Increasing Minority Children's Participation in Gifted Classes Using the NNAT: A Response to Lohman

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ABSTRACT

In a previous article, we (Naglieri & Ford, 2003) provided evidence from a large-scale study that similar proportions of White, Black, and Hispanic children would be identified as gifted using the Naglieri Nonverbal Ability Test (NNAT; Naglieri, 1997). Lohman (2005) has taken issue with our conclusions and our methods. We provide several responses to his arguments and make five important points. First, we take the position that underrepresentation of minority children in classes for the gifted is a serious problem that must be remedied. Second, traditional measures of ability that include verbal and quantitative tests pose particular problems to less-advantaged children who may be intelligent, but lack verbal and math knowledge. Third, we argue that the CogAT verbal and quantitative tests of "ability" correlate higher with the ITBS "achievement" tests than the CogAT nonverbal tests of ability because of the similarity of skills needed to answer the items on both the ITBS and the CogAT. Fourth, we reject an emphasis on "academically gifted" children that excludes the identification of "intellectually gifted" children who happen to have poor academic skills. Fifth, we request that critics of the NNAT provide evidence of the magnitude of race and ethnic differences, as well as the likely effect on representation of minorities using whatever alternatives they propose.

Before we offer one perspective, express one opinion, or argue one point, it is important for the reader to know who we are and what goals we have on behalf of gifted children. First, it is obvious that one of us is the author of the Naglieri Nonverbal Ability Test (NNAT; Naglieri, 1997) and a psychologist who has examined the role intelligence tests can play in the identification of diverse populations of gifted children. Second, it is also well known that the other author is an educator who has worked more broadly within the area of gifted education to address the persistent problem of minority student underrepresentation. Both of us have worked to increase representation of minority children in classes for the gifted and have provided many research papers, conceptual papers, and presentations on this topic. Our positions and goals are clear.

First, we find the fact that minority children are underrepresented in classes for the gifted (U.S. Department of Education, 1993) to be unacceptable. Second, we call for continued study of the ways current identification methods, including tests, contribute to the disproportional representation of minority children in programs for the gifted. Third, we urge expanded efforts to determine ways to increase the diversity of children who are in need of gifted programs and services. Fourth, we challenge the field to meet the needs of gifted minority children who, despite being "intellectually gifted" (e.g., children who demonstrate high scores on a nonverbal test of intelligence), may not have a history of strong academic achievement and, therefore, are not nominated for inclusion in gifted programs. Finally, we reject limiting the definition of gifted to those who demonstrate "academic giftedness" as described by Lohman (2005). Instead, we support the notion of potential and believe, as does the U.S. Department of Education (1993), that some students demonstrate their gifts and talents while others show the potential for responding positively to gifted education services. That is not to say we reject the concept that gifted children are those who demonstrate high academic achievement, but that we also accept that a child may be intellectually gifted but *not* demonstrate high academic achievement. Some scholars refer to such children as potentially gifted or underachievers. Once these students have been found—most likely using a nonverbal test of general ability—then they should be provided appropriate educational instruction.

Before we present any response to the technical issues raised by Lohman, we urge the reader to consider why he objects to our inclusion of a nonverbal approach to assessment and why he has devoted so much effort to criticizing the NNAT and the Naglieri and Ford (2003) study. We suggest that there are at least two main issues that underlie Lohman's concerns. First, he has a very different view about the characteristics of a gifted child, and second, he is the author of the Cognitive Abilities Test (CogAT; Lohman & Hagen, 2001). We will discuss the latter issue first.

Readers of Lohman's critique of our 2003 research paper on the NNAT need to know that he is an author, along with Elizabeth Hagen, of the CogAT. Like the NNAT, the CogAT is a group-administered test that can be used as part of the identification process for gifted children. Unlike the nonverbal NNAT, the CogAT is comprised of Verbal, Quantitative, and Nonverbal Batteries. Both tests can be used to measure general ability, but they are distinguished by considerable differences in item content. This disparity in content reflects a significant difference in the ways the authors conceptualize and measure general ability, and it has considerable influence on who is eventually identified as gifted.

