ESTIMATING THE COST OF AN ADEQUATE EDUCATION FOR TEXAS SCHOOL DISTRICTS USING THE EVIDENCE-BASED APPROACH

Lawrence O. Picus
Allan Odden
Michael Goetz
Anabel Aportela

Lawrence O. Picus and Associates
4949 Auckland Ave.
North Hollywood, CA 91601
v. 818 980-1703
f. 818 980-1624
lpicus@lpicus.com
www.lpicus.com

July 30, 2012

ESTIMATING THE COST OF AN ADEQUATE EDUCATION FOR TEXAS SCHOOL DISTRICTS USING THE EVIDENCE-BASED APPROACH

Lawrence O. Picus
Allan Odden
Michael Goetz
Anabel Aportela

Lawrence O. Picus and Associates

July 31, 2012

This report estimates the cost of adequate school funding levels for Texas school districts using the Evidence-Based (EB) approach. Plaintiffs[1] in Texas School Funding lawsuits have retained Lawrence O. Picus and Associates to develop these estimates. Our firm has been associated with the development and use of the EB approach to school finance adequacy for over ten years. The specifics of the model can be found in many places, notably our school finance textbook (Odden and Picus, 2008) and on our firm's website (www.lpicus.com). In this document, we use evidence-based methods to develop an estimated per pupil cost of education for each school district in Texas and for the state as a whole.

Texas has a long history of school finance litigation. This recent round is motivated in part by substantial funding reductions implemented by the Texas Legislature for the 2011-2013 biennium. These funding reductions amounted to $5.4 billion over the two years, and have led to a number of funding cutbacks among school districts throughout the state. We have prepared this analysis of school finance adequacy using our EB model to ascertain how current Texas school funding compares to our estimates of an adequate level of funding for Texas school districts.

The cost estimates in this document represent our best estimate of an adequate level of funding to meet the Texas constitutional requirements for education. We view these numbers as what should be available in each district for the funding system's basic allotment, and would view any current district expenditures for enrichment to be above the figures in this report. In addition, the estimates provided here do not include the costs of transportation, food services or capital outlay – costs that would be in addition to our estimates. Finally, as described below, our approach to special education assumes that the costs of services to children with severe and profound disabilities be paid entirely by the state. Consequently, the estimates in this report do not, at the present time, include estimates of those costs.

[1] Specifically we have been retained by the plaintiffs identified as the Fort Bent Plaintiffs and the Calhoun County Plaintiffs.

THE EVIDENCE-BASED APPROACH

The Evidence-Based (EB) Approach to school finance adequacy uses current research findings to specify the resources needed in prototypical elementary, middle and high schools. The resources advocated provide all students in each school an equal opportunity to meet the Texas proficiency standards. The research on which we rely includes experimental design studies, other peer reviewed publications and analysis of best practices from schools and districts that have dramatically improved student performance over a 4-6 year time period. We also rely on professional standards, as well as Texas legal requirements, for elements such as guidance counselors and nurses, as well as maintenance, custodial and groundskeeper personnel.

We have summarized this research in a number of publications, including our widely used school finance textbook (Odden & Picus, 2008), an article in the journal of the Association for Education Finance and Policy (Odden, Goetz & Picus, 2008), and in books on how schools and districts can dramatically improve performance and reallocate resources in the process (Odden & Archibald, 2009; Odden, 2009; Odden, 2012). We also used this framework to estimate, using statewide average data, the degree to which each of the 50 states provided adequate school funding in 2005-06 (Odden, Picus & Goetz, 2010). This report updates that work and estimates the costs of the EB model on a district-by-district basis for the state of Texas.

The EB process we employ to estimate the cost of an adequate education in Texas begins by describing in detail a prototypical school district designed for high student performance, including resources at the school (elementary, middle and high, separately) and district level, and then estimates the costs of the resources that comprise that district. We note that the recent transition to a new assessment system, the more rigorous linkages between performance on the new tests and high school graduation requirements, and the far lower rates of passage on the new tests than had prevailed under the previous tests all highlight the importance of supplying the resources needed to improve student performance on a statewide basis.

We recognize that there are few – if any – schools in Texas that have exactly the same enrollment as our prototypical schools, and there are no districts with exactly the enrollment of our prototypical district. These prototypes are used to establish estimates of the per pupil costs of operating a school district. The process for estimating the cost of the EB model for each district– which can then be aggregated to a total state cost – uses the following steps:

1. Estimate the core per pupil resources for each prototypical school.
2. Determine the additional per pupil resources necessary to meet the needs of special needs students (Economically Disadvantaged [ED], Bilingual/English as a Second Language [LEP], Special Education [SE], as well as Career and Technical Education [CTE]).
3. Compute the per pupil costs of the central office and maintenance and operations.
4. Determine the per pupil costs of a comprehensive Pre-K program.
5. Estimate the additional costs required due to the diseconomies of small school districts.

These per pupil cost estimates are then applied to the ADA of each district such that a total estimated cost per ADA – based on the characteristics of the students in that district – can be determined for each school district in the state. This figure is then adjusted by a Cost of Education Index (CEI) that accounts for differences in the cost of providing educational services across a state as large and diverse as Texas.

Although the model relies on detailed specifications of personnel and resources – an organizational structure we believe can lead to substantial improvements in student performance in a four to six year period – the purpose of the model as described herein is to establish a cost estimate only. It is not a mandate for school or school district organization or a requirement that schools and districts employ staff in the proportions described. Rather, it is a tool to ascertain how much revenue each district needs to provide an adequate educational program to every student it serves.

We recognize that each district and school is unique, and that local administrators and staff are best positioned to understand the particular needs of their districts and schools. Individual circumstances can dictate higher costs for particular districts than those we have estimated. In many cases, moreover, it would likely be impractical or undesirable for a district to attempt a wholesale or immediate restructuring in an attempt to match all of the attributes described in our model. Nonetheless, for the reasons previously stated, we believe the model is a useful and important conceptual tool in estimating the costs of adequacy, especially at the statewide level.

Finally, we note that research into best educational practices is an ever-developing field. While we believe the strategies identified in this report are well supported by the existing research base, we do not wish to suggest that latitude for experimentation with different techniques should be restricted. The opportunity for trial and error in implementation of new strategies is something that the Texas system of local control particularly encourages. We do not intend for our analysis to be read as opposing such an approach.

Pupil Count

Like other states, Texas relies on Average Daily Attendance (ADA) to count the number of pupils in each school district. There are a number of alternative ADA measures used in the system. For this report we have used the ADA count as calculated in the Texas Public Education Information Management System (PEIMS) . However, to accommodate the needs of school districts with declining enrollment, we use the higher of a three-year rolling average or the previous year's ADA, whichever is greater. The use of a three-year rolling average was first recommended by Cavin, Murnane & Brown (1985) to help districts plan for the decline in revenues that accompanies lower enrollments. However, we modify their recommendation by using the previous year's ADA in the case of growing school districts.

EB Core K-12 Per Pupil Costs

The first step in estimating the EB model is to identify resources for prototypical elementary, middle and high schools, using prototypical school sizes of 450, 450 and

600, respectively. Under this assumption a prototypical elementary school has 75 students in each of six grades (K-5) organized into classes of 15 students in grades K-3 and 25 students in grades 4 and 5.[2] The prototypical middle school has 150 students per grade (6-8) and is organized into classes of 25 students. The prototypical high school also uses average class size of 25 and has four grades with 150 students each (9-12). These are combined into a school district of four elementary schools, two middle schools and two high schools for a prototypical school district with 3.900 students.

