

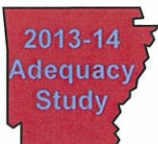


Research Report

An Overview of Methodologies of Assessing Educational Adequacy

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BACKGROUND AND PURPOSE OF REPORT

Historically, two differing philosophical frameworks, adequacy and equity, have served as the guiding principles for making decisions about how to distribute financial resources to schools or districts, which vary in terms of poverty and other socio-demographics. This report focuses on districts because most funding and expenditures are reported at that level. It also uses the terms “district” and “schools” interchangeably for convenience of discussion and because of convention in the school finance literature. Finally, the term “resources” is used to include *personnel* and educational *expenditures*, such as those found in the Arkansas Funding Matrix in Appendix A, for ease of discussion.

The threefold purpose of this report is to provide a very succinct historical overview of the evolution of the concepts of *equity* and *adequacy*, a brief description of these concepts, and a critique of methodologies currently used to evaluate educational adequacy in states. While educational adequacy is the primary goal of contemporary state financial distribution systems, equity remains in the background as states create categorical funding for disadvantaged students, or calculate mathematical weights for additional funding for these students.

COURT DECISIONS REGARDING EDUCATION FINANCES

A primary “driver” of educational finance has been litigation in courts throughout this country (Lindseth, 2004). In 1954, the United States Supreme Court held in the landmark case *Brown vs. Board of Education* that when a state provides children an education, such an opportunity “is a right which must be made available to all on equal terms.” This philosophical stand on the principle of equality continued in American educational law and policy through a host of state-level “equity” finance litigations, such as the landmark decision in the *Serrano v. Priest* (1971) case in California. The basic philosophical or legal argument was that the equal protection guaranteed to citizens under the Fourteenth Amendment prohibited substantially unequal funding of schools that was the product of the wealth of the people or property within any particular school district.

In 1973, however, the federal equal protection theory reached a dead-end when the U.S. Supreme Court rejected the argument in *San Antonio Independent School District v. Rodriguez*, finding that there was no fundamental right to education under the U.S. Constitution (Lindseth, 2004; Reich, 2006). With no recourse at the federal level, the battleground over school finance shifted to the states and the language in the 50 state constitutions. The New Jersey Supreme Court inaugurated the second wave of litigation with a 1973 decision imposing on the state legislature a duty to provide equity of school funding. State courts primarily sought to achieve “horizontal equity” across school districts such that per pupil revenues were roughly equalized by the state. Several reasons have been identified for the disenchantment with “equity” as a guiding principle for statewide distribution of resources (Reich, 2006). The most commonly cited reasons are scaling down financial resources to equalize funding for all school districts, and the failure of equalization to raise student performance and narrow achievement gaps (Odden and Picus, 2007; Reich, 2006).

The third wave of litigation marks the shift from “equity” to an “adequacy” philosophical argument inaugurated in 1989 by the Kentucky Supreme Court decision in *Rose v. Council for Better Education*. The court interpreted the education article in Kentucky’s constitution to require that the state legislature provide Kentucky children with an adequate education, which the court specified by identifying seven capabilities that all students would be expected to attain. In the Kentucky case, the court offered a very explicit definition of adequacy as providing students with the opportunity to achieve “sufficient capacity” in seven areas, including oral and written communication skills, knowledge of economic, social, and political systems, and understanding of governmental processes. This standard was the basis for development of the Kentucky Education Reform Act and has been cited in several subsequent cases in other states (Lefkowitz, 2004).

EQUITY AND ADEQUACY

The fundamental conceptual difference between “equity” and “adequacy” is rooted in the philosophical principles of *relative deprivation* and *absolute deprivation*. Equity addresses relative deprivation with comparative measures that ferret out inequities in resources needed to provide equal educational opportunities to all students, irrespective of individual and community disadvantages. Equity focuses on inputs (or resources) in school funding formulas (e.g., funding Matrix), and it has been deployed to answer the question, “Why should resource levels between districts be substantially different?”

