



RESEARCH CAPSULE

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Dale Romanik, Director
Christie Blazer, Sr. Research Analyst

Gifted Education: Equity, Assessment, and Curriculum

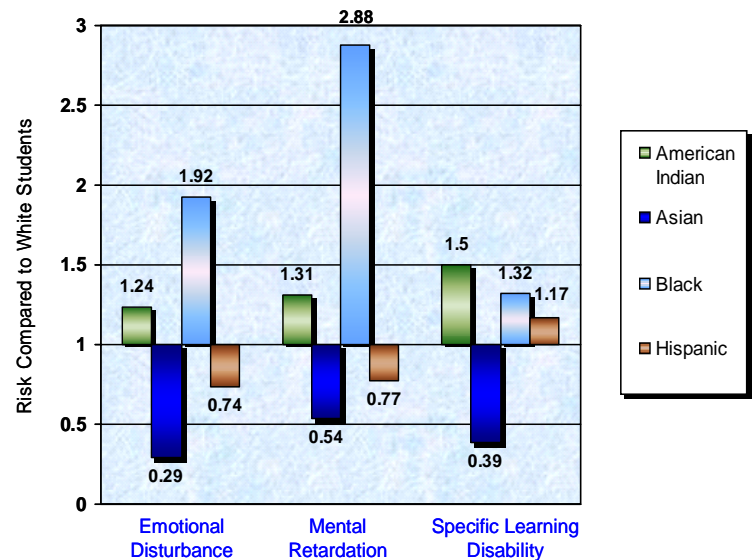
AT A GLANCE

This Research Capsule summarizes three important issues in gifted education: equity, alternative assessment strategies, and the gifted curriculum. Nationwide and in M-DCPS, more minority children are served in special education and fewer are served in gifted programs based on the percentage in the general population. Reasons for this disproportionality and recommendations for its alleviation are provided. Since the use of standardized IQ or achievement tests alone limits the number of minority children identified as gifted, a growing number of educators have begun using alternative assessments to identify gifted students. Alternative assessment strategies designed to discover talents, gifts, and creative abilities that have not been formally identified are reviewed. Development of the curriculum for gifted students is an ongoing process and must be continually modified to meet students' individual needs. A summary of the research conducted on grouping arrangements and curriculum differentiation techniques is provided. This Research Capsule is not meant to be an exhaustive review of the literature, but rather a synopsis of three important issues under discussion in the field at the present time.

Equity Issues: Disproportionality

Disproportionality refers to the fact that more minority children are served in special education and fewer are served in gifted programs than expected based on their percentage in the general population. The overrepresentation of minority students in special education and the underrepresentation of such students in gifted and talented programs has been reported on a national basis for more than 30 years (Artiles, Trent, and Palmer, 2004). Black students nationwide are nearly three times as likely as White students to be labeled mentally retarded, almost two times as likely to be classified as emotionally disturbed, and almost one and a half times as likely to be diagnosed with a learning disability (Figure 1).

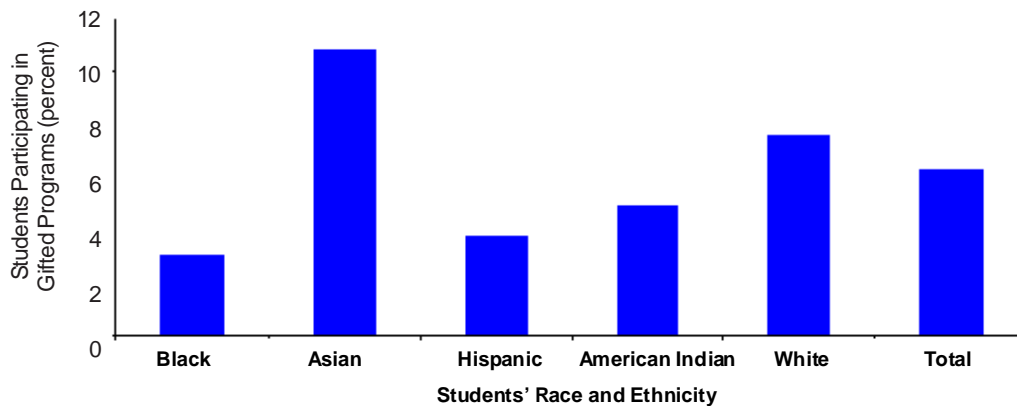
Figure 1
Likelihood of Minority Students Being Identified with Certain Cognitive Disabilities Compared to White Students



Source: Tom Parish, Disparities in Identification, Funding, and Provision of Special Education in RACIAL INEQUITY IN SPECIAL EDUCATION, by the Harvard Educational Press (2002).

In addition, the National Research Council (2003) has shown that three student groups are consistently underrepresented in gifted programs including Black, Hispanic, and Native American students (Figure 2). However, if disproportionality is based on the percent an ethnic/racial group represents in the general population, then Asian children also represent a minority group and they are overrepresented in gifted programs and underrepresented in special education. This is the opposite of the disproportionality observed with Black and Hispanic children. This finding has led some experts to question the wisdom of asserting disproportionality based exclusively on a minority group's composition in the general population. At present, a definitive solution to this dilemma is not available in the literature.

Figure 2
Proportion of Students Nationally Participating in Gifted and Talented Programs



Source: National Research Council (2003). Data from the 2000 Elementary and Secondary Survey.