Table 1 provides an overview of the formulas for the EB **core** school staffing and resources using our prototypical school sizes. Key aspects of the EB **core** staffing allocations include:

- **Core teachers for class sizes of 15 in K through grade 3 and 25 in Grades 4-12.**

  This includes teacher resources to provide a full-day kindergarten program. We use these small class sizes based on the extensive research on class size which finds that small classes of 15 (not a class of 30 with an instructional aide or two teachers) in kindergarten through grade 3 have significant, positive impacts on student achievement in mathematics and reading (Achilles, 1999; Gerber, Finn, Achilles & Boyd-Zaharias, 2001; Grissmer, 1999; Mishel & Rothstein, 2002; Molnar, 1999; Nye, Hedges & Konstantopoulous, 2002). It is commonly also concluded that the impact of small class size is even larger for students from low-income and minority backgrounds (Finn & Achilles, 1999; Konstantopoulos & Chung, 2009; Krueger & Whitmore, 2001). The evidence supports a policy to provide class sizes of 15 in all classrooms for kindergarten through grade 3.

  The primary evidence on the impact of small classes today is the Tennessee STAR study, which was a large scale, randomized experiment of class sizes of approximately 15 compared to a control group of classes with approximately 22 students in kindergarten through grade 3 (Finn and Achilles, 1999; Word, et al., 1990). The study found that students in the small classes achieved at a significantly higher level than those in regular class sizes, and that the impacts were even larger for low income and minority students (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002). The same research also showed that a regular class of 24-25 with a teacher and an instructional aide *did not* produce a discernible positive impact on student achievement, a finding that undercuts proposals and wide spread practices that place instructional aides in elementary classrooms (Gerber, Achilles, & Boyd-Zaharias, 2001).

  Evidence on the most effective class sizes in grades 4-12 is scarce as most of the research on class size reduction has been conducted at the elementary level. Our recommendation of an average class size of 25 is based on evidence on the most appropriate secondary class size from typical and best practices, and based on the

[2] Texas law requires 4th grade classes to have no more than 22 students per class. Although our EB model uses an average class size of 25 in 4th grade, the overall model generates a total of 26 teachers for the prototypical elementary school (5 each in grades K-3 and 3 each in grades 4 and 5). This amounts to an average of 17.3 students per class making it possible for any school with this level of resources to meet the Texas standard for 4th grade class sizes.

fact that nearly all comprehensive school reform models are developed on the basis of a class size of 25 (Odden, 1997; Odden & Picus, 2000; Stringfield, Ross & Smith, 1996). This conclusion on class size has been reached by the dozens of experts who created these whole-school design models.

Thus our EB model relies on class sizes of 15 in grades K-3 and 25 in grades 4-12 and also includes a full-day kindergarten program.

- **Full-Day Kindergarten program with a class size of 15.**

  Research shows that full-day kindergarten, particularly for students from low-income backgrounds, has significant, positive effects on student learning in the early elementary grades (Cooper, et al., 2010; Fusaro, 1997; Gullo, 2000; Slavin, Karweit & Wasik, 1994). In a late 1990s meta-analysis of 23 studies comparing the achievement effect of full-day kindergarten to half-day kindergarten programs, Fusaro (1997) found an average effect size of 0.77 standard deviations, which is quite substantial. Children participating in such programs do better in learning the basic skills of reading, writing, and mathematics in the primary grades of elementary school than children who receive only a half-day program or no kindergarten at all. A mid-2003 study by the National Center for Education Research (Denton, West & Walston, 2003), using nationally-representative, longitudinal data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS–K), showed that children who attended full-day kindergarten had a greater ability to demonstrate reading knowledge and skill than their peers in half-day programs, across the range of family backgrounds. This study also found that the more children were exposed to literacy activities in the home, the more likely they were to perform well in both kindergarten and first grade. As a result of this research, funding full day kindergarten for 5 year-olds as well as for 4 year-olds is an increasingly common practice among the states (Kauerz, 2005).

- **Specialist teachers at 20% of core teachers at elementary and middle schools, and 33% at high school.**

  Specialist teachers provide for electives in art, music, PE and other important non-core classes. The EB model provides these resources at the rate of 20 percent of core teachers for both the elementary and middle school, and at the rate of 33 percent of core teachers for high schools. We provide additional specialist teachers at high schools on the theory that high schools are organized with a block schedule of four 90 minute classes daily with teachers providing instruction for three of four blocks a day. These assumptions allow elementary and middle schools to have versions of a 6 period schedule, with all teachers providing instruction for 5 periods and having one period a day for planning, preparation and collaborative work. It allows high school teachers to have up to 90 minutes every day for planning, preparation and collaborative work.

  High schools can organize with any schedule they find appropriate. The typical organization in Texas is generally a 7 period day, with teachers providing

instruction for 6 periods. Providing 33% more specialist teachers make it possible for the prototypical high school to offer students 32 course credits over the four years of high school, more than enough to meet the high school graduation requirement of 26 courses.

- **Instructional coaches to provide embedded professional development for teachers at a rate of 1 per 200 students.**

  Instructional coaches coordinate the instructional program at each school, and, more importantly, provide the critical ongoing instructional coaching and mentoring that the professional development literature shows is necessary for teachers to improve their instructional practice (Garet, Porter, Desimone, Birman, &Yoon, 2001; Joyce & Calhoun, 1996; Joyce & Showers, 2002). Thus they spend the bulk of their time in classrooms, modeling lessons, giving feedback to teachers and helping improve the instructional program.

  Earlier research from mostly qualitative studies found strong effect sizes (1.25-2.71 standard deviations) for coaches as part of professional development (Joyce & Calhoun, 1996; Joyce & Showers, 2002). A 2010 evaluation of a Florida program that provided reading coaches for middle schools found positive impacts on student performance in reading (Lockwood, McCombs & Marsh, 2010). And a related study found that coaches provided as part of a data-based decision making initiative also improved both teachers' instructional practice and student achievement (Marsh, McCombs & Martorell, 2010). Further, a recent randomized trial study of coaching found significant, positive impacts of student achievement gains across four subject areas – mathematics, science, history and language arts (Pianta, Allen & King, 2011).

- **Substitute teachers at 5% of core, specialist, and instructional coach teachers.**

- **Counselors at the ratio of one counselor per 250 students.**

  This recommendation is based on: 1) the recommendations of the American School Counselor Association (ASCA) at secondary schools and 2) meeting the Texas state requirement of one counselor at each elementary school.

- **Librarians at each elementary, middle and high school.**

- **Nurses at the rate of one nurse per 750 students.**

  Based on the American Nurses Association standard.

- **Supervisory Aides to monitor students,** for example, in the lunch room, playgrounds, and other locations.

- **Site administrators to provide leadership at each elementary, middle, and high school.**

- **Site clerical assistance to provide administrative support at each elementary, middle, and high school.**

In addition, the model includes dollar resources for:

- **Professional development for trainers**
- **Computer technology and equipment.**
- **Student activities.**
- **Instructional materials to support a six-year textbook adoption cycle.**
- **Short cycle student assessments.**
- **Gifted and talented students to provide resources for materials and online curriculum.**

To estimate the costs of the EB core model, we relied on the 2010-11 average salary of individuals employed in school districts across Texas.[3] For the per pupil costs of technology, instructional materials, assessments and student activities, we relied on current research and practice in other states as well as Texas experience.