General Issues Regarding Gifted Identification

There is no consensus in the field about how ability should be measured. While many professionals use some type of a test, there is no consensus as to which test should be used and what other information should be gathered. For example, Lohman's view of how ability should be measured during the process of screening for gifted children is considerably different than that used by Naglieri and Ford (2003). Lohman and Hagen (2001) have stated that verbal, quantitative, and nonverbal cognitive tasks are necessary to obtain a "reliable measure of those reasoning abilities that research has consistently shown to have significant positive correlations with a wide range of important societal and educational criteria" (p. 5). Lohman (2005) argues that "academically talented" students (e.g., those with high achievement scores) should be identified as gifted. If gifted is defined as those with high achievement, then it would seem reasonable that a test of achievement would be sufficient for identification. In contrast, we suggest that nonverbal tests alone are advantageous in that they

Table 1

Average Correlations Between the CogAT and ITBS for Two Samples of Children in Grades 4 and 6 (N = 7,364)

	Verbal	Quantitative	Nonverbal
Reading & Language	.77	.64	.59
Mathematics	.71	.74	.66

provide a more equitable evaluation of children from culturally and linguistically diverse populations. Moreover, we believe that the apparent psychometric advantage verbal and quantitative tests have over nonverbal tests for prediction of achievement is due to the similar skills needed to solve the items included in the verbal, quantitative, and achievement tests, rather than some theoretical advantage.

At the crux of Lohman's argument about verbal and quantitative versus nonverbal tests is his position that verbal and quantitative scores are more highly related to achievement than nonverbal scores. His position is consistent with data provided in Table 8.9 of the CogAT Manual (Lohman & Hagen, 2001), which provides correlations of the three CogAT scales with the Iowa Test of Basic Skills (ITBS; Hoover, Dunbar, & Frisbie, 2001) Reading, Language, and Mathematics sections. To summarize that table, we computed the average correlations between the three CogAT scores with the Reading, Language, and Mathematics portions of the ITBS (see Table 1) for the two samples combined (N = 7,364). It is clear that the CogAT Verbal correlated the highest with Reading and Language (.77); Quantitative correlated the highest with Mathematics (.74). The CogAT Nonverbal scale correlated .59 with Reading and Language and .66 with Mathematics. One interpretation of these findings is that the verbal and quantitative tests are better measures of "ability" than nonverbal tests because they predict achievement better. Although the data seem to support this view, there is an important confounding factor that should be considered whenever verbal and quantitative tests included in a measure of "ability" are correlated with reading and language tests in a measure of "achievement."

The CogAT Form 6 Level D Verbal Battery contains three tests: Verbal Classification, Sentence Completion, and Verbal Analogies. The Verbal Classification items require the child to determine how the three key words are alike (e.g., the words *red*, *brown*, and *yellow* with the options *color*, *crayon*, *paint*, *green*, and *marker*). Obviously,

knowledge of words, a common part of any curriculum for young children, is required to solve this item. If the child does not know these vocabulary words, then he or she will not be able to classify the words into a group of colors and then solve the item. In addition, if the item is intended to measure some type of verbal reasoning, lack of knowledge of the words will interfere with the child's ability to reason and, therefore, threaten the validity of the measure. Knowledge of words is also required in the ITBS, which is an "achievement" test often used with the CogAT.

The Reading portion of the ITBS includes a Vocabulary test. In this test, a word is presented within the context of a short phrase or sentence. Students select the answer that has the same meaning as the target word. For example, the sentence "To peek in the box" and options *push, stand, break,* and *look.* The CogAT also includes a Sentence Completion test, which requires the child to read a sentence such as "Birds ____ in the sky" and choose from the following options: *sit, fly, swim, float,* and *nest.* To answer the question, students require reading *and* knowledge of the words.

The third CogAT test is called Verbal Analogies, which includes items such as: "up → down: in → ?" with options such as *on, over, top, side,* and *out.* Of course, verbal analogies require knowledge of the words, as well as reasoning about the relationships among the words; but, if the child does not know the words, then reasoning is blocked.

Both the CogAT Verbal *and* the ITBS Reading and Language tests have items that require reading and word knowledge. Thus, these two tests, which are apparently intended to measure two *different* constructs (ability vs. achievement), have questions that require *very similar* knowledge and skills. In order to examine how the use of achievement-laden tests on the CogAT could influence the performance of children with limited English language skills, we examined the readability of the items for one of the CogAT tests.

