Introduction and Overview

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About the Author

Dr. William J. Fowler, Jr. is an education statistician at the U.S. Department of Education, National Center for Education Statistics (NCES), who specializes in school finance and educational productivity research. His work has focused on redesigning the federal school finance data collection effort to obtain information that can provide more policy-oriented analyses for the school finance community. NCES recently reinstituted a state and school district finance data collection effort for the first time in more than a decade, and is currently funding exploratory research work.

Prior to his work at NCES, Dr. Fowler served as a supervisor of school finance research for the New Jersey Department of Education, and taught at Bucknell University and at the University of Illinois. He also served as a senior research associate for the Central Educational Midwestern Regional Educational Laboratory (CEMREL) in Chicago and for the New York Department of Education.

Dr. Fowler has been a member of the American Education Finance Association since 1977, and was elected to its Board of Directors in 1992. He is a coauthor of *Disparities in Public School Spending*, 1989–90, and a coeditor of *Organizational Influences on Educational Productivity*, published by the JAI Press. In addition, he serves on the editorial board of the *Journal of Education Finance*. Dr. Fowler obtained his doctorate in education from Columbia University in 1977.

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Disparity in public school district funding is often thought of in terms of the range of expenditures throughout a state, or the difference in expenditures between rich and poor school districts. In at least half the states in the nation, these expenditure differences alone have brought challenges to the constitutionality of state education aid to school districts, and the outcome of this litigation is often court-ordered education finance equalization. Expenditure disparities, however, are seldom the only example of inequitable education financing. There may also be disparities in student access to services and programs. This may be especially true for students in certain residential locations, or those who have been racially or economically segregated. Race and poverty may all influence a student's curriculum through course selection. All of these disparities focus on the child. However, a recent development is to examine the resource allocation to schools, and the equity and effectiveness of school-based funding, which may dramatically influence the resources a child receives.

Although it may seem peripheral to questions of equity, another central concern is the productivity of the entire national public education system. If the system is becoming less productive and efficient, and simultaneously engenders inequity, then simply correcting inequity will not be sufficient.

The presenters at the 1996 National Center for Education Statistics (NCES) Summer Conference sought to deal with the perplexing persistence of inequity, not only in expenditures at the school district level, but also at the school level, and in student access to services, programs and course offerings. Participants also dealt with the question of the efficacy and productivity of public elementary and secondary education.

In the first presentation, **Wayne Riddle and Liane White** of the Congressional Research Service, Library of Congress, examined the nature of expenditure disparities within states. Public elementary and secondary education is dependent upon the wealth of local and state governments, and since their creation, there have been extensive differences in school districts' ability to raise revenue, and subsequent expenditures. Although the importance of these

differences in expenditures, and their relationship to student outcomes continues to be disputed, a recent development has been whether these spending variations should be a Federal concern. Since 1973, when the U.S. Supreme Court decided, in *San Antonio Independent School District v. Rodriguez* that intrastate disparities did not violate the U.S. Constitution, Federal mandates to action in remedying these inequalities would seem an unjustified Federal intrusion upon state responsibilities. The Rodriguez case was decided by the Justices being satisfied that the differences were an incidental byproduct of a conscious and legitimate state action to preserve local control of public schooling. Litigation involving intra-state expenditure disparities then moved to the state courts.

The Federal quiescence regarding state spending disparities has recently been stirred by the passage of a congressionally-mandated study of school finance by the National Academy of Sciences, and by a recently authorized (but not funded) equity provision for the program of education for the disadvantaged (Title I). Another unfunded provision of Federal education legislation provided technical assistance to states for the development of plans to increase school finance equity.

Riddle and White, using NCES data, turn to an analysis of the range of public education expenditures per pupil within states. Despite an NCES report that employs experimental geographic and student need adjustments to expenditures per pupil (Parrish, Matsumoto, and Fowler, 1995), Riddle and White choose to examine nominal expenditures, using a measure of inequality termed the "coefficient of variation" (COV). The COV is the standard deviation divided by the mean, which standardizes the measure across states. The higher the COV, the greater the disparity in spending. One advantage of the COV, in contrast to simply comparing the highest and lowest expenditures in a state (the range), is that the COV considers the expenditures of all the school districts in a state. Unfortunately, because it uses the mean (the average expenditure), it can be influenced by a few outliers, that is, very high or low spending school

districts. For this reason, researchers often examine only those school districts that fall between the top and bottom five percent of the school districts in the state (the 95th and 5th percentiles). Riddle and White also acknowledge differences in school district organization. Some states have "unified" school districts, serving grades pre-k–12, while others have elementary and secondary school districts. These organizational differences are not trivial when attempting to assess spending equity.