Table 1 displays the ratios used to compute staffing needs for core education programs as well as the dollar per pupil resources needed to provide a strong academic program for all students. The section following this table provides details the additional resources provided through the EB model for struggling and CTE students.

[3] In the case of maintenance and operations personnel, the model uses 2010-11 data from the Bureau and Labor Statistics (BLS).

Table 1: Texas School Staffing and Resource Models

School Element	Elementary Schools	Middle Schools	High Schools
School Configuration	K-5	6-8	9-12
Prototypical school size	450	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	192 work days: Instruction: 180 Professional Dev.: 10 Open/Close Schools & Parent Conferences: 2	192 work days: Instruction: 180 Professional Dev.: 10 Open/Close Schools & Parent Conferences: 2	192 work days: Instruction: 180 Professional Dev.: 10 Open/Close Schools & Parent Conferences: 2
Personnel Resources			
Core Teachers	26	18	24
Elective Teachers	20% more 5.2	20% more 3.6	33.333% more assuming a 90 minute block schedule; teachers teach 3 blocks daily: 8.0
Instructional Coaches	1 per 200 students: 2.25	1 per 200 students: 2.25	1 per 200 students: 3.0
Total Core, Elective and Coach Teachers	33.45	23.85	35.0
Substitute Teachers	5% extra core, specialist & instructional coaches: 1.67	5% extra core, specialist & instructional coaches: 1.19	5% extra core, specialist & instructional coaches: 1.75
Counselors	1 (per state statute)	1.0 /250 students 1.8	1.0 /250 students 2.4
Nurses	1/750 students 0.6	1/750 students 0.6	1/750 students 0.8
Instructional Aides	0	0	0
Supervisory Aides	2.0	2.0	3.0
Librarian	1.0	1.0	1.0
Principal	1	1	1
Assistant Principal/ Program Coordinator	0	0	1
School Site Secretary	2	2	3

Table 1 (Continued): Texas School Staffing and Resource Models

School Element	Elementary Schools	Middle Schools	High Schools
Dollar per Pupil			
Additional Professional development	5 additional teacher days to total 10 PD days; $100/pupil	5 additional teacher days to total 10 PD days; $100/pupil	5 additional teacher days to total 10 PD days; $100/pupil
Technology Equipment	$250/pupil	$250/pupil	$250/pupil
Instructional Materials including Library Resources	$140/pupil	$140/pupil	$175/pupil
Short Cycle Diagnostic Assessments	$25/pupil	$25/pupil	$25/pupil
Student Activities	$250/pupil	$250/pupil	$250/pupil
Gifted/talented students	$25/student (based on total school enrollment)	$25/student (based on total school enrollment)	$25/student (based on total school enrollment)

Per Pupil Costs for Struggling Students

The EB model provides additional resources to meet the needs of struggling students and those who otherwise need specific assistance (See Odden and Picus, 2008 as well as various state reports at www.lpicus.com). In the Texas model we estimate the number of students requiring additional support using the Texas Economically Disadvantaged (ED) count, which is based on counts of students eligible for free and reduced price lunch as well as other services based on economic status. The model also provides Limited English Proficiency (LEP) resources based on the number of LEP students in each district. In addition, we provide resources for special education for students with mild and moderate disabilities (and assume the costs of special education programs for children with severe disabilities are funded entirely by the state).

The model also provides funding for Career and Technical Education (CTE) based on state FTE counts of CTE students. Although CTE students do not fit within the classification of students needing special help, we include this category here for convenience.

These resources reflect a Response to Intervention (RTI) approach, in which efforts are made to identify struggling students early and provide them help as needed – one-to-one tutoring, small group (maximum of five students), academic-focused extended day help and academic-focused summer school – with the intent to move them back to the regular program. Students who continue to struggle are offered more intensive services and if necessary are eventually referred to special education programs. The goal is to help students remain in the regular program and minimize the need for more expensive special education programs. The theory is to hold high academic standards constant and vary instructional time and intensity so all students can meet proficiency standards.

Resources for struggling students include the following:

LEP: The EB model provides resources to offer additional help to Limited English Proficient (LEP) students. The resources identified in Table 2 provide additional teacher resources that allow districts to offer a range of services to LEP students, through some combination of small classes, English as a second language classes, professional development for teachers to help them teach "sheltered English classes", and "reception" centers for districts with large numbers of LEP students who arrive at the school throughout the year.

ED: The EB model provides resources to support the additional learning needs of students identified as needing Economically Disadvantaged (ED) resources. In Texas we use the ED pupil count to generate resources for the following purposes:

> *Tutors*. Professional teachers offer immediate support in the extant curriculum to students who are struggling. This tutoring is provided in a one-on-one or very small group (no more than 5 students per group) setting for between 20 and 30 minutes a day until the student has mastered the knowledge and skills and can return to the regular classroom program.

Extended Day. Struggling students receive additional help in before- or after-school programs staffed by professional teachers for two hours a day, five days a week. We assume half of struggling students will participate in this program in class sizes of 15.

Summer School. Struggling students are also provided academic-focused summer school opportunities in programs. These programs are staffed by professional teachers and offered for between six and eight weeks with at least four hours a day of core academic programming. These programs are similarly staffed with class sizes of 15 and assume half the struggling students will participate.

We note that some of these assumptions may be conservative in light of the initial passage rates on the 9th grade STAAR exams and the large percentage of 9th grade students who have been required, as a result, to participate in summer accelerated learning.

Additional Pupil Support. This support provides resources in proportion to the number of ED students to provide additional guidance counselors, nurses, family liaison, and social workers, in ways that best address student needs from the perspective of each district and school.

Special Education: The model uses a census approach to provide resources to schools and districts to meet the needs of children with mild and moderate disabilities. The census approach provides an identified set of resources to the prototypical school and then relies on each school or district to meet the IEP needs of the students with those resources. The model provides 1 FTE teacher position and ½ FTE instructional aide position for every 150 total ADA in a school . For children with severe and profound disabilities, our model assumes state reimbursement of all costs.

Career and Technical Education (CTE): For convenience, we include resources for career and technical education programs in this section as well. Specifically we provide resources of $9,000 per teacher for additional program/technology costs associated with CTE classes, which are staffed by teachers in the school with class sizes of 25.

Table 2 summarizes the resources identified in the EB model for each of these programs. Table 3 provides the estimated per pupil cost of providing additional services for LEP, ED, Special Education and CTE students.

It is important to note in Table 3 that for LEP, ED and CTE, the per pupil cost figures are applied to the number of students identified in each of the categories respectively, but for special education, the per pupil cost identified in the table is applied to all children in the school.

Of equal importance, students who are both ED and LEP generate resources for both categories in the EB model. In other words 100 LEP students who are categorized as Educationally Disadvantaged not only generate the LEP resources identified in Table 2, but also generate the ED resources identified in that table.