Equity measures involve comparisons of resource distributions of school districts with a goal of equalizing educational opportunities. These measures will be presented in February by Rebeca Whorton, an analyst with the Bureau of Legislative Research. Briefly, “horizontal equity” refers to the equal treatment of students irrespective of need --sometimes referred to as the “one scholar, one dollar” principle. “Vertical equity” is aimed at providing additional funding for disadvantaged students to equalize educational opportunities. “Neutrality” measures are designed to indicate inequities resulting from school district wealth or geographic location.

By contrast, adequacy legal arguments address the question, “What level of educational resources is sufficient to generate a specific set of educational outcomes?” Adequacy definitions and study purposes, or goals, in most state legislation do not explicitly address inequities in educational opportunities. However, adequacy studies typically focus on whether school districts have sufficient resources to provide an adequate education to all students, including disadvantaged students, based on some explicit or implicit standard. Philosophically, the concept of adequacy implies an absolute measure. However, state definitions of adequacy tend to be vague and difficult to measure because standards are stated very generally instead of providing benchmarks that are to be achieved (Kagan, 2003; Walker, 2005).

METHODS OF MEASURING AND DETERMINING ADEQUACY

There are four primary methodological approaches currently used to assess educational adequacy in states: 1) evidence-based model, 2) professional judgment, 3) successful schools, and 4) cost function (or statistical) analysis.

1. EVIDENCE-BASED MODEL

Arkansas and Kentucky have relied on the *evidence-based* model to determine the amount of resources needed to provide an adequate education. In the *evidence-based* model, consultants are hired to design a package, or collection, of resources (e.g., our Matrix in Appendix A) needed to provide an adequate education to all districts. Based on their knowledge of research methodology and study findings, consultants make decisions about types and amounts of resources needed to promote student achievement (Michael, Spradlin & Carter, 2010). Recommendations regarding the distribution of resources are based on consultants’ interpretations of the effectiveness of various resources in facilitating student achievement (Michael et al., 2010). Odden, Goetz, and Picus (2007) argue that their evidence-based model of resource allocation can be applied nationally with reasonable accuracy because of its positive association with national student performance.

The *evidence-based* model focuses on inputs, or resources, in the school funding formula (Matrix). Adequacy is assessed by comparing district resources to the resource allocation package (Matrix) recommended by the expert consultants. Costs (or expenditures) for each resource are based on estimates found in the school finance literature, and these costs are summed to arrive at a total cost (or per pupil cost) for funding adequacy (Odden & Picus, 2007).

A salient strength of the *evidence-based* model is the use of experts who have extensive experience in conducting and evaluating research on resource allocation and student performance. They typically are highly trained methodologists who have a thorough knowledge of the school finance literature. Furthermore, the evidence-based adequacy study process is transparent and easily understood, and it examines current data from the educational system being evaluated.

At the same time, critics point out that the *evidence-based* model focuses exclusively on inputs (resources) to the exclusion of outcomes (e.g., student achievement, remediation rates). Many contemporary researchers and policy-makers argue that the ultimate goal of education is student achievement, and therefore, an adequate education should be assessed in terms of student performance (Duncombe, Ruggiero, & Yinger, 1996; Hanushek, 2005a & b; 2006; Michael et al., 2010). The only linkage between resources and student achievement in the *evidence-based* approach to educational adequacy are the extrapolations consultants make from prior research in designing a resource allocation plan or Matrix (Michael et al., 2010).

Critics not only observe that *evidence-based* studies fail to directly examine the relationship between resources and achievement, they argue that research findings cannot be generalized across states that have different policies and demographic characteristics (Hanushek, 2005a & b; 2006). They also criticize the piecemeal practice of providing evidence for each resource separately instead of investigating the impact of the total resource allocation package consultants recommend to states (Hanushek, 2005a & b; 2006).

