both oral reading fluency and comprehension, as well as attitudes toward reading.
Gentry and Owen (1999)	Promoting student achievement and exemplary classroom practices through cluster	N = 226 E	Students at all achievement levels (high, medium and low) benefited from cluster grouping and other forms of instructional grouping accompanied by differentiated instruction and content. Students

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Table 1 (continued)

Author and date	Title of study	Sample	Major results and findings
<i>Student achievement increases/gains using gifted education curriculum and/or grouping strategies</i>			
Kulik (1992)	grouping: A research-based alternative to heterogeneous elementary classrooms An analysis of the research on ability grouping: Historical and contemporary perspectives	Research synthesis	who were in cluster groups scored significantly higher than students who did More students were identified as high achieving during the 3 years that cluster grouping was used in the school. Achievement is increased when gifted and talented students are grouped together for enriched or accelerated learning. Ability grouping without curricular acceleration or enrichment produces little or no differences in student achievement. Bright, average, and struggling students all benefit from being grouped with others in their ability/instructional groups when the curriculum is adjusted to the aptitude levels of the group. When gifted students are grouped together and receive advanced enrichment or acceleration, they benefit the most because they outperform control group students who are not grouped and do not receive enrichment or acceleration by five months to a full year on achievement tests.
Rogers (1991)	The relationship of grouping practices to the education of the gifted and talented learner	Research syntheses	Grouping gifted and talented students for instruction improves their achievement. Full-time ability/instructional grouping produces substantial academic gains in these students. Pull-out enrichment grouping options produce substantial academic gains in general achievement, critical thinking, and creativity. Within-class grouping and regrouping for specific instruction options produce substantial academic gains provided the instruction is differentiated. Cross-grade grouping produces substantial academic gains. Several forms of acceleration also produced substantial academic effects. Cluster grouping produces substantial academic effects.
Field (2009)	An experimental study using Renzulli Learning to investigate reading fluency and comprehension as well as social studies achievement	N = 383 E, M	After 16 weeks, students who participated in enrichment and differentiated programs using Renzulli Learning for 2–3 h each week demonstrated significantly higher growth in reading comprehension than control group students who did not participate in the program. Students who participated in Renzulli Learning demonstrated significantly higher growth in oral reading fluency and in social studies achievement than those students who did not participate.
Colangelo et al. (2004)	Benefits of various forms of acceleration	Research syntheses	The use of many different types of acceleration practices results in higher achievement for gifted and talented learners. Students who are accelerated tend to be more ambitious, and they earn graduate degrees at higher rates than other students. Interviewed years later, an overwhelming majority of accelerated students say that acceleration was an excellent experience for them. Accelerated students feel academically challenged and socially accepted, and they do not fall prey to the boredom, as do so many highly capable students who are forced to follow the curriculum for their age-peers.
Gubbins et al. (2007)	Unclogging the mathematics pipeline through access to algebraic understanding	N = 5 teachers N = 73 students M	Elementary grade students identified for an after-school program in algebra using grade 8, norm-referenced achievement and algebra aptitude tests; the 30 h intervention yielded significant pre/post achievement results in problem solving and data interpretation (17-point gain), and algebra tests.
Gavin et al. (2007); Gavin et al. (2009)	Math achievement was investigated using Project M ³ : Mentoring Mathematical Minds curriculum units for mathematically talented students	N = 41 teachers N = 800 students E	Challenging math curriculum resulted in significant gains in achievement in math concepts, computation, and problem solving each year over a 3-year period for talented math students in grades 3, 4, and 5. Students using the curriculum outperformed a comparison group of students of like ability from the same schools. Significant gains were found on challenging open-ended problems adapted from international and national assessments in favor of students using the project M ³ curriculum over the comparison group. Students receiving the advanced math achieved significant gains in all mathematical concepts across grade levels.
Tieso (2002)	The effects of grouping and curricular practices on intermediate students' math achievement	N = 31 teachers N = 645 students E, M	Results indicated significant differences on math achievement for treatment group students (who were grouped for an enriched math lesson and exposed to an enhanced unit) when compared to the comparison groups. Further, results indicated significant differences favoring the group that received a modified and differentiated curriculum in a grouped class.
Reis et al. (1997)	Talents in two places: Case studies of high ability students	N = 12 currently enrolled college or university students PS	Gifted students with learning disabilities in this study encountered many negative experiences in school, often failed to be identified as either gifted or learning disabled, and half had psychological problems that required professional help and support in subsequent years.
Little et al. (2007)	A study of curriculum effectiveness in social studies	N = 1200 (Treatment—941 Comparison—251)	A quasi-experimental study examined the effects on student performance of a Javits-funded curriculum designed to respond to the needs of high ability students in elementary and middle school social studies. Results demonstrate significant differences between treatment and comparison groups in the area of content learning, favoring the treatment group; but no significant differences are found for the small sub-sample of gifted students.