Table 2: EB School Staffing and Resource Models for K-12 LEP, ED, Special Education and Career and Technical Education Programs

School Element	Resources
LEP	
LEP Teachers	1 teacher for every 100 LEP students
Substitutes	5 percent of teacher positions
Professional Development	Additional 5 days a year for each LEP teacher
Instructional Materials	$10 per LEP pupil beyond what each generates through the core model
ED	
1. Tutors	1 teacher for every 100 ED students
2. Extended Day	3.33 teacher for every 100, times 0.25
3. Summer School	3.33 teacher for every 100, times 0.25
4. Additional Pupil Support	1 teacher support position for every 100 ED students
Substitutes	5 percent of teacher positions
Professional Development	Additional 5 Days a year for each teacher position generated for tutors, extended day, summer school and pupil support
Instructional Materials	$10 per ED pupil for each of 4 programs (tutors, extended day, summer school and pupil support)
Students with Mild and Moderate Disabilities*	
Special Education – mild and moderate disabilities	1.0 Teacher and 0.5 Aide for every 150 regular students (to be used to provide special education services)
Substitute	5 percent of teacher positions
Professional Development	Additional 5 Days a year for each teacher position identified herein
Instructional Materials	$10 for every regular student to be used to provide special education services
Career and Technical Education	
Equipment Resources	$9,000 per teacher FTE

*Special Education for students with severe and profound disabilities is 100% state funded with an extra ordinary aid program.

Table 3: EB Model Per Pupil Costs for Struggling Students

	Resources	Unit Cost	Total Cost
LEP			
LEP Teachers (includes PD)	0.01000	$59,046	$590
Substitute Teachers	0.00050	$31,150	$16
Instructional Materials	1.00000	$10	$10
Total per LEP Student			**$616**
ED			
Tutors (includes PD)	0.01000	$59,046	$590
Extended Day (includes PD)	0.00833	$59,046	$492
Summer School (includes PD)	0.00833	$59,046	$492
Additional Pupil Support (includes PD)	0.01000	$59,046	$590
Substitute Teachers	0.00183	$31,150	$57
Instructional Materials	4.00000	$10	$40
Total per ED Student			**$2,262**
SPED (Mild and Moderate Disabilities)			
Teachers (includes PD)	0.00667	$59,046	$394
Substitute Teachers	0.00033	$31,150	$10
Instrucational Aides	0.00333	$21,982	$73
Instructional Materials	1.00000	$10	$10
Total per Regular Student			**$487**
Career and Technical Education (CTE)			
Equipment Resources (per CTE teacher)	1.00000	$9,000	$9,000
CTE students per CTE teacher			25
Total Per CTE Student			**$360**

Central Office, Maintenance and Operations, Groundskeepers and Utilities

In addition to the school level resources identified above, the EB model provides funding for administrative and maintenance costs associated with a prototype Texas school district composed of four elementary, two middle and two high schools. This represents a district of 3,900 students (four 450 elementary school students, two 450 middle school students and two 600 high school students). We have identified resource levels for a central office, as well, for custodians, groundskeepers and maintenance workers and for costs for energy (gas and electricity), communications and other miscellaneous expenditures for administration (e.g. insurance, purchased services, elections, school board support, materials and supplies, district wide technology and custodial supplies).

Resources typically found in the central office include the district superintendent, deputy, associate and assistant superintendents, directors and other support staff to manage the district. Table 4 identifies the personnel and non-personnel resources necessary for a central office to support a district of 3,900 students based on our research in other states, the doctoral research of Swift (2005) and recent demands placed on school districts for testing and accountability. As the table shows, these resources produce a per-ADA cost of $549 for central office services.

We have developed over time a set of formulas to estimate the custodial (school cleaning and minor repair), maintenance (district-wide maintenance and repair of larger assets) and groundskeepers.

For custodians, we estimate the number of personnel needed for each prototypical school site through a formula that takes into account the number of teachers, number of classrooms, number of students and the gross square footage of the school. We also provide custodial personnel for the central office building space. The formula is as follows:

1 Custodian for every 13 teachers +
1 Custodian for every 325 students +
1 Custodian for every 13 classrooms +
1 Custodian for every 18,000 Gross Square Feet (GSF)

The total divided by 4.[4]

To estimate the GSF of each building, we apply the following guidelines:

- Elementary without PK 63,000
- PK only 21,000
- Elementary with PK 84,000
- Middle School 62,784
- High School 106,887
- Central Office 29,053

[4] The four custodial formulas each are estimates for the same staff, so the results of the four different calculations are divided by four to determine the appropriate number of custodians.

For the total number of maintenance workers needed, we use the following formula (Zuerich, 1998):

$$\frac{\begin{array}{c}\text{\# of Buildings in District x 1.1 +}\\ \text{(GSF/60,000 SqFt) x 1.2 +}\\ \text{(ADM/1,000) x 1.3 +}\\ \text{(General Fund Revenue/5,000,000) x 1.2}\end{array}}{\text{Total divided by 4}}$$

We assume a district needs one groundskeeper per school.

Utility costs are based on current year utility costs for Texas school districts and amount to $310 per ADA.

Finally we estimate $0.70 per GSF for custodial and maintenance supplies.

We emphasize that our model attempts to formulate a conservative estimate of these costs for a prototypical district, and that the actual costs for many districts may exceed our estimates. To cite two of many possible examples, utility prices for many districts may fluctuate in a manner that is beyond the control of the districts, and districts located in hurricane or storm-prone zones may face substantially higher insurance costs.

Table 5 shows the estimated per pupil cost of maintenance, operations and groundskeepers by prototypical school and for a prototypical district. The table shows that for a 3,900-student district, total per pupil costs for these operations are $715. When added to the $549 for central office costs bring district costs to $1,264 per pupil.

Table 4: Central Office Resources

Central Office			
Student ADA	3900		
	Resources	**Unit Cost**	**Total Cost**
Superintendents Office			
Superintendent	1.0	$141,699	$141,699
Asst. Superintendent	1.0	$136,764	$136,764
Secretary	1.0	$35,781	$35,781
Business Office			
Business Manager	1.0	$88,240	$88,240
Director of Human Resources	1.0	$108,357	$108,357
Accounting Clerk	1.0	$35,781	$35,781
Accounts Payable	1.0	$35,781	$35,781
Secretary	1.0	$35,781	$35,781
Curriculum and Support			
Director of Pupil Services	1.0	$80,306	$80,306
Director of SPED	1.0	$80,306	$80,306
Director of Assessment and Evaluation	1.0	$80,306	$80,306
Secretary	1.0	$35,781	$35,781
Secretary	1.0	$35,781	$35,781
Technology			
Director of Technology	1.0	$78,661	$78,661
Computer Technician	1.0	$35,781	$35,781
Secretary	1.0	$35,781	$35,781
Secretary	1.0	$35,781	$35,781
Operations and Maintenance			
Director of M&O	1.0	$80,306	$80,306
Secretary	1.0	$35,781	$35,781
Other Expenses			
Misc. (purch services, insurance, supplies, legal, audit, association fees, elections, technology, etc.)	3900	$183	$715,182
Communication	3900	$50	$195,000
Central Office Cost			$2,142,933
Per-ADA			$549

Table 5: EB Costs for Custodians, Maintenance and Groundskeepers plus Utilities and Supplies

