Washington Adequacy Funding Study

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Executive Summary

Introduction

The constitution of the state of Washington declares, "It is the paramount duty of the state to make ample provision for the education of all children residing within its borders." This establishes education and education funding as the highest priorities for the state. In recent years, Washington has experienced periods of rapid student population growth and disproportionate increases in the number of low-income students, the number of students in special education, and the number of students who have limited English proficiency. These demographic trends converge with increasing accountability standards. At the federal level, the No Child Left Behind (NCLB) Act annually increases performance expectations and sanctions for schools failing to meet NCLB requirements. At the state level, despite the constitutional obligation of the state to provide an adequate education, a significant number of students are falling short of the state's own expectations, as measured by the Washington Assessment of Student Learning (WASL). In 2005-06, only 51.8% of tenth graders tested in Washington met WASL standards in all three content areas (math, reading, and writing). Students in the class of 2008 who do not meet WASL standards in reading and writing will not be able to graduate from high school. The goal of this study was to determine the level of educational expenditure necessary to make ample provision for the education of all students, providing all students with the skills to meet long-term academic standards, pursue additional learning beyond high school, and become productive citizens and contributing members of society.

Methodology

This study drew from four established adequacy funding methodologies to estimate an adequate expenditure level. These were the successful schools method, the evidence-based method, the professional judgment method, and the cost function method. The study also created baseline prototype schools to provide a context for decisions and utilized a teacher wage analysis to determine necessary adjustments to teacher salary that were beyond the scope of the professional judgment approach.

Researchers began by creating baseline prototype schools that captured all the reported dollars spent on the operation of Washington K-12 schools in 2004-05 (with the exceptions of the small school subsidy and institutional funding). The study then used a modified version of the successful schools method to refine the baseline prototype schools in order to ensure that the baseline prototype schools were representative of efficient Washington schools. Specifically, researchers identified elementary, middle,

and high schools that performed at high levels relative to their family income levels and showed improvement on reading and math WASL scores from 2002-03 to 2004-05. Principals at these schools completed surveys detailing resource allocation patterns at their schools. Three school business managers also completed surveys to provide more detail to the baseline schools. The responses of the principals and business managers were used to adjust expenditure categories within the baseline schools to ensure that the schools reflected optimal resource allocation within the constraints of the educational system. These adjustments did not change the bottom line expenditure levels, but simply shifted resources between expenditure categories. This process of refinement is referred to in the study as the *Improving Schools Method*. These schools represent the 2004-05 educational system functioning in an efficient and effective fashion. The study then used the refined baseline schools as the reference points for gauging what constitutes adequate funding. These "optimized" baseline schools ensured that the starting point for decisions regarding adequate resources was calibrated in relation to effectively functioning schools that were using current resources wisely and efficiently.

The study then employed the evidence-based method to identify the variables most closely associated with a quality education. Researchers conducted an extensive literature review of educational interventions that are likely to improve student performance and educational quality. The result of the review was a set of interventions that were then included in an online budget simulation that utilized the baseline prototype schools as its starting point. Select educational administrators (referred to in this study as panelists) completed the budget simulation by choosing interventions and making other adjustments to the baseline prototype schools that they felt were necessary in order to provide an adequate education for all students. The budget simulation presented information on the components of each intervention, its potential effect, and the cost associated with implementing the intervention in a prototype school, as well as the cumulative cost of implementing the intervention statewide.

The professional judgment method as employed in this study included data from the budget simulation completed by the panelists and from two group meetings of the panelists. The professional judgment panelists were recruited from a pool of Washington school, district, and regional educational administrators with expertise implementing and managing educational programs and budgets. There were three budget simulations, one for each prototype school level: elementary, middle, and high school. Most of the panelists completed a simulation for one of the school levels; some completed budget simulations for multiple levels. The structure of each budget simulation was identical, although the content varied

between each school level. Each panelist received training over the phone and had several weeks to complete the simulation.*

In addition to presenting the interventions identified through the evidence-based method, the budget simulations presented information on baseline prototype school staffing and expenditures and allowed panelists to review and modify the baseline prototype school staffing and expenditures to levels they considered adequate. The first section of each budget simulation, the compensation worksheet, asked panelists to specify the salary and benefits necessary for each staff position within the prototype school. The second section, the intervention worksheet, asked panelists to select the educational interventions that they felt were necessary to bring about the greatest improvement in schools. When a panelist selected an intervention, the budget simulation calculated the cost of implementing the intervention at the prototype school and statewide. This school level and state level cost information caused panelists to consider the fiscal impact of their decisions. The intervention worksheets also incorporated any adjustments the panelist made to salaries and benefits in the compensation worksheet.

The final section of the budget simulation, the adequacy worksheet, reflected panelist input into the two previous worksheets pertaining to compensation and interventions. In this section, panelists reviewed the fiscal effects of their previous decisions and were able to make any additional changes they deemed necessary in each expenditure category. This section concluded with comparisons between the baseline expenditure totals and the new expenditure totals per pupil, for the prototype school and for the state education budget, based on panelist input. This presented panelists with one final opportunity to gauge the cost-effectiveness of the recommendations they had made.

Forty-three panelists completed a budget simulation for at least one of the prototype school levels, and several panelists completed a simulation for more than one school level, for a total of 47 completed simulations. The results of these separate online simulations were assimilated, analyzed, and integrated into a draft adequacy model that was presented at meetings of professional judgment panelists in Spokane and Renton. At these meetings, panelists offered suggestions for further refinement of the prototypes and recommended specific areas to increase or decrease. Researchers made additional modifications to the prototypes based on suggestions from the meetings.

* Please see Appendices A or B for visual representations of the simulations and Appendix E for a complete list of professional judgment participants.

Two types of teacher wage analyses were performed in this study—a comparable wage analysis and a hedonic wage analysis—to determine whether changes to teacher wages in particular schools, districts, or labor markets might improve teacher quality. Both analyses sought to establish the wage level at which all schools would be able to recruit and retain the best teachers. The comparable wage analysis compared the compensation levels of non-teachers to teacher compensation levels in particular regions of the state in order to assess the need for teacher salary adjustments that would enable schools to compete with other sectors of the economy for well-qualified individuals.

The hedonic wage analysis compared teacher salaries among districts and schools to assess whether districts and schools with particular characteristics may be at a competitive disadvantage compared to others in attracting and retaining the top teachers. The hedonic models included both district- and school-level analyses. Each of the wage analyses identified changes in teacher salary for teachers in particular schools, districts, and labor markets that would allow schools to meet their teacher recruitment and retention goals. Researchers then calculated a state average salary based on the recommended changes to individual teacher salaries. This state average was inserted into the professional judgment budget simulations and was used to adjust per student expenditure levels for each prototype school so that salaries were adequate to attract and retain quality teachers at all levels statewide.

