USING AVAILABLE EVIDENCE TO ESTIMATE THE COST OF EDUCATIONAL ADEQUACY

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Abstract

This article seeks to move the adequacy issue forward by demonstrating that under a certain set of assumptions, it is possible to provide a set of programmatic offerings that corresponds well with what we consider to be an emerging, research-based consensus about what constitutes best practices. We do this by showing what could be purchased with the national average expenditure per pupil if it were to be applied to one adequacy approach, the evidence-based approach, and how these resources have been linked to increases in student performance.

INTRODUCTION

Debates rage across the country about multiple issues related to school finance. Historically, school finance has focused on issues related to inequities caused by wide variations in expenditures per pupil across districts, both within and across states (Odden and Picus 2008). A more recent concern has looked at whether money matters; do higher-spending districts provide their students an educational advantage through more money and, conversely, do lower-spending districts shortchange the educational opportunities of the students they serve (Hanushek 2006)? Today, both state standards-based education reform and the No Child Left Behind Act (NCLB) require high levels of student performance from public schools. Consequently, the question of whether schools have sufficient resources to meet those performance demands has assumed new importance, with many educators claiming that the federal government should fully fund NCLB. In addition, educators call for states to increase school funding so that districts have the resources they need to meet these mandated performance expectations. Today, these issues are joined as the focus of school finance shifts from equity to adequacy (Minorini and Sugarman 1999), a concept that requires states to provide each district and school an "adequate" level of resources that would allow them to deploy educational programs and strategies to provide all students an equal educational opportunity to achieve state performance standards.

Although school finance adequacy is conceptually straightforward, several different approaches to identifying the cost of adequacy have been developed (see Guthrie and Rothstein 1999; Odden 2003; Odden and Picus 2008), and there is an emerging debate—quite a strong debate in many cases—about whether any of those approaches reflect good science (Hanushek 2006). The alternative methods usually identify differing levels of expenditure to fund an adequate program in a given state, and the results of those studies can vary substantially.

Despite this continuing debate, states and districts are moving forward on the adequacy agenda. This movement exists because many states are under a court mandate to provide adequate school funding and nearly all pending school finance suits raise the adequacy argument (Odden and Picus 2008). We should note, though, that even if a state provides what it determines to be adequate school funding, districts might not use the funds in ways that produce the desired level of student performance. Moreover, even if districts produced the desired level of performance, there might be strategies identified in the future that could produce that level of performance with fewer resources, or over time the state might set even higher performance standards that might require a different level of funds to be adequate. The point is that providing what might be termed adequate school funding today is only one step in the

process of producing desired levels of student performance over time at the least cost.

This article seeks to move the adequacy issue forward by demonstrating that under a certain set of assumptions, it is possible to provide a set of programmatic offerings that corresponds well with what we consider to be an emerging, research-based consensus about what constitutes best practices. We do this by showing what could be purchased with the national average expenditure per pupil if it were to be applied to one adequacy approach, the evidence-based approach, and how these resources have been linked to increases in student performance.

The next section discusses in more detail the programs and strategies we have distilled from the best available research evidence. It also summarizes case study research findings on schools that have made substantial and even dramatic improvements in student performance with educational strategies and resources similar to those recommended by the evidence-based model. The following section identifies the methods used to cost out the core recommendations from the evidence-based model. We then present the results of our cost estimation work and compares the findings to the national average expenditure per pupil for 2005–6. In the last section we offer conclusions as to how these findings can be used by state policy makers faced with funding an "adequate" education system, identify the limits of the evidence used in reaching our findings, and offer suggestions for future research and the role of the school finance community in helping states and school districts find cost-effective ways to implement school finance adequacy strategies that link to improvements in student learning.

THE EVIDENCE-BASED APPROACH TO SCHOOL FINANCE ADEQUACY

Over the last decade, states have moved from a focus on school finance equity to that of adequacy, as courts and legislatures interpret the education clauses of state constitutions to require that the school finance system provide each district, school, and student an adequate level of resources. "Adequate" is generally defined as a level of funding that would allow each district and school to deploy a range of educational programs and strategies that would provide each student an equal opportunity to achieve the state's education performance standards.

Four methods exist to determine school finance adequacy, each with its own advantages and limitations: cost function (e.g., Duncombe, Ruggiero, and Yinger 1996; Imazeki and Reschovsky 2005; Reschovsky and Imazeki 1998, 2000, 2001); professional judgment (e.g., Augenblick et al. 2002; Guthrie et al. 1997); successful schools/districts (e.g., Augenblick 2001; Augenblick

et al. 2002; Fermanich et al. 2006; Dupree, Augenblick, and Silverstein 2006); and evidence based (see cites below). Reviews of these approaches have been prepared by Baker, Taylor, and Vedlitz (2005) and Guthrie and Rothstein (1999).