The Sentence Completion Test 2 of the CogAT Form 6 Level D is intended to be administered to children of average ability in grades 5 and 6. To better understand the academic demands of this test, we calculated the readability of the items using the Flesch-Kincaid Grade Level method (Flesch, 1948), which is among the most widely used methods of evaluating reading requirements of text (Chall & Dale, 1995). This approach calculates an estimated grade level based on a formula that includes the number of words in the items and the number of syllables per word. Although, like all methods, it has limitations

(Kotula, 2003), the Flesch method can provide good estimates of reading levels.

The entire Sentence Completion test readability grade level was 6.1, and the readabilities of the individual items ranged from grade 3.7 to 10.4. The distribution of grade level scores for the 20 items is shown in Figure 1. What is alarming about these findings is that 80% of the items have readability values of 5 or more, suggesting that a student must be an average reader to be able to read the vast majority of the items. A child who is not reading on at least the 5th-grade level will only be able to comprehend 4 of the 20 items in this test. It is reasonable to conclude that, despite the shortcomings of the readability formula in general (Kotula, 2003), these data strongly suggest that reading achievement can limit the performance of children on the CogAT Sentence Completion test, thereby limiting the score they could obtain on this measure of "ability."

The CogAT Quantitative tests also require the same kinds of skills that are necessary to complete items on the ITBS Mathematics portion of that "achievement" test. For example, the CogAT Quantitative Relations test includes questions like "Is 4 + 0 greater than, less than, or equal to 0 + 4?" It also requires reading comprehension of questions such as the following: "The number of sides of a square is greater than the number of sides of a triangle. The number of sides of a square is less than the number of sides of a triangle. The number of sides of a square is equal to the number of sides of a triangle." Comprehension of this sentence has a readability score of 7.2. The CogAT items also require basic arithmetic skills.

The CogAT Equation Building test demands basic math skills to determine how numbers and symbols can be combined to yield a specific numerical value (e.g., 7 x 4 = ? and 15 + 4 − 6 + 2 = ?). Similarly, there are three ITBS Mathematics tests that emphasize quantitative reasoning skills and one in particular (Math Concepts) that also involves equations. On this ITBS test, the student is given a math problem and is asked to select which of four possible equations answers the question. Knowledge of equations is used in the CogAT and in the ITBS. Whereas math skills *should* be part of a test of achievement, in our opinion they are *not* the best way to measure ability because acquired skills are influenced by both instruction and ability. We find it unacceptable, therefore, that the knowledge needed to complete the CogAT Quantitative items are so similar to those needed to solve the ITBS Mathematics items.

It must be considered that the similarity in basic skills necessary to complete the CogAT Quantitative and the
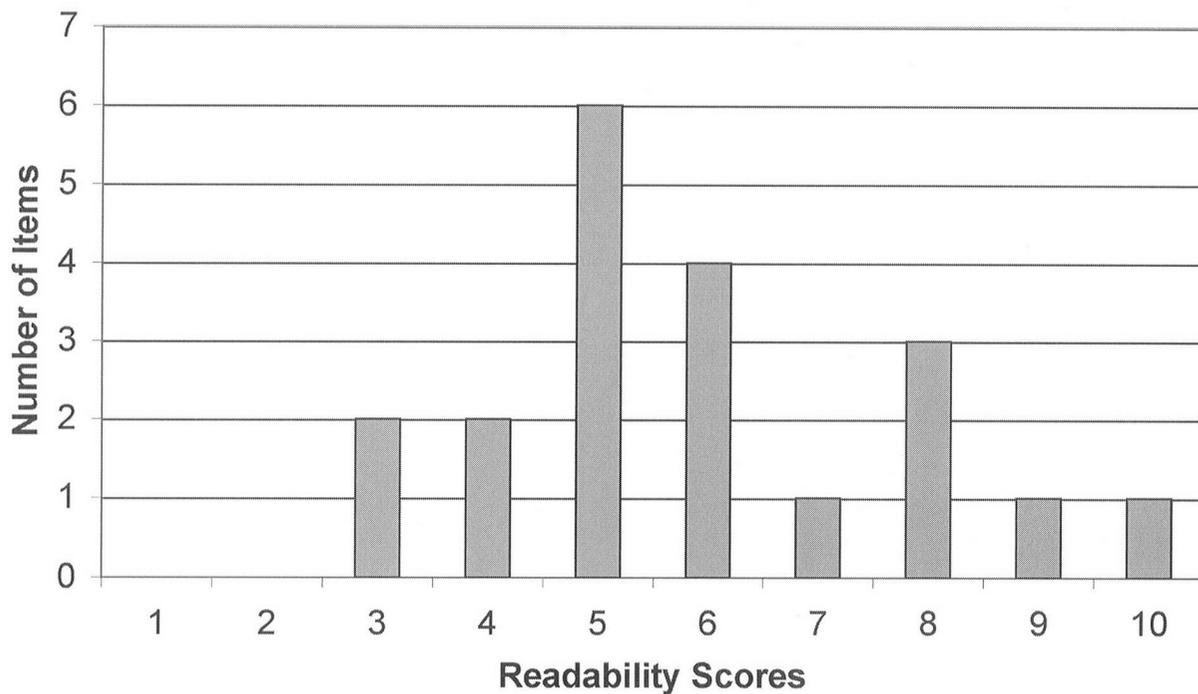
Figure 1. Frequency of Flesh–Kincaid Readability values for the CogAT Sentence Completion Test items