The *evidence-based* method ultimately relies on professional judgment or interpretation of research rigor and findings. Critics point out judgments are influenced in immeasurable ways by personal preferences and biases, and they cite examples of how expert consultants have “cherry picked” studies that support their resource allocation, while ignoring contrary evidence. They also note that there is scarce research on the effectiveness of resources on student achievement, and in some cases there is no evidence to support recommended resources (Hanushek, 2005a & b, 2006; Michael et al., 2010).

Finally, reviewers observe that reports written by expert consultants typically do not articulate the methodological criteria used to select studies that provide support for resources recommended, which raises questions about the validity of studies used. There are no published examinations of the validity (accuracy) or reliability (consistency between evaluators) of the evidence-based method (Michael et al., 2010).

2. PROFESSIONAL JUDGMENT MODEL

Another major method of assessing educational adequacy that also focuses on resources, rather than on outcomes, is the *professional judgment* model. Instead of relying on the judgment of hired expert consultants, this model is based on the judgment of a local panel of professional educators (e.g., teachers, principals, superintendents, professors). Panels have been constituted by expert consultants, legislators, and governors. This panel of educators meets over a period of time to construct a package of resources. Once the resource allocation plan has been determined, the same panel, or a different group of experts, estimates the costs of each resource component. To address the issues of validity and reliability, some states have used more than one panel that work separately to derive independent resource distribution models and costs. The panels eventually meet together to amalgamate the independently-derived resource allocation plans. At times, panels have been informed by surveys of teachers, principals, and superintendents concerning needed resources and costs (Chambers & Levin, 2009).

An important advantage of the professional judgment approach to assessing educational adequacy is the deliberation by local professionals who are currently involved in the system being assessed, and intimately familiar with differences in districts, their resource needs, and regional costs. However, this intimate knowledge is a “dual-edged” sword because, in practice, panels of educators have tended to

simply present a wish list of resources, rather than design an efficient distribution of resources that supports educational adequacy (Chambers & Levin, 2009). Professional judgment methods of assessing adequacy typically have resulted in costly resource allocation models (Michael et al., 2010; Odden & Picus, 2007)

Educator panels rely on personal judgments based on knowledge and experience rather than on a systematic, clearly articulated set of mathematical procedures, such as statistical analyses. The personal preferences and biases inherent in professional judgments are problematic in making adjustments in resource allocation for high concentrations of poverty (Michael et al., 2010).

Contiguous states to Arkansas that have used the professional judgment approach to assessing adequacy are Missouri and Tennessee (Michael et al., 2010). Two professional judgment panels were created by Odden and Picus in 2003 to review their evidence-based model recommendations to the General Assembly's Joint Education Committee on Adequacy Odden, Picus, & Fermanich, 2003).

3. SUCCESSFUL SCHOOLS MODEL

The *successful school* approach examines the spending patterns of districts that have achieved success in student performance, and uses those patterns as a measure of educational adequacy for other districts. "The fundamental premise of the [successful schools] approach is that it is possible to determine an adequate base cost level by examining the basic spending of successful school districts" (Augenblick & Myers, 2001, p. 5). The *successful schools* model begins by identifying a subset of the schools in a state that are effective at meeting educational goals concerning student performance (Michael et al., 2010).

After agreement is reached on what constitutes a successful school, schools meeting the criteria are identified with statistical procedures, and current expenditures for these schools are calculated. The average expenditure of these schools, or some percentage thereof, is considered to be adequate. Expenditure data identify how dollars are spent, and spending patterns are used to establish resource allocation for adequate education.

For example, conducting a "successful schools" assessment in Illinois, Augenblick & Myers (2001) write:

"... [A] set of school districts (or schools) are selected from among all school districts (or schools) that meet a variety of criteria related to: (1) their level of success in meeting state standards; (2) socio-economic characteristics such as district wealth or proportion of pupils from low-income families; and (3) their efficiency in terms of spending. Once districts have been selected, their basic spending (excluding spending for capital purposes, transportation, special education, other special programs, and any service funded by federal revenue) is examined to determine a base cost" (p. 3).