Riddle and White rank the states on the COV, and list the states with the highest and lowest COV. They conclude that while all of the high COV states have been the subject of litigation challenging the equity of the state elementary and secondary education funding system, there have also been challenges to the constitutionality of five of the eleven lowest COV-ranged states. In addition, there does not seem to be a relationship between the COV and the decisions of State supreme courts in deciding the constitutionality of the State education funding system. For example, New York and Illinois have high COV's, but have not been overturned, while Rhode Island was declared unconstitutional, although it had one of the lowest COV's.

David Monk, **Brian Brent**, and **Christopher Roellke** use a combination of state collected data and case study data to examine resource allocation patterns among school districts in New York State. Particular attention is paid to the distribution of teaching resources across secondary school subject areas. This work addresses recent interest in tracing resource flows to more micro-levels of the schooling system. Recent litigation in Los Angeles, for example, focused on inequalities within the same district. The final settlement (arrived at by agreement of the parties), called for the school district to provide all students with maximum access to teachers with experience and training, limiting revenues to each school to an equal dollar amount per pupil (within $100).

Monk, Brent, and Roellke examine the origination, disposition, and utilization of education resources in relation to school district spending, size, and wealth. Since more than one-third of the pupils in the state reside in New York City, the authors provide separate results for the "Big Five" (New York City, Buffalo, Rochester, Syracuse, and Yonkers). They find that the majority of revenues for education in the state are derived from local sources (56 percent), with the local property tax accounting for nearly half of the total revenue in non-city districts. They examine full-time equivalent (FTE) staffing levels per 1,000 pupils and find the big cities have much lower levels of certified professional staff and higher levels of subject-level administration. Longitudinally, staffing for foreign language and special education has grown, while staffing for English and vocational education has declined. As spending and district wealth increases, staffing of remedial courses declines, and advanced and rigorous curricular offerings grow. This pattern has persisted over time.

The final section of the paper reports on a series of case studies designed to complement the empirical analyses using state collected data. Instructional costs per pupil are calculated for each curricular program area in six school sites. They find that poor districts spend significantly less on math than their wealthier counterparts. Across all schools, either foreign language or science have the highest instructional costs per pupil of the core program areas. Physical education and health consistently spend the lowest amount per pupil on instructional costs. When program instructional costs are expressed as a percent of total instructional costs, the resources devoted to specific areas of the curriculum are quite similar across schools. This suggests that, while the size of the school district's pool of resources may vary among school districts, school systems assign similar priorities to program types when dividing this pool.

Nicola A. Alexander, while at the State University of New York-Albany, sought to track the course selection that students from different racial and economic conditions have made over time. Alexander examined course selection at the school level in grades 9–12 in New York State for twenty years, from 1974–75 to 1994–95, focusing on the courses traditionally associated with a core curriculum: language arts (English, reading, and limited English proficiency); foreign languages; mathematics; science; and social studies. She anticipated that schools with high minority populations and/or large numbers of students with free or reduced-price lunches would have fewer student class periods devoted to a core or advanced curriculum than their "whiter" or more wealthy counterparts.

Alexander finds that the average number of student class periods per week devoted to the core has increased substantially over the past twenty years, with the most dramatic change taking place in special education. The time allotted to English has remained about the same, but mathematics and science class periods have increased. More class periods are being devoted to advanced and Regents courses, and fewer to remedial course work. Surprisingly, poor minority students do not differ in their course taking from their richer, "whiter" counterparts. However, this was only true until 1985, when a dramatic reversal appeared. Investigating further through the use of regression analysis, Alexander finds the smaller the school size and the higher the portion of minority students, the fewer student class periods are devoted to core curriculum and advanced courses. She concludes that if additional courses do not have a substantial effect on educational or labor outcomes, then requiring mastery of the core curricula is an appropriate policy.

After the U.S. Supreme Court failed, in 1973, to find that school district spending inequities violated the U.S. Constitution, litigation moved to the state courts. Since then, approximately 28 State Supreme Courts have ruled on the equity of their education funding systems under their State Constitutions. Professor **Douglas S. Reed** of Georgetown University informs us that of these 28 cases, 12 State Supreme Courts have ruled for the plaintiffs, in favor of more equitable funding, and 16 have ruled for retaining the status quo. He seeks to examine the impact on the

actual distributions of school funds within four states (Connecticut, New Jersey, Texas, and Kentucky) where the State Supreme Court decided favorably for the plaintiffs. Moreover, he analyzes polling results and voting returns, in order to judge public reaction to the Courts' decisions. Particularly, he is interested in whether opposition to equalization comes from economic self-interest, or ideological and racial opposition.