The methods used to measure disproportionality are not discussed in this Research Capsule. However, the interested reader is referred to Coutinho and Oswald (2004) and Froman, Feild, and Bayne (2002) for a detailed discussion of such measures including the Composition Index, Relative Risk Index, and Risk Ratio.

Why is This Issue Important?

The decision to place students into special education can have significant long-term consequences for students. The magnitude of the issue is realized when considering that by 2040, 40 percent of the nations' students are projected to be students of color (Smith, 2003). By 2050, the number of Hispanic students nationwide is projected to increase to more than 18 million or 27 percent of all school-aged children. In addition, enrollment in special education is also associated with negative consequences including dropping out, suspensions, involvement with the juvenile justice system, and low-level employment opportunities.

The Civil Rights Project at Harvard University (Losen and Orfield, 2002) reported that 75 percent of the Black students with disabilities, compared to 47 percent of white students, were not employed two years after high school. From three to five years after high school, the arrest rate for Black students with disabilities was 40 percent, compared to 27 percent for white students.

Why Does Disproportionality Exist?

The question of why disproportionality exists in both special and gifted education has been addressed in the educational literature. However, there is a lack of consensus regarding whether it is because of cultural and linguistic differences; subjectivity inherent in the psychological assessment and placement process; environmental factors such as poverty, low birth weight, lack of adequate nutrition, and exposure to toxins; or to discrimination on the part of teachers and school officials.

Experts generally agree that some overrepresentation is to be expected since so many minority children grow up in poverty and poverty has been associated with greater developmental risks (Viadero, 2004a; Papalia, Olds, Feldman, 2002). However, a number of researchers do not believe environmental factors contribute to the higher incidence of special education placement among minority students. Losen and Orfield (2002) reported that although Hispanic and Black students suffer poverty to a greater extent than non-minority children, Black students are identified for special education in higher numbers than either Hispanic or White children. In addition, there is less of a disparity between minority and non-minority children in the frequency of “hard disabilities” such as those diagnosed in medical settings outside the purview of schools. These disabilities include orthopedic impairments, anemia, lead poisoning, hearing and vision loss, asthma, etc. Combined with the finding that Southern states constituted three quarters of the states with unusually high incidence rates of Black students being identified as mentally retarded, Losen and Orfield (2002) concluded that bias and discrimination are responsible for the disproportionality and this situation in ESE is only part of a larger issue of inequality in education. It should be noted, the majority of writers describe this discrimination as most likely inadvertent or unconscious. Unfortunately, the impact remains the same for all affected students.

What Are Other Reasons for Disproportionality?

The reasons for the disproportionality in special education and in gifted classes are complex and a multitude of other factors have been identified in the literature. Samples of these additional causal factors are listed below.

- Lack of high quality teaching yielding poor instructional quality especially at schools with large minority populations
- Teacher bias and lowered or stereotypical expectations of minority students
- Poor classroom management skills on the part of teachers
- Unjustifiable reliance on standard IQ tests and subjectivity of the decision-making process from referral to placement
- Failure to use sufficient numbers of minority students in the normative samples of standardized tests
- Tests not administered in students' native language
- Pressure to eliminate low-achieving students from the administration of high-stakes tests
- Lack of funding resulting in overidentification in ESE so poor schools can qualify for additional state and federal funding
- Continuation of the “wait-to-fail” model rather than the early intervention strategy promoting the “wait-to-succeed” model
- Performance pay models for teachers which may result in increased ESE referrals
- Increased pressure on minority student performance that can yield increased failure
- Lack of parent involvement and parent's acceptance of educators' conclusions without question
- Lack of knowledge on the part of parents regarding ESE/gifted services, procedures, and impact on students

What Can Be Done to Alleviate Disproportionality?

Alexinia Baldwin (2004a) in her book “*Culturally Diverse and Underserved Populations of Gifted Students*”, listed several assumptions that must be accepted before the necessary attitude adjustment can be made in the field of gifted education. These assumptions were taken directly from her book and include:

- All populations have gifted children who exhibit behaviors that are indicative of giftedness
- Giftedness can be expressed through a variety of behaviors
- Carefully planned subjective assessment techniques can be used effectively in combination with objective assessment techniques
- A total ability profile is important in the educational planning for gifted students
- Giftedness expressed in one dimension or domain is just as important as giftedness expressed in another
- Giftedness in any area can indicate potential giftedness in another area or be a catalyst for the development of giftedness in another area

The following recommendations have been made in the literature to rectify the underrepresentation of minority students in gifted education and the overrepresentation of such students in special education.

- Train teachers and provide high quality instruction to ALL students
- Improve early identification and intervention programs
- Recruit teachers and administrators from diverse backgrounds
- Use a pre-referral process to assess students’ ability to deal with the regular classroom setting prior to ESE referral
- Use ethnographic assessment procedures to observe potentially gifted students in multiple situations or contexts over time
- Increase referral and evaluation accuracy by using multiple assessments and culturally diverse assessment teams
- Inform parents about characteristics of gifted children and involve parents in the nomination process for gifted education
- Train teachers to recognize gifted students with limited English language skills and the characteristics of gifted students from various cultures
- Eliminate teacher bias and improve teachers’ perceptions of students from diverse cultures
- Ensure accountability when disparities are large and persist over time

Is Recruiting Minority Students Enough?