Table 1 (continued)

Author and date	Title of study	Sample	Major results and findings
<i>Student achievement increases/gains using gifted education curriculum and/or grouping strategies</i>			
VanTassel-Baska et al. (1998)	A National Pilot Study of Science Curriculum Effectiveness for High Ability Students.	N = 1471 E	Results indicate small but significant gains for students using a unit on the dimension of integrated science process skills when compared to equally able students not using the units.
VanTassel-Baska et al. (2002)	Gifted students' learning using the Integrated Curriculum Model (ICM): Impacts and perceptions of the William and Mary Language Arts and Science Curriculum	N = 2189 E	Findings suggest that gifted student learning at grades 3 to 5 was enhanced at significant and important levels in language arts critical reading and persuasive writing and scientific research design skills, through the use of the curriculum across individual academic years.
Vaughn et al. (1991)	Meta-analyses and review of research on pull-out programs in gifted education	Research synthesis	The purpose of this research was to evaluate the effectiveness of pull-out programs in gifted education. Nine experimental studies were located that dealt with pull-out programs for gifted students. The variables of self-concept, achievement, critical thinking, and creativity were quantified via meta-analysis. The results indicate that pull-out models in gifted education have significant positive effects for the variables of achievement, critical thinking, and creativity

P = Primary grades, K-2; E = Elementary grades, 3-5; M = Middle grades, 6-8; S, H = Secondary or High School grades, 9-12. PS = Post secondary grades.

In a study on curriculum differentiation (Reis et al., 1993), the effects of using curriculum compacting (Reis, Burns, & Renzulli, 1992) were examined; curriculum compacting is the process of modifying the curriculum and eliminating previously mastered work for high ability students. The content that is eliminated is usually repeated from previous textbooks or even content that may be new in the curriculum but that some students already know. In this study, after a few hours of training, classroom teachers learned how to differentiate curriculum and instruction, and they were able to eliminate between 40 and 50% of previously mastered regular curriculum for high ability students. However, they were less effective at replacing what they eliminated with high quality, challenging curriculum and instruction (Reis et al., 1993). No differences were found in the achievement scores of gifted students whose work was compacted and students who did *all* the work in reading, math computation, social studies, and spelling. In science and math concepts, students whose curriculum was compacted scored significantly higher than control group in achievement (Reis et al., 1993).

Little differentiation in reading was found for third- or seventh-grade gifted readers who read several grade levels ahead in reading (Reis et al., 2004). Research conducted in 12 different third- and seventh-grade reading classrooms in both urban and suburban school districts over a 9-month period showed that little purposeful or meaningful differentiated reading instruction was given for talented readers in any of the classrooms (Reis et al., 2004). Above-grade level books were seldom available for these students in their classrooms, and students were not encouraged to select more challenging books and so made little continuous progress. Other research related to the absence of middle school differentiation and attitudes of teachers and administrators about differentiation (Moon, Tomlinson, & Callahan, 1995) suggests that advanced students continue to remain under-challenged in many middle school classrooms in the United States.

The research studies summarized in this section suggest that gifted and high potential students in American schools are under-challenged. In a data-based longitudinal study (Reis, Hébert, Díaz, Maxfield, & Ratley, 1995) conducted with gifted, urban, high school students, half of these previously identified students were found to be under-achieving in high school. These students provided insight about why they did poorly, blaming an elementary and middle school program that was too easy. The problem of systematically learning not to work exists in rural, suburban, and urban areas and seems to be an area of increasing importance in the education of gifted and talented students.

This section has summarized studies showing a pattern of little differentiation occurring in randomly selected classrooms (Archambault et al., 1993; Reis et al., 1993, 2004; Westberg et al., 1993). Many classroom teachers have not received training in differentiation or gifted education pedagogy and fail to use it regularly or effectively in their

classrooms (Archambault et al., 1993; Reis et al., 2004). When they do receive training, they can often eliminate redundant content through procedures such as curriculum compacting but often have few resources to use with their students (Reis et al., 1993). This lack of challenge and differentiation is one reason that some gifted students drop out (Renzulli & Park, 2000) or underachieve in school (Reis et al., 1995).