Reed organizes his paper in the following way: section one presents a quantitative assessment of the effects that Connecticut, New Jersey, Texas, and Kentucky Supreme Courts have had on the equality of school finance expenditures; section two examines the public opposition to the education finance reforms that followed the declaration of unconstitutionality of the state education aid systems in New Jersey and Texas; section three concludes by assessing the limitations of state courts and state legislatures in fashioning publically-popular remedies to such court decisions.

Using the coefficient of variation (COV), which standardizes the comparison of inequity between the states, Reed concludes that Connecticut saw only a small decline in inequity, followed by worsening inequity within six years. Texas also showed a very slight decline in the level of inequity. However, New Jersey demonstrated a substantial decline in inequity, and Kentucky almost halved its inequities over four years. In part, the public opposition to greater fiscal equity in Texas and New Jersey may be a product of the changes wrought by the New Jersey and Texas legislators' response to their Supreme Court decisions.

Employing a sophisticated logit statistical procedure, Reed concludes that whites and non-whites in New Jersey perceive differently school finance reform, depending on whether they have children. Economic self-interest governs those respondents without children, while race shapes those with children. Perceived loss of state education aid for one's school district and higher education tax rates were statistically significant. If a respondent thought his property taxes would rise, support for the education finance reform legislation (QEA) dropped by 25 percent. Lower state education aid lessened respondent support by 15 percent. A white parent of a child enrolled in public schools was 33 percent less likely to approve of QEA, even more so if the parent resided in an urban school district. In Texas, the state legislature passed a constitutional amendment to recapture local property taxes, only to see the measure soundly defeated at the polls (63 to 27 percent). Analyzing demographic data and election returns from 150 state polling districts, using a regression analysis, Reed finds that it is not the affluent who opposed the constitutional amendment, but rather those ideologically approving of the conservative Republican U.S. Senate candidate Kay Bailey Hutchinson. Presence of Hispanic residents was a very strong and reliable predictor of support for the amendment.

Reed concludes that although State Supreme Courts can effectively bring about education finance reform through State Legislatures' responses to their decisions, public opposition may occur, and the success or failure of the courts' efforts to improve equity may hinge on the willingness and ability of the State Legislatures' to withstand public opposition to the reform legislation. Although some courts can (and have) threatened to use injunctions to achieve results, the more common outcome is for the legislature to enact reform legislation that is publicly palatable. Racial division and economic self-interest may prevent public acceptance of legislated reforms.

Although a few states, such as Ohio and Texas, have started to move to reporting revenues and expenditures at the school-level, most states do not have such systems in place. New Zealand and the United Kingdom, however, are able to report the finances of every school, and the state of Victoria, Australia, permits site-based management to determine the use of funds at the school level. **Brian J. Caldwell**, a Professor and Head, Department of Education Policy and Management at the University of Melbourne discusses the radical decentralization

since 1993 from a theoretical view, while in another paper, **Peter W. Hill**, a Professor and Deputy Dean of Education also at the University of Melbourne, discusses school-based funding models.

Caldwell explains that the creation of a system of 1,700 self-managing schools occurred at the same time as down-sizing of central and regional agencies. School attendance is "de-zoned" and school councils have the power to set policy and approve budgets. About 90 percent of the state's education budget is decentralized to schools which have the capacity to select their own staff. This occurs within a state-wide curriculum and standards framework and comprehensive accountability requirements. Under the previous centralized system, schools were allocated resources on a uniform formula basis with minimal local discretion. Under decentralized arrangements, a school's "global" allocation is determined by a range of student needs based factors, including a school index of students at educational risk. Under consideration is an increase in weighting for resourcing elementary schools, which are currently under-resourced in relation to secondary schools. There is promising opinion-based evidence that student outcomes have improved.

Hill explains some of the contextual detail of the Australian system. The main source of funds for public education in Australia is income tax collected at the federal level, and re-distributed to the state governments. More than 29 percent of Australian students attend non-government schools, which also receive substantial government funds, but still less than government schools. Of the total expenditure on school education, 95 percent is at the school level. Of this 95 percent, 8 percent are recurrent funds, such as busing, welfare allowance, substitute teachers, or certain support services, such as speech and psychological services. These funds are not considered discretionary, leaving 87 percent of the funds to be used at the school site level by school councils. The formula used to allocate funds to schools includes adjustments for size, student need, rurality and isolation, and priority programs, (such as teacher

professional development). The recent radical reforms are really the result of more than two decades of incremental change that has given schools (and school councils) increasing autonomy and accountability, which now includes budgeting and staffing.