	K-5 Elementary School Prototype			6-8 Middle School Prototype			9-12 High School Prototype			Central Office			3900 ADA per K-12 District		
	450 ADA per School			450 ADA per School			600 ADA per School			3900 ADA per School			Resources	Unit Cost	Total Cost
	Resources	Unit Cost	Total Cost	Resources	Unit Cost	Total Cost	Resources	Unit Cost	Total Cost	Resources	Unit Cost	Total Cost		District	
Teachers															
Core Classrooms	26.00			18.00			24.00			0.00			188.00		
Elective Classrooms	5.20			3.60			8.00			0.00			44.00		
Instructional Coach Office	2.25			2.25			3.00			0.00			19.50		
Counselor Offices	1.00			1.80			2.40			0.00			12.40		
Libraries	1.00			1.00			1.33			0.00			8.67		
Principal Offices	1.00			1.00			1.00			0.00			8.00		
Assistant Principal Offices	0.00			0.00			1.00			0.00			2.00		
At-Risk Pup Support Classrooms	0.61			0.61			0.61			0.00			4.85		
Nurse Clinics	1.00			1.00			1.00			0.00			8.00		
LEP Support Classrooms	0.17			0.17			0.17			0.00			1.34		
SPED Resource	2.00			2.00			3.00			0.00			18.00		
SPED Self Contained Classrooms	1.00			1.00			1.00			0.00			8.00		
Other	2.00			5.00			14.00			0.00					
Gross Square Footage	63,000			62,784			106,887			29,053			620,395		
Staffing															
Custodians	2.62	$24,929	$65,332	2.31	$24,929	$57,491	3.65	$24,929	$90,882	1.61	$24,929	$40,237	24.00	$24,929	$598,312
Maintenance	0.99	$38,253	$37,965	0.99	$38,253	$37,924	1.35	$38,253	$51,491	0.08	$38,253	$2,984	8.72	$38,253	$333,672
Groundskeepers	1.00	$26,530	$26,530	1.00	$26,530	$26,530	1.00	$26,530	$26,530	0.00	$26,530	$0	8.00	$26,530	$212,237
Supplies	63,000	$0.70	$44,100	62,784	$0.70	$43,949	106,887	$0.70	$74,821	29,053	$0.70	$20,337	620,395	0.70	$434,277
Utilities	450	$310	$139,583	450	$310	$139,583	600	$310	$186,111				3,900	$310	$1,209,723
Total			$313,510			$305,476			$429,835			$63,557			$2,788,220
Per ADA			$697			$679			$716			$16			$715

K-12 Program Model Costs

The factors described above and the resources identified in Tables 1-5 are combined to estimate a base cost per ADA for each district. Table 6 identifies the base school and district costs per ADA for each of the school prototypes and for a prototype school district of 3,900 students.

To this base figure of $7,051 for the K-12 students in a school district, the per pupil cos for special education are added based on the district's total ADA. In addition, per pupil costs for ESL, ED and CTE students are added to this new total based on the respective ADA in each category, revealing an average K-12 student cost of $9,384, including adjustments for the CEI.

Following this process, resources for PK programs as well as small district and geographic cost adjustments are made to the resources for each district. These steps are described below.

Table 6: EB Model Core Costs for Prototypical Elementary, Middle and High Schools and for A Prototypical School District

	K-5 Elementary School Prototype			6-8 Middle School Prototype			9-12 High School Prototype			K-12 Prototype District		
	450 ADA per School			**450** ADA per School			**600** ADA per School			**3900** ADA per PK-12 District		
	Resources	**Unit Cost**	**Total Cost**	**Resources**	**Unit Cost**	**Total Cost**	**Resources**	**Unit Cost**	**Total Cost**	**Resources**	**Unit Cost**	**Total Cost**
Personnel Resources												
Core Teachers	26.00	$59,046	$1,535,193	18.00	$59,046	$1,062,826	24.00	$59,046	$1,417,101	188.00	$59,046	$11,100,624
Elective Teachers	5.20	$59,046	$307,039	3.60	$59,046	$212,565	8.00	$59,046	$472,367	44.00	$59,046	$2,598,018
Instructional Facilitators	2.25	$68,149	$153,336	2.25	$68,149	$153,336	3.00	$68,149	$204,448	19.50	$68,149	$1,328,911
Substitute Teachers	1.67	$59,046	$98,754	1.19	$59,046	$70,412	1.75	$59,046	$103,330	12.58	$59,046	$742,502
Counselors	1.00	$71,670	$71,670	1.80	$71,670	$129,005	2.40	$71,670	$172,007	12.40	$71,670	$888,703
Nurses	0.60	$55,315	$33,189	0.60	$55,315	$33,189	0.80	$55,315	$44,252	5.20	$55,315	$287,640
Supervisory Aides	2.00	$21,982	$43,963	2.00	$21,982	$43,963	3.00	$21,982	$65,945	18.00	$21,982	$395,670
Librarians	1.00	$67,083	$67,083	1.00	$67,083	$67,083	1.00	$67,083	$67,083	8.00	$67,083	$536,667
Principals	1.00	$95,973	$95,973	1.00	$95,973	$95,973	1.00	$95,973	$95,973	8.00	$95,973	$767,781
Assistant Principals	0.00	$77,277	$0	0.00	$77,277	$0	1.00	$77,277	$77,277	2.00	$77,277	$154,554
School Secretary	2.00	$35,781	$71,562	2.00	$35,781	$71,562	3.00	$35,781	$107,342	18.00	$35,781	$644,054
Dollar per Pupil Resources												
PD Resources	450	$100	$45,000	450	$100	$45,000	600	$100	$60,000	3,900	$100	$390,000
Technology/Equipment	450	$250	$112,500	450	$250	$112,500	600	$250	$150,000	3,900	$250	$975,000
Instructional Materials	450	$140	$63,000	450	$140	$63,000	600	$175	$105,000	3,900	$151	$588,000
Assessments	450	$25	$11,250	450	$25	$11,250	600	$25	$15,000	3,900	$25	$97,500
Student Activities	450	$250	$112,500	450	$250	$112,500	600	$250	$150,000	3,900	$250	$975,000
Gifted Funds	450	$25	$11,250	450	$25	$11,250	600	$25	$15,000	3,900	$25	$97,500
School Costs			$2,833,261			$2,295,414			$3,322,126			$22,568,125
School Per Pupil Costs			$6,296			$5,101			$5,537			$5,787
District Per Pupil Costs			$1,264			$1,264			$1,264			$1,264
Total Per Pupil Cost			$7,561			$6,365			$6,801			$7,051

Pre-K Program Costs

An important component of any education program is a strong Pre-K program. Reynol and Temple (2008) identify a number of major studies that fine long-term positive effec of pre-school programs on student learning. Gault, et. Al. (2008 find that policy makers in many states are beginning to commit additional resources to Pre-K programs as well. In addition many others have found benefits to Pre-K programs. In addition, a recent conversation with Steve Barnett indicated that the resources we develop for a Pre-K program are essentially the same as those he would recommend for such programs.

We estimate the costs of a full day program for 3 or 4 year old children, and estimate th costs of the Pre-K program for the state based on current enrollment numbers for Pre-K students in school districts across the state. Our resource estimates are based on previou work completed for the Foundation for Child Development (Picus, Odden & Goetz, 2009a; 2009b). The model was developed for the Foundation relying extensively on earlier research on successful pre-school programs and their programmatic elements, which include class sizes of 15 with a fully certified teacher and instructional aide, time for collaborative work with other early childhood teachers (e.g., grades K and 1) and fo ongoing professional development.