In applying the *successful schools* model in California, Perez & Socias (2008) examined success over a period of four years for elementary and middle schools, and three years for high schools. Having multiple years of data allows for chance fluctuations in performance. To assess differences in resource allocation between successful and comparison schools, Perez and Socias (2008) used regression statistics to examine how well resource expenditures and student characteristics predict achievement. The regression analyses provide estimates of the impact of resources on achievement, after considering the effects (or influences) of student and district characteristics. The results of the regression analyses are used to devise resource allocation plans.

The most salient strength of the *successful schools* model is the intuitively appealing process of using the resource allocation of "successful schools" as a model for other schools. This apparent strength has also proved to be a limitation in practice because successful schools typically have dissimilar needs and characteristics to schools with high concentrations of poverty and disadvantaged students (Michael et al., 2010). Early studies attempted to address this disparity by identifying successful schools in subsets defined by demographic characteristics. However, studies have found that there

are so few successful schools with high concentrations of poverty. More recent studies have addressed demographic disparities by using sophisticated multivariate statistical procedures that control (or account) for these factors when examining the relationships between resources and student achievement (Augenblick & Myers, 2001; Duncombe, 2006; Perez & Socias, 2008).

Despite sophisticated adjustments for demographics, resource allocations in successful schools often have not proved to be appropriate models for schools with high concentrations of poverty and disadvantaged students (Borman et al., 2003; Michael et al., 2010; U. S. Department of Education, 2008). For example, schools with high concentrations of poverty often are located in communities that experience problems recruiting and retaining teachers, especially in critical subject areas.

States contiguous to Arkansas that have used the *successful schools* model include Mississippi, Missouri, and Tennessee (Michael et al., 2010).

4. COST FUNCTION (OR STATISTICAL) MODEL

The key characteristic of the cost function approach to educational adequacy is a set of reasonable estimates of the resource costs for individual school districts to reach a particular performance standard. In turn, such estimates rest on clearly defined standards of performance and on appropriate adjustments for factors that make the cost of achieving any given standard higher in some districts than in others. A cost function statistical analysis systematically examines the relationship between resources and student achievement, after adjusting for student and district demographic characteristics that impact that achievement (Gronberg et al., 2004; Reschovsky & Imazeki, 2000).

The cost function analysis is used to predict the level of spending needed to reach a specified performance standard in a particular school district, given their student and district characteristics. Differences in predicted spending provide insight into the extent to which factors outside of a district's control affect the cost of education. Such insights can be particularly useful to policymakers interested in integrating performance standards into the school finance formula, and ensuring that school districts have adequate resources needed to meet those standards. The cost function model provides the most rigorous calculation of cost estimates of resource allocation based on mathematical adjustments for poverty and other factors that lie beyond the control of school districts.

The statistical formula derived from data on district expenditures provides estimates of the funding needed for each district to provide an adequate education. These statistical procedures also provide information concerning the level of significance of each factor (resources and demographics) to student achievement. The relative strength of each factor to student achievement is indicated in these statistical analyses (Gronberg et al. 2004; Reschovsky & Imazeki, 2000).

The primary difference between the *cost function* and *successful schools* methods is the basis for resource allocation. The formula for resource allocation in the *cost function* approach is based on the entire collection of districts being studied, whereas in the *successful schools* approach the formula is based only on high performing schools. Both formulas involve resource allocation adjustments for districts with high concentrations of poverty and disadvantaged students.

A major strength of the *cost function* analysis of educational adequacy is the systematic mathematical adjustments in resource allocation for districts with high concentrations of poverty and disadvantaged students. These adjustments are especially important in states that have considerable diversity in student and district characteristics. The alternative to precise mathematical adjustments has been the use of professional judgments to create categorical funding or funding weights to provide extra resources to districts that have high concentrations of poverty and disadvantaged students (Michael et al., 2010).