The last method applied in the study was a cost function analysis, which employed regression equations to identify characteristics of schools that required additional adjustments. Based on the cost function results, researchers made expenditure adjustments to account for schools in two categories—schools with high proportions of low-income students and schools with low student enrollment. These adjustments generated a final expenditure level that defines adequate funding.

Findings and Conclusions

The evidence-based and professional judgment methods yielded a set of changes to the baseline prototypes necessary for Washington schools to achieve goals set at the local, state, and federal levels, and to do so with an increasingly challenging student population. The major interventions are similar, but not identical, at all three levels. The interventions are specifically adapted to the needs and structures of each level. In addition, some interventions are specific to a particular grade level. All of the interventions at each level were identified through the evidence-based method and endorsed by the professional judgment panelists. A general summary of the interventions follows. A complete listing of changes to the baseline prototypes can be found beginning in Table 10.

Recommended Adequacy Interventions

At the elementary level, full-day kindergarten is made available to all Washington students, as are targeted class size reductions in the lower grades necessary to develop key literacy and numeracy skills and to teach all students how to learn. High schools received additional teachers to offer career academy programs that engage students, reduce dropouts, and help students transition to work or college.

All three levels receive extra support in core academic areas so that all schools can offer high quality, effective programs that develop basic skills for all students. The learning needs of students who require more time to reach necessary performance levels are addressed in part through the provision of summer school programs and tutoring opportunities. Schools receive resources to provide programs that enable the increasing proportion of English Language Learners to make comparable academic progress. Extracurricular programs provide more students the opportunity to develop leadership skills, interact successfully with a range of students from backgrounds different than their own, and strengthen their affiliation with school.

Teacher and administrator skills are enhanced through additional targeted professional development, which includes instructional improvement coaching for teachers. Qualified, trained substitute teachers are available so that teachers can leave the classroom periodically to acquire new skills and sharpen existing ones without disrupting student learning in the process. Special education teachers receive additional support so that they can focus on students and not paperwork. Regular education teachers also receive instructional support.

Libraries have professional staff to support student learning of new research skills. The technology replacement and updating cycle is accelerated to ensure schools have current technologies to enable efficient administrative record keeping, better information on student achievement, and more uses of technology in the classroom as a learning tool. A technology specialist is available to ensure the entire information management system functions properly and that administrators and teachers are properly supported in their uses of technology.

An adequately staffed counselor office helps address problems from home that students bring with them to school and to support students who need extra assistance. A parent involvement and outreach coordinator works in concert with counselors to engage and assist parents in participating as full partners in their children's education. Behavior support programs make classrooms environments where time is devoted to learning, not behavior management. Campus security is sufficient so that administrators are not spending time monitoring the grounds and students can learn in a safe, secure environment.

Adequacy Expenditure Level

This study determined that the average per student expenditure level needed to provide an adequate education to every K-12 Washington student in 2004-05 was $11,678. This is $3,613 per student above the baseline level, or a 45% increase. As noted above, the study employed multiple methods in a progressive fashion to generate an increasingly precise final figure.

Table 1 contains expenditures on a per student basis for the methods discussed above. *Baseline Expenditure Per Student* represents actual 2004-05 K-12 expenditures from all operating revenue sources (with the exceptions of the small school subsidy and institutional funding). These expenditures include the changes based on the improving school method, although the improving schools method did not affect the overall expenditure level. The *Professional Judgment Expenditure Per Student* indicates the result of the professional judgment approach.

The *Wage Analysis Expenditure Per Student* takes the amount from the *Professional Judgment Expenditure Per Student* and adjusts it to include the average adequate teacher salary as calculated by the teacher wage analyses.

In order to conduct the teacher wage analyses, researchers first excluded the panelist recommendations on teacher salary and benefits. This was necessary because the wage analyses had to be based on existing compensation data from sources not readily available to panelists. However, it was still necessary for panelists to make recommendations on teacher compensation in the simulation in order for them to see the cost implications of teacher compensation adjustments in the context of all of their decisions regarding interventions and adjustments to the baseline prototype schools. As a result, the *Professional Judgment Expenditure Per Student* includes the panelists' salary and benefit recommendations, and the *Wage Analysis Expenditure Per Student* removes these recommendations and includes the results of the wage analyses.

The *Adequate Expenditure Per Student With Cost Function Adjustments* is the final figure that defines an adequately funded education. This figure includes adjustments for small schools and those with high percentages of students from low-income families. This figure is presented as a per-pupil cost across all grade levels due to the manner in which the cost function adjustments are calculated.

Table 1: Summary of results

	Prototype Schools			Average Across All Prototypes
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065
Professional Judgment Expenditure Per Student	$11,386	$10,293	$10,495	$10,825
Wage Analysis Expenditure Per Student	$11,667	$10,517	$10,733	$11,078
Adequate Expenditure Per Student With Cost Function Adjustments				$11,678

These figures include teacher professional development expenditures in teacher salary. Please see Appendix J for a technical description of how and why these were combined.

The *Professional Judgment Expenditure Per Student* increases baseline expenditures by 40% per student at the elementary level, 29% at the middle school level, and 31% at the high school level. Across all K-12 Washington students, these numbers represent a per student increase of $2,761, or 34% over the baseline level.

The comparable teacher wage analyses yielded recommendations for teacher salary increases of 28% in Seattle, 27% in Richland, 16% in Tacoma, and 17% in the Portland-Vancouver metropolitan area. The district-level hedonic teacher wage analysis suggested the need for small teacher salary adjustments based on working conditions, including the family income level of students. The school-level hedonic model indicated a need for salary increases of $3,000 per teacher in schools where 60%-80% of the student population was low-income and increases of $5,000 per teacher in schools where 80%-100% of the student population was low-income. These wage adjustments would increase the ability of all schools and districts to recruit and retain the best teachers and would create a greater likelihood that schools and districts with high proportions of low-income students would be able to compete for the best teachers with schools and districts with lower proportions.

When researchers integrated these wage adjustments with the professional judgment adjustments derived from the evidence-based interventions, the result was a recommended 43% increase in funding above the baseline at the elementary level, 32% at the middle school level, and 34% at the high school level. For all Washington K-12 students, the average *Wage Analysis Expenditure Per Student* of $11,078 was 37% higher than the baseline, or $3,013 higher per student than the baseline.

