Article

Education and Urban Society
2014, Vol. 46(7) 798–825

DOI: 10.1177/0013124512470162
eus.sagepub.com
SAGE

Gifted Education: Robin Hood or the Sheriff of Nottingham?

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Abstract

This article looks at the issue of gifted and talented education from the perspective of public policy. It asserts that the underachievement of gifted children is a national concern, as these children may someday benefit society in ways that are disproportionate to their share of the population. Perhaps more importantly, it concludes that gifted education need not be inequitable. In fact, in the current state of the affairs of the United States, I find tremendous variation in the resources districts receive from the state that go toward gifted education. The state is particularly important as it has the power to reduce inequalities between districts that are the result of wealth and other factors. Rather than exacerbating inequality, a larger distribution of the gifted and talented resources serves to ensure gifted children in both poor and rich districts have an opportunity to maximize their potential.

Keywords

educational policy, educational reform, urban education, schools, school improvement

It goes without saying that when Balamurali Ambati was a child, he was considered a prodigy. Balamurali finished first grade at age 6 within two weeks, finished both the second and third grades by the end of the year, cowrote an

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introductory book on AIDS with his 17-year-old brother when he was 11, graduated magna cum laude from New York University at the age of 14, and completed medical school at Mount Sinai Medical School fresh off receiving his driver's license at the age of 17, making Balamurali the youngest physician ever (Boy wonder, 1995). Today, Balamurali is on the faculty at the Medical College of Georgia and is also a volunteer surgeon for the ORBIS Flying Eye Hospital, where he trains physicians in developing nations in the use of state-of-the-art techniques in eye surgery (Baker, 2006).

Let us look at Balamurali's experience through the eyes of his parents. No doubt, they knew their son was a "gifted" kid very early in his life. He learned at a pace that far exceeded that of the peers of his age group. Now imagine how Balamurali's parents would have reacted if their son was not given the opportunity to fulfill his intellectual potential. What if Balamurali grew up in a school district with few resources for gifted education? Would Balamurali have become the youngest doctor in modern history? Who would have pursued his research on the growth of new blood vessels in the cornea? Could Balamurali have accomplished as much as he has? Perhaps he would have accomplished all that he had at a later date, but at what cost? Is the cost solely private, a young prodigy suffering from the stifling of his intellectual curiosity? Or is the cost larger and more widespread in the form of society's inability to benefit from the fruits of his research? One can never know the answers to these questions but the questions beg asking.

Although Balamurali's case is one that receives near-universal respect and appreciation, such praise is not widespread when it comes to the education of the gifted. The Los Angeles Times reports that parents who push schools for attention to the needs of their gifted children are extremely unpopular, and are perceived as having an inflated view of their child's abilities (Ulene, 2006). This antipathy to gifted education is not a new phenomenon. Since the birth of the United States there has been a deep-seeded unease about gifted education and about the nature of intellectualism in general. In fact, de Tocqueville (1945) identified an anti-intellectual strain in American culture (Winner, 1997).

This tension between egalitarianism and exceptionalism has resulted in a gifted education system that is schizophrenic in nature. On the one hand, there is a general acknowledgment that giftedness is real and should be nurtured, but on the other hand the resources at the federal and state levels to achieve this goal have been almost absent. This article examines the education of gifted children in the United States with a specific emphasis on the role—if any—of the public sector in gifted education. In addition, this article examines equity issues relating to the education of the gifted and investigates policies that address concerns that may arise from both equity and efficiency standpoints. The National Research Center on the Gifted and Talented estimates there are about three million academically gifted students in the United States. The issue of gifted education is not a trivial one; it has a direct impact on a significant population within this nation, and as I conclude in this article, and may have high opportunity costs for the rest of society as well.

The article begins by asking the question: What is giftedness? After this discussion, it goes on to describe and compare multiple perspectives on this construct of giftedness. It then considers the responsibility of government in fostering this notion of giftedness. Following will be an analysis of equity concerns related to gifted education. A data and methodology section follows and precedes findings from a national equity analysis of resources for gifted programs. The final section concludes, discusses implications for public policy, and provides suggestions for further research.

What is Giftedness?

The federal government's longstanding definition of giftedness is as follows:

> Gifted and talented children are those identified by professionally qualified persons who by virtue of outstanding abilities, are capable of high performance. These are children who require differentiated educational programs and/or services beyond those normally provided by the regular school program in order to realize their contribution to self and society. Children capable of high performance include those with demonstrated achievement and/or potential ability in any of the following areas: 1) General intellectual ability; 2) Specific academic ability; 3) Creative or productive thinking; 4) Leadership ability; 5) Visual and performing arts; and 6) Psychomotor ability. (Marland Jr., 1972)

It should be noted that the sixth ability (psychomotor) was later dropped because of its relationship to athletic ability, which was and remains already a form of merit well-supported by society (e.g., professional athletes). Irrespective of the importance of the sixth ability, it is evident that what is now called the "Marland definition" measures giftedness in the form of ability.

In this framework, gifted students are identified by a higher level of ability relative to their peers and age group (Gallagher, 1994). Stephens & Karnes (2000) find that some variant of the Marland definition is used by a majority of state definitions for the gifted and talented. In contrast, six states use alternative definitions and four states—Massachusetts, Minnesota, New Hampshire, New Jersey, and South Dakota—report no state definitions as late as 2000, further complicating a national policy for gifted and talented education.

An alternative definition is provided by Renzulli (1986). Renzulli's definition of giftedness is focused on a concept of "productivity":

> Gifted behavior reflects an interaction among three basic clusters of human traits—above-average general or specific abilities, high levels of task commitment, and high levels of creativity. 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 (Gallagher, 1994; Renzulli & Reis, 1986).