The essence of the evidence-based approach is to give the prime influence for programmatic recommendations first to research evidence, as we have distilled it. In our distillation of the research evidence, our strongest programmatic recommendations are those supported by randomized trials and/or meta-analyses of effects, such as the recommendations for class sizes of fifteen in grades K–3, tutoring, and summer school. Recommendations based on best practices often derive from the resource parameters of comprehensive school reforms, such as class sizes of twenty-five in grades 4–12 (e.g., Stringfield, Ross, and Smith 1996). Finally, in some cases where there is little or no experimental design research—for example, on the use of guidance counselors and nurses—the approach relies on recommendations from professional associations.

In any state where we have used the evidence-based approach, the process starts with a set of core recommendations based on our distillation of research and best practices (see Odden and Picus 2008, chapter 4). However, as the process unfolds, teams of state policy makers as well as education leaders and practitioners review, modify, and tailor our core recommendations. Throughout this process, we frequently recommend that the policy task forces with which we work not accept recommendations that have little or no evidence supporting them, even if they reflect professional or political preference. For example, in our experience, professional judgment panels often recommend class sizes of twenty for grades 4–12, more elective classes in middle schools and high schools, and more pupil support staff. In every case, we have not supported those suggestions, all of which would significantly increase costs with no evidence that they would boost student performance. Nevertheless, the final set of strategies and their resource requirements are what state policy makers decide and form the basis of their cost estimates. We use the core recommendations in this article.

We have used the evidence-based approach to school finance adequacy in Kentucky (Odden, Fermanich, and Picus 2003), Arkansas (Odden, Picus, and Fermanich 2003; Odden, Picus, and Goetz 2006), Arizona (Odden et al. 2004), Wyoming (Odden et al. 2005), Washington (Odden et al. 2006), and Wisconsin (Odden et al. 2007). The recommendations from the evidence-based approach have been used by the Arkansas and Wyoming legislatures to reconfigure their state school finance structures.

Without undercutting the evidence that we use to make programmatic recommendations, we admit that current research evidence on what works in

education is limited and uneven, so the research evidence behind each individual recommendation varies in strength. Variance exists due to the paucity of high-quality studies and the small number of randomized, controlled studies. Further, some strategies have widely varying results in terms of effect sizes, possibly due to implementation issues, focus of the intervention (e.g., whether a summer school program had an academic emphasis), or any number of other issues. Further, because we must rely on the research that currently exists, alternative and lower-cost strategies may emerge in the future.

Nevertheless, when combined with other evidence, some discussed below and some from the more general school improvement literature, we have concluded that the evidence is quite suggestive about what can work in schools to boost student achievement. We have sought to distill the evidence into cohesive school strategies. In this process, we have found that there is considerable coherence to the practices suggested by the evidence and that these practices align with emerging consensus in education about best practices (see, for example, Stringfield, Ross, and Smith 1996 and our discussion below on schools dramatically improving student performance). Further, there are a few specific examples, such as appropriate class size, that are beginning to emerge and that are key to producing cost estimates. As we show below, when we estimated the costs of all practices together we discovered a surprising result—that under reasonable assumptions, it is possible to financially support the full range of what the best educators claim is needed programmatically to improve student performance without spending much more than the country currently spends on its K–12 public schools.

The evidence-based model includes the following resources in prototype schools with student enrollments of 432 (elementary), 450 (middle school), and 600 (high school):[1]

1. Full-day kindergarten.
2. Core class sizes of fifteen for grades K–3 and twenty-five for grades 4–12. Core is defined as the regular classroom teacher in elementary school and teachers of mathematics, science, reading/English/writing, history, and world language in secondary schools. With these ratios, class sizes average eighteen in the elementary school and twenty-five in middle and high schools.
3. Specialist teachers to provide instruction in art, music, physical education, career technical education, etc. They are resourced in numbers adequate to cover a six-period day in middle schools with teachers teaching five

1. This is described in more detail in the above-referenced state studies as well as in chapter 4 of Odden and Picus 2008.

periods, and in high schools to allow ninety-minute block schedules. This resource also provides all teachers with time during the day for collaborative planning and to work on the instructional program.