The cost function low-income student analysis indicated the need for a 40% per student weight for each low-income student above the mean low-income student rate in the prototype schools. In other words, this adjustment would compensate for schools with high rates of low-income students and more challenging

student populations. The cost function analyses also found the need for a scale adjustment for small schools—the smaller the school below 100 students per grade level, the larger the necessary adjustment. The low-income student and school size cost function adjustments increased the *Wage Analysis Expenditure Per Student* level from $11,078 per student to the final adequate expenditure level of $11,678 per student.

This study determined the overall per student expenditure level that is necessary to make ample provision for the education of all students in 2004-05 to be $11,678. This is an increase of $3,613 per student, or 45%, above the baseline expenditure level. This figure takes into account a range of key variables including educational program, compensation, regional and geographic variables, school size, and family income levels. The figure is the result of the application of multiple methods that address a wide range of variables in a progressive fashion in order to yield a final figure that is accurate and reasonable as an indicator of the funding required to provide an adequate education to all Washington public school students.

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Figures and Tables

Educational Policy Improvement Center (EPIC)

The Educational Policy Improvement Center, a 501(c)3 nonprofit organization, seeks to help policy makers and policy implementers alike do a better job of using educational policy as a tool to improve schooling and student learning.

EPIC works with federal agencies, state education departments, non-governmental organizations, private foundations, and school districts to support research on a range of issues in the areas of high school-to-college articulation, adequacy funding, large-scale assessment models, and other policy initiatives designed to improve student success.

On this study, EPIC worked in partnership with the Center for Educational Policy Research (CEPR), a University of Oregon research center with expertise in validity studies and high school-college articulation issues. This study was prepared under a contract with the Washington Education Association. The findings and recommendations are the sole prerogative of the study's authors and are independent of any influence from the contractor.

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List of Acronyms

AYP	Adequate Yearly Progress
CPRE	Center on Reinventing Public Education
CWI	Comparable Wage Index
EALRs	Essential Academic Learning Requirements
ELL	English Language Learners
ESA	Educational Staff Associate
ESD	Educational Service Districts
FTE	Full Time Equivalent
GCERF	Governor's Council on Education Reform and Funding
GLEs	Grade Level Expectations
IPUMS	U.S. Census Bureau Integrated Public Use Micro-data System
JLARC	Joint Legislative Audit and Review Committee
LAP	Learning Assistance Program
NCES	National Center for Education Statistics
NCLB	No Child Left Behind Act
NEA	National Education Association
OSPI	Washington Office of Superintendent of Public Instruction
PESB	Professional Educator Standards Board
WASA	Washington Association of School Administrators
WASL	Washington Assessment of Student Learning

1 Overview

1.1 What Is Adequacy?

The constitution of the state of Washington declares, “It is the paramount duty of the state to make ample provision for the education of all children residing within its borders.” Merriam-Webster Dictionary defines *ample* as “generous or more than adequate in size, scope, or capacity” or “generously sufficient to satisfy a requirement or need”[1]. This analysis was conducted in order to determine the adequate funding level necessary to make ample provision for the education of all Washington students. For the purposes of this study, an adequate education is one that provides the required resources for all students to achieve the state’s goals and to meet the expectations citizens have for their schools. Those goals include the standards established to fulfill the requirements of the 1977 Basic Education Act (as amended), the 1993 Education Reform Act (HB 1209), and the federal education goals for which Washington agrees to strive when it accepts federal funds.

The overarching goals of the Basic Education Act are “to provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities, and to enjoy productive and satisfying lives”[2]. These fundamental goals, which entail a comprehensive high quality education, frame the specific expectations that *all students* are expected to achieve[2]:

1. Read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways and settings.
2. Know and apply the core concepts and principles of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness.
3. Think analytically, logically, and creatively, and integrate experience and knowledge to form reasoned judgments and solve problems.
4. Understand the importance of work and how performance, effort, and decisions directly affect future career and educational opportunities.

The Basic Education Act goes on to state “The Legislature finds that student achievement in Washington must be improved to keep pace with societal changes, changes in the workplace, and an increasingly competitive international economy,” and that the intent of the law is “to increase student achievement”[2]. According to the law, “the state of Washington needs to develop a public school system that focuses more

on the educational performance of students and that includes high expectations for all students"[2]. Clearly this sets a high achievement standard for Washington's schools and students.

Washington school funding court cases in the late 1970s and early 1980s established various requirements regarding the state's paramount duty. One requirement directly related to education reform is that the Legislature is "required to continually review, evaluate, and revise, if necessary the educational system of the state and the program of education and its funding to meet the current needs of the children of the state"[3]. The 1993 Education Reform Act revised the state's 1977 educational goals and expectations. However, it did not review or make any significant changes in the state's funding of basic education in order to achieve the new educational goals.

As part of education reform, the state instituted new student assessments of core subjects starting in 1997. These assessments, cumulatively known as the Washington Assessment of Student Learning (WASL), have been administered in grades 4, 7, and 10 since the 1998-99 school year. Successful student completion of the 10th grade reading and writing WASLs or an alternative assessment is a graduation requirement beginning with the graduating class of 2008. In November 2006, the Washington State Board of Education approved a three-year transition period for instituting the math WASL as a graduation requirement[4]. WASL results for the class of 2008 reported that only 51.8% of the tested 10th grade students were able to meet the WASL standards in reading, writing, and math.

An education system that meets the state's goals is in the long-term interest of the state itself. Research establishes positive relationships between K-12 school resources and earnings in the labor market that are consistent with the state goal of productive citizens[5]. Productive citizens pay taxes and participate in civic institutions, thereby strengthening the state. For these and a host of other reasons, it is incumbent upon the state to consider what constitutes an adequate level of funding for public education, one that will ensure that schools have the means to enable all Washington students to meet state performance outcomes. This study provides a comprehensive analysis that utilizes multiple methods to determine with precision the resources necessary for the state to meet its obligation to fund schools adequately.

The remainder of section 1 of this report provides general context for this study, highlighting the increasing challenges faced by Washington schools, the history of Washington school finance, and the current condition and structure of Washington schools and school finance. Finally, this section describes the common methodological approaches to adequacy funding and describes how these were employed in several different states.