Although the vast majority of the educational research pertains to recruiting minority students for inclusion into gifted programs, a related area of concern has emerged regarding retaining these students in the programs once they are enrolled. Moore, Ford, and Milner (2005) reported the underrepresentation issue will continue until educators more effectively address recruitment and retention. Therefore, recruitment is not enough to alter the demographics of students enrolled in gifted programs.

Moore, Ford, and Milner explained, “. . . national trends indicate that too many Black students do not wish to be involved in gifted education if there are few ethnic minorities in the programs, if they feel isolated from other gifted students, if they are teased by Black peers for achieving, and if they have poor (i.e., weak or negative) racial identities.” p. 2 These authors concluded, public schools need teachers and counselors who understand these issues and are willing and capable of assisting minority students in adjusting to the psychological and social demands placed on them by virtue of their enrollment in gifted programs.

On a Local Note: Equity in Gifted Education

The Florida Department of Education (2002) provided statewide and district data regarding the composition of Black and White students identified as emotionally handicapped (EH) for 2001-02. Out of a total of 2,874 M-DCPS students identified as EH, 122, or 4.2 percent, were White and 1,625, or 56.5 percent, were Black. Relative Risk Ratios indicated that Black students attending M-DCPS were 4.7 times as likely as White students to be identified EH. This ratio was relatively high since it ranked 16th (highest) out of the 67 Florida counties and exceeded the statewide average of 3.4.

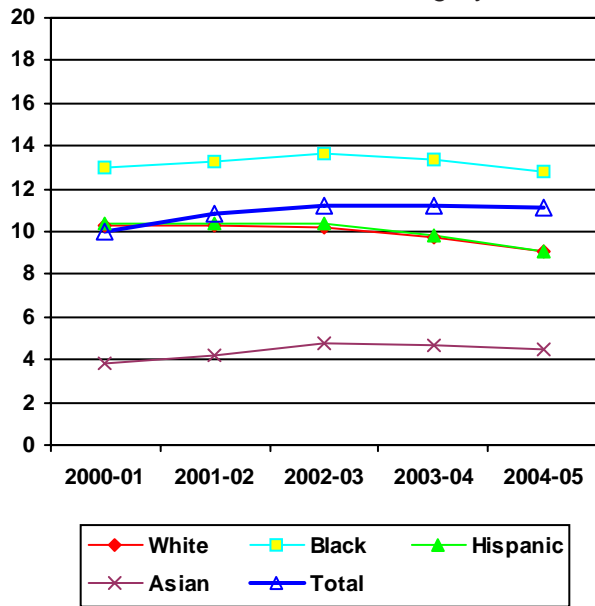
Data from the M-DCPS Statistical Abstract were examined over the past five years (2000-01 to 2004-05) and are displayed in Figure 3. These data indicate that larger proportions of Black students (12.8% to 13.6%) were enrolled in the ESE program (all disabilities combined, excluding gifted) over the four-year period when compared to either White students (9.1% to 10.3%) or Hispanic students (9.1% to 10.4%). Transforming these data into Relative Risk Ratios yielded approximately 1.4 for Black students and 1.0 for Hispanic students. Therefore, Black students were 1.4 times as likely as White students to be labeled disabled and Hispanic students were identified as such at the same frequency as White students. Asian students were enrolled in ESE at the lowest rate (3.8% to 4.8%) yielding a Relative Risk Ratio of approximately .42 indicating less frequent identification than White students. These data follow the national trends reviewed above.

In addition, Asian students were enrolled in gifted classes from 2000-01 to 2004-05 at a higher rate (17.9% to 18.5%) than either White students (13.9% to 14.8%), Hispanic students (5.9% to 6.7%), and Black students (3.3% to 3.6%). These data are displayed in Figure 4 and also follow the national trends discussed previously. Comparing Asian students to White students provides a Relative Risk Ratio of approximately 1.3 indicating that Asian students are 1.3 times as likely to be identified as gifted. However, using Black students as a comparison group yields a Relative Risk Ratio of 5.5, indicating Asian students were selected for the gifted program in 2001-02 over five times more frequently than Black students.

In addition to the high percentage of Asian students enrolled in gifted programs, such students also excel on other indicators of academic success. For example, as a percentage of 2003-04 M-DCPS membership in grades 9-12, Asian students sitting for Advanced Placement Tests passed these tests at a rate two times that of white students and four times that of Hispanic students. In fact, M-DCPS Asian students passed the Advanced Placement Exams 20 times more frequently than Black students when considering passing rates as a percentage of all M-DCPS students within the same ethnic/racial group.