4. At least one period (usually an hour) of planning and preparation time each day for all teachers in elementary, middle, and high schools.
5. A comprehensive range of "extra help" strategies for students who need additional instructional assistance and extra time to achieve rigorous state proficiency standards, including:
    a. Resources to provide one-to-one tutoring at the ratio of one full-time equivalent (FTE) teacher tutor position for every one hundred at-risk students.[2]
    b. Extended day resources to provide academic help for two hours of before- or after-school programming, at the ratio of one FTE position for every thirty at-risk students, assuming about 50 percent of at-risk students would participate.
    c. Summer school resources to provide a summer schedule of up to six hours a day for eight to nine weeks, and academic help for two-thirds of the time students are in summer school each day. This would be resourced at the ratio of one FTE position for every thirty at-risk students, assuming about 50 percent of at-risk students would attend the program.
    d. One additional FTE teacher position for every one hundred English language learning (ELL) students (the bulk of whom also are at-risk and trigger the first three extra help resources) primarily to provide instruction in English as a second language.
    e. One FTE teacher for every 150 students to provide services for high-incidence but lower-cost students with disabilities (three positions at the prototypical elementary and middle schools and four positions at the prototypical high schools), with an additional 0.5 aide per full-time special education staff member. The model also recommends full state funding of the entire costs of the high-cost special need students (assuming 2 percent of those with disabilities are in the "high-cost" category).
6. Pupil support staff including guidance counselors (one FTE position for every 250 students in middle and high schools) and nurses, as well as additional pupil support to include social workers and family liaison personnel, the latter provided on the basis of one FTE position for every one hundred at-risk students.

2. At-risk students are generally the number of students eligible for the federal free and reduced price lunch program, often with adjustments for high school students, where lunch eligibility is typically underreported.

7. A full-time principal and librarian in every prototypical school, as well as two secretarial positions in the prototypical elementary and middle schools, three secretaries in the prototypical high school, and an additional library media technical person.
8. An ambitious set of professional development resources including one instructional coach for every 200 students (three FTE positions in a 600-student high school), at least ten pupil-free days for professional development (which usually means extending the school year for teachers by five additional days), and $100 per pupil for trainers and other expenses related to professional development.
9. Supervisory aides to cover recess, lunch, hall monitoring, and bus loading and unloading.
10. Funding for instructional materials, formative assessments, and supplies amounting to $165 per pupil in elementary and middle schools and $200 per pupil in high schools; $250 per pupil for technology and equipment; and $250 per pupil for student activities (sports, clubs, etc.).
11. $25 per pupil to provide extra strategies for gifted and talented students.
12. Substitute teacher resources at ten days for each teacher and instructional facilitator position.
13. Central office staff covering the superintendent's office, the business office, curriculum and pupil support, technology personnel, an operations and maintenance director, and staff for school-based custodial services and district-based maintenance and groundskeeper services (configured on a prototypical district; see Odden et al. 2007).
14. Food services are assumed to be a self-supporting enterprise activity; where such services operate at a loss, the model recommends outsourcing the function to a private sector company whose core business is food services, such as ARA Services.

We caution that no single recommendation can be considered a silver bullet, and good implementation of each is important. Indeed, California experienced multiple problems trying to reduce K–3 class sizes to twenty (larger than the fifteen we recommend), with many urban elementary schools ending up with small classes led by poorly qualified teachers. Moreover, schools need to emphasize that providing high-quality instruction to all students in core subjects is the first priority for effective use of resources and that other school strategies, particularly ongoing professional development, need to bolster the goals of this core priority in order to reach the final goal of more students achieving to higher performance standards. Schools need powerful and synergistic strategies for using the above resources and a relentless pursuit of teaching all students to high standards if they are to use the resources effectively and efficiently.

To show what all these core recommendations mean in terms of staff positions and dollars, the recommendations are often displayed as applied to prototypical elementary, middle, and high schools (see table 1). However, in actual use, the core recommendations are "fit" to the student numbers and student demographics of each school in a state, so schools with more students than shown in the prototypical schools would have proportionately more resources, and schools with fewer students would receive fewer resources, though several core resources (e.g., principal, secretary, librarian positions) often are retained for smaller schools to address diseconomies of small school size. Further, schools with larger concentrations and numbers of at-risk students would be eligible for a greater level of resources targeted to meet their needs and triggered by those higher pupil counts.

To determine the costs of an adequate education, salary and benefit figures need to be attached to the various staff positions. This process often entails analyses of what would constitute an "adequate" teacher salary and benefit package (e.g., see Imazeki 2006). After estimating the costs of all the school-based resources, those costs are aggregated to the district level, added to the central office and other district resource costs, and summed across all districts to determine a state-level total cost figure.

The costs of adequacy vary from state to state mainly due to personnel costs, specifically the number of FTE positions in the final recommendations and the salary and benefit levels for each of the recommended positions. Determining the number of staff positions and compensation levels are contextually specific policy and political decisions in each state. The policy choices with the largest fiscal impact include the salary and benefit levels identified as adequate and the number of FTE positions needed for the class size, instructional facilitator/coaches, certified teacher-tutors for struggling students, summer school, and extended day programs.

In the evidence-based model, the research evidence behind each individual recommendation varies in strength. Variance exists due to the paucity of high-quality studies and the small number of high-quality randomized, controlled studies that exist in educational research. Further, some strategies have widely varying results in terms of effect sizes, possibly due to implementation issues, possibly due to the focus of the intervention (e.g., whether a summer school program had an academic emphasis), or caused by any number of other issues. Because the evidence-based approach to school funding adequacy relies on the research that currently exists, alternative and lower-cost strategies may emerge in the future.