Our approach to staffing Pre-K programs makes it easy to incorporate them into an elementary school allowing the school to form an early childhood team of teachers in Pre-K, K and grade 1 for collaborative work. As a result, in addition to core teachers ar instructional aides, we also provide resources for specialist or elective teaches.

Table 7 displays the resources estimated through the EB model for a strong, high quality Pre-K program, and Table 8 shows the estimated per pupil costs of the Pre-K program which amount to $10,650 per PK student. With CEI adjustments, the average Pre-K co is $11,037.

Table 7: EB Model Resources for Pre-K Programs

School Element	Pre-K Programs
School Configuration	Pre-K
Prototypical school size	150
Class size	15
Number of teacher work days	192 work days: Instruction: 180 Professional Dev.: 10 Open/Close Schools & Parent Conferences: 2
Personnel Resources	
Core Teachers	10
Elective Teachers	20% more 2.0
Instructional Coaches	1 per 200 students: 0.75
Total Core, Elective and Coach Teachers	12.75
Pupil Support	1 FTE support position for every 100 ED students[5] 1.50
SPED Teachers	1.0 Teacher for every 150 regular students (to be used to provide special education services) 1.0
SPED Instructional Aides	0.5 Aide for every 150 regular students (to be used to provide special education services) .50
Substitute Teachers	5% extra core, specialist, SPED & instructional coaches:0.64
Instructional Aides	1 per classroom: 10
Supervisory Aides	.75
Assistant Principal/ Program Coordinator	1
School Site Secretary	1
Dollar per Pupil	
Additional Professional development	5 additional days to total 10 PD days; $100/pupil
Technology/equipment	$250/pupil
Instructional Materials including Library Resources	$140/pupil
Short Cycle Diagnostic Assessments	$25/pupil

[5] Since the state supports preschool only for students who are from a poverty background, we add this pupil support program element, as it is part of the ED set of programs in the EB model.

Table 8: EB Pre-K Costs

	Pre-K Prototype		
ADA	**150**	ADA per School	
Configuration	**Resources**	**Unit Cost**	**Total Cost**
Personnel Resources			
Core Teachers	10.00	$59,046	$590,459
Elective Teachers	2.00	$59,046	$118,092
Instructional Facilitators	0.75	$68,149	$51,112
Pupil Support (in lieu of Counselor, I	1.50	$71,670	$107,504
SPED	1.00	$71,670	$71,670
SPED Instructional Aides	0.50	$21,982	$10,991
Supervisory Aides	0.75	$21,982	$16,486
Instructional Aides	10.00	$21,982	$219,817
Substitute Teachers	0.69	$59,046	$40,594
Program Coordintor (in lieu of Princi	1.00	$68,149	$68,149
School Secretary	1.00	$35,781	$35,781
Dollar per Pupil Resources			
PD Resources	150	$100	$15,000
Technology/Equipment	150	$250	$37,500
Instructional Materials	150	$140	$21,000
Assessments	150	$25	$3,750
School Costs			$1,407,904
School Per Pupil Costs			$9,386
District Per Pupil Costs			$1,264
Total Per Pupil Cost			$10,650

Small District Adjustments

A state as large and diverse as Texas has school districts of vastly different size, ranging from large urban districts like Houston and Dallas to very small rural districts with fewer than 100 students, such as Star and Ezzell. Thus an adjustment for small districts needs to be made in the funding model to ensure adequate resources for small school districts. We have extensive experience working with small school districts, particularly in Wyoming and North Dakota (see our state reports at www.lpicus.com), as well as in other states where we have conducted EB studies.

There is a tradition in Texas to recognize the diseconomies of scale that exist in the operation of small school districts, and we have developed a Texas-specific small district adjustment to the resource costs identified for prototypical schools above. The adjustments are based on estimates of when prototypical schools enrollments are so low that they cannot support one class at each grade level. In addition, there are certain fixed costs of personnel in central offices and schools that cannot be reduced as district enrollment declines. Thus, for Texas, we have designed a small district adjustment that operates as a series of dollar per pupil increases for each marginal decrease in a district's ADA.

The diseconomies of scale are very clear at a school district size of approximately 10% of the prototype district, or 390 students. However, we found the diseconomies likely to begin at a district size of about one-fourth of the prototype school district (975 ADA or 3,900/4). Because of this, we designed a linear adjustment for small school districts with three breakpoints where the marginal increment in total dollars per ADA is adjusted.

The first panel in Table 9 displays the resources we estimate a school district with 390 ADA would require to operate and provide a program consistent with Texas standards. As the staffing patterns displayed in that panel show, each personnel category receives more than 10 percent of the total a prototype district of 390 would receive, and the estimated per ADA cost of this model amounts to $8,037 per ADA.

To adjust for the dis-economies of scale for districts with fewer than 975 ADA, we subtract the per pupil model base cost at the larger ADA break point (975 ADA) from the per pupil base cost at the smaller break point (390) and divide it by the ADA count between the two points. That figure is added to the base ADA resources for each incremental decline in ADA from the higher break point. This is displayed in the example below:

Base per pupil cost at 975 ADA	$7,051
Base per pupil cost at 390 ADA	$8,037
Difference	$ 986
Difference per ADA (585 ADA or 975-390)	$ 1.69

Thus for each decline of one student in ADA, the per pupil base allocation for the district is increased by $1.69 from the per-ADA cost in a 975 ADA district. This new figure is multiplied by the district's total ADA. Further adjustments for ESL, struggling students, special education and CTE are then added to the new total.

Panel 2 of Table 9 shows the resources we estimated would be needed for a district of 195 students or half of the 390 used previously. Again, this inflection point represents a point at which pro-ration of our resource allocations is inadequate to staff a school district of that size. Thus, we make the same computations as described above for districts with between 195 and 390 ADA, with the resulting incremental increase of $2.34 for each marginal decline in ADA. We found a similar inflection point at 97.5 ADA and computed an adjustment factor of $45.81 per ADA for districts between 97.5.

Below 95.7 ADA we use an alternative approach that provides funding for one assistant principal position, one teacher position for every seven students, one superintendent level position, one custodial and one secretarial position. These resources would be used to staff the district as determined by the local school officials.