This definition describes giftedness as a manifestation. It is based on both ability and behavior. Regardless of the definitional differences between Marland and Renzulli, both authors support the same overall policy: enrichment beyond the regular school curriculum so that gifted students can meet their full potential.

In addition, both authors would agree that giftedness is real; and that not all children are, or should be considered, gifted. The inventor of the statistical concepts of regression and correlation and a pioneer in eugenics, Francis Galton (1869), was one of the first individuals to scientifically study the biological determinants of intelligence. More recently in studies of rats, Guzowski & McGaugh (1997) found that the cAMP response element binding protein (CREB) played an integral role in long-term memory development. Without this protein, the rats became significantly impaired in their ability to recall water maze training (Tayyari, 2006).

These biological bases for giftedness do not in any way exclude the role of environmental factors in the development of giftedness. For example, Albert (1978, 1980) reports that high scholastic achievers tend to come from cohesive and child-centered families where parent–child identification is strong. Another important factor that has been commonly found in the literature to play a key role in giftedness is the level of stress or challenge a child encounters (Olszewski-Kubilius, 2002).

In the end, a gifted child is probably the result of an interaction of genetics, the environment, and a little luck. But parents, peers, and especially teachers intuitively know what giftedness is when they see it. It is more than a 170 on an IQ test, and requires a more encompassing definition. The most commonly accepted psychological theory of intelligence is that first purposed by Gardner (1993). Gardner conjectured that there are actually seven intelligences that human beings possess in various levels. These intelligences are linguistic intelligence, logical-mathematical intelligence, spatial intelligence, musical intelligence, bodily kinesthetic intelligence, interpersonal intelligence, and intrapersonal intelligence. Although Gardner disagrees with common conceptions of intelligence focusing on linguistic intelligence and logical-mathematical intelligence, he agrees that gifted children are deserving of education suited to their needs:

> In my view, the purpose of school should be to develop intelligences and to help people reach vocational and avocational goals that are appropriate to their particular spectrum of intelligence. People who are helped to do so, I believe, feel more engaged and competent, and therefore more inclined to serve the society in a constructive way. (Gardner, 1993)

Education that allows individuals to maximize their individual potential lies at the heart of the rationale for gifted education.

A Role for Public Policy?

Public policy analysis has most commonly relied upon the traditional "public finance" framework to determine a role, if any, for government. This viewpoint emphasizes the notion of "market failure"—"unsatisfactory" distributions of economic and political resources—as the key impetus for government intervention (Weimer & Vining, 1992). With this rubric in mind, the question remains to be asked, is there a role for public policy in the provision of gifted and talented education? I would say the answer is yes.

Tables 1, 2, 3, and 4 are derived from the 2003 Trends in International Mathematics and Science Study (TIMSS). TIMSS provides international comparative information on mathematics and science achievement in the fourth and eighth grades. TIMMS is conducted on behalf of the International Association for the Evaluation of Educational Achievement (IEA) and administered by the International Study Center at Boston College.

These tables report national averages of students in the top-ten percentile of scorers. A new score was formed by averaging a set of five plausible values for each observation. Scores in the top decile of the achievement distribution were then averaged according to a weighting scheme and nations with at least 100 observations are presented. Table 1 presents mean fourth grade

Table 1. Mean 4th Grade Math Achievement for Top 10% of Scorers.

Singapore	665.2
Moldova	648.3
Russia	647.9
Taiwan	644.4
Lithuania	643.5
Scotland	643.5
New Zealand	642.8
United States	642.1
Latvia	641.5
The Netherlands	633.6

Notes: All data represent author's own calculations. Nations with fewer than 100 observations in top-10 percentile were not included.
Source: 2003 Trends in International Mathematics and Science Study (TIMSS).

Table 2. Mean 4th Grade Science Achievement for Top 10% of Scorers.

Russia	654.3
Taiwan	644.8
United States	635.5
Singapore	634.5
Moldova	634.0
Slovenia	631.2
New Zealand	629.0
Scotland	626.4
Norway	625.6
The Netherlands	623.4

Notes: All data represent author's own calculations. Nations with fewer than 100 observations in top-10 percentile were not included.
Source: 2003 Trends in International Mathematics and Science Study (TIMSS).

math achievement for the top 10% of scores within a nation. Table 2 presents science scores for the same subgroup. Tables 3 and 4 present the same achievement information for eighth graders.

In each and every table, America's gifted place no higher than third, which is America's rank in both fourth and eighth grade science. Achievement for the top 10% of scorers on the TIMMS mathematics exam is particularly disturbing. In fourth grade mathematics, the United States places behind seven other nations including Moldova and Lithuania. On the eighth grade

Table 3. Mean 8th Grade Math Achievement for Top 10% of Scorers.

Taiwan	667.7
Singapore	662.3
South Korea	658.4
Japan	652.9
Hong Kong	646.7
Bahrain	643.0
Australia	639.7
Estonia	639.5
United States	**638.4**
England	638.1

Notes: All data represent author's own calculations. Nations with fewer than 100 observations in top-10 percentile were not included.
Source: 2003 Trends in International Mathematics and Science Study (TIMSS).

Table 4. Mean 8th Grade Science Achievement for Top 10% of Scorers.

Singapore	654.3
Taiwan	644.8
United States	635.5
South Korea	634.5
Russia	634.0
Sweden	631.2
Scotland	629.0
Slovenia	626.4
Serbia	625.6
The Netherlands	623.4

Notes: All data represent author's own calculations. Nations with fewer than 100 observations in top-10 percentile were not included.
Source: 2003 Trends in International Mathematics and Science Study (TIMSS)

examination, the average math score for America's highest scorers is lower than that of eight nations, falling behind nations like Bahrain and Estonia. Gifted children from Asian nations perform particularly well on each exam.