3. Research on grouping patterns for gifted students

Although research on tracking has been shown to produce detrimental effects for some students (Oakes, 2005), we make a distinction between tracking and instructional grouping. We define tracking as the permanent placement of students into a class that is often remedial or advanced in nature with little chance of exit or entrance over the years. In contrast, several types of instructional grouping exist for academically talented students, and the ones reviewed in this article enable flexible movement in and out of grouping patterns. Several studies have proven that grouping gifted students together for differentiated curriculum and instruction increases achievement for gifted students and, in some cases, also for students who are achieving at average and below average levels (Gentry & Owen, 1999; Kulik, 1992; Rogers, 1991; Tieso, 2002). Kulik's (1992) meta-analysis of grouping found that achievement is increased when gifted and talented students are grouped together for enriched, advanced, or accelerated learning in classes. Kulik further found, in this meta-analysis, that ability grouping without curricular acceleration or enrichment produces little or no differences in student achievement. Kulik's research found positive effects for students at all achievement levels; gifted, average, and struggling students were all found to benefit from being grouped with others in ability/instructional groups when the curriculum is adjusted to the aptitude levels of the group. Gifted students who were grouped together and received advanced enrichment or acceleration benefitted the most because they outperformed control group students who were not grouped and did not receive enrichment or acceleration by 5 months to a full year on achievement tests (Kulik, 1992).

Rogers (1991), in a separate meta-analysis, found similar results showing grouping gifted and talented students for instruction in advanced classes improves their achievement, and that full-time ability/instructional grouping produces substantial academic gains in these students. She also found that pull-out enrichment grouping options produce substantial academic gains in general achievement, critical thinking, and creativity, and that within-class grouping and regrouping for specific instruction options produce substantial academic gains provided the instruction is differentiated, more advanced, or infused with enrichment opportunities (Rogers, 1991). More recently, Tieso (2002) studied grouping patterns and found

similar results, as treatment group students outperformed students who were grouped for an enriched math lesson scored higher than comparison groups. Further, results indicated significant differences favoring the group that received a modified and differentiated curriculum in a grouped class (Tieso, 2002). Gentry and Owen (1999), in a quasi-experimental cluster group study of high ability students, found that students at high, medium, and low levels all benefited from cluster grouping and other forms of instructional grouping accompanied by differentiated instruction and content. Cluster groups of students, usually those who score at the very high or low end of achievement, are grouped in a cluster and then placed in a class with other students. Students who were in cluster groups and who received advanced and enriched learning opportunities scored significantly higher than students who were not cluster grouped (Gentry & Owen, 1999).

The more recent research on various forms of grouping gifted and high potential students strongly supports the use of this instructional strategy for higher achievement and also suggests benefits for children of other achievement levels as well. Flexible grouping (Tieso, 2002), class grouping (Rogers, 1999), or cluster grouping (Gentry & Owen, 1999; Tieso, 2002), when combined with advanced content and differentiated instruction, has been shown to be an effective strategy for challenging gifted and talented learners, as well as students from other bands of achievement as well.

4. Achievement increases from accelerated and enriched programs

The use of enrichment, differentiation, acceleration, and curriculum enhancement has resulted in higher achievement for gifted and talented learners as well as other students when it is applied to a broader population of high and average achievers (Colangelo, Assouline, & Gross, 2004; Field, 2009; Gavin et al., 2007; Gentry & Owen, 1999; Gubbins, Housand, Oliver, Schader, & De Wet, 2007; Kulik, 1992; Reis et al., 2007; Rogers, 1991; Tieso, 2002). For example, in one experimental study, teachers used curriculum compacting and enrichment for gifted students, finding that elimination of work already mastered by gifted and talented students followed by the replacement of enriched learning opportunities such as self-selected independent study resulted in higher or similar achievement scores (Reis, Westberg, Kulikowich, & Purcell, 1998).

Colangelo et al. (2004), in the most comprehensive meta-analysis of acceleration to date, studied many different types of acceleration practices. They summarized research proving that, over decades, these practices resulted in both higher achievement and higher standardized scores for gifted and talented learners. Students whose grade level was accelerated tended to be more ambitious, and they earned graduate degrees at higher rates than other students. Interviewed years later, accelerated students were uniformly positive about their experiences, reporting that they were academically challenged, socially accepted, and did not fall prey to the boredom, as do highly capable students who are forced to follow the curriculum for their age-peers (Colangelo et al., 2004).