Table 9: Small District Adjustment Prototypes

	District 390			District 195			District 97.5		
	390 ADA per District			**195** ADA per District			**97.5** ADA per District		
	Resources	**Unit Cost**	**Total Cost**	**Resources**	**Unit Cost**	**Total Cost**	**Resources**	**Unit Cost**	**Total Cost**
Personnel Resources									
Core Teachers (K-8)	14.00	$59,046	$826,642	0.00	$59,046	$0	0.00	$59,046	$0
Core & Spec Teachers (K-5)	0.00	$59,046	$0	6.00	$59,046	$354,275	0.00	$59,046	$0
Elective Teachers (K-8)	3.00	$59,046	$177,138	0.00	$59,046	$0	0.00	$59,046	$0
Core Teachers (9-12)	5.00	$59,046	$295,229	0.00	$59,046	$0	0.00	$59,046	$0
Core & Spec Teachers (6-12)	0.00	$59,046	$0	7.00	$59,046	$413,321	0.00	$59,046	$0
Elective Teachers (9-12)	2.00	$59,046	$118,092	0.00	$59,046	$0	0.00	$59,046	$0
Staff (K-12)	0.00	$59,046	$0	0.00	$59,046	$0	13.93	$59,046	$822,425
Instructional Facilitators	2.00	$68,149	$136,299	1.00	$68,149	$68,149	0.00	$68,149	$0
Substitute Teachers	1.30	$59,046	$76,760	0.70	$59,046	$41,332	0.00	$59,046	$0
Counselors/Nurse	2.00	$71,670	$143,339	1.00	$71,670	$71,670	0.00	$71,670	$0
Supervisory Aides	2.00	$21,982	$43,963	1.00	$21,982	$21,982	0.00	$21,982	$0
Librarians	1.00	$67,083	$67,083	0.50	$67,083	$33,542	0.00	$67,083	$0
Principals	1.00	$95,973	$95,973	1.00	$95,973	$95,973	0.00	$95,973	$0
Assistant Principals	1.00	$77,277	$77,277	0.00	$77,277	$0	1.00	$77,277	$77,277
School Secretary	2.00	$35,781	$71,562	1.00	$35,781	$35,781	0.00	$35,781	$0
Dollar per Pupil Resources									
PD Resources	390	$100	$39,000	195	$100	$19,500	97.5	$100	$9,750
Technology/Equipment	390	$250	$97,500	195	$250	$48,750	97.5	$250	$24,375
Instructional Materials	390	$140	$54,600	195	$140	$27,300	97.5	$140	$13,650
Student Activities	390	$250	$97,500	195	$250	$48,750	97.5	$250	$24,375
Gifted Funds	390	$25	$9,750	195	$25	$4,875	97.5	$25	$2,438
Central Office									
Professional Staff	2.00	$136,764	$273,528	1.00	$136,764	$136,764	1.00	$136,764	$136,764
Support Staff	2.00	$35,781	$71,562	1.00	$35,781	$35,781	1.00	$35,781	$35,781
Misc. (insurance, etc.)	390.00	$183	$71,518	195.00	$183	$35,759	97.50	$183	$17,880
Communications	390.00	$50	$19,500	195.00	$50	$9,750	97.50	$50	$4,875
M&O									
Custodians	2.00	$24,929	$49,858	1.00	$24,929	$24,929	0.50	$24,929	$12,464
Maintenance	1.00	$38,253	$38,253	0.50	$38,253	$19,126	0.25	$38,253	$9,563
Groundskeepers	1.00	$26,530	$26,530	0.50	$26,530	$13,265	0.25	$26,530	$6,632
Utilites	390	$310	$120,972	195	$310	$60,486	97.5	$310	$30,243
Supplies	50,000	$0.70	$35,000	50,000	$0.70	$35,000	50,000	$0.70	$35,000
Total Per Pupil Cost			$8,037			$8,493			$12,959

Adjustments for Differences in the Cost of Education

One final adjustment that needs to be made is to accommodate regional or geographic cost differences across the state. Texas has recognized the need to do this for many yea and the current funding formula includes a Cost of Education Index (CEI) that was developed in the early 1990s and take into account district size, teacher salaries in neighboring districts and the percentage of low-income students in the district in 1989-9 (TEA, 2010). This hedonic index is then applied to approximately 71 percent of school district revenues to adjust for cost differences. When implemented, Texas normed the index to a minimum of one, so the average CEI index is 1.08. While this ensures that every district gets additional dollars for the adjustment, if the system were fully funded an adequate level, norming the index at its lowest level overcompensates districts for price differences caused by geography. Thus, we have used the CEI but re-normed it sc the average is 1.0; this slightly decreases funding for districts that face below average costs and increases resources for districts that face above average costs and reduces the dollar requirements for the geographic price adjustment.

While hedonic indexes have been used in education for a number of years, recent research has suggested the use of comparable wage indexes (CWI) that compare the relative level of wages in other sectors across regions, might be a better way to address the issue of cost differences. Our model currently uses the Texas school funding CEI bu applies it to the share of costs identified in the EB model as compensation for professional workers, which is 78.50 percent of the total. This index is applied as a last step in estimating the individual district costs of the EB model. Recent CWI estimates l school district are available and can be used instead if desired.

Summary of Total EB Costs

The total costs estimated through the EB model are displayed in Table 10. To this number should be added the costs of special education for children with severe and profound disabilities.

We understand that in the course of this litigation, it is likely that evidence will be presented (including possible testimony from other experts designated by the plaintiffs) concerning the exact levels of current spending on public education in Texas. It would be a relatively straightforward exercise to compare these numbers to the results of our model, and to determine the difference between present funding levels and the funding levels our model proposes. Such a comparison would involve ensuring that the funding levels to be compared include and exclude the same categories of funding as our model (i.e. that they exclude capital expenditures, child nutrition, debt service, transportation, etc. as our model does), are adjusted for inflation to reflect dollars in a common year, and account for the fact that some funding for school districts is intended to provide local supplementation and enrichment, while our model is intended to estimate the costs of adequacy. We reserve the right to supplement this report and/or provide testimony concerning this comparison as information concerning the precise current funding levels is presented in the course of this litigation.

Table 10: Total EB Model Adequate Education Funding for Texas 2010-11

Adequate Education Funding in Texas 2010-11	
Statewide Costs	
Total Cost	$43,076,055,352
K-12 Base Funding	$31,637,384,315
ED Funding	$6,156,473,206
LEP Funding	$466,077,521
SPED Funding (Mild/Moderate Disabilities)	$2,186,430,537
SPED Funding (Severe Disabilities)	
CTE Funding	$78,239,796
Small District Funding	$199,560,433
Pre-K Funding	$2,351,889,544
Per-ADA Costs	
K-12 Model	$7,051
K-5 Base Model	$7,561
6-8 Base Model	$6,365
9-12 Base Model	$6,801
Central Office & M&O	$1,264
Pre-K Model	$10,650
Per K-12 ADA Special Needs Cost	
ED	$2,262
LEP	$616
SPED (per all ADA)	$487
Career and Technical Education (CTE)	$360
Statewide Per-ADA Averages	
K-12	$9,384
Pre-K	$11,037
Small District Base Allocation, Per ADA	
District at 390 ADA	$8,037
District at 195 ADA	$8,493
District at 97.5 ADA	$12,959

References

Achilles, Charles. (1999). *Let's Put Kids First, Finally; Getting Class Size Right*. Thousand Oaks, CA: Corwin Press.

Cavin, E., Murnane, R., & R. Brown, R. (1985). School District Response to Enrollment Changes: The Direction of Change Matters. *Journal of Education Finance, 10*(4), 426-440.

Cooper, Harris, Ashley Batts Allen, Erika A. Patall & Any L. Dent. (2010). Effects of Full-Day Kinderg2arten on Academic Achievement and Social Development. *Review of Educational Research,* 80(1), 34-70.

Denton, K., West, J., & Walston, J. (2003). *Reading—Young Children's Achievement and Classroom Experiences: Findings from the Condition of Education 2003*. Washington, DC: National Center for Education Statistics.

Denton, K., West, J., & Walston, J. (2003). *Reading—Young Children's Achievement and Classroom Experiences: Findings from the Condition of Education 2003*. Washington, DC: National Center for Education Statistics.

Finn, J.D. & Achilles, C.M. (1999). Tennessee's Class Size Study: Findings, Implications, Misconceptions. *Educational Evaluation and Policy Analysis, 21,* 97-109.

Finn, Jeremy. (2002). Small Classes in America: Research, Practice, and Politics. *Phi Delta Kappan 83*(7), 551–560.