Much has been made of the underachievement of American children versus the achievement of children from other industrialized nations and even some developing nations. Yet as can be seen from the data, the underachievement exists at every level even among our nation's best and brightest. What is the cause of this gifted underachievement?

The literature on gifted underachievement has focused on two concepts: self-efficacy and self-concept. Bandura (1986) defines self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performance." It is an assessment of competence. A more holistic construct of self-perspective is provided by self-concept. Whereas self-efficacy involves a personal appraisal of certain skills, self-concept involves an appraisal of one's overall abilities. Academic self-concept involves both internal and external comparisons (McCoach & Siegle, 2001). According to Byrne (1996), "Students typically make such judgments by comparing their own performances with that of their classmates (an external comparison), as well as with their own performance in other subjects (an internal comparison); these dual comparatives processes represent frame-of-reference effects."

The literature has been mixed in investigating poor self-identity among gifted children. Studies using qualitative and case study methodologies including Bricklin and Bricklin (1967), Bruns (1992), Diaz (1998), Supplee (1990), and Whitmore (1980) have tended to find that underachievers suffer from either poor self-efficacy or self-concept. However, quantitative analyses like Lupart and Pyryt (1996) and McCoach and Siegle (2001) have tended to find gifted underachievers do not suffer from poor self-perception. Poor self-perspective is probably not a problem for the average gifted underachiever, but the preponderance of studies that have found such a phenomenon indicates that it affects more than a trivial number of gifted children.

Educational setting has been found to have an important effect on a gifted child's self-perspective. Jin & Moon (2006) find that high-ability Korean adolescents in science high schools had higher levels of satisfaction with their school life than their peers in general high schools. The conclusions are supported by research by Robinson, Reis, Neihart, and Moon (2002), who find that placement in a school environment with insufficient academic challenge and inappropriate peers to be an important determinant of social and emotion problems in gifted youth.

Other causes have been suggested for underachievement. Reis and McCoach (2002) produce an extensive review of causes for this happening, including environmental causes and factors within the individual. The environmental causes they cite are:

- chronically underchallenging, slow-moving classroom experiences (Whitmore, 1986), or moving from a regular classroom to an appropriately challenging one (Krissman, 1989);

- peer pressure to confirm to “regular” norms, to “be like everyone else,” which may be intense for students from underrepresented minorities (Diaz, 1998; Ford, 1992, 1996);
- loneliness, isolation from classmates and the educational enterprise (Mandel & Marcus, 1988, 1995); and
- family dynamics (family conflict drains energies; parents’ centering on the underachieving child masks other conflicts; (Green, Fine & Tollefson, 1988); family has too-low, too-variable, or too-rigid expectations (Rimm, 1995; Rimm & Lowe, 1988).

Individual factors leading to gifted underachievement include:

- internalizing issues, depression, anxiety, perfectionism, failure-avoidance, low-self-esteem (Bruns, 1992; Mandel & Marcus, 1988; Supplee, 1990);
- externalizing issues: rebelliousness, irritability, nonconformity, anger (Bricklin & Bricklin, 1967; Bruns, 1992; Rimm, 1995);
- unrecognized learning deficits that interfere with learning/performance (Vail, 1987);
- nontraditional gifts (e.g., spatial reasoning) that do not fit teacher’s expectations (Gohm, Humphreys, & Yao, 1998);
- deficits in self-regulation: disorganization, impulsivity, attention deficit (Baum, Olenchak, & Owen, 1998; Borkowski & Thorpe, 1994; Krouse & Krouse, 1981; Schunk, 1998);
- maladaptive strategies, such as failure to set realistic goals (Van Boxtel, & Monks, 1992), short-term rather than long-term coping strategies (Gallagher, 1991); and
- social immaturity (Whitmore, 1980) or overemphasis on social, as opposed to academic, pursuits (Mandel & Marcus, 1988; Van Boxtel et al., 1992).

Although specialized education for the gifted may not be able to ameliorate all of these factors, they can and probably do help address some of them. Ultimately, as explained by clinical child psychologist Maureen Neihart, “We improve when we work at the edge of our competence, not when we stay in our comfort zone” (Ulene, 2006).

Why are these factors important, and why do we need policies to address the problem of gifted underachievement? Gifted underachievement is a problem for the same reason that unemployment is. Gifted underachievement entails wasted resources. As can be seen our nation’s brightest children are not performing to the best of their abilities. Hence, we must develop a new paradigm for education.

The existing paradigm in education finance has focused on adequacy. Berne and Stiefel (1999) write, "Adequacy could be defined in a number of ways. One definition specifies a level of resources that is sufficient to meet defined or absolute, rather than relative, output standards. In the words of Clune (1995), 'adequacy refers to resources which are sufficient (or adequate) to achieve some educational result, such as a minimum passing grade on a state achievement test.'"

Adequacy has played a pivotal role in numerous education finance cases in the numerous states. In the case of the Campaign for Fiscal Equity v. the State of New York (2003), the New York State Court of Appeals, New York's highest court, ruled that New York State was not providing New York City students with a "sound basic education." They equated a "sound basic education," with, "the basic literacy, calculating, and verbal skills necessary to enable children to eventually function productively as civic participants capable of voting and serving on a jury." The Justices declared ultimately it was the state's responsibility to ensure that its citizens received the education owed to them by the state constitution.