Nevertheless, we would argue that the strategies included in the core evidence-based recommendations listed above are those widely suggested by practitioners and researchers as strategies that work (i.e., boost student

Table 1. Recommendations for Adequate Resources for Prototypical Elementary, Middle, and High Schools

School Element	Elementary Schools	Middle Schools	High Schools
School characteristics			
School configuration	K–5	6–8	9–12
Prototypical school size	432	450	600
Class size	K–3: 15 4–5: 25	6–8: 25	9–12: 25
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	190 teacher work days, so an increase of 5 days	190 teacher work days, so an increase of 5 days	190 teacher work days, so an increase of 5 days
Percent of students with disabilities	13.7	13.7	13.7
Percent poverty (free and reduced price lunch)	36.3	36.3	36.3
Percent ELL	10.6	10.6	10.6
Personnel resources			
Core teachers	24	18	24
Specialist teachers	20% more assuming a 6-period day with each FTE teaching 5 periods: 4.8	20% more assuming a 6-period day with each FTE teaching 5 periods: 3.6	33% more assuming a 90-minute block schedule with each FTE teaching 3 blocks a day: 8.0
Instructional facilitators/coaches (ratio of 1 for every 200 students)	2.2	2.25	3.0
Tutors for struggling students	1 for every 100 poverty students: 1.57	1 for every 100 poverty students: 1.63	1 for every 100 poverty students: 2.18
Teachers for ELL students	An additional 1.0 teachers for every 100 ELL students: 0.46	An additional 1.0 teachers for every 100 ELL students: 0.48	An additional 1.0 teachers for every 100 ELL students: 0.64
Extended day	1.31	1.36	1.74
Summer school	1.31	1.36	1.74
Students with mild disabilities	Additional 3 professional teacher positions and 0.5 aides for each special education teacher	Additional 3 professional teacher positions and 0.5 aides for each special education teacher	Additional 4 professional teacher positions and 0.5 aides for each special education teacher

Students with severe disabilities	100% state reimbursement minus federal funds	100% state reimbursement minus federal funds	100% state reimbursement minus federal funds
Resources for gifted/talented students	$25/student	$25/student	$25/student
Substitutes	10 days/FTE	10 days/FTE	10 days/FTE
Pupil support staff	1 for every 100 poverty students: 1.32	1 for every 100 poverty students plus 1.0 guidance/250 students: 3.18 total	1 for every 100 poverty students plus 1.0 guidance/250 students: 4.25 total
Supervisory aides	2.0	2.0	3.0
Librarians/media specialists	1.0	1.0	1.0 librarian 1.0 library technician
Principal	1	1	1
School site secretary	1.0 secretary and 1.0 clerical	1.0 secretary and 1.0 clerical	1.0 secretary and 3.0 clerical
Dollar per pupil resources			
Professional development	Included above: Instructional facilitators 10 summer days Additional: $100/pupil for other PD expenses (trainers, conferences, travel, etc.)	Included above: Instructional facilitators 10 summer days Additional: $100/pupil for other PD expenses (trainers, conferences, travel, etc.)	Included above: Instructional facilitators 10 summer days Additional: $100/pupil for other PD expenses (trainers, conferences, travel, etc.)
Technology and equipment	$250/pupil	$250/pupil	$250/pupil
Instructional materials, including textbooks and formative assessments	$165/pupil	$165/pupil	$200/pupil
Student activities	$250/pupil	$250/pupil	$250/pupil
Other expenditures			
Operations and maintenance	$890/pupil	$890/pupil	$890/pupil
Transportation	$375/pupil	$375/pupil	$375/pupil
Food services	Self-supporting	Self-supporting	Self-supporting

achievement). Further, the resources included in the evidence-based model cover all the major programmatic aspects of schools. These include the resources identified by Sharp and Bransford (2007) as necessary for learner-centered classrooms and the resources identified by Weiss (2007) to support the cycle of continuous instructional improvement. Nevertheless, there is continuing debate over whether the strategies outlined above are effective in dramatically improving student academic achievement.[3]

To add to the evidence on the efficacy of these strategies, particularly the impact of the combined strategies in schools, we have conducted case studies of several schools and districts around the country that have dramatically improved student performance as measured by state tests over a four- to seven-year time period (e.g., Odden et al. 2006, 2007). The cases include schools and districts in rural, suburban, and urban communities and small, medium, and large schools. The cases show that the schools follow a series of remarkably similar steps to improving performance. These steps track closely to similar findings and research on approaches to improving organizational performance in the private sector (Kotter 1996, 2002) and in education (Fullan 2002; Duke 2006). Our findings from these educational case studies show that the schools used the kinds of resources described in the evidence-based model to deploy their comprehensive set of strategies that produced the improved student performance. Such common strategies and resource deployments include:

- Small class sizes (with a goal of fifteen) in grades K–3;
- Extensive teacher professional development, including more days of training and the placement of instructional coaches in schools;
- Extensive use of formative assessments to help tailor and focus instruction to the precise learning status of each teacher's students;
- Deployment of a series of extra help strategies that usually include some combination of one-to-one tutoring and extended day and academic-oriented summer school programs; and
- Creation of a collaborative, professional school culture.