Fusaro, J. A. (1997). The Effect of Full-day Kindergarten on Student Achievement: A Meta-Analysis, *Child Study Journal, 27*(4), 269-277.

Fusaro, J. A. (1997). The Effect of Full-day Kindergarten on Student Achievement: A Meta-Analysis, *Child Study Journal, 27*(4), 269-277.

Garet, Michael S., Porter, Andrew, Desimone, Laura, Birman, Beatrice & Yoon, Kwang. (2001). What Makes Professional Development Effective? Results from a National Sample of Teachers. *American Educational Research Journal 38*(4), 915-945.

Gault, B., Mitchell, A.W., Williams, E., Dey, J., and Sorokina, O. (2008). *Meaningful Investments in Pre-K: Estimating the Per-Child Costs of Quality Programs.* Washington, DC: Institute for Women's policy Research. http://www.iwpr.org/pdf/G718preknow.pdf. Last referenced on July 8, 2008.

Gerber, Susan, Finn, Jeremy, Achilles, Charles & Boyd-Zaharias, Jane (2001). Teacher Aides and Students' Academic Achievement. *Educational Evaluation and Policy Analysis 23*(2), 123–143.

Grissmer, David. (1999). Class Size: Issues and New Findings. *Educational Evaluation and Policy Analysis 21*(2). (Entire issue.)

Gullo, D. (2000). The Long-Term Effects of Full-School-day Kindergarten on Student Achievement: A Meta-analysis. *Early Child Development and Care, 160*(1), 17-24.

Gullo, D. (2000). The Long-Term Effects of Full-School-day Kindergarten on Student Achievement: A Meta-analysis. *Early Child Development and Care, 160*(1), 17-24.

Joyce, Bruce & Showers, B. (2002). *Student Achievement Through Staff Development (3rd Ed.).* Alexandria, VA: Association for Supervision and Curriculum Development.

Joyce, Bruce, & Calhoun, E. (1996). *Learning Experiences in School Renewal: An Exploration of Five Successful Programs*. Eugene, OR: ERIC Clearinghouse on Educational Management.

Kauerz, Kristie. (2005). *Full Day Kindergarten: A Study of State Policies in the United States*. Denver, CO: Education Commission of the States.

Kauerz, Kristie. (2005). *Full Day Kindergarten: A Study of State Policies in the United States*. Denver, CO: Education Commission of the States.

Konstantopoulos, Spyros & Vicki Chung. (2009). What Are the Long-Term Effects of Small Classes on the Achievement Gap? Evidence from the Lasting Benefits Study. *American Journal of Education* 116:1-30.

Kreuger, Alan. (2002). Understanding the Magnitude and Effect of Class Size on Student Achievement. In Lawrence Mishel & Richard Rothstein (Eds.), *The Class Size Debate* (pp. 7–35). Washington, D.C.: Economic Policy Institute.

Krueger, A. B., & Whitmore, D.M. (2001). *Would Smaller Classes Help Close the Black-White Achievement Gap? (*Working paper #451). Princeton, NJ: Princeton University. [On-line]. Available: http://www.irs.princeton.edu/pubs/pdfs/451.pdf.

Lockwood, J.R., Jennifer Sloan McCombs & Julie Marsh. (2010). Linking Reading Coaches and Student Achievement: Evidence from Florida Middle Schools. *Educational Evaluation and Policy Analysis,* 32(3), 372-388.

Marsh, Julie A., Jennifer Sloan McCombs & Francisco Martorell. (2010). How Instructional Coaches Support Data-Driven Decision Making. *Educational Policy*, 24(6), 872-907.

Mishel, Lawrence & Richard Rothstein. (2002). *The Class Size Debate*. Washington, DC: Economic Policy Institute.

Molnar, Alex. (1999). Evaluating the SAGE Program: A Pilot Program in Targeted Pupil-teacher Reduction in Wisconsin. *Educational Evaluation and Policy Analysis 21*(2), 165-177.

Monk, D. (1990). *Educational finance: An economic approach*. New York: McGraw-Hill.

Nye, B., Hedges, L.V., & Konstantopoulos, S. (2002). Do Low-achieving Students Benefit More From Small Classes? Evidence From the Tennessee Class Size Experiment. *Educational Evaluation & Policy Analysis 24*(3), 201-217.

Odden, A.R. and Picus, L.O. (2008). *School Finance: A Policy Perspective, 4th edition*. New York, NY: McGraw-Hill.

Odden, A.R., Goetz, M.E., and Picus, L.O. (2008). Using Available Evidence to Estimate the Cost of Educational Adequacy. *Education Finance and Policy*, 3 (3), Summer 2008. 374-397.

Odden, Allan & Sarah Archibald. (2009). *Doubling Student Performance …and finding the resources to do it*. Thousand Oaks, CA: Corwin Press.

Odden, Allan, Lawrence O. Picus & Michael Goetz. (2010). A 50 State Strategy to Achieve School Finance Adequacy. *Educational Policy*, 24(4), 628-654.

Odden, Allan. (2009). *10 Strategies for Doubling Student Performance*. Thousand Oaks, CA: Corwin Press.

Odden, Allan. (2012). *Improving Student Learning When Budgets Are Tight*. Thousand Oaks, CA: Corwin Press.

Odden, Allan. (1997). *The Finance Side of Implementing New American Schools*. Paper prepared for the New American Schools, Alexandria, VA.

Pianta, Robert, Joseph Allen & High King. (2011). An Interaction-Based Approach to Enhancing Secondary School Instruction and Student Achievement, *Science*, 333 (6045), 1034-1037.

Picus, L.O., Odden, A., and Goetz, M. (2009a). *An Evidence Based Approach to Estimating the National and State-by-State Costs of an Integrated PreK-3rd Education Program.* Prepared for the Foundation for Child Development, New York, NY.

Picus, L.O., Odden, A., and Goetz, M. (2009b). *An Evidence Based Approach to Estimating the National Costs of Prek-3rd*. New York: NY, Foundation for Child Development, Policy Brief No. 10.

Reynolds, A.J. and Temple, J.A. (2008). Cost-Effective Early Childhood Development Programs from Preschool to Third Grade. *American Review of Clinical Psychology*. 4:109-39.

Slavin, Robert, Karweit Nancy & Wasik., Barbara (1994). *Preventing Early School Failure: Research Policy and Practice*. Boston: Allyn and Bacon.

Slavin, Robert, Karweit Nancy & Wasik., Barbara (1994). *Preventing Early School Failure: Research Policy and Practice*. Boston: Allyn and Bacon.

Stringfield, Samuel, Ross, Steven & Smith, Lana. (1996). *Bold Plans for School Restructuring: The New American School Designs*. Mahwah, NJ: Lawrence Erlbaum.

Swift, E. (2005). *Estimating the central office resources necessary for an adequate educational program.* Doctoral dissertation at the USC Rossier School of Education, August 2005.

TEA (2010). School Finance 101: Funding of Texas Public Schools. Texas Education Agency.

Word, E., Johnston, J., Bain, H., Fulton, D.B., Boyd-Zaharias, J., Lintz, M.N., Achilles, C.M., Folger, J. & Breda, C. (1990). *Student/teacher Achievement Ratio (STAR): Tennessee's K-3 Class-size Study.* Nashville, TN: Tennessee State Department of Education.