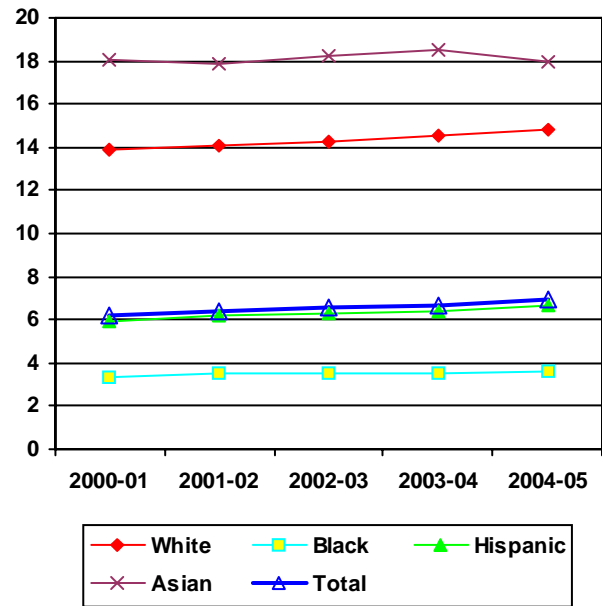
The superior academic performance on the part of Asian students has been documented frequently in the educational literature (Vivian, 2001). Several authors have offered the opinion that this academic superiority on the part of Asian students is the result of cultural heritage where emphasis is placed on

Figure 3
M-DCPS Students Served in Exceptional Student Education Programs (Excluding Gifted) as a Percentage of Membership In Each Ethnic/Racial Category



Source: M-DCPS, Statistical Abstract, Research Services.

Figure 4
M-DCPS Students Served in the Gifted Programs as a Percentage of Membership In Each Ethnic/Racial Category



Source: M-DCPS, Statistical Abstract, Research Services.

academic achievement and hard work. School work is considered to be the most important activity in which an Asian child participates and almost all other activities are secondary. It is perceived to be the royal road to success and prosperity, as well as a way to ease discrimination for the next generation. Vivian (2001a) conducted extensive interviews with Chinese Americans and concluded that, "The parents taught their children to be mindful of racial discrimination, to work harder than other people for the same results, and to pay particular attention to education as a way to level (somewhat, at least) an unequal playing field." p. 455.

Other authors indicate that Asian families have not experienced the degree of discrimination and lack of opportunities over time that other minority groups have endured. Therefore, the obstacles they need to overcome are not as limiting nor oppressive as those confronted by other ethnic/racial minorities. It is difficult to find consensus regarding the driving forces behind the academic accomplishments of Asian children. However, educators should examine the environmental and sociological antecedents in order to share this success story with other groups of students.

Assessment Strategies

Traditional Assessment

Although the predictors used to identify students with disabilities are well established, there is minimal consensus regarding identifying gifted students. The main ideas presented in this section emphasize the notion held by a number of experts, that the use of standardized IQ or achievements tests alone to identify gifted students will limit the numbers of minority children included in gifted programs (Baldwin 2004b). Many of these students excel in abilities and skill areas not conducive to identification using traditional testing instruments such as the Wechsler Intelligence Scale for Children or Stanford-Binet Intelligence Scale. As a result, children with nontraditional talents and children from disadvantaged families are frequently underrepresented in gifted programs.

Authors addressing assessment strategies recommend a broader definition of intelligence like that used in Howard Gardner’s Theory of Multiple Intelligences (1993). Gardner proposed the use of eight different domains or types of human intelligence. These areas are described in detail in the following table.

Eight Intelligences, According to Gardner		
Intelligence	Definition	Fields or Occupations Where Used
<i>Linguistic</i>	Ability to use and understand words and nuances of meaning	Writing, editing, translating
<i>Logical-mathematical</i>	Ability to manipulate numbers and solve logical problems	Science, business, medicine
<i>Musical</i>	Ability to perceive and create patterns of pitch and rhythm	Musical composition, conducting
<i>Spatial</i>	Ability to find one’s way around in an environment and judge relationships between objects in space	Architecture, carpentry, city planning
<i>Body-kinesthetic</i>	Ability to move with precision	Dancing, athletics, surgery
<i>Interpersonal</i>	Ability to understand and communicate with others	Teaching, acting, politics
<i>Intrapersonal</i>	Ability to understand the self	Counseling, psychiatry, spiritual leadership
<i>Naturalist</i>	Ability to distinguish species	Hunting, fishing, farming, gardening, cooking

The use of intelligence tests is controversial. The main controversy is fairness and equity. Critics claim they underestimate the intelligence of children from non-middle class backgrounds. IQ tests are considered culturally biased since they assess the amount of information acquired about the prevailing or dominant culture. Scores can suffer if the examinee is not part of nor familiar with the dominant culture. The testing industry has tried for years to develop reliable and valid “culture free” and/or “culture fair” intelligence tests. Most of these instruments limit the use of language and include nonverbal items requiring “figural reasoning” using geometric designs.

Lohman (2005) concluded that such tests are not the answer either since they are like measuring running speed to select speed skaters for the Winter Olympics. Running speed is correlated to or associated with being a good speed skater, however, it is only one attribute of a competent world-class athlete. Such an assessment would select many athletes that would not be prepared to excel in skating. Nonverbal IQ tests are viewed similarly since they measure only a small fraction of the skills required to excel in academics. Lohman suggested using cognitive tests since cognition or the ability to think is more closely related to the behavior you are trying to predict (i.e., academic performance).

Other authors claim there is nothing wrong with the traditional IQ tests but rather the problem lies with the individuals responsible for their administration, interpretation, and those making important decisions about children as a result of the test scores (Dawson 2003). Some consider the assessment of intelligence an art as well as a science. If these tests are administered to learn about how an individual child confronts an intellectual challenge, how they think, reason, and solve problems, then IQ tests can be very helpful in determining intellectual giftedness and the identification of children with learning disabilities. Therefore,

such tests can be used as stimulus materials for dynamic assessment described below. However, IQ tests are not valuable if they are administered solely for the purpose of securing an IQ score. Much depends on the training, skill level, and intent of the person using the test.