Since these findings are based on case studies, it is inappropriate to generalize to a larger group of schools or school districts, and at this point it is premature from a research perspective to claim that there is a template for dramatically improving performance.

3. We note for the reader, and we caution policy makers, that the effect sizes for the individual programs should *not* be added together to estimate a total effect size. They are simply effect sizes for each individual program. The studies of schools dramatically improving performance show how the resources can be put together into a holistic, comprehensive, and integrated strategy, but we have only cases (though dozens of cases) of how schools can put all the programs together into a schoolwide strategy.

As described above, the current state of research is somewhat limited, and more research evidence is needed on the individual strategies themselves, various combinations of those strategies, and schools and districts that have been successful in dramatically improving student performance as measured by external instruments. However, given the evidence that is in place, together with the growing number of schools and districts that have used the kinds of resources in the evidence-based model to significantly boost student learning, combined with policy-maker and practitioner support for these evidence-based strategies, it seems appropriate to suggest that the evidence-based strategies identified here, if deployed effectively, are likely to produce improvements in student performance over a relatively short time frame (four to six years). As more evidence and information is created, these strategies and their underlying resources could be recalibrated, but they provide a substantive and reasonable starting point for moving forward today.

Of course, the key question in any state—and for the country—is how much do these strategies cost? As we show below, the costs of the evidence-based model are not out of the bounds of reasonable expectations of what many states can afford to spend on education today or in the near future.

METHODOLOGY FOR COSTING OUT THE EVIDENCE-BASED MODEL

In order to determine the national average cost of an evidence-based approach to school finance adequacy, we used a prototypical district consisting of four 432-student elementary schools, two 432-student middle schools, and two 576-student high schools, for a total of 3,744 students, with about 108 students in each grade. This prototype district contains the national average percentages of free and reduced priced lunch students, ELLs (National Center for Education Statistics 2006), and special education students (Hoffman and Sable 2006). The staff members in each of these schools were determined by using the recommendations from the evidence-based model applied to the numbers and demographics of these prototypical schools as shown in table 1.[4]

The prototypical district could have any number of students or schools; we use the numbers here merely to estimate a statewide per pupil expenditure for the recommendations contained in the model described above. Once that per pupil figure is determined, it could be used as the expenditure per pupil figure in a state foundation program. Districts with higher numbers of ELLs or students eligible for free and reduced price lunch would receive additional revenue based on these student characteristics.

4. Note that although several evidence-based studies included minimum staff to deal with the increased cost of small schools and districts, this per pupil figure is a simple proration, up and down, of the costs of the model. In analyses of the statewide difference in per pupil costs between models that include minimum staff positions and those that use simple proration, minimal total statewide cost differences exist.

This approach provides an estimate for each of the fifty states that can be summed to estimate a total per pupil adequacy estimate. For example, in Wisconsin, we first estimated what the expenditure level would be for the base program and the amounts for categorical programs based on counts of at-risk and ELL students by applying all the recommendations in the evidence-based model to the demographics of each school and aggregating to the district and then the state level. We then used the prototypical district described above to estimate the statewide adequate expenditure level. The two approaches produced results on a statewide basis that were within $50 per pupil of each other. Thus we are confident that the prototypical district approach for estimating the cost for a state with national average demographics and prices yields a reasonable estimate of the statewide per pupil cost of the evidence-based model. However, it is important to remember that if actually implemented, the expenditure level would vary for each state across the country and for each district within a state depending on district size, student demographics, and prices.

Applying national average salary data as well as a defined group of benefits (see table 2) to the personnel resources of the prototypical elementary, middle, and high schools, and then adding the school-based dollar per pupil resources (instructional materials, technology, professional development, etc.) produced a cost for general education resources at the school level of $5,847 per pupil.

Each school then was allocated resources for extra help strategies. Students eligible for free and reduced price lunch trigger resources for tutors, extended day and summer school programs, and additional pupil support staff, all with appropriate substitute teacher days. ELL students trigger resources for ELL teachers and their substitute days. Special education students also trigger teacher and aide resources using a census approach as well as resources for high-cost special education students (i.e., students who need services above and beyond the staffing provided via the census approach to special education funding).