Yet with citizens competing in an increasingly global environment, a paradigm based by and large on civic participation is simply not enough. In a world where education matters more than ever before and where even college graduates are finding difficulty finding proper employment, adequacy is simply not adequate. The new paradigm in education should be based on maximizing the potential of all students, including the gifted.

There can be no doubt that Balamurali Ambati is gifted. In addition, there can be no doubt that the gifted can do great things. Finally, the literature has been consistent regarding the difference special programs make for the gifted. Akexakos and Rothney (1967) found that gifted high school students who were previously enrolled in a special science programs had higher GPAs, academic honor and general scholarship than gifted students who did not (Davis & Rimm, 1985). Tremaine (1979) has also found similar results and declared, " . . . the study leads to the conclusion that gifted programs do indeed make a difference—and that difference makes program development vitally worthwhile." These factors are important contributions in developing a public interest in gifted education.

There is another factor I wish to address. There is some evidence that our nation's best and brightest can be doing even better than they are currently, at least in eighth grade in mathematics. There is an externality at work here—the size of which—to the author's knowledge has not been quantified. For

America to successfully compete in an increasingly connected world, we must focus on maximizing the potential of all of our human capital. Barro (1991), Jorgenson & Fraumeni (1992), Lucas (1988), and Romer (1990) have all documented a relationship between education and economic growth. Gifted children are an asset in which we should as a society make an investment. The Marland study put it best when it wrote, “The benefit to be derived from a Mozart or Dickens is difficult to describe but may rest in his enduring value to mankind.”

Equity Concerns

Thomas Jefferson once wrote that, “There is nothing more unequal, than the equal treatment of unequal people.” As Jefferson understood, equality does not represent the same concept as equity. Equality is a fact, it means sameness, it asks how similar people are to one another. Equity is a notion of fairness. When critics charge gifted education is inequitable, I tend to believe they really mean to say it is unequal.

The term we have used to describe the academically exceptional is *gifted*. The very term implies effortlessness. It is something that is not earned. Individuals who are gifted through no effort of their own are born elite. But giftedness is not a form of elitism, Americans have come to appreciate. Although we show the value we place on athletic merit through the praise and monetary rewards great athletes receive, intellectualism is different. Intellectuals are assailed as nerds or geeks. Colangelo (1991) suggests that this anti-intellectual strand results from a perception that giftedness threatens the self-esteem of both young people and adults in ways other talents do not. Yet, the only seeming solution to this problem is to ensure that each student achieves at the same level, perfect equality, which runs counter to American values of individuality and excellence.

Turning the discussion toward the concept of equity, Berne & Stiefel (1984) identify three principles that they believe capture some form of equity. Proponents of horizontal equity are concerned with the equal treatment of equals. Students who are alike should receive the same resources. The second equity principle they identify is vertical equity. Vertical equity recognizes differences between students and recognizes a need to treat different children differently. Because of vertical equity most Americans recognize that schools and teachers should provide different educational experiences for children with learning disabilities, children without, and also for the gifted. The final principle of equity Berne & Stiefel identify is equal opportunity. More so than the concepts of vertical and horizontal equal opportunity is a normative concept. Berne and Stiefel write, “The principle can be formulated in a negative way: there should not be differences according to characteristics that are considered illegitimate, such as property wealth per pupil, household income, fiscal capacity, or sex.”

Historically, school finance litigation and educational equity analyses have been targeted at the state level. With few exceptions, local governments have long had the primary power to raise funds and set spending levels in public schools under their jurisdiction (Minorini & Sugarman, 1999). The logical result has been a system of tremendous inequality and inequity between and within states, as the revenue raising ability of a district and the cost of educating its own children has been anything but homogenous even within a single state.[1] It was the responsibility of the state to ensure that even children in “poor” districts received an adequate education. In addition, the state was best able to redistribute resources from more affluent districts to less affluent districts so as to guarantee an adequate education for all children.

Let us assume that giftednes is not an illegitimate characteristic in it of itself (this is of course a question of values), and that gifted children and nongifted children represent functionally different groups (by definition true). Vertical equity hence becomes the main focus. The two most popular approaches for measuring vertical equity are standards-based econometric cost functions and resource-cost models.

Standards-based models measure appropriateness in terms of adequacy, that is, achieving a minimum set of academic performance standards (Downes & Pogue, 1994; Duncombe & Yinger, 1998; Reschovsky & Imazeki, 1999). Applying this approach to gifted children, Baker (2001) posits that “it might be reasonable to assume that the marginal costs of educating gifted children (frequently classified as the top 3% to 5%) to minimum standards is asymptotic to ‘$0.’” Hence, no additional resources are necessary for gifted children to reach minimum standards.

Baker gets very different results when the resource-cost approach is applied to gifted young people. Levin and McEwan (2002) explain the resource-cost approach in terms of ingredients. The resource-cost approach entails identifying and assigning a value to the “ingredients” that are needed to produce a certain outcome. As discussed previously, this outcome should be maximizing potential for all students. A corollary that necessarily follows from this framework is that for gifted children to reach their maximum potential they require additional resources, resources that come at additional costs. Although the standards-based cost approach strongly favors those who fall below the minimum standards, the resource-cost approach better addresses the needs of all students. With this understanding in mind, significant variance in supplemental resources important to gifted children represents serious inequity.

Special education is often justified with language that focuses on the special needs these children have to reach their full potential and to contribute to society in the most valuable way possible. Because less wealthy districts are often unable to raise the resources to ensure a sound basic education for special education students, the state and even the federal government have stepped in to provide additional funds and to ensure a more equitable distribution of resources. The same argument has and should be used in support of gifted children. Children are not baseball caps, one size does not fit all, and it is time we stop treating them that way. Given that resources can fluctuate district to district, it is essential that the state ensure that even gifted children in "poor" districts have the opportunity provided to their counterparts in "wealthy" districts to maximize their potential. In the next section, I draw from the work of Baker (2001) as well as Murray, Evans, and Schwab (1998) to analyze the distribution of resources for gifted education nationally.