1.2 Demands on Washington Schools

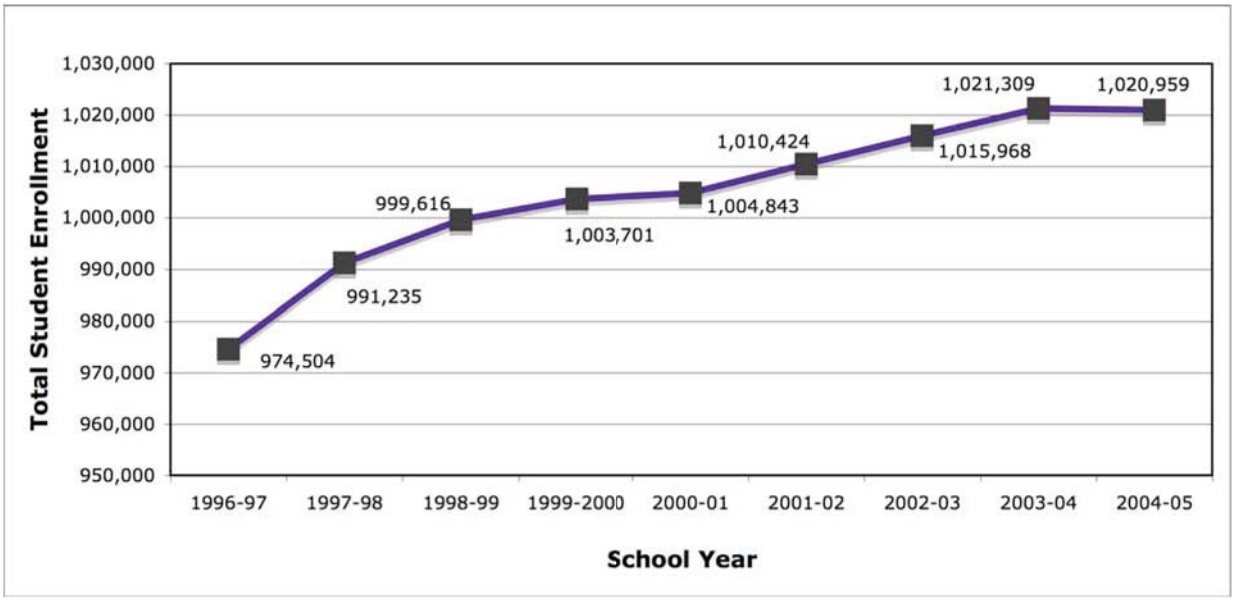
Schools are subject to numerous forces that are beyond their direct control. In order to accommodate these forces, schools need adequate resources. In recent years, Washington schools have experienced dramatic changes in the nature of their student population and the expectations of what constitutes an adequate education for these students. The state's school system experienced significant overall student population growth over the past decade. This growth was accompanied by increases in the percentages of students in special education, students with limited English proficiency, and low-income students. In terms of expectations, the Education Reform Act (HB 1209) of 1993 established the expectation that schools would enable all students to meet state academic content standards. Beginning in 2002, the state's schools were also expected to fulfill the accountability requirements of federal legislation in the form of the No Child Left Behind (NCLB) Act.

During this period of rapid change and increasing expectations for education, no systematic study of the needs of Washington schools has been conducted. In essence, the system currently operates under the same basic governance and funding processes as it did prior to this period of new challenges and increasing demands. The following sections present evidence of the increasing demands on Washington schools.

1.2.1 Changes in Enrollment

Washington experienced a greater percent increase in overall population than all but eleven other states between 1993 and 2003[6]. This large increase was accompanied by corresponding growth in K-12 school enrollment. From 1996-97 to 2004-05, more than 46,000 new students entered Washington public schools[7]. A report from the Washington Office of Financial Management predicts another surge in student enrollment will begin in 2010[8]. These enrollment increases may contribute to Washington's comparatively high student-to-teacher ratio. The National Center for Education Statistics (NCES) reported that Washington had the fifth-highest ratio out of all 50 states in the 2004-05 school year (19.2 to 1 compared to the United States average of 15.8 to 1)[9]. Figure 1 shows Washington K-12 enrollment changes over the last ten years.

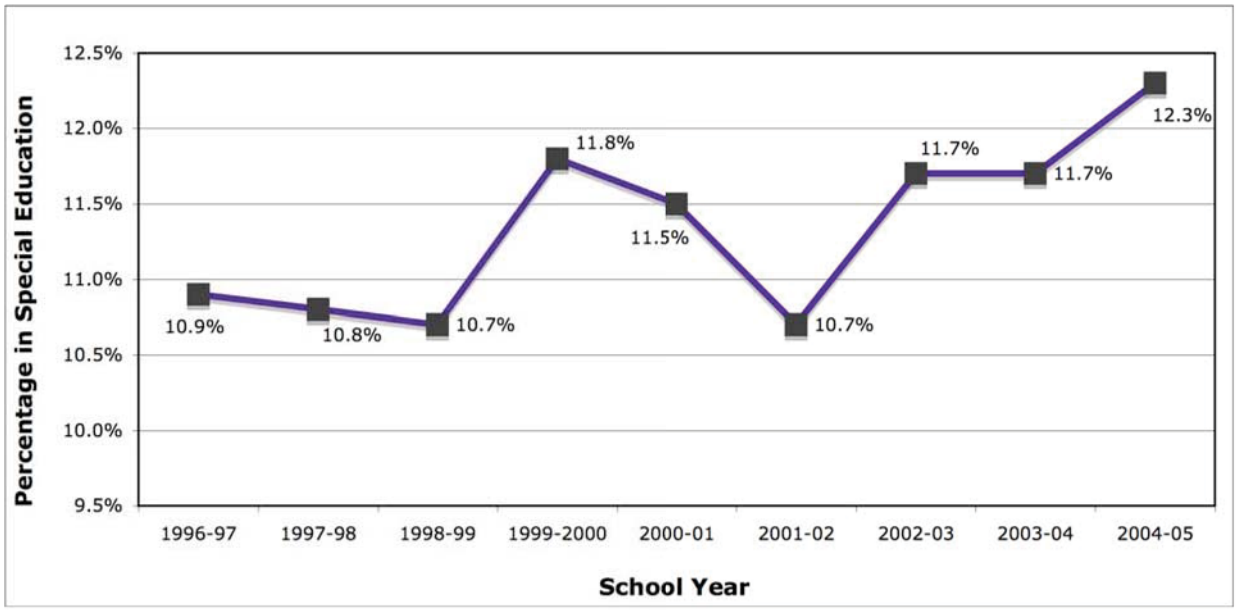
Figure 1: Washington total K-12 enrollment, 1996-2005



Source: OSPI Report Card

Washington schools must also provide special education services to an increasing number of students. According to the Washington Office of Superintendent of Public Instruction (OSPI), both the number and percentage of Washington students in special education increased between 1996-97 to 2004-05[7]. The number of special education students increased by 19,357—from 10.9% of students to 12.3% of students between the 1996-97 and 2004-05 school years[7]. The cost of providing special education services may be almost double the cost of providing services for a regular education student[10]. Figure 2 illustrates the increasing percentage of students enrolled in special education from 1996-97 through 2004-05.