The costs for students with severe disabilities were estimated at 2 percent of the total number of students with disabilities. We reached this figure through an analysis of Wisconsin special education. That analysis, reconfigured to national special education percentages, estimates that fully funding all high-cost students would require about $137 per regular student.[5]

The extra help strategy resources, triggered by the pupil characteristics identified above (including children with severe disabilities), are estimated

5. This estimate is based on a high-cost student with disabilities requiring $50,000 above regular pupil costs. For every 1,000 students, assuming that 13.7 percent have disabilities and that 2 percent of those students are high cost, that produces 2.74 high-cost students. The total cost for these students would be 2.74 times $50,000, or $137,000, or $137 per regular student and $50,000 per high-cost special education student.

Table 2. Salary and Benefit Rates

Position	Salary ($)	Benefits ($)	Total Compensation ($)
School-based			
Principal	80,411	20,986	101,397
Teacher	46,953	15,583	62,536
Librarian	52,505	16,480	68,985
Media technician	37,562	14,066	51,629
Counselors	51,862	16,376	68,238
School secretary	24,887	12,019	36,906
School clerical	19,910	11,215	31,125
Supervisory aide	15,915	10,570	26,485
Central office			
Superintendent	116,244	26,773	143,017
Assistant superintendent	99,771	24,113	123,884
Business manager	78,154	20,622	98,776
Staff-personnel services	80,568	21,012	101,580
Technology	66,832	18,793	85,625
Other areas	68,229	19,019	87,248
Secretary	33,077	13,342	46,419
Accounting/payroll clerks	34,829	13,625	48,454

Sources: Salary information from Educational Research Service, *National Survey of Salaries and Wages in Public Schools, 2005–06*. Costs for instructional facilitators, coaches, psychologists, and occupational/physical therapists are estimated using "other professional staff" salaries. Principal salaries are based on an unweighted average of elementary, junior high/middle, and high school principal salaries. Media technician salary is 80% of teacher salary and school clerical salary is 80% of secretary salary. Supervisory aide salary is based on 7.5 work hours for 185 school days. Benefits are 7.65% FICA/Social Security, 1% unemployment compensation, $8,000 health, and 7.5% retirement.

to cost a total of $1,601 per regular student (i.e., $2,382 per free and reduced price lunch student, $653 per ELL student, $3,893 per low-cost, high-incidence special education student, and $50,000 per high-cost, low-incidence special education student).

Next we added district-level resources to the school-level costs. These resources include central office, maintenance and operations, and transportation costs. The central office resources total $678 per pupil (see Odden et al. 2007 for details). An additional $890 per pupil for maintenance and operations costs and $375 per pupil for transportation bring total district-level resources to $1,943 per pupil.[6] Similar expenditures for operations and maintenance can

6. These figures represent the national average percentage of 9.5 percent for maintenance and operations and 4.4 percent for transportation (Snyder, Tan, and Hoffman 2006).

be determined by applying a set of standards for those functions (see Odden et al. 2006).

RESULTS

Table 3 shows the final results. General education resources for the schools totaled $5,847. The resources for all the extra help strategies—tutors, extended day, summer school, ELL students, students with all categories and degrees of disabilities—totaled another $1,601 per pupil. When district office resources were added, including central office, operations and maintenance, and transportation services, these functions added an additional $1,943 per pupil, for a total of $9,391 per pupil.

We know this figure would be different in each of the fifty states, both because of the different demographics of each state and because districts in each state offer different average salary level and benefit packages. We also know that states would make resource decisions that differ from the core evidence-based recommendations described in table 1. Nevertheless, we are confident that this figure is a good estimate of what the combined evidence-based recommendations would cost on a national average basis for a state with national average demographics and prices.

As noted, the expenditure estimate would rise if the percentage of free and reduced price students were higher (e.g., if the state had twice the national average count of students eligible for free and reduced price lunches, the adequate expenditure per pupil level would be increased by $865 to $10,256). And if the state had half the average amount of free and reduced price students, the expenditure level would drop by $433 to $8,958. If the state had five times the percentage of ELL students, the adequate expenditure level would rise by $264 to $9,655 just for a higher percentage of ELL students. But since many of the ELL students would probably also qualify for free and reduced price lunch, resources based on that factor also would rise. Since special education, except for students with severe and profound disabilities, is provided on a census basis, variations in percentages of special education students would not vary the adequate expenditure level.

The observation that the precise dollar per pupil figures will vary across states depending on student characteristics and prices also are true for per pupil figures across districts within states. The actual figures will be higher than the statewide average to the degree that the percentage of at-risk and ELL students as well as prices in the district are above the state average and will be lower if those student demographic figures are lower than the state average.