Gifted Equity Analysis

Data

The National Center for Education Statistics (NCES) Longitudinal Unified School District Fiscal-Nonfiscal Detail File (UFNFD) provides information on general categories of revenues and expenditures as well as enrollment data for the years 1989-90 through 1999-2000. Fiscal data for the UFNFD is collected by and derived from the Common Core of Data School District Finance Survey (F-33), which is submitted annually to the NCES by state education agencies in all 50 states as well as the District of Columbia. The F-33 survey has been the primary data source used in numerous studies of education finance (e.g., Murray, Evans, & Schwab, 1998), because it is national in scope, and uses the local school district—the major provider of public education services in the United States—as its unit of analysis.

The UFNFD is considered a significant advancement over previous incarnations of F-33 data sets. First, the actual data is considered much more reliable. All missing data have been replaced by statistical imputations, obviously erroneous responses have been replaced with plausible values, and subtotals have been edited so that each subtotal is equal to the sum of its categorical values. In addition, the UFNFD creates K-12 "pseudo-districts" in the small number of cases where states and localities have created separate school districts for primary and secondary education. Because the cost of secondary education is generally higher than the cost of elementary education, failure to account for this discrepancy may result in artificially high estimates of dispersion. Finally, the UFNFD's emphasis on identifying and reconciling district consolidation linkages ensures the continuity of analyses over time.

This study builds upon the work of Baker (2001) by extending the analysis of gifted resources to a national scale. Because only a small minority of states provide any resources for gifted education at all, decompositions of inequality measures into between-state and within-state components were not possible (as almost all inequality is between-state). In addition, because Alaska, the District of Columbia, Hawaii, and Montana represent states that serve as entire school districts, they were removed from the analysis. The focus is on state resources because although school districts and schools may have resources dedicated to gifted programs, the state can ensure each gifted child, no matter the district or school, is treated fairly.

Description of Variables

This article analyzes the dispersion of four inputs into education. These are total expenditures per pupil, total instructional expenditures per pupil, state revenues for special education per pupil, and state revenues for gifted education per pupil. The first two variables are intended to provide a baseline of sorts to compare the distribution of resources for special education and gifted education against. I do not suggest that special education and gifted education funding should be at odds. Rather I include the special education variables to compare how another group has compensatory funding to achieve its goals. All variables were derived by dividing by district enrollment and are presented in greater detail below:

Total expenditures per pupil. Total expenditures are comprised of current expenditures, capital outlay, intergovernmental expenditures (i.e., payments to other state and local governments and other school systems), and expenditures for debt service.

Total instructional expenditures per pupil. This variable only captures expenditures for instruction and not the other expenditures listed above.

State revenues for special education per pupil. Special education represents an understanding of American public education that certain children require additional resources based on their needs. It represents the concept of equal educational opportunity that each child should have the opportunity to reach their potential and meaningfully contribute to society (Fetterman, 1988). By looking at revenues for special education from the state, we can get an idea of the interest of the state in providing equitable special education, and compare it to revenues for gifted education.

State revenues for gifted education per pupil. This variable is the variable of interest in this study. These are revenues districts receive from the state that are dedicated toward gifted and talented programs. To reiterate, through their ability to raise and redistribute economic resources, states play a pivotal role in ensuring that district wealth is not the solely determinant of opportunities for gifted children.

Each variable is measured at three points in time, for the 1992-93, 1997-98, and 2002-03 school years, allowing the possibility of observing some trends.

Measures of Inequality

Inequality metrics have long been used in economic literature to measure the distribution of economic resources—particularly income and wealth—among members of a society. Inequality measures are not functionally dependent on the mean of a distribution but aim at measuring the dispersion of the distribution. More recently, these tools traditionally used in the analysis of poverty and income distribution have been extended to analyses of education finance.

It is common to use a set of inequality measures because each measure on its own possesses distinct advantages as well as distinct disadvantages. Collectively, the measures should provide a consistent and valid picture of the distribution of gifted program resource distribution. Although each measure is calculated per pupil, there is a question as to whether the pupil or the district should be the unit of analysis. With the district unit of analysis, each state's school finance system is modeled as distributing resources to school districts. When the pupil is the unit of analysis (empirically estimated by weighting each district by its student membership) the size of a district's enrollment is taken into account (Berne & Stiefel, 1984). In this article, most measures are performed using both districts and pupils as the units of analysis.[2]

In total, I report estimates of four measures of inequality: the standard deviation, the coefficient of variation, the Gini coefficient, and the Federal range ratio. Derivations of each of these measures can be found in the appendix.

Table 5. Variance in the Distribution of Resources for Gifted Education 1992-1993.