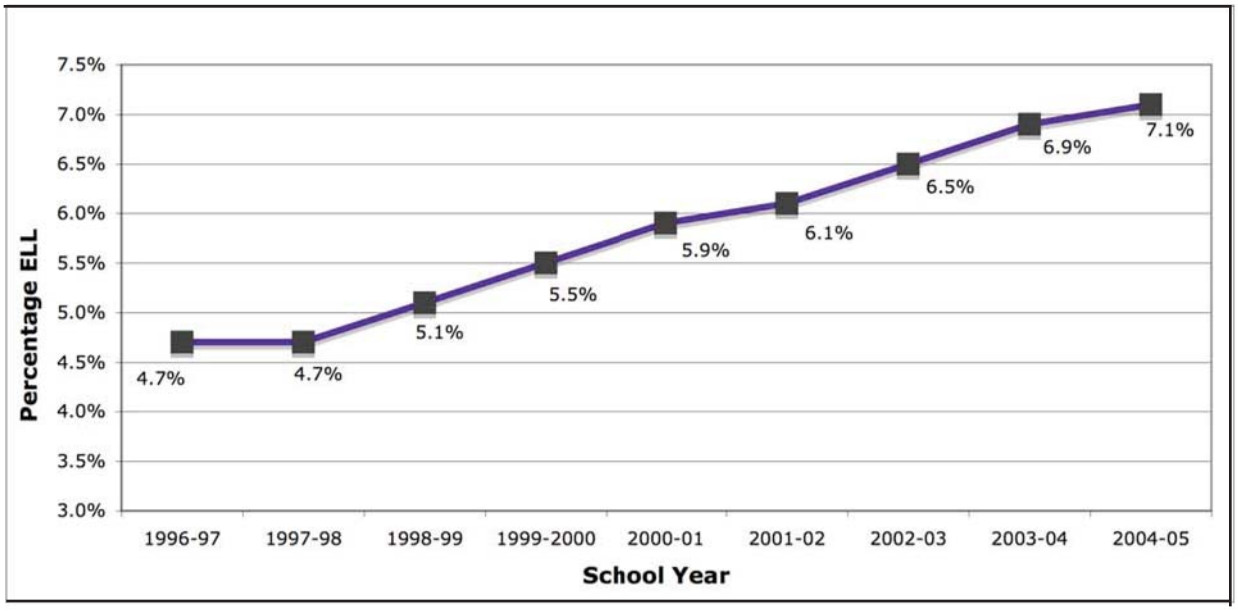
Figure 2: Percentage of Washington K-12 students enrolled in special education



Source: OSPI Report Card

Other enrollment challenges facing Washington are the increasing numbers and percentages of both English Language Learners (ELL) and students eligible for free or reduced price lunches (a proxy for students from low-income families). The number of ELL students grew by 26,686 students, from 4.7% of the total school enrollment in 1996 to 7.1% in 2005 (see Figure 3 below)[7]. Students who are learning English require specialized language training and the employment of staff with specialized skills. Districts and schools with high concentrations of ELL students therefore face additional unique challenges that necessitate lower student-to-teacher ratios and additional staff to provide instruction in situations where few students speak, understand, read, or write English.

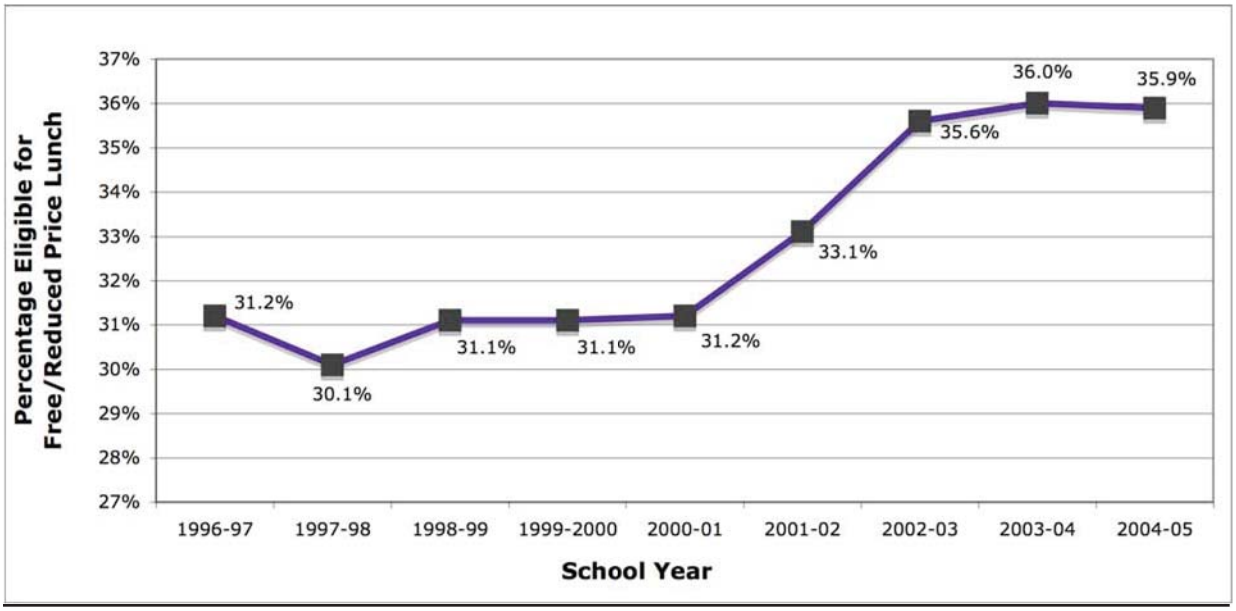
Figure 3: Percentage of Washington K-12 students who are English Language Learners



Source: OSPI Report Card

The percentage of Washington students eligible for free or reduced price lunch grew from 31.2% of total school enrollment in 1996-97 to 35.9% in 2004-05 (see Figure 4 below)[7]. This figure obscures the fact that more students in elementary schools come from low-income families than in secondary schools, where students may be more reluctant to report such information to school authorities. Abundant evidence exists to demonstrate that low-income students require additional educational services such as greater outreach to parents, summer school, and tutoring, and consequently that schools with high concentrations of low-income students must account for these needs.