Alternative Assessment

An alternative form of assessment can be defined as “. . . any form of measuring what students know and are able to do other than traditional standardized tests” (Council for Exceptional Children, 2000). The main purpose of these methods is to identify children who have talents, gifts and creative abilities that have not been formally identified and developed. A number of alternative assessment strategies are currently being used across the country for gifted and special education placement. A brief description of some of these assessment tools is provided below. Reliability and validity studies have been more rigorously conducted on the non-traditional student assessments listed below, as opposed to the other strategies listed. The work of several authors has been used in the following section including Lohman (2005), Baldwin (2004), Castellano (1998), Naglieri, et al. (2003), Schwartz (1997), Scott, Deuel, Jean-Francois, and Urbano (1996), and Feuerstein, Rand, and Hoffman (1979).

- **Authentic Assessment:** A general term indicating assessment of student knowledge using real world activities rather than standardized tests
- **Dynamic Assessment:** A diagnostic procedure that takes into account the context of the testing situation and the ability of a student to learn from experience in that context. The student is given the opportunity to transfer newly acquired skills into new and novel situations. The types of errors are noted so that a record of problem solving strategies and abilities can be recorded.
- **Non-traditional Standardized Assessment**
 - ♦ Ravens Standard Progressive Matrices
 - ♦ Advanced Ravens Progressive Matrices
 - ♦ Naglieri Nonverbal Ability Test
 - ♦ Torrance Tests of Creativity
 - ♦ Baldwin Identification Matrix
 - ♦ Screening Assessment for Gifted Elementary Students (SAGES)
 - ♦ System of Multicultural Pluralistic Assessment (SOMPA)
 - ♦ Scale of Rating Behavioral Characteristics of Superior Students
 - ♦ Abbreviated Binet for the Disadvantaged (ABDA)
 - ♦ Cognitive Abilities Test (CogAT).
 - ♦ Discovering Intellectual Strengths and Capabilities while Observing Varied Ethnic Responses (DISCOVER)
 - ♦ Learning Potential Assessment Device (LAPD)
- **Curriculum-Based Measurement (CBM):** CBM uses the student’s curriculum to guide assessment with the results being used to develop intervention strategies. An example of CBM would include quantifying student performance by counting the number of words read correctly in one minute. Related methods are Instructional Assessment (IA) and Curriculum-Based Assessment (CBA).
- **Performance-Based Evaluation:** Assessment that requires a student to create or develop an answer or product that demonstrates his or her knowledge or skills
- **Portfolio Assessment:** A systematic collection of background materials including student records, letters of reference, work samples which document skills, capabilities, and extent of creativity
- **Peer and Self Nominations:** Asking students who the smartest student is in the classroom assists teachers in identifying an otherwise unidentified student; biographical inventories

- Teacher Observation: Teachers can see how children use their time and how many talent indicators a child expresses
- Behavioral Checklists: Observe classroom behaviors such as how students solve problems, how they use their time, and how many talent indicators apply to them
- Past School Performance: Examining academic performance at the preschool level and throughout schooling
- Parent Interviews: Parents are questioned regarding their child's talents, level of attention, and absorption in intellectual tasks
- Writing and Other Samples of Creativity: Evaluating writing samples can provide important information regarding use and generation of ideas

In an attempt to promote equity in special and gifted education placement, the National Center for Culturally Responsive Educational Reform (2005) has developed a school level self-assessment tool for elementary schools to evaluate whether they are culturally responsive to the needs of students from culturally and linguistically diverse backgrounds. The checklist is organized into five domains previously identified by research. The five domains include: 1) school governance, organization, and climate; 2) family involvement; 3) curriculum; 4) organization of learning; and 5) special education referral process and programs. The school principal facilitates the evaluation along with assistance from teachers and other school staff. Questionnaires are completed and address all five domains. The areas needing improvement are targeted yielding a "culturally responsive school improvement plan."

On a Local Note: Assessment in Gifted Education

Qualification for M-DCPS gifted programs includes a provision to select traditionally underrepresented groups in order to increase their participation. This provision complies with the district's post-unitary plan of action developed to ensure equity in educational opportunities. It also is in response to a mandate from the Florida Department of Education to increase minority representation in gifted programs. According to data provided by M-DCPS Department of Advanced Academic Programs, 39 percent of the students enrolled in the gifted program receive free/reduced price lunch and 7 percent are Limited English Proficient (LEP). This compares to district percentages of 63 percent free/reduced lunch and 27 percent LEP.

Students qualify for M-DCPS gifted programming according to the following criteria:

- score two standard deviations or more above the average IQ score on a standardized test of intelligence;
- majority of personal characteristics defined as gifted are exhibited by the student and are recorded on a standard scale or behavioral checklist. The "Teacher Nomination Form for Gifted Programs -Rating Scale" was described by Advanced Academic Program staff as including learning characteristics identified by educational research. In addition, the form was approved by the State prior to use and includes 39 items which are subjectively rated on a four-point Likert scale.
- membership in an underrepresented group including limited English proficient or low socioeconomic status. Eligibility for gifted programs for such students requires completion of the "Gifted Eligibility Determination Form For Use With Underrepresented Students." This form entails ratings on several criteria: documented need for a special program; Teacher Nomination Rating Scale; and score equal to or higher than the 98th percentile on a standardized achievement test (e.g., SAT-9, MAT-7, FCAT-NRT, WISC, Binet, etc.) or a score of at least nine points on a matrix scoring system involving the above categories.