ITBS Mathematics items augment the correlation between these two tests. That is, it is reasonable to consider that the similarity in basic skills required in the items contained in these two tests contributes to the higher correlations found between the CogAT Verbal and Quantitative "ability" measures and the "achievement" tests on the ITBS. This possibility undermines the view that verbal and quantitative tests are better measures of "ability" than the nonverbal CogAT tests because they correlate higher with tests of "achievement." This problem of content similarity is important for two reasons: one theoretical and one practical.

The theoretical importance of separating the content in tests of ability and achievement is that making such a distinction defines the concept of intelligence used in a test of cognitive ability. Bracken and Naglieri (2003) stated that "general intelligence tests with verbal content and nonverbal content measure essentially the same construct as general ability tests that are entirely nonverbal" (p. 247). Both types of tests measure general ability, but one test measures general ability with varying content (verbal, quantitative, and nonverbal) and the other takes an exclusively nonverbal approach. The term "nonverbal assessment" describes the methods used to measure the construct of general intelligence, not a theoretical construct

of "nonverbal ability" (Bracken & McCallun, 1998). There is no assumption that nonverbal, as opposed to verbal, *abilities* are being measured. Importantly, *general ability* is being measured using nonverbal tests so that a wide variety of individuals may be assessed *using the same set of questions.* For this reason, a nonverbal test of general ability is considered more appropriate, or fair, for culturally or linguistically diverse populations. Additionally, a nonverbal test holds much promise for opening doors to gifted education programs that have historically and consistently been closed to culturally and linguistically diverse students.

There is a clear theoretical blurring of the lines between tests of "achievement" and "ability" that is apparent in many widely used tests and particularly illustrated when the CogAT and ITBS items are reviewed. Even the descriptions of the tests themselves provided by the authors show this confusion. For example, the ITBS Vocabulary test is described as "a useful indicator of overall verbal *ability*" (emphasis added) in the automated parent report and on the publisher's Web page (http://riverpub.com/products/group/itbs_a/tests.html). The test is also described as a measure of "the skills and achievement . . . [that] provides an in-depth assessment of students' achievement of important educational

objectives . . . [and] information both about the development of students' skills and about their ability to think critically" (The Riverside Publishing Company, 2004a). It is illogical that any subtest of the ITBS "achievement" test be described as a measure of verbal "ability." Similarly, the CogAT Quantitative Battery includes verbal story problems designed to measure "Quantitative reasoning *abilities* in children" (The Riverside Publishing Company, 2004a, p. 9), and the ITBS Math tests "emphasize the *ability* to do quantitative reasoning and to think mathematically in a wide variety of contexts" (The Riverside Publishing Company, 2004b; emphasis added). The lack of a clear distinction between ability and achievement has corrupted the very concept of ability in such a way that any child who does not have an adequately enriched educational experience will be at a disadvantage when assessed with a so-called "ability" test like the CogAT.

The practical importance of separating the content in tests of ability and achievement is particularly salient for children with limited English language skills or those from lower socioeconomic levels where the degree of enrichment in the home is limited. It is well known that poverty or low SES negatively affects students' test performance; high poverty is correlated with low test scores because of issues associated with educational enrichment at home and at school. Thus, many students receive low test scores because of unequal opportunity to learn. Too many of these students—from all racial and cultural backgrounds—are penalized on traditional tests of intelligence and achievement and subsequently denied access to gifted education programs and services. Such denial of access is common when tests are highly verbal-and highly achievement-oriented, as just discussed.