Gavin et al. (2007) used quasi-experimental methods in intact classrooms to investigate the use of more challenging math curriculum for gifted students; findings showed that talented third-, fourth-, and fifth-grade math students had significant gains in achievement in math concepts, computation, and problem solving each year over a 3-year period. Reis et al. (2007; Reis, Eckert, McCoach, Jacobs, & Coyne, 2008), using experimental research methods, found that students, including gifted students, benefitted from an enriched and accelerated reading intervention. Gifted students as well as randomly assigned students who participated in the enriched and accelerated SEM-R program had significantly higher scores in reading fluency and comprehension than students in the control group, who did not participate in the SEM-R. Results show achievement differences favoring the SEM-R treatment across all levels, including students who read well above, at, and below grade level (Reis et al., 2007, 2008).

Field (2009) studied the use of Renzulli Learning, an innovative on-line enrichment program based on the Enrichment Triad Model, for students in both an urban and suburban school. In this 16-week experimental study, both gifted and non-gifted students who participated in this enrichment program and used Renzulli Learning for 2–3 hours each week demonstrated significantly higher growth in reading comprehension than control group students who did not participate in the program. Students also demonstrated significantly higher growth in oral reading fluency and in social studies achievement than those students who did not participate (Field, 2009).

Using quasi-experimental methods in intact classrooms, VanTassel-Baska, Zuo, Avery, and Little (2002) investigated the use of advanced content with gifted students in units developed across content areas. They found significant differences favoring students using this content in language arts, critical reading, persuasive writing, and scientific research design skills. Little, Feng, VanTassel-Baska, Rogers, and Avery (2007) used quasi-experimental methods to examine whether the advanced curriculum units respond to the needs of high ability students in elementary and middle school social studies. Results demonstrate significant differences between treatment and comparison groups in the area of content learning, favoring the treatment group.

The studies summarized in this section have demonstrated that enrichment pedagogy (Field, 2009; Reis et al., 2007, 2008), differentiation (Gentry & Owen, 1999; Reis et al., 1993; Tieso, 2002), acceleration (Colangelo et al., 2004), and curriculum enhancement and advanced lessons (Gavin et al., 2007; VanTassel-Baska et al., 2002) have resulted in higher achievement for gifted and talented learners as well as other students when they are applied to both gifted and other lower achieving students.

5. Benefits of gifted education programs and pedagogy for diverse populations and twice exceptional students

Recent research has also documented positive effects regarding the use of gifted education programs and strategies when serving gifted and high ability students from diverse cultural groups (Gavin et al., 2007; Hébert & Reis, 1999; Little et al., 2007; Reis & Diaz, 1999; Reis et al., 2007, 2008) as well as when serving those with special education needs and those who have high ability but underachieve in school. Work in mathematics conducted by Gavin et al. (2007) has been extended to culturally diverse children, as has been reading instruction differentiation and enrichment by Reis et al. (2007, 2008) as well as curriculum enhancement in social studies and language arts by VanTassel-Baska et al. Underrepresentation of black and Latino students in gifted programs has been an ongoing problem in the field (Cunningham, Callahan, Plucker, Roberson, & Rapkin, 1998; Donovan & Cross, 2002; Frasier, 1991; Harris & Ford, 1991) and so these curriculum outreach efforts have been promising.

Approximately 50% of culturally diverse gifted students underachieved in a longitudinal study conducted in an urban high school (Reis et al., 1995). Some underachievement can be reversed (Baum, Hébert, & Renzulli, 1999); when teachers served as mentors for a gifted program self-selected independent study, 82% of gifted underachieving students reversed their underachievement (Baum et al., 1999). An analysis of one large national database found that 5% of identified gifted students dropped out of high school (Renzulli & Park, 2000). Students' reasons for dropping out related to failures in school, disliking school, finding a job, or becoming pregnant, although many other related reasons also existed. The majority of gifted students who dropped out of school participated in fewer extracurricular activities, were from low SES families and/or racial minority groups, and had parents with low levels of education.