	Expenditures per pupil	Total instructional expenditures per pupil	State revenues for special education per pupil	State revenues for gifted education per pupil
Mean				
Unit = district[a]	$ 5,653.16	$ 2,965.01	$ 116.07	$ 2.46
Unit =pupil[b]	$ 5,180.48	$ 2,921.47	$ 145.48	$ 4.67
Standard deviation				
Unit = district	$ 133,343.60	$ 1,010.41	$ 155.62	$ 7.58
Unit = pupil	$ 8,325.40	$ 899.71	$ 149.46	$ 11.21
Coefficient of variation				
Unit = district	2.36	0.34	1.34	3.08
Unit = pupil	1.61	0.31	1.03	2.40
Gini coefficient (x100)				
Unit = district	24.11	16.85	64.43	85.48
Unit = pupil	19.78	15.63	55.04	79.22
95th percentile	$ 9,209.72	$ 4,798.63	$ 392.73	$ 12.61
5th percentile	$ 2,899.08	$ 1,921.07	$ —	$ —
Federal range ratio[c]	217.68%	149.79%	—	—

[a]Each districted is weighted equally.
[b]Each district is weighted according to student membership. [c]Federal range ratio = (95th percentile - 5th percentile)/5th percentile.
Notes: All measures represent author's own calculations and do not include data from Alaska, the District of Columbia, Hawaii, and Montana.
Source: Longitudinal Unified School District Fiscal-Nonfiscal Detail File.

Findings

Tables 5, 6, and 7 present summary statistics for general education expenditures, instructional expenditures, revenues for special education, and revenues for gifted education. The most striking measures of inequality all involve gifted education. As can be seen in Table 5, the unweighted Gini coefficient for state revenues for gifted education per pupil is 85.48, which is much closer to 1 (perfect inequality) than 0 (perfect equality). The estimate stays fairly level through 2002-2003 but appears to be on a positive trend.

The coefficient of variation (CV), a unitless measure of inequality, for gifted education revenues is consistently higher than the CV's associated with general expenditures, instructional expenditures, and revenues for special education. In 2002-2003, the CV for gifted education revenues was 3.43

Table 6. Variance in the Distribution of Resources for Gifted Education 1997-1998.

	Expenditures per pupil	Total instructional expenditures per pupil	State revenues for special education per pupil	State revenues for gifted education per pupil
Mean				
Unit = district[a]	$ 7,016.22	$ 3,687.73	$ 123.20	$ 2.28
Unit =pupil[b]	$ 6,786.03	$ 3,578.69	$ 159.89	$ 5.69
Standard deviation				
Unit = district	$ 2,361.12	$ 1,115.04	$ 170.92	$ 6.42
Unit = pupil	$ 1,865.98	$ 994.50	$ 175.28	$ 11.89
Coefficient of variation				
Unit = district	0.34	0.30	1.39	2.82
Unit = pupil	0.27	0.28	1.10	2.09
Gini coefficient (x100)				
Unit = district	16.27	15.11	66.79	87.87
Unit = pupil	14.18	14.09	57.92	80.06
95th percentile	$ 11,225.17	$ 5,801.12	$ 420.64	$ 12.16
5th percentile	$ 4,603.06	$ 2,504.62	$ —	$ —
Federal range ratio[c]	143.86%	131.62%	—	—

[a]Each districted is weighted equally.
[b]Each district is weighted according to student membership. [c]Federal range ratio = (95th percentile - 5th percentile)/5th percentile.
Notes: All measures represent author's own calculations and do not include data from Alaska, the District of Columbia, Hawaii, and Montana.
Source: Longitudinal Unified School District Fiscal-Nonfiscal Detail File.

(3.10 pupil-weighted) versus 0.36 (0.28) for general education expenditures, 0.30 (0.28) for instructional expenditures, and 1.43 (1.20) for special education revenues. Although the coefficient of variation for gifted education revenues does vary from 1992-93 to 1997-98 and from 1997-98 to 2002-03, it is in each year of this analysis the resource with the greatest dispersion. This finding is not surprising as state and societal priorities were and remain for adequacy.

Equally as prominent as the considerable inequality in gifted education revenues is the level of revenues dedicated for gifted education. In the 1992-93 school year, an average district only received US$2.46 from the state for gifted education, versus US$116.07 for special education. By the 1997-98 school year, which can be seen in Table 6, the amount received for gifted education declined to US$2.28 but rose back to US$3.38 in the 2002-03 school year. All of these calculations are not inflation-adjusted. Given the

Table 7. Variance in the Distribution of Resources for Gifted Education 2002-2003.

	Total expenditures per pupil	Total instructional expenditures per pupil	State revenues for special education per pupil	State revenues for gifted education per pupil
Mean				
Unit = district[a]	$ 9,395.17	$ 4,792.29	$ 201.84	$ 3.38
Unit =pupil[b]	$ 9,114.13	$ 4,681.45	$ 245.69	$ 10.95
Standard deviation				
Unit = district	$ 3,373.03	$ 1,416.02	$ 288.43	$ 11.57
Unit = pupil	$ 2,542.65	$ 1,332.08	$ 295.92	$ 33.92
Coefficient of variation				
Unit = district	0.36	0.30	1.43	3.43
Unit = pupil	0.28	0.28	1.20	3.10
Gini coefficient (x100)				
Unit = district	16.75	14.36	68.40	88.34
Unit = pupil	14.30	14.10	62.27	86.89
95th percentile	$ 15,468.68	$ 7,460.40	$ 770.76	$ 17.61
5th percentile	$ 6,146.03	$ 3,341.27	$ —	$ —
Federal range ratio[c]	151.69%	123.28%	—	—

[a]Each districted is weighted equally.
[b]Each district is weighted according to student membership. [c]Federal range ratio = (95th percentile - 5th percentile)/5th percentile.
Notes: All measures represent author's own calculations and do not include data from Alaska, the District of Columbia, Hawaii, and Montana.
Source: Longitudinal Unified School District Fiscal-Nonfiscal Detail File.

size of the gifted share of the public education population, the level of resource should be low, but size does not explain the level of inequality.