Figure 4: Percentage of Washington K-12 students eligible for free/reduced price lunch



Source: OSPI Report Card

1.2.2 Increased Accountability

As schools work to address the needs of an increasingly large and diverse student population, they must also satisfy a long list of state and federal performance and accountability requirements that are much more clearly focused on student learning than were previous policies. Schools are now expected to educate essentially all students to high levels of performance, and are subject to sanctions if they are unable to do so. Students, as well, now experience repercussions if they are unable to pass tests and meet standards necessary for graduation.

The increased expectations for performance and accountability in Washington schools formally began with the passage of the Education Reform Act in 1993 (HB 1209) that established broad educational goals for all students in the state. In order to measure student progress toward these goals, Washington first administered the Washington Assessment of Student Learning (WASL) in 1996-97. According to the WASL 2006 Resource Center, the WASL is "a series of tests that ensures Washington students are learning the foundational skills and knowledge that educators, parents, and community leaders have continued to say are important to their success in life"[11].

The federal government enacted the No Child Left Behind (NCLB) Act in 2001 to reduce the achievement gap and to increase school accountability. NCLB requires every state to test students and

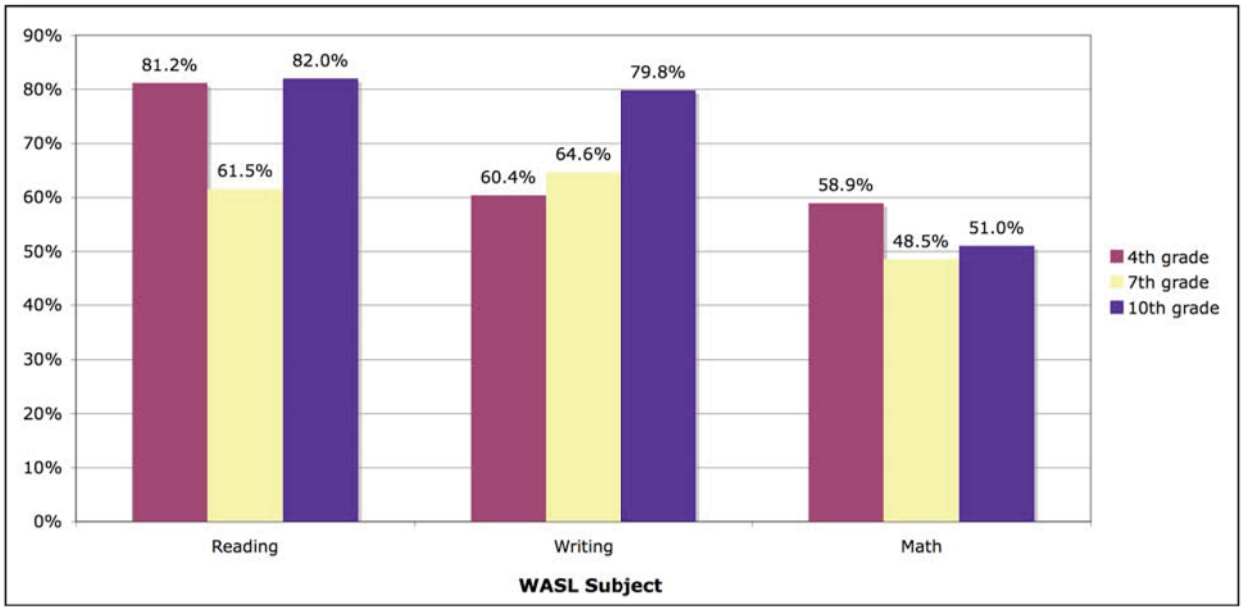
measure Adequate Yearly Progress (AYP) towards universal student attainment of standards. Washington has measured AYP primarily through student reading and math scores on the WASL[12]. This legislation contains a range of consequences for schools that do not achieve AYP for all groups of students each year.

In essence, these two pieces of legislation changed the rules and expectations under which Washington schools had historically operated. Instead of being controlled by and accountable to local school boards almost entirely, schools now had to look to the state and federal government for guidance and approval. Schools instituted significant and often dramatic changes in their programs, personnel, and structures as they attempted to adapt rapidly to this significant shift in the conditions under which they operated.

1.2.2.1 WASL and AYP Performance

In the 2005-06 school year, grade level proficiency on the WASL varied (among 4th, 7th, and 10th grade) from 61.5% to 82.0% in reading, 60.4% to 79.8% in writing, and 48.5% to 58.9% in mathematics (as shown in Figure 5).

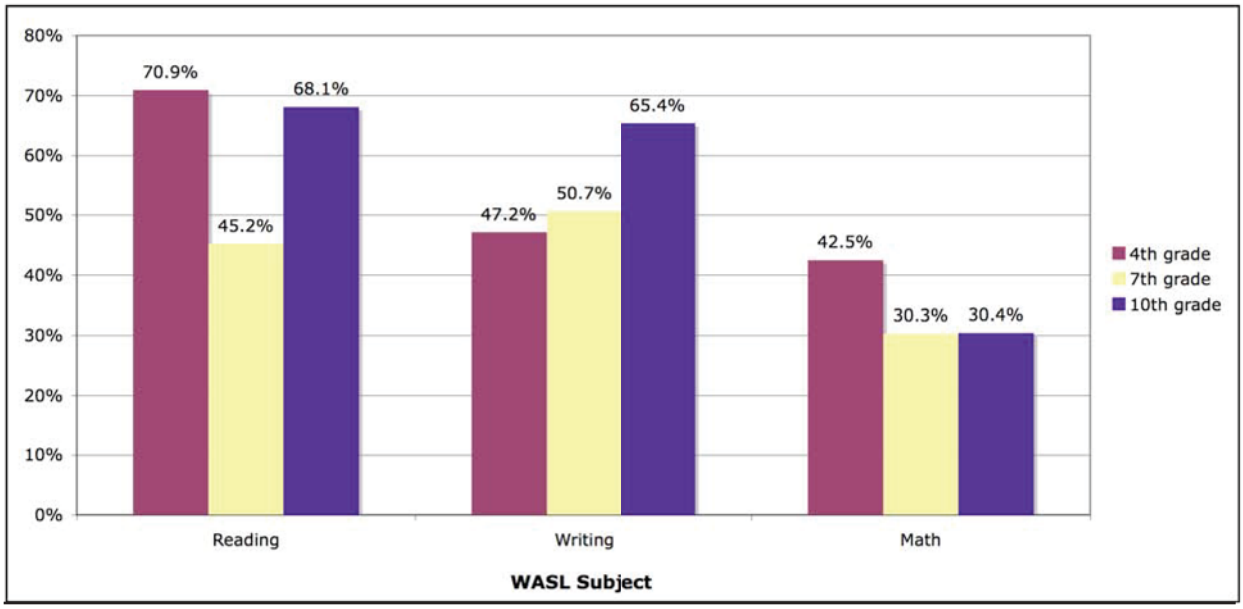
Figure 5: Percent of all Washington students meeting WASL standards, 2005-06



Source: OSPI Report Card

Students from low-income families met standards on the WASL at rates that were on average 10% to 21% points lower than the rates for all Washington students in 2005-06 (Figure 6).