During the last two decades, increasing attention has also been given to the perplexing problem of gifted and high ability/talented students who also have learning disabilities (Baum, 1988). In one qualitative case study, participants who were both gifted and learning disabled had the

opportunity to participate in gifted education programs and work on advanced projects; results included improved behavior, self-regulation, and self-esteem (Baum, 1988). Little research exists on program outcomes for these students as so few are able to participate in gifted programs. Due to the difficulty in identification and the lack of services for this population, some research suggests that these “twice exceptional” students may be at risk for social and emotional adjustment challenges. In one study, for example, half of the gifted students with learning disabilities enrolled in a competitive university experienced emotional difficulties and sought counseling (Reis, Neu, & McGuire, 1997). Learning disability programs are often targeted for less advanced students and differentiation is necessary if gifted students with learning disabilities are to be both challenged and learn how to use compensation strategies to learn how to be successful in an academic setting (Reis, McGuire, & Neu, 2000; Reis et al., 1997).

6. Longitudinal benefits of gifted education programs and pedagogy for gifted and talented students

Gifted education programs and strategies have been found to longitudinally benefit gifted and talented students, helping students increase aspirations for college and careers (Taylor, 1992), determine post-secondary and career plans (Delcourt, 1993; Hébert, 1993; Lubinski, Webb, Morelock, & Benbow, 2001; Taylor, 1992), develop creativity and motivation that was applied to later work (Delcourt, 1993; Hébert, 1993), and achieve more advanced degrees (Lubinski et al., 2001). Hébert (1993) and Delcourt (1993) found that gifted programs which were based on Renzulli’s Triad/SEM approach (Renzulli, 1977; Renzulli & Reis, 1985, 1997) and focused on interest development and productivity in areas of interest, had a positive effect on students’ subsequent interests, positively affected post-secondary plans; Renzulli and Reis (1985, 1997) also found that early advanced project work in gifted programs served as important training for later productivity. Hébert (1993) also found that non-intellectual characteristics, such as creativity, interests, and task commitment, remain consistent in gifted and talented students over time. Westberg (1999), investigating longitudinal findings of students who participated in the same type of program, found that students maintained interests and were still involved in both interests and creative productive work after they finished college and graduate school. Delcourt (1993) identified benefits of gifted programs, including students’ ability to maintain interests over time and continue to be involved in creative productive work. Students who participated in gifted programs in elementary and secondary school maintained academic interests and increased career aspirations in college (Taylor, 1992). Taylor (1992) also studied longitudinal effects of Renzulli’s interest and project-based enrichment program and found that students’ involvement in gifted programs in high school expanded potential career interests.

Moon, Feldhusen, and Dillon (1994) conducted a retrospective study on the effects of an elementary pull-out gifted program based on the Purdue Three-Stage Model. Students and their families indicated that the program had a long-term positive impact on the cognitive, affective, and social development of most participating students. Lubinski et al. (2001), in follow-up studies of gifted students who participated in an academic Talent-search for mathematically advanced students, found that 320 gifted students who were identified as adolescents pursued doctoral degrees at over 50× the base rate expectations (for the general population is 1%–1 in 100). The same group of researchers (Lubinski, Benbow, Webb, & Bleske-Rechek, 2006) tracked 286 males and 94 females (Talent-search participants scoring in the top .01% on cognitive-ability measures who were identified before age 13) for over 20 years. They were compared with graduate students (299 males, 287 females) enrolled in top-ranked U.S. mathematics, engineering, and physical science programs in 1992 who were tracked for over 10 years. By their mid-30s, the two

groups achieved comparable and exceptional success (e.g., securing top tenure-track positions) and reported high and commensurate career and life satisfaction. Park, Lubinski, and Benbow (2007) studied a sample of 2409 intellectually talented adolescents (top 1%) who were assessed on the SAT at age 13 and tracked them longitudinally for more than 25 years. Their creative accomplishments, with particular emphasis on literary achievement and scientific-technical innovation, were examined and results showed that the distinct ability patterns identified by age 13 were associated with similar forms of creative expression by middle age.

In summary, both qualitative and quantitative longitudinal studies of gifted programs demonstrate positive outcomes in cognitive, affective, and social development of participating students. The participants also pursued doctoral degrees at higher levels than expected, increased their college and work aspirations, and maintained interests and creative productive work that begins in gifted programs after they finished college and graduate school.

7. Summary and discussion

What can be learned from this examination of recent research on gifted and talented students and the programs and services in which they participate? First, research detailing less restrictive and more expanded conceptions of giftedness and talent development are more the norm than the exception in recent research that extends giftedness beyond IQ scores (Sternberg & Davidson, 2005). This review also found that the needs of many gifted and talented students are not addressed in many regular classroom settings across our country (Archambault et al., 1993; Moon et al., 1995; Reis et al., 2004; Reis & Purcell, 1993; Westberg et al., 1993). Classroom teachers can, however, learn to differentiate curriculum and instruction in their regular classrooms (Reis et al., 1993) and to implement gifted education strategies and pedagogy, such as acceleration (Colangelo et al., 2004), content and instructional differentiation and enrichment, and interest-based projects across all content areas (Field, 2009; Gavin et al., 2007; Little et al., 2007; Reis et al., 2007; Reis, Gentry, & Maxfield, 1998; Reis, Westberg, et al., 1998; Tieso, 2002).