Another distinct advantage of the *cost function* approach is the inclusion of a measure of financial efficiency in the analyses of resource allocation. Some *successful schools* studies also have included an efficiency measure, although it seems to be more common with cost function analyses (Michael et al., 2010). School districts differ significantly in the efficient allocation of resources, and failure to

examine efficiency can lead to distortions in resource allocations (Duncombe, Ruggiero, & Yinger, 1996; Reschovsky & Imazeki, 2000).

The *cost function* approach to assessing educational adequacy has two major vulnerabilities that can limit its usefulness. Sophisticated mathematical procedures used in the *cost function* analyses require valid (accurate) and reliable (consistent) data. These statistical procedures compound any errors in data, which results in distorted findings.

The *cost function* approach typically relies exclusively on available administrative (or macro-level) data, including salaries, expenditures for various educational functions, and district mileage rates. However, several national meta-analyses indicate that micro-level factors, such as quality of teaching and leadership, play a more significant role in student achievement gains than these macro-level variables (e.g., Borman et al., 2003; Orland, Hoffman, & Vaughn, 2010; U. S. Department of Education, 2008).

CONCLUSIONS

Each of the methodologies used for assessing educational adequacy offers advantages and weaknesses in comparison with the other methods. The evidence-based approach has the advantage of having expert opinions on what resources are essential to effective education of diverse students. Education finance experts typically have a firm grasp on “cutting-edge” research on what resources are associated with effective student performance outcomes. Arguably, they have knowledge concerning the costs associated with resources in various regions of the country (e.g., Augenblick & Myers, 2001; Duncombe, 2006; Odden & Picus, 2007). However, critics have noted that some recommended resources are based on sparse or unreliable evidence. They also contend that resource allocations in one state do not necessarily generalize to another state or location (Hanushek, 2005a & b; 2006; Michael et al., 2010).

In concert, educator panels have considerable expertise about current resource needs and costs within the educational system being evaluated for adequacy. However, practice experience indicates that these panels tend to create wish lists of resources without regard to costs, and as a result they design very expensive resource allocation systems (Michael et al., 2010; Odden & Picus, 2007). While professional judgment and evidence-based approaches focus on inputs (resources), critics argue that the primary goal of education is student achievement. Therefore, achievement must be analyzed to determine education adequacy.

Successful schools and *cost function* approaches to adequacy assessment directly analyze the associations between resources and student achievement, and both make statistical adjustments for differences in student demographics and district characteristics. These analyses also make adjustments for financial efficiency (Duncombe, 2006; Michael et al., 2010; Reschovsky & Imazeki, 2000). However, both approaches require high quality data because multivariate statistical analyses compound any errors in data, and therefore, can provide biased cost estimates. An alternative to selecting one of these approaches to adequacy study is to use more than one and compare results. Several states have either used two approaches simultaneously, or alternated methods from one year to another. Also, states have taken advantage of the differential strengths of the methods by using them for different purposes (Michael et al., 2010).

For example, expert consultants might be commissioned to design a national state-of-the-art resource allocation system (Matrix) that accounts for the diversity in student and district characteristics. Their system of resources then could be used as a template to initiate a discussion of resource needs in a local educator panel (or panels). This panel’s proposed resource allocation strategy could serve to inform a more systematic statistical analysis of resources, student and district characteristics, and student performance outcomes. Surveys of teachers, principals, and superintendents could inform resource allocation designs and serve to validate findings of statistical analyses.