Data provided by Advanced Academic Programs using the above criteria indicated, 24,434 students or six percent of the total M-DCPS membership participated in gifted programming during 2003-04. Ninety-one percent of gifted students compared to 47 percent of students districtwide scored three and above on FCAT Reading during 2003-04. Additionally, 96 percent of gifted students scored three and above on FCAT Mathematics compared to 52 percent of students districtwide.

Curriculum

Developing a sufficiently rigorous curriculum for gifted students is a challenging task. A uniform curriculum delivery option will probably not meet the needs of all gifted students. It is difficult to make generalizations about gifted students because their characteristics and needs are unique; however, as a group, they comprehend complex ideas quickly, learn more rapidly and in greater depth than their peers, and make connections between seemingly unrelated concepts (Center for Talent Development, 2002; Berger, 1991).

When planning the gifted curriculum, schools often think in terms of one gifted program instead of the need to offer an array of services. Rather than trying to determine the “best” model for curriculum delivery, schools should ascertain the academic needs of the particular gifted population they are serving and offer the range of services for which they have the available resources (Center for Talent Development, 2002).

Research on Gifted Education Curriculum

The field of gifted education is characterized by a lack of empirical research on the effectiveness of curricular options offered to gifted students, particularly minority gifted students. Although educators have many theories and recommendations about the best practices in the classroom, few studies have been conducted on the effectiveness of specific instructional strategies and interventions (Center for Talent Development, 2002; National Research Council, 2002).

The research base is further limited by problems surrounding the interpretation of results. First, comparison and generalization of findings are often difficult because of the wide variability in the definition of “gifted” used in the studies. Second, many of the studies lacked a comparison group, limiting the interpretation of findings. Finally, many researchers studied differing curricular models, rather than specific instructional strategies. For example, the term “acceleration” may refer to early entrance into kindergarten, grade skipping, or early entrance into college. While all of these options deliver advanced content, the variety of delivery methods may produce significantly different results (National Research Council, 2002).

With these limitations in mind, a sampling of research conducted on the effective program components of gifted education, as well as a summary of generally accepted practices, is provided below.

Grouping Arrangements

Debate among educators regarding the education of gifted students has focused on the format for delivering instructional services. Educators have tried to determine if students are served better through ability grouping or inclusion. Ability grouping refers to the provision of special programs outside of the regular classroom. Inclusion is the main streaming of gifted students into regular classrooms with students of varying ability levels (Mutter et al., 1998).

Models of grouping students for gifted education include (Hearne and Maurer, 2000):

- Self contained classroom (for all or part of a day).
- Inclusion of gifted students into regular classrooms.
- Pull out model. Students leave their regular classroom for a specified period of time for specialized instruction and then return to spend the remaining time in the regular classroom.

- Cluster grouping (variation on the pull out model). Cluster grouping occurs within the regular classroom where identified students are assigned to a group or cluster and the teacher modifies the curriculum and instruction to meet their needs. This model allows students to remain in the regular classroom, while still having access to others of similar ability, and reduces the need for pullout.
- Cross-grade grouping. Several age-grade groups are combined in one classroom. This allows for a range of resources and pacing of instruction. When team teaching and looping are added to this model, it can provide a viable alternative for instructional grouping of gifted students.
- Special schools. The entire school is dedicated to the education of gifted children and enrolls only gifted and high ability students. The special, or gifted, school model allows gifted students to interact with others of high ability throughout the day. The curriculum and instructional strategies are designed to help students develop high levels of skill in critical and creative thinking, problem solving, research, and communication.

Mutter et al. (1998) reported that ability grouping produces higher levels of achievement; is more likely to provide a challenging curriculum; promotes peer support among gifted students; and is easier for teachers instructionally because of the more homogeneous nature of the group. Hearne and Maurer (2000) concluded that inclusion didn't allow students to be challenged to their full potential or to interact with others of similar ability. They found that time spent in the regular classroom was not individualized enough to meet the needs of gifted students. Mutter et al. (1998), however, suggested that inclusion offers some benefits. They state that inclusion provides gifted students with more exposure to their age peers and serves more borderline gifted students who do not qualify for special programs.

A longitudinal study of over 1,000 second and third grade students from 14 schools in 10 states compared the effects of teaching gifted students in regular classrooms, pull-out classrooms, self-contained classrooms, and special school programs. Results indicated that gifted students in self-contained classrooms, pull-out classrooms, and special schools had higher levels of achievement than gifted students taught in regular classrooms. Gifted students taught in regular classrooms received the lowest scores in all areas of achievement (mathematics concepts, mathematics problem-solving, reading comprehension, science, and social studies). Black students in the study received significantly lower test scores than White students; however, there were no differential effects for White and Black students by grouping arrangement, leading the researchers to conclude that no particular grouping arrangement affected learning outcomes according to racial/ethnic status (Delcourt et al., 1994).