Now we will consider the last portion of the CogAT, the nonverbal tests. The Figure Classifications and Figure Analogies questions both require the child to determine relationships among geometric shapes, but these tests begin with lengthy verbal instructions (about 150 words). Surprisingly, the third CogAT nonverbal test, Figure Analysis, has test directions comprised of more than 300 words and many verbal concepts such as "square, dark, folded, unfolded, row, middle, dotted line, and layers." Although the content of the items on this test are nonverbal, it is clear that the instructions are not. It should be considered that the verbal nature of the directions may erode the advantage of the nonverbal CogAT scale for assessment of culturally and linguistically diverse populations.

Specific Issues Related to Naglieri and Ford (2003)

Sample Characteristics

Lohman (2005) makes the point that the three samples in Naglieri and Ford's (2003) study were not representative of their respective populations. It was not our intention to provide samples that were representative, but rather to compare the three large groups of students who were similar in composition. We clearly stated in our paper the ways in which the samples were similar and different, and in particular we noted that the Hispanic sample had a larger proportion of children at the two low-SES status levels. The percentages of White, Black, and Hispanic children who were classified as low and low middle were 39.3%, 47.0%, and 71.3%, respectively. The percentages of White, Black, and Hispanic children who were classified as high and high middle were 40.3%, 44.7%, and 25.7%, respectively. Importantly, this imbalance (more minorities with lower socioeconomic status levels) made it *more* difficult to get the results we obtained and our findings even more noteworthy.

Item Characteristics

Lohman (2005) argues that, because scores on the Raven's Progressive Matrix tests (Raven, Court, & Raven, 1983) show large group differences by ethnicity, then the NNAT should, as well. This logic is contradicted by the data provided by Naglieri (1985) for an earlier version of the test, by Naglieri and Ronning (2000), and by the data we reported (Naglieri & Ford, 2003). One of the most obvious reasons for the differences between Raven's and NNAT tests is that black-and-white line drawings and the colorized Colored Progressive Matrices may not be equally interesting to all children. Lohman writes "I know of no research that would lead one to expect . . . [this difference] would reduce, much less eliminate, ethic differences" (p. 22), but he discounts the results from Naglieri (1985) and Naglieri and Ronning (2000) as such evidence.

Getting the Big Picture

Controversy is appealing to some because it increases interest in a particular topic. The controversy created by Lohman (2005) regarding the NNAT has been very helpful because it has brought out a number of important issues.

First, there is considerable need in the field of gifted education to revisit how the conceptualization of giftedness as high academic achievement may be related to the disproportionate representation of minority children. If the gifted child *must* be one who is academically advanced, then we can expect to see continued underrepresentation of gifted minority children who have high general ability, as demonstrated by a nonverbal test like the NNAT, and lower achievement levels. Several scholars in gifted education have devoted considerable attention to gifted underachievers and have sought ways to make their achievement commensurate with their potential. Regardless of their linguistic and cultural background, any student who demonstrates a need for more demanding curricula should be challenged. Our most recent federal definition urges educators to identify gifted students who demonstrate their talents, as well as those who have potential—this often includes low-SES and minority students. We have also been urged by the U.S. Department of Education (1993) to believe that gifts and talents can be found in all cultural and economic groups.

One final point is worth addressing. The criticisms raised by Lohman (2005) lead one to ask several important questions about the CogAT. For example, given all the standardization data available, why has there been no published research on the differences between race and ethnic groups on the CogAT? The data are curiously absent. If there are large differences on the CogAT (as there tend to be on traditional, verbally loaded tests), then it would follow that use of the CogAT could *exacerbate* the problem of underrepresentation of minority children in gifted classes. Why have the CogAT authors not replicated the study by Naglieri and Ronning (2000), which showed the similarities of White, Black, and Hispanic children' scores on the NNAT? Why has there been no reporting of CogAT data looking at identification rates like the Naglieri and Ford (2003) study, of which Lohman has been so critical? What results could CogAT users expect when children from diverse racial and cultural groups are screened for gifted programs? Why has Lohman not provided a study of children with limited English language skills like the one published by Naglieri, Booth, and Winsler (2004), which showed that NNAT scores were minimally related to language skills? One can only assume that there are large differences between racial and cultural groups on the CogAT, given the historical information Lohman has provided, and that reporting such data could be considered undesirable. In sum, rather than devote so much time attacking the NNAT, Lohman should conduct studies to demonstrate the efficacy of using the CogAT with minority students. This information could shed further light on how tests positively or negatively affect the representation of diverse students in gifted education.