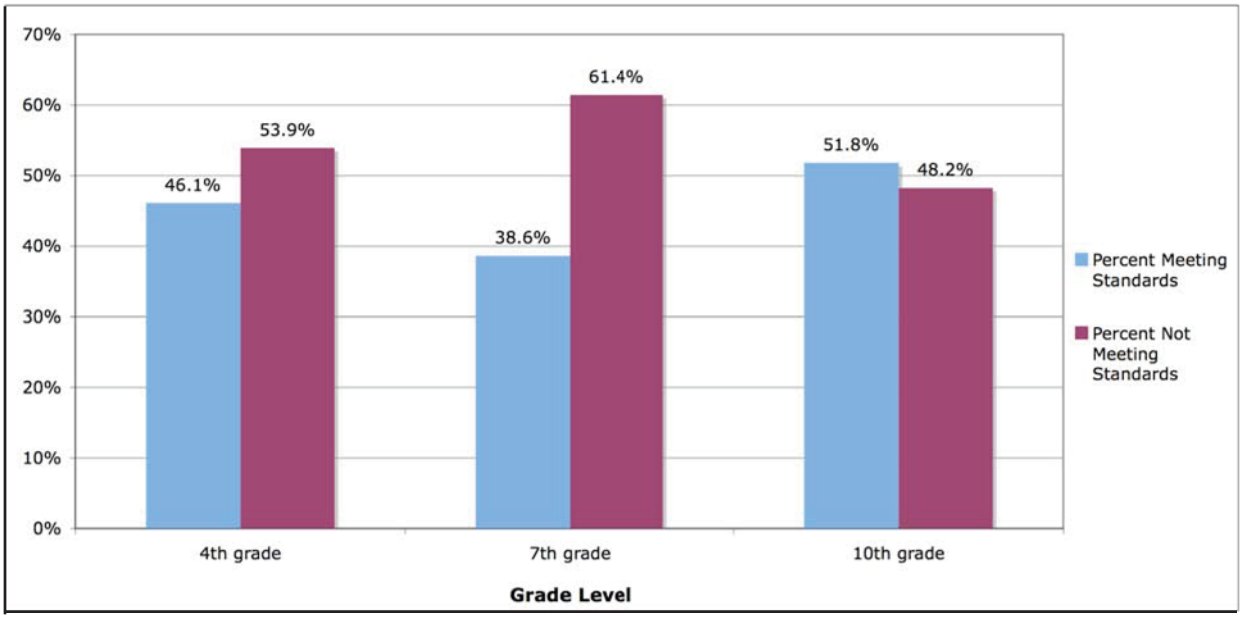
Figure 6: Percent of low-income students meeting WASL standards, 2005-06



Source: OSPI Report Card

The academic accountability requirements carry specific consequences for Washington students in the class of 2008, who will be required, among other things, to pass the WASL in reading and writing or achieve an equivalent academic standard through an identified alternative method of assessment in order to graduate[13]. In November 2006, the Washington Board of Education voted to approve a three-year transition period for instituting the math WASL as a graduation requirement[4]. This transition would allow students in the classes of 2008-2010 who do not meet WASL standards to graduate if they continue to take high school math classes and retake the math WASL[4]. The 2005-06 high school WASL results indicate that only 51.8% of tested 10th grade students met the required standards in reading, writing, and math and only 30.7% of tested low-income 10th grade students met the standards in all three content areas. Figure 7 displays the percent of Washington students who met WASL standards in 2005-06 in all three content areas.

Figure 7: Percent of students meeting or not meeting WASL standards in all 3 subject areas in 2005-06



Source: OSPI Report Card

Under the requirements of NCLB, the federal government evaluates Washington schools on student achievement[12]. "Each school and district is required to meet AYP as a whole and by disaggregated student groups"[12]. Schools that fail to meet NCLB accountability requirements for two consecutive years and receive federal Title I funds are classified as needing improvement. Schools that need improvement must notify parents of this status, develop a school improvement plan, offer parents the opportunity to transfer their student to another school in the district (one that is meeting standards), and pay for the transportation to the alternate school if requested[12]. After three consecutive years of failing to meet AYP, schools must also offer parents the opportunity to request supplemental educational services such as tutoring for low-achieving students[12]. If schools still do not improve their performance under NCLB, schools then must take such options as replacing staff, implementing new curriculum, providing additional professional development, decreasing management authority, extending the school day or school year, or restructuring the internal organization of the school[12]. After six consecutive years of not meeting requirements, schools must restructure, replace all or most of the school staff, or allow an outside entity or the state to take over control of the school[12]. These options may improve the quality of education, but they are not without cost, and these associated expenses have not yet been calculated with any precision.

In the 2004-05 school year, 10% of Washington schools offering 4th grade did not meet AYP at the school level[14]. Twenty-two percent of schools offering 7th grade, and 36% of schools offering 10th grade also failed to meet AYP at the school level[14]. Twelve schools statewide failed to meet AYP in 2004-05 for either the 3rd or 4th consecutive year, including two elementary schools, eight middle school/junior high/intermediate schools, and two high schools[15].

The accountability data illustrates the gap between student performance and state and federal expectations, particularly for students from low-income families. This increased focus on adequate student performance suggests that it is prudent to review Washington school funding to determine if it is sufficient in light of the gap between current and desired student academic performance.

1.2.2.2 School Mandates

Federal and state policy makers have the authority to issue mandates to schools and districts in order to improve education and/or increase accountability. These mandates however, can be expensive to implement, and the districts and schools may bear part or all of the implementation costs without a concomitant increase in resources. Examples of the diverse array of accountability requirements that Washington schools are responsible for that have been added in recent years without specific funding attached to them include: tracking students beyond high school, annual bus driver training, student vision/hearing/scoliosis testing, underground fuel tank inspections, sexual harassment sensitivity training, mentoring plans for new teachers, vocational equipment, and extracurricular coaching[16]. These mandates often require considerable staff time or other resources to implement.

The accountability mandates represent some of the most recently enacted requirements governing the operation of Washington schools. However, there are a host of other rules that provide structure for the educational system and school finance system, many of which do not specifically take into account these new requirements and responsibilities. These are discussed in the next section.