Lou et al. (1996) examined research that studied the effects of small group versus whole class instruction and the effects of heterogeneous grouping versus homogeneous grouping (based on student achievement and attitudes toward learning). They concluded that, on average, gifted students receiving small group instruction achieved significantly more than students receiving whole class instruction. Overall, results favored homogeneous grouping; however, peer influences and the extent to which materials were appropriately tailored to the group's readiness to learn greatly influenced academic performance in small group learning situations.

Differentiated Curriculum

The most promising strategies for differentiating curriculum for gifted students include:

- Increase the level of abstractness in the curriculum. A discovery approach that encourages students to explore concepts, emphasizes understanding concepts rather than memorizing facts, and provides opportunities for interdisciplinary connections will better differentiate content for gifted students (Maker and Nielson, 1996; Van Tassel-Baska, 1994).

- Add variety and complexity to the content. Students should be exposed to new materials, books, tools, and people that will help stimulate curiosity and creativity. One of the easiest ways to present more challenging content is to provide students with advanced materials. Textbooks, trade books, and other resources from higher grade levels or even written for adults will provide more complexity (Maker and Nielson, 1996; Tirosh, 1989).
- Encourage self-directed learning. Self-directed learning is not a single strategy, but a range of methods. The appropriate strategies will depend on students' levels of readiness. Some students will be able to choose their own topics of study or design a final product, while others will need a list of ideas from which to choose. Basic skills included in self-directed learning include making choices, planning, setting goals, and identifying resources. As students practice and master these skills, they will become increasingly self-directed. The primary goals of self-directed learning are that students make decisions based on self-knowledge; assume responsibility for completing their work; seek and articulate problems and determine a method for solving them; and evaluate their own work (Stepanek, 1999; Tomlinson, 1993; Treffinger and Barton, 1988).
- Create learning centers to enrich and add variety to the curriculum. Learning center topics might be those that are connected to, but not usually included in, the curriculum. Activities should be challenging and address students' learning styles and preferences. Learning centers can also be created by students for their classmates as independent projects. Students should be responsible for designing visual displays, preparing materials, creating activities, and gathering resources (Smutny et al., 1997; Lopez and MacKenzie, 1993).
- Conduct seminars with small groups of students within a class. Seminars provide students with the opportunity to learn more about topics that are not covered in their regular class work. Students themselves should determine the scope and activities of the seminar, with the teacher serving as an advisor. The students select the ideas they will discuss, the questions they will pursue, the overall time line of their work, and what final products they will produce to demonstrate what they have learned. There is no set length of time that the seminar should last, but there should be sufficient time for students to pursue the topic in depth. The seminar meetings can be scheduled for times when other students are working on content that the seminar members have already mastered, or when all students are pursuing independent learning activities (Stepanek, 1999).
- Engage students in problem-based learning, a type of problem solving in which students are presented with an "ill-structured" problem. This type of problem resembles a real-life situation in that students don't have all the information they need to solve the problem. Students usually work in groups to solve the problem. They are responsible for identifying additional data and resources they will need, determining which group members will focus on which parts of the problem, and deciding how to present their findings. Groups can demonstrate their learning through presentations, exhibits, written reports, or videos. The teacher helps students plan their work, analyze their progress, and question their assumptions, but does not provide students with information or outline the processes to use (Gallagher et al., 1995; Van Tassel-Baska et al., 1993). An example would be to ask students to re-design the physical layout of their school so that it promotes the optimum school atmosphere or climate.

The open-ended nature of problem-based learning activities allows for differentiation in a number of ways. Students can combine their strengths, choosing areas of the problem to concentrate on according to their preferences and abilities. They can decide how much information they want to work with, how complex their solutions will be, and how they will demonstrate their learning. The teacher may also provide varying levels of guidance. Some students will need more assistance with defining the problem and planning their work than others (Stepanek, 1999).

- "Most Difficult First" is a strategy for changing the pace of the curriculum and is used most frequently in mathematics instruction. Students are allowed to work on the five most difficult

problems instead of completing the whole assignment. If the students are successful, they are allowed free time or asked to work on an alternative enrichment activity (Winebrenner, 1992).

- Contracts are written agreements between teachers and students that outline what students will learn, how they will learn it, in what period of time, and how they will be evaluated. Contracts allow students to engage actively in the decision-making process and to direct their own course of study. The contract specifies the concepts students will learn, the activities they will engage in, the projects they will complete, and the outcomes or evaluative criteria needed to demonstrate mastery (Winebrenner and Berger, 1994).
- Acceleration means moving through the traditional curriculum at faster rates than usual to match the level and complexity of the curriculum with the readiness and motivation of the student (Colangelo et al., 2004). Forms of acceleration include grade skipping, early entrance into kindergarten, early exit from school, acceleration in a specific subject, and dual enrollment in high school and college (Pennsylvania Association for Gifted Education, 2004).

Research shows that gifted students who have been allowed to accelerate through school outperform gifted students who stay with their own age group. The average achievement difference amounts to almost one grade level (Viadero, 2004b). Studies have concluded that students who are accelerated tend to be more ambitious and earn graduate degrees at higher rates than other students. Interviewed years later, the majority of accelerated students reported that acceleration was a beneficial experience and that they had felt academically challenged and socially accepted (Colangelo, 2004). Research also shows that gifted students who do not accelerate through school at an appropriate pace often exhibit boredom, poor study habits, underachievement, and behavior problems (Pennsylvania Association for Gifted Education, 2004).