In the Meantime

On a daily basis, educators struggle with finding the most effective ways to both identify and serve gifted students who are not reaching their potential, as measured by tests or as perceived by teachers, counselors, or parents. When nonverbal tests or alternative measures are used to identify gifted students who have poor academic skills or achievement, it is clear that educators will have to do something different for these students. In other words, these gifted underachievers or potentially gifted students will require additional support to reach their potential. Some of these intellectually gifted students may require assistance in gaining basic academic skills, such as tutoring, study skills, organizational skills, and time-management skills. Many of them, we believe, will also need substantive and ongoing assistance in increasing their language and literacy skills.

Educators who support the notion of talent development (U.S. Department of Education, 1993) must see the need to provide gifted underachievers and potentially gifted students—a disproportionate percent of whom appear to be minority students—with the time and resources to overcome whatever barriers are inhibiting them from achieving academically. Whitmore (1980), Ford (1996), Renzulli (1978, 1994), Rimm (1986, 1996) and others (e.g., Renzulli & Reis, 1985) have written extensively about strategies and resources needed to help these otherwise capable students. They have argued for the need to develop programs and services based on students' needs, rather than fitting students to predefined programs.

Likewise, many educators are more actively or proactively encouraging educators to identify gifts and talents early, using the notion of talent development to guide their work. The litany of talent development programs and centers housed in schools and universities are testimony to this view of intelligence and giftedness. More writers are acknowledging, and we agree, that gifted students are not a homogeneous group; thus, we must find more than one type of test to use in the identification process (e.g., Greenfield, 1997; Helms, 1992).

As educators—teachers, psychologists, counselors, and others—we are in an ideal position to nurture gifts

and talents that are demonstrated or evident. We are also in an ideal position to search for potential in students and develop and nurture it. We cannot allow tests to eliminate students from gifted programs who might indeed need the challenge. It is our contention and conviction that nonverbal tests offer much promise in initiating and otherwise supporting the process of finding intellectually gifted students, especially minority students, who show such promise, but who may be penalized by intelligence tests that are heavily influenced by achievement, as noted throughout this article and elsewhere. One's views and philosophical orientations about giftedness, as well as the need for equity, will influence the tests one chooses to use in identifying intelligence and achievement and, ultimately, placing and serving gifted students.

Conclusions

The field of education has wrestled with issues of testing since its inception. Much controversy and debate continues, *ad infinitum*, regarding the most efficient, equitable ways, and effective ways to measure intelligence and achievement. Controversy runs rampant. We were not, therefore, surprised to find that Lohman took issue with our publication and welcome the opportunity to discuss our efforts to increase the numbers of gifted minority children using the nonverbal method we have carefully studied. There is considerable research support for our position that using a general measure of ability that is not laden with verbal and quantitative knowledge is an appropriate way—perhaps the most appropriate way—to measure general ability and level the playing field for children who come to school with limited language or educational skills, as well as with economic limitations. We further suggest that it is time to *stop* the *exclusive* use of achievement-laden tests of "ability" when screening for gifted children. Moreover, it is time to recognize that a test of "ability" must not require the same skills as a test of "achievement."

We strongly urge professionals in the gifted education community to continue to reflect on how gifted children are selected and, in particular, the role a measure of ability plays in the definition of giftedness and how students are identified. We also recognize that a valid measure of ability can play an important role in identifying gifted children, particularly when combined with other methods (for example, see Sparrow, Pfeiffer, & Newman, 2004, for a discussion of how the Gifted Rating Scale can be used with a measure of ability). Whereas we continue to support the identification of academically gifted children, we also support the identification of very intelligent children from any racial, cultural, or economic group who may not be academically advanced. This could have a profound impact on the field of gifted education and minority students in particular. Gifted education is a need, not a privilege, and as educators, we must find ways to open doors to all children who stand to benefit from gifted education programs and services.

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