A large body of research supports the finding that various forms of acceleration result in higher achievement for gifted and talented learners (Colangelo et al., 2004; Rogers, 1991). In addition, the use of enrichment and curriculum enhancement results in higher achievement for gifted and talented learners as well as other students (Field, 2009; Gavin et al., 2007; Gentry & Owen, 1999; Kulik, 1992; Reis et al., 2007; Gubbins et al., 2007; Rogers, 1991; Tieso, 2002). Positive findings and results have also been found relating to the use of gifted education programs and strategies that have been found to be effective at serving gifted and high ability students in a variety of educational settings and students from diverse ethnic and socioeconomic populations (Baum, 1988; Colangelo et al., 2004; Gavin et al., 2007; Hébert & Reis, 1999; Little et al., 2007; Reis & Diaz, 1999; Reis et al., 2007). Some enrichment pedagogy have even been found to benefit struggling and special needs students when implemented in a wide variety of settings (Baum, 1988; Field, 2009; Gavin et al., 2007; Gentry & Owen, 1999; Kulik, 1992; Little et al., 2007; Reis, Schader, Milne, & Stephens, 2003; Reis et al., 2007, 2008; VanTassel-Baska et al., 2002). While not all forms of pedagogy can be extended to all students, some reading and technology enrichment programs (Field, 2009; Reis et al., 2007, 2008), some content based enrichment (VanTassel-Baska et al., 2002), and some differentiation and enrichment project-based learning have been found to benefit students of all achievement levels.

Some gifted students with learning disabilities who are not identified and served experience emotional difficulties and seek counseling (Reis et al., 1997). Many gifted students underachieve in school, but this underachievement can be reversed if programmatic interventions are implemented (Baum et al., 1999; Hébert & Reis, 1999). And some gifted students do, unfortunately, drop out of high

school due to lack of engagement and success in school (Renzulli & Park, 2000). Finally, gifted education programs and strategies have been found to benefit gifted and talented students longitudinally, helping them to increase aspirations for college and careers, determine post-secondary and career plans, develop creativity and motivation that is applied to later work, and achieving more advanced degrees (Delcourt, 1993; Hébert, 1993; Lubinski et al., 2001; Taylor, 1992).

What implications emerge from this review of recent research? Gifted and talented students need programs and services that challenge them in regular classroom settings and enable them to experience enrichment (Gavin et al., 2009; Reis, Gentry, et al., 1998, 2007) and accelerated programs (Colangelo et al., 2004) to enable them to make continuous progress in school. Many gifted students underachieve in school (Reis & McCoach, 2000) and some even drop out of high school (Renzulli & Park, 2000); without programming and adequate challenge, this trend will continue. Gifted students who do underachieve can be helped; over 80% of those who underachieved reversed their underachievement when provided with challenging enriched learning opportunities in areas of interest (Baum et al., 1999).

The lack of teacher training and professional development in gifted education for classroom teachers (Archambault et al., 1993) may result in fewer challenges, less differentiation, more underachievement and dropping out, and lower achievement for all gifted and talented students. Teachers who receive professional development can learn how to differentiate and compact curriculum in order to provide more challenge to all students (Reis et al., 1993); integral to this is that teachers have adequate training, time, and support to learn how to effectively implement these skills and strategies.

Longitudinal research demonstrates the effectiveness of gifted education programs and curriculum in raising student achievement, as well as helping students to develop interests, creativity, and productivity, and career goals (Delcourt, 1993; Hébert, 1993; Lubinski et al., 2001; Taylor, 1992). Gifted education curriculum, services, and programs often benefit other students in addition to identified gifted students, including those who have special needs, such as twice exceptional children. With so much at stake, including the absence of challenge and increased levels of underachievement, coupled with the documented recorded benefits of so many gifted program services to identified and non-identified students, why isn't more being done to challenge our most able students? We must conclude that there is indeed a need for programs and services for this population. Indeed, the need may be more critical than in any time period in recent history for gifted education programs to continue to extend and enrich the educational experiences of high potential and gifted students of all racial and ethnic groups.

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