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APPENDIX A – ARKANSAS RESOURCE ALLOCATION MATRIX

	FY08	FY09	FY10	FY11	FY12	FY13
Matrix Calculations	recalibration					
School Size	500	500	500	500	500	500
K = 8% of students	40	40	40	40	40	40
Grades 1-3 = 23% of students	115	115	115	115	115	115
Grades 4-12 = 69% of students	345	345	345	345	345	345
Staffing Ratios						
K P:T ratio = 20:1	2.0	2.0	2.0	2.0	2.0	2.0
Grades 1-3 P:T ratio = 23:1	5.0	5.0	5.0	5.0	5.0	5.0
Grades 4-12 P:T ratio = 25:1	13.8	13.8	13.8	13.8	13.8	13.8
PAM = 20% of classroom	4.14	4.14	4.14	4.14	4.14	4.14
Total Classroom Teachers	24.94	24.94	24.94	24.94	24.94	24.94
Special Ed Teachers	2.9	2.9	2.9	2.9	2.9	2.9
Instructional Facilitators	2.5	2.5	2.5	2.5	2.5	2.5
Librarian / Media Specialist	0.825	0.825	0.825	0.825	0.825	0.825
Guidance Counselor & Nurse	2.5	2.5	2.5	2.5	2.5	2.5
Total Pupil Support Personnel	8.725	8.725	8.725	8.725	8.725	8.725
SUBTOTAL	33.665	33.665	33.665	33.665	33.665	33.665
Principal	1.0	1.0	1.0	1.0	1.0	1.0
Secretary	1.0	1.0	1.0	1.0	1.0	1.0
Total School-Level Personnel	35.665	35.665	35.665	35.665	35.665	35.665
School-Level Salaries						
Teacher Salary + Benefits	54,888	55,954	57,073	58,214	59,378	60,566
Per Student Matrix Expenditure	3,695.6	3,767.4	3,842.7	3,919.6	3,998.0	4,077.9
Principal Salary + Benefits	86,168	87,860	89,617	91,409	93,237	95,102
Per Student Matrix Expenditure	172.3	175.7	179.2	182.8	186.5	190.2
School-Level Secretary	34,751	35,415	36,123	36,845	37,582	38,334
Per Student Matrix Expenditure	69.5	70.8	72.3	73.7	75.2	76.7
School-Level Salaries Per Student	3,937.4	4,013.9	4,094.2	4,176.1	4,259.7	4,344.8
School-Level Resources						
Technology	220	201	205	209.1	213.3	217.6
Instructional Materials	160	163.2	166.5	169.8	173.2	176.7
Extra Duty Funds	50	51.0	52.0	53.0	54.1	55.2
Supervisory Aides	49.35	50.35	51.4	52.5	53.6	54.7
Substitutes	59	59	60.2	61.4	62.7	64.0
School-Level Resources Per Student	538.4	524.6	535.1	545.8	556.9	568.2
Carry-Forward						
Operations & Maintenance	581	581	592.6	604.5	616.6	629.0
Central Office	376	383.5	391.2	399.0	407.0	415.1
Transportation	286	286	291.7	297.5	303.8	309.9
Carry-Forward Per Student	1,243.0	1,250.5	1,275.5	1,301.0	1,327.4	1,354.0
Foundation Per Pupil Expenditures	5,719	5,789	5,905	6,023	6,144	6,267
Retirement	0.0	0.0	0.0	0.0	0.0	0.0
Matrix Foundation Per Student	5,719	5,789	5,905	6,023	6,144	6,267
Increase per ADM	57	70	116	118	121	123
	1.0%	1.2%	2.0%	2.0%	2.01%	2.0%
Enhanced Funding Per Student	51.0	87.0	35.0	0.0	0.0	0.0
Matrix Foundation + Enhanced Per Student	5,770	5,876	5,940	6,023	6,144	6,267
Categorical Program Funding	FY08&09 ADJ	New Cost	FY10 ADJ	FY11 ADJ	FY12 Cost	FY13 Cost
ELL	0.4/1 to 0.6/1	293	0	0	299	305
ALE	15/1 to 12/1	4,063	0	0	4,145	4,228
NSLA	1.0328	496	0	0	506	517
	1.0328	992	0	0	1,012	1,033
	1.0328	1,488	0	0	1,518	1,549
PD	0	50	0	0	51	52

Per-Student Foundation Funding: FY 2012-13