Most finance reporting in education does nothing to adjust the revenues and expenditures for either differences in geographic location, or inflation over time (termed "nominal" revenues or expenditures). The development of geographic cost adjustments appeared in the report titled, *Developments in School Finance, 1996*. At the July 1996 Summer Conference one of the most controversial issues was how to deflate education expenditures over time (termed "real" revenues or expenditures), and how to interpret the results of the adjusted figures for assessing educational productivity. **Richard Rothstein and Lawrence Mishel**, of the Economic Policy Institute, explore the problem of making proper inflation adjustments as a basis for assessing educational productivity. How one views educational productivity may vastly influence one's willingness to provide additional tax revenues for public education.

Rothstein and Mishel note that in the last quarter century, government spending jumped from 26 to 31 percent of the gross domestic product,

> ...while schools are not noticeably better, police protection has apparently declined, mail is delivered less often, streets are dirtier, and roads have deteriorated. This apparent conflict between rising public expenditures and declining quality of public service may be one of the causes of the resistance to taxation which increasingly affects public decisionmaking.

However, Rothstein and Mishel suggest that this conflict may be more apparent than real. In an earlier work by Rothstein and Miles (1995), an interesting argument was made that we should expect inflation in

school spending to be higher than inflation shown by the Consumer Price Index (CPI), and Rothstein and Miles used a modified version of the "services" subcomponent of the (CPI) published by the Bureau of Labor Statistics (BLS). Rothstein and Mishel criticize those who use the gross domestic price deflator, or the CPI to convert nominal dollar expenditures to real dollar expenditures. They argue that education is an inherently low productivity-growth industry, and does not face an average inflation rate. Rather, they suggest, education should be compared to other services, which also show low productivity-growth (such as health care). Choosing an inflation rate makes a large difference in the measurement of school spending over time. For example, using the Rothstein and Miles approach, rather than the CPI, education spending from 1967–1991 grew by 40 percent less than it did using the CPI.

Rothstein and Mishel argue that more spending is required in education simply to keep the same real resources available to students. Comparing education and computers, the cost of delivering education services has increased relatively rapidly, while the cost of computers has declined (even while computers have greater quality and ability). In addition, they argue that education is not best measured by examining changes in the prices of education inputs, such as teachers and textbooks. Rather, they assert that one wishes to measure the "value-added" by education. This is more difficult in education than in manufacturing, where the value of the cost of inputs is subtracted from the value of shipments.

They insist that price increases reflect "inflation" if the price increases do not result from either new resources or higher quality. Rothstein and Mishel suggest that if school administrators decide to pay teachers at higher rates (for example, to attract higher quality teachers), this higher cost should not be attributed to inflation. But if they must pay higher salaries to attract a constant quality of teachers because the salaries of other college-educated workers are going up, this is an inflationary cost. Rothstein and Mishel argue that we can't know whether a teacher

salary increase should be attributed to inflation or to district choice without examining the trends in salaries of comparable professional workers outside education. They assert that, if we examine education costs alone, we can be misled into confusing inflation with real cost increases because of market imperfections in education. They comment that Chambers and Fowler (1995) find that teacher salaries are lower where large percentages of teachers in a county are employed by a few large districts. This is the result of monopsonistic power, that is, a large district is able to set the salary guide for an area. Rothstein and Mishel then argue for an index that represents the salaries of all college graduates in a region who are substitutable for teachers, rather than a specific education price index. They then argue that it is not meaningful to deflate the input by an education specific deflator, and that their "net services index" (NSI) should be extended and made more generally available.

They argue the NSI is preferable to a specific education price index, because it does not require the complexity of the efforts of, for example, Chambers and Fowler, and because such a task is simply not possible for historical data. Second, they argue that the problems of inflation affect not only education, but other similar human services, such as health, child welfare, and law enforcement. Thus, the NSI could become a single human services index.

An education finance economist, **Eric A. Hanushek** of the University of Rochester, examines the arguments of Rothstein and Mishel and believes their evidence conclusively supports a productivity collapse in schools. Hanushek observes that although the lack of a discernable improvement in student achievement with increased spending suggests a significant productivity collapse. Moreover, the magnitude of the collapse exceeds that in other low productivity sectors of the economy.