Our findings suggest that if such resources were provided on average to each district and school, adjusted for prices to ensure parity of the purchasing power of the education dollar across states and districts (see Taylor and Fowler

Table 3. Per Pupil Resource Needs for Evidence-Based School Funding Approach in a Prototypical District of 3,744 Students

General Education Resources	Personnel	Total Cost ($)	Per Pupil Cost ($)
Teachers	180.5	11,286,481	3,015
Specialist teachers	42.1	2,631,911	703
Instructional facilitators	18.7	1,170,672	313
Counselors	8.1	550,269	147
Librarians	7.8	540,839	144
Principal	8.0	811,176	217
School secretary	7.8	289,345	77
School clerical	11.7	363,540	97
Noninstructional aides	17.6	466,133	125
Media specialists	1.9	99,127	26
Gifted		93,600	25
Substitute teachers		259,745	69
Additional PD days		423,254	113
PD funds		374,400	100
Technology		936,000	250
Instructional materials		658,080	176
Student activities		936,000	250
Subtotal		*21,890,572*	*5,847*
Special Needs Resources			
Low-income resources	49.8	3,237,353	865
ELL resources	4.0	248,183	66
Special education teachers (census)/aides	38.2	1,997,053	533
High-cost special education resources		512,928	137
Subtotal		*5,995,516*	*1,601*
District Resources			
Central office	19.3	2,539,196	678
M&O		3,332,160	890
Transportation		1,404,000	375
Subtotal		*7,275,356*	*1,943*
Total evidence-based approach cost:		*35,161,444*	*9,391*

Notes: Low-income, ELL, and special education teacher (census) resources include funding for substitute teachers to cover sick days for full-time staff as well as an additional five days for staff professional development. Personnel are displayed to the tenths place, though actual decimal places are used in calculations.

2006) and adjusted for demographics reflecting student need, schools would have a sufficient set of resources to deploy a series of strategies enabling them to produce substantial improvements in student academic achievement, which is the ultimate objective of the education system and of school finance adequacy. Of course, the key question is how close is the evidence-based cost estimate of $9,391 per pupil to the current national average expenditure per pupil?

In June 2007, the federal government had not yet provided an estimate of per pupil expenditures for the 2005–6 school year, so we turned to the most recent estimate published by the National Education Association (NEA) in December 2006. The NEA estimated that 2005–6 expenditures per pupil for public schools, including all sources of expenditures and all operating functions, were $9,576 per average daily attendance (ADA) and $9,022 per enrolled pupil (NEA 2006). The NEA estimates include roughly $375 in food service expenditures, which our evidence-based estimate assumes is self-funding. Subtracting the $375 from national ADA and enrollment estimates brings the NEA's comparable estimates to $9,201 and $8,647, respectively.

In comparing these figures with our estimate of $9,391 per pupil, we find it is 8.6 percent above the average per pupil (enrollment) expenditure in 2005–6 and 2.1 percent above the national average expenditure per ADA. This suggests that the national average expenditure per pupil is close to providing school finance adequacy as estimated using an evidence-based approach—at least on a national average basis.

DISCUSSION, CONCLUSIONS, AND FUTURE RESEARCH

The central finding from our analysis is that, using an evidence-based approach to estimate school finance adequacy, overall and on average, our nation is closer than might be expected to providing the resources needed to cover the costs of what we view as an emerging, evidence-based-informed consensus about what counts as adequate school funding. This conclusion is important because we anticipate that if asked, most educators and policy makers would predict that the nation is far from adequately funding its schools.

Today there is no state that looks exactly like the national average. Some states spend considerably above our estimate and some substantially below. Even those that spend close to the figure we calculate might not be adequately funding their public school systems, either because they have a higher concentration of poverty and other students who need extra help or they provide salaries that are too low to recruit and retain high-quality teachers. So without specifically applying the core recommendations of the evidence-based approach to each state, it would be inappropriate to say that our fiscal findings apply to any specific state.

However, if one accepts our assessment of the current research on school improvement and our analysis of what that tells us about how to allocate resources to improve student learning, the conclusion we reach regarding the resources needed for our schools should cause the country to pause for a moment and consider how it funds public school systems in the fifty states. If on average the overall funding is adequate, or nearly adequate, does it make sense that some states might be funding at a level above—sometimes far above—adequacy and others at a level below—sometimes far below—adequacy? And if our finding that the country as a whole is close to adequately funding its public schools is on the mark, what does that suggest for a federal role in school financing? To what degree does it make sense to try to iron out the funding inequities across states so that extant resources could be deployed in ways that bring most schools to adequate funding levels, and what would those strategies be?

There are other complex issues to consider. Even districts and schools that are adequately funded may not use their resources in ways that produce the desired and possible levels of student performance. What are the strategies for creating a sense of urgency to change and improve in these schools? How can we encourage them to rethink their curriculum, instruction, classroom, and school organizational strategies and create a more powerful school vision? How can we help them restructure with that vision and in the process reallocate their resources to meet a more effective and productive vision of student learning? If those processes are known, what are the strategies to scale up and fund all districts and schools so they can restructure themselves into educational organizations that produce higher levels of student achievement?