Helping to explain the conspicuous lack of support for gifted education at the state level are Figures 1 and 2. Figure 1 is a graph of the Lorenz curve of the distribution of state revenues for gifted education in the 2002-03 academic year. This particular graph does not take into account district size. Figure 1 shows quite plainly that a little less than 80% of all school districts in America receive no funding whatsoever for gifted education from state governments, and approximately 20% of American districts receive all state revenues for gifted education. Figure 2 graphs the weighted results, which appear to be somewhat more equitable than in Figure 1, though still quite far from a perfectly equal distribution.

When compared in the context of special education the distribution of resources for gifted education are even more arresting. As can be seen in

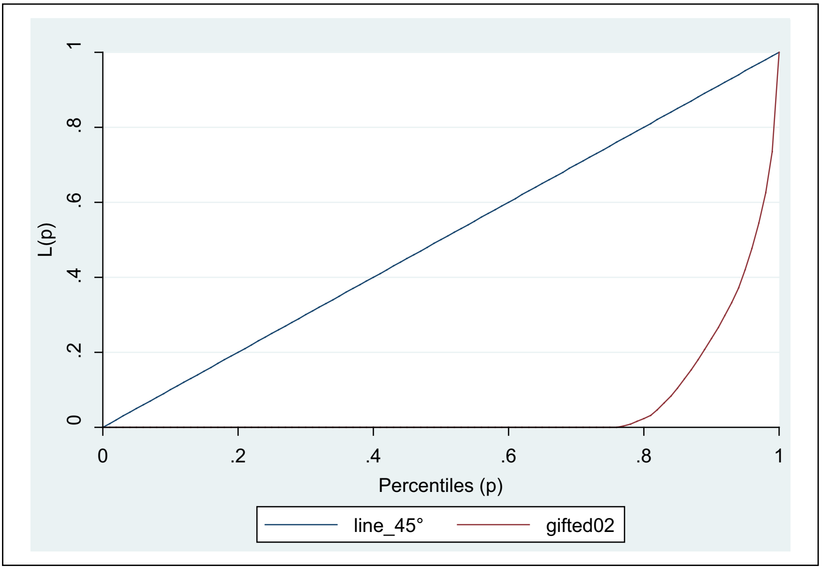

Figure 1. Revenues for gifted education (2002-2003)—District unit of analysis.

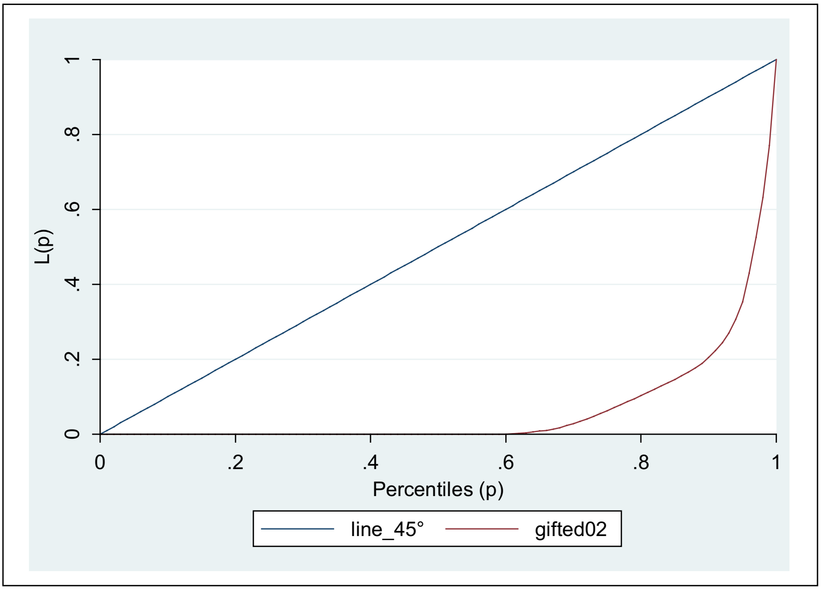

Figure 2. Revenues for gifted education (2002-2003)—Pupil unit of analysis.

Table 7, in the most recent year of data, the 2002-03 school year, the coefficient of variation for per-pupil state revenues for gifted education is more than twice that of the coefficient of variation for per-pupil state revenues for special education (3.43 vs. 1.43). Inequality as measured by the Gini coefficient is also higher for gifted education than for special education. The relationship between these two variables holds in the other two time periods as well. The results indicate that the state plays a large role in equalizing resources for special education but why not for gifted education?

Overall, nontargeted resources as measured by total expenditures per pupil and total instructional expenditures per pupil appear to have become more equitable during the time period of this study. In the 1992-93 academic year, the Gini coefficient of per-pupil instructional expenditures was 16.85 (15.63 pupil-weighted), by 2002-03, that measure had fallen to 14.36 (14.10 pupil-weighted). Likewise, the Gini coefficient for total expenditures per pupil was 24.11 (19.78 pupil-weighted) in 1992-93, and had fallen to 16.75 (14.30 pupil-weighted) in 2002-03. The numerous school finance cases occurring in various states in this time period, including in New York, may have had an effect on the distribution of these resources.

Discussion and Conclusion

Americans reward athletic ability, we reward good looks, and we reward charisma and savvy. But we are hesitant to reward excellence. Gifted children are already an elite group, many would argue. But the research has just not borne that out. Many gifted children do excel, without additional enrichment, but a long line of research shows many do not. Age only is not an accurate measure of a child's capabilities, and to develop curricula based solely on that concept is not only unfair, it is un-American.

Giftedness is real, and instead of condemning it or defaming it, we should embrace it. From the standpoint of efficiency, the possible externalities from finding and developing the next Bach, Beethoven, or Mozart, are limitless, especially considering my findings that American children score below their peers from other nations. From an equity standpoint, by not providing the resources so that gifted children can reach their full potential is to suggest their needs are somehow different or less important than the needs of other children. It may also mean that the potential benefits they may produce for society are not proportional to their share of the population, a clear externality that is at work.