Hanushek believes that increases in education spending should be judged in comparison with price increases in service industries. Schools have had

larger spending increases than those for the service sector. This implies that productivity in schools has declined compared to the service sector, which has very low improvements in productivity. Measurement of productivity in education is actually easier than the service sector, Hanushek asserts, where in the service industry, measurement of output is very difficult.

The "basic building blocks" for assessing productivity trends in schools are data on spending, resources, and student performance. In 1965 current spending per pupil was $538. By 1990, it was $5,258. In 1965, the pupil-teacher ratio was 24.1, and the percent of teachers with a master's degree was 23.1. In 1990, the pupil-teacher ratio was 17.3, and the percent of teachers with a master's degree was 52.6. What Hanushek explains is that these changes were accompanied by roughly the same student achievement outcomes, causing much of the discussion about productivity and costs to become confused. Turning to basic considerations of costs, Hanushek elaborates that if widget producers devise a better way of producing widgets, so that more widgets can be produced with fewer workers (like autos which are constructed, in part, by robots), the price of widgets will tend to increase less rapidly than the salaries paid to widget workers. Assuming that the quality of the widgets remains the same (or increases), a widget productivity index would increase. Hanushek argues that while it is often assumed that measurement is easier for goods in the economy as opposed to services, the availability of direct measures of quality in some service sectors (including education) provide significant advantages for the measurement of price and productivity change.

Economic work centering on the cost implications of differential technological change has shown that technologically stagnant work sectors, such as the services industry, where the nature of production may prevent rapid improvements in the production function, face increases in the prices of outputs. The inability to improve the production process may arise from some necessity to maintain perceived quality, say, because the input quantity is related to perceived quality (e.g. smaller class sizes). If labor costs increase, these imply increased costs in the stagnant industries, a situation termed "Baumol's disease." The industries where labor services predominate such as the government, the arts, and nonprofit groups are all subject to this "disease."

Hanushek examines how the price of schooling has grown relative to other prices in the economy, comparing 1982–91. Expenditure per student increased by 7.6 percent annually, while the general price level increased by either 3.7 percent (GDP deflator) or 3.9 percent (CPI). Thus, the price of schooling relative to all other goods in the economy rose by close to 4 percent a year, implying that school productivity lagged those in the general sector by 4 percent a year. Alternatively, examining the changes in average wages for college-educated workers age 25–35, Hanushek concludes that productivity in schools has fallen by 2.5–3 percent per year. Indeed, comparing education to other low-productivity sectors of the economy confirms that education has been doing significantly worse than the typical low productivity industry.

Hanushek concludes that schools systematically hired more teachers, exacerbating "Baumol's disease." The increased proportions of students receiving special education services (something both Rothstein and Hanushek agree on), may explain some of the productivity collapse, but not the extent of the observed decline. One possibility is that students may be becoming more expensive to educate, but the evidence (Grissmer et al., 1994), suggests the opposite. Rather, Hanushek argues, the structure of schools does not provide incentives to improve student performance or to conserve on costs. This lack of incentives is probably the most significant factor in the productivity collapse of schools.

In the final paper, **Dan D. Goldhaber** of the CNA Corporation and **Dominic J. Brewer** of RAND seek to explain the inconsistent findings of researchers with respect to educational resources, particularly

teachers. They utilize an NCES data set, the National Educational Longitudinal Study of 1988 (NELS:88). NELS:88 is a nationally-representative survey of about 24,000 eighth-grade students, with about 18,000 re-surveyed in the tenth grade. NELS:88 links specific students to specific classes and teachers. This linkage ameliorates problems that may arise from using data aggregated to the school-level, and permits exploration of the effect of subject-specific teacher degree levels on student achievement. The teacher and class data in NELS:88 are organized by four school subjects (math, science, English, and history), in such a way that separate information is available about the teachers in each of the four subject areas sampled. Goldhaber and Brewer confine their study to public schools (fearing that private school students may be significantly different from students in public schools).

Goldhaber and Brewer find that although virtually all teachers in public schools have at least an undergraduate degree, only about 70 percent of teachers have a B.A. in their subject area. A lower proportion of math and science teachers have B.A. degrees in their subject area than English and history teachers. Although about half of all teachers have a M.A., less than a quarter are in the subject area they are teaching. Interestingly, a much higher proportion of female teachers teach English than the other three subjects. Goldhaber and Brewer find the usual results, that is, class size, teacher experience, and the percentage of teachers with a M.A. degree are statistically non-significant for students' achievement in each of the four subjects. However, when they examine teacher subject-specific training in math and science, they find that teacher training in the appropriate subject has a significant impact on student test scores in those subjects.

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