And as all of this takes place, what more can we learn to improve our understanding of the linkages among resource allocation, use, and student learning? Put differently, adequate funding would be but one in a series of steps required for schools to re-create themselves into the kinds of high-performance organizations envisioned by the high national aspirations we have set for the country's schools. Regardless of whether one agrees with our interpretation of the research, it seems that at a minimum, more research on how to accomplish that daunting goal is needed. In the meantime, however, policy makers faced with the need to improve our schools now can use what we know today to transform our schools beginning tomorrow. If we subscribe to a process of continuous improvement, the research in our evidence-based model will allow us to begin that process, particularly given that the costs appear lower on average than one might expect.

One approach to these implementation issues is to focus on states that already provide adequate funding for schools and then rely on multiple strategies to create a sense of urgency to encourage schools to redesign and

restructure themselves into more effective organizations. We then need to study these efforts so a knowledge base is created describing how to establish incentives for schools to use resources in the most productive and efficient ways.

The lessons learned could be used in other states that need to increase school funding to a level that is adequate or at least adequate using the resource standards of the evidence-based model. That model provides them with sufficient resources to implement strategies with the potential to dramatically improve student academic achievement, if not up to the levels finally desired then at least to higher levels than the current status.

Simultaneously, the federal government could work with multiple states to launch an ambitious research agenda to bolster the evidence undergirding the strategies included in the evidence-based model as well as other strategies that are effective in boosting student learning. Such a research agenda should include the following:

- Use of other adequacy methods to determine how national school funding tracks with estimates of adequate funding using those models.
- Randomized experimentation using different class sizes to provide more evidence on what class sizes produce the highest levels of achievement in elementary, middle, and high schools and to determine if different class sizes are needed for different core subjects, such as mathematics, science, history, reading, and writing. Since class size is a prime determinant of school costs, these studies are critical to more precisely estimating the costs of adequately funding schools.
- More analysis of what constitutes adequate teacher salary levels. This is important if we are to determine whether teacher salary increases could by themselves enhance the effectiveness of teachers by allowing the education system to recruit and retain a larger number of high-quality teachers. This research would also help us determine the salary premiums needed to recruit and retain quality teachers in hard-to-staff positions such as mathematics and science in urban, high-poverty, and low-performing schools. Since teacher salary level is the second major determinant of school costs, these studies are also critical to establishing a more accurate estimate of adequate school funding.
- More randomized trials of each specific strategy and combinations of strategies (e.g., class sizes of fifteen in just grades K–1 or other grade spans, small class sizes combined with one-to-one tutoring, etc.).
- More case studies of schools dramatically improving student achievement, identifying the strategies used to do so, and delineating the needed resources.

- More studies of the comprehensive use of computer technologies to affect student achievement and reduce the personnel needs of schools and districts.

Undoubtedly the research agenda could be even more ambitious. But this list would significantly add to our knowledge of what works and how best to create a more effective and more efficient school organization that can produce the levels of student achievement that the country needs both to remain competitive in the emerging global economy and for each individual student to be successful in his or her adult life.

Crucial to this article's conclusions is confidence in the current research evidence that backs the recommendations undergirding our cost estimates. Certainly some will argue that the evidence basis for the model's recommendations is suspect or weak. We argue that the research behind our recommendations is the best currently available, and it offers education officials across the country a place to start. We also agree with many analysts who argue that we need more evidence, and publishing that evidence is one of the core missions of *Education Finance and Policy*.

In our studies for states as well as in Odden and Picus (2008), we document our approach to sifting through the vast amount of educational research that exists and seek to be completely transparent about what findings we use to develop each recommendation. Thus others seeking to find ways to organize and finance schools to enhance student performance could use our recommendations as a starting place from which they could seek other solutions and understand the rationale for the recommendations contained herein. In the meantime we have a reasonable level of confidence in our model following extensive school-level research that seems to indicate schools making large improvements in student performance often organize in ways that are similar to the components of the model described above (see, for example, Fermanich et al. 2006).

To those who suggest there is little that can be done other than to encourage local experimentation, we suggest that there is another positive path toward improved schools. That path requires taking what we know today, providing that information to policy makers, education leaders, and teachers, and helping them design systems and structures that enable them to improve schools. At the same time, we need to continue an ambitious research agenda to find out more about what does and does not work in schools, estimate the resource requirements of each, and find ways to provide local leaders with the expertise to implement those strategies that evidence suggests will work.

The evidence-based approach offers a place for policy makers to start. Using an informed distillation of available research, it offers a set of strategies that

have the potential to work in many educational settings and provides an estimate of what that will cost. The key is to recognize that this is a start and that we need to continue to improve our knowledge and develop a stronger understanding of the linkages between resources and learning—and use that knowledge to refine educational processes and the funding systems that support them. We hope the growing debate over what works will continue to be disseminated through academic research in journals such as this and will find its way to state capitals and school districts in the form of adequate resources backed by strategies for success to help students learn.

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