Barnett and Durden (1993) compared students who participated in the Johns Hopkins University Center for Talented Youth academy programs with nonparticipating students over a five-year period. The Johns Hopkins model is an out-of-school model with instruction offered through colleges and universities in the summer. Both groups of gifted students exhibited high academic achievement, but the students enrolled in the Johns Hopkins Center took more advanced courses at an earlier age and enrolled in more college courses while in high school.

- Curriculum compacting is a form of acceleration and is a method of differentiating content that allows the curriculum to be adapted to meet gifted students' learning needs. When gifted students are proficient in the base curriculum, they are provided time for more challenging curriculum. Students are preassessed to determine which parts of a particular unit of instruction they have already mastered. Content or skills that students are proficient in are replaced with alternative topics or projects to eliminate busywork and repetition (National Research Council, 2002; Hearne and Maurer, 2000; Stepanek, 1999).

A study by Reis et al. (1993) found no significant differences in the mathematics, language arts, science, and social studies achievement test scores of gifted students who had between 40 and 50 percent of their curriculum eliminated and gifted students who experienced the full range of the curriculum. Examination of trends indicated that ceiling effects on the one-year-out-of-level tests may have masked greater gains by the curriculum-compacted group. Reis et al. (1993) reported that the most frequently compacted subject was mathematics, followed by language arts.

- Flexible pacing is a key concept in structuring programs for the gifted. It enables students to work at the level most appropriate to their abilities. The use of continuous progress reports allows teachers to modify instruction so that the pace and content level are engaging to students, and provides the opportunity for teacher feedback, direction, and structure (Ysseldyke et al., 2004; Berger, 1991; Miller, 1990).

Accelerated Math (AM) is a computer-based instructional system that facilitates differentiated instruction in mathematics by allowing students to progress at their own speed. It is flexible enough to allow students the opportunity to develop more advanced mathematics skills if their pace and understanding move ahead of others. AM helps teachers assign instruction that is matched to students' skill development and monitors progress toward mastery of mathematics objectives. It also provides immediate feedback to both the teacher and student on mathematics performance. AM is used to track student performance in the curriculum, assign work, and let teachers know when students need assistance. Ysseldyke et al. (2003a; 2003b; 2004) conducted research on the effectiveness of AM as an enhancement to the mathematics curriculum. In each of the three studies, the use of AM resulted in significant differences in mathematics achievement between gifted students whose teachers used the program and gifted students whose teachers did not use the program. The researchers concluded that the extent to which students are provided extra opportunities for learning may not matter as much as the type and structure of the practice provided, matched with individual pacing and feedback.

On a Local Note: Curriculum in Gifted Education

In M-DCPS, gifted education programs are offered to students in grades kindergarten through 12. The district employs the following gifted program delivery models:

- Elementary Resources (K-5/6): Students attend the gifted program two days a week and the basic instructional program for basic instruction three days a week. During the two days in the gifted program, students complete in-depth studies in their particular areas of interest and giftedness with an open access to curriculum content.
- Elementary Content (K-5/6): Students attend the gifted program for a block of time from 2 to 2½ hours each day. They receive a total of 10 to 12 hours of gifted services per week and interdisciplinary instruction around selected basic subjects.
- Full time (K-5/6): Students are served in a self-contained classroom in which gifted strategies are utilized throughout the school day and across all subject areas. Students receive a total of 25 hours of gifted services per week.
- Middle School (6-8): Middle school gifted programs offer gifted content area courses and/or an elective resource class.
- Senior High (9-12): Senior high gifted programs offer gifted content area courses (Honors and/or Advanced Placement) and/or an elective course in philosophy or research.

The curriculum for gifted programs utilizes, in part, the preceding methods of curriculum differentiation, including acceleration and enrichment of the curriculum content with more emphasis on depth, breadth, complexity, or abstractness than the general curriculum.

Overall Summary

This research capsule summarized three important issues in gifted education: equity issues, alternative assessment strategies, and curriculum delivery models. Nationwide and in M-DCPS, more minority children are served in special education and fewer are served in gifted programs based on their percentage in the general population. Possible reasons for this disproportionality, including cultural and linguistic differences, subjectivity inherent in the assessment and placement process, and discrimination on the part of teachers and school officials, are discussed.

The use of standardized IQ or achievement tests alone limits the number of minority children identified as gifted. Many students excel in abilities and skill areas not conducive to identification by traditional testing instruments. In addition, some educators claim that bias exists in the administration and interpretation of test scores. In response to these assertions, a growing number of educators have begun using alternative

assessment strategies to discover talents, gifts, and creative abilities that have not been formally identified and developed, such as dynamic assessment, curriculum-based measurement, performance-based evaluation, and portfolio assessment.

Research on grouping arrangements for the gifted tends to support the effectiveness of the ability grouping model (self-contained classrooms and variations of the pull-out model) over the inclusion (or main streaming) model. Studies have also focused on how to successfully differentiate the gifted curriculum. Acceleration, curriculum compacting, and flexible pacing have been found to have a positive impact on gifted students' levels of achievement. Other curriculum differentiation strategies, such as problem-based learning, written contracts, and learning centers, are based on sound educational principles, but their impact on gifted students' academic performance has yet to be empirically confirmed.

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