The average school district in the United States receives only US$3.38 per pupil for gifted education from the state, and only 20% of all school districts receive any additional funding at all. Whereas the actual dollar amount may make sense given the size of the population being served, the level of inequality in these dollars does not. Additional funding for gifted education does not create inequality, it restores it. The current state of American education implies that the needs of gifted children are more important in some states and school districts than others, a clear shot against the bow of horizontal equity. Whether gifted children live in a rich district, a poor, district, an urban district, a rural district and so forth, should not mean they are deprived of resources for achieving their goals.

When combined with the findings by Baker (2001) and Baker and Friedman-Nimz (2003) that wealthier districts are the ones more likely to provide gifted education programs, the inequality argument against gifted education becomes even more tenuous. Although schools and school districts often are the chief financiers and providers of gifted education, states and even the federal government have a role to play as well. The state and federal governments can and should be responsible for ensuring that gifted children in poor districts or poor states are offered the same opportunities as gifted children in wealthier districts or wealthier states for reasons of both equity and efficiency. The paradigm of maximizing potential does not mean redistributing resources from disadvantaged children to gifted children; it simply means ensuring that each child, at any level of intelligence is provided the opportunity to be all that he or she can be. It is for this reason that gifted education is far closer to Robin Hood than the Sheriff of Nottingham.

Suggestions for Further Research

It is the hope of the author that this study adds to the small, but growing, body of literature on resource distribution for gifted education. Indeed, there is much that can be added within the same area of this article.

In recent years, data on the intradistrict allocation of resources has become much more widely available (e.g., Iatarola & Stiefel, 2003). It would provide greater insight into the distribution of economic resources for gifted education if the analysis presented in this article was extended to the school level. Do different schools receive different levels of gifted educational funding from the school district, and for what reasons? In New York City, for example, several science high schools exist solely to address the needs of the gifted and talented. What effect do these schools have on within-district equity? In addition, within a single school, there may be special programs for the gifted in the form of honors or advanced placement program. It would be interesting to look at student-level distribution of resources between the gifted and nongifted.

This particular article focuses on the what. It presents a portrait of gifted education resource distribution now and over time. It does not ask, and hence does not answer, the why. Why are some states more likely to provide funding for gifted education than others? Why are some districts more likely to receive resources than others? Work on these questions has already begun, but the ability to prove causation has been elusive.

Appendix

This section presents the formulas used to calculate the measures of inequality presented in this article.

The first and arguably the oldest measure of inequality used in this study is the well-known statistical measure known as the standard deviation. The standard deviation is given by

$$\sqrt{\frac{\sum_{i=1}^{N} P_i(\overline{X}_P - X_i)^2}{\sum_{i=1}^{N} P_i}}, \tag{1}$$

where X_p represents mean revenues or expenditures for all districts, X_i represents average revenues (expenditures) for each district *i*, and P_i represents the number of districts used in the analysis. Another measure of dispersion, the variance, can be calculated by squaring the standard deviation. Keep in mind for the standard deviation and most other measures of inequality in this analysis, pupils or districts may be the units of analysis and revenues or expenditures can be the resources that are studied.

When the standard deviation is divided by the mean, a disparity measure known as the coefficient of variation is created. The coefficient of variation is given by

$$\frac{\sqrt{\frac{\sum_{i=1}^{N} P_i(\overline{X}_P - X_i)^2}{\sum_{i=1}^{N} P_i}}}{\overline{X}_P}. \tag{2}$$

The division of the standard deviation by the mean in essence standardizes it, so that samples or populations with different units or vastly different means can be compared easily.

Based on the Lorenz curve, the Gini coefficient is one of the most popular measures of inequality used in income inequality analyses. The Gini coefficient is based on the Lorenz curve, and attempts to measure the "gap" between the actual distribution of district resources to a percentage of districts from a distribution based on a share of resources equal to the percentage of districts in question. The Gini coefficient equals

$$\frac{\left(\sum_{i=j}^{N}\sum_{j=1}^{N} P_i P_j \left|X_i - X_j\right|\right)}{2\left(\sum_{i=1}^{N} P_i\right)^2 \overline{X}_p}, \tag{3}$$

and can vary from 0 to 1. A Gini coefficient of 0 suggests perfect equality (a 45° Lorenz curve) and a Gini coefficient of 0 suggests perfect inequality. It should be noted that the Gini coefficient has been criticized for its insensitivity to the effect of extreme values on the estimate of inequality.

Finally, I calculated the Federal Range Ratio, which is equal to the difference between average revenue of the 95th and 5th percentiles of districts arranged in ascending order of district resources divided by the average revenue of the district representing the 5th percentile. By removing observations at the tail ends of the distribution, the Federal Range Ratio is thought to be less sensitive to extremely large and extremely small values, though by doing so it loses potentially useful information. As with the coefficient of variation, the Federal Range Ratio is a dimensionless measure. In this case, a value of 1 represents perfect equality.

Acknowledgement

The author wishes to thank Tim Smeeding and participants of the 2006 Association for Budgeting and Financial Management Annual Conference for their helpful comments.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

Notes

1. Alaska, the District of Columbia, Hawaii, and Montana are each comprised of only one school district.
2. Wilson, Lambright, & Smeeding (2006) find that studies using district-level data tend to overstate the level of inequality in per student expenditures that is found using individual-student-level data. Nevertheless, individual-student-level data on student and family characteristics linked to district-level fiscal data remains a relative rarity.

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