1.3 History of Washington School Finance

This section provides an overview of the Washington school finance system and its evolution over the past 30 years. It serves to delineate Washington's obligations, both constitutionally and legislatively, to finance schools adequately. The section begins by presenting relevant sections from the state constitution, and then considers key legal challenges and legislative acts that affect Washington school finance. It concludes with a review of the current condition of Washington school finance.

1.3.1 Constitutional Obligation

Article IX, Section 1 of the Washington constitution states, “It is the paramount duty of the state to make ample provision for the education of all children residing within its borders, without distinction or preference on account of race, color, caste, or sex.” Section 2 further requires that “the Legislature shall provide for a general and uniform system of public schools.” The state’s funding responsibility under these two sections of the state constitution was litigated in the early 1970s and 1980s.

1.3.2 Early Challenges

In the 1974 case, *Northshore School District v. Kinnear*, 25 Washington school districts asserted that the state’s funding program violated Article IX of the state constitution along with the equal protection clause of the state and federal constitutions[17]. Plaintiffs contended that the wide disparities in district tax bases and in educational expenditures among districts were unconstitutional. The Washington Supreme Court ruled that differences in the assessed property wealth among districts did not violate the “ample provision” clause or the “general and uniform” clause of the Washington constitutions, or the equal protection clauses of the U.S. or Washington constitutions[17]. The court declared that “there was no evidence that any child had been deprived of accreditation, promotion, or admission to other schools because his district failed to meet state standards”[17].

Although the court did not find evidence of constitutional violation, several important principles emerged from this case. The Washington Supreme Court defined a general and uniform school system as “one in which every child has free access to certain minimum and reasonably standardized educational and instructional facilities and opportunities”[18]. Furthermore, the court determined that “the system should be administered with the degree of uniformity that enables a child to transfer from one district to another within the same grade without substantial loss of credit or standing, and with access for each student to acquire those skills and training that are reasonably understood to be fundamental and basic to a sound education”[18].

1.3.3 The Miller Report

There were two unsuccessful attempts in the early 1970s to pass a state income tax or a corporate income tax to provide additional funds to stabilize education revenue and to reduce district reliance on special property tax levies. Many districts relied on increasing property tax levies to help fund basic education, but were unable to raise the requisite funds because each levy required 60% voter approval. In 1975, 65 school districts enrolling more than 40% of the state’s students were unable to pass any levy[19].

In the same year that these levy failures occurred, the Washington Legislature contracted with Wally Miller to study Washington's education finance system. His report, the Miller Report, found that the state's contributions to education funding in the late 1960s and early 1970s had not kept pace with the costs of inflation, K-12 school enrollment growth, the costs associated with class size reductions, and the costs of implementing new programs to meet the special needs of students[17]. The report concluded that 90% of spending variation among districts could be attributed to the differences in staff salaries, and the numbers of staff per 1,000 students[17]. The Miller Report confirmed school districts' heavy reliance on local levies for basic education costs, and this confirmation, coupled with the significant levy failures in 1975, led to a lawsuit against the state.

1.3.4 School Funding I (Doran I)

The state of Washington faced its first school adequacy funding challenge in 1976 in *Seattle School District No. 1 v. State*. The plaintiff school district contended that the state did not provide sufficient funding for K-12 public schools, causing school districts to rely on special levies to fund basic education. Washington Superior Court Judge Robert Doran examined three different methods to assess whether state educational funding was adequate and assigned a total cost based on each method[17]. The first method evaluated whether the educational system complied with state statutes and regulations. The second examined adequacy in terms of whether schools met accreditation standards. The third approach was known as the "collective wisdom" approach and it calculated the average statewide cost of educating a "normal range ability" student. Judge Doran ruled that Washington education funding did not suffice using any of the three methods.

Judge Doran ruled that "there can be compliance with the state's mandatory duty only if there are sufficient funds derived through dependable and regular tax sources to permit school districts to carry out a basic program of education"[20]. The court also determined that local tax levies should be used for enrichment purposes only and should not be necessary to fund a basic education[20, 21]. Without the supplemental funds provided by special levies, the court concluded that Washington did not amply provide for its school system. Finally, the court interpreted the state's constitutional duty as one that "embraces broad educational opportunities needed in the contemporary setting to equip our children for their role as citizens and as potential competitors in today's market as well as in the marketplace of ideas"[20].

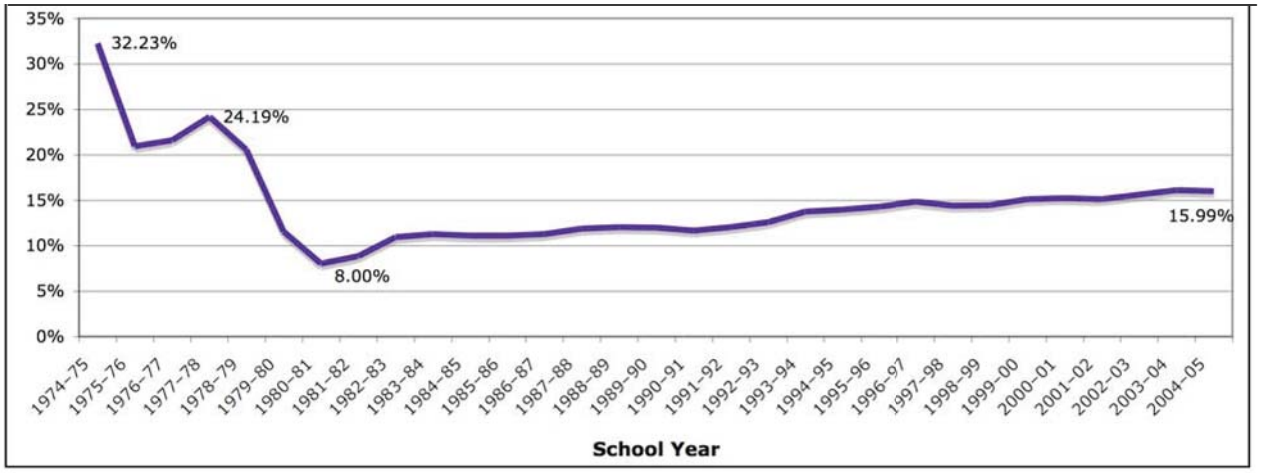
1.3.5 Basic Education Act, Levy Lid, and Salary Acts

Following the Doran I decision, the Washington Legislature passed the Basic Education Act of 1977. This act addressed "basic education" in terms of minimum school days per year, minimum instructional hours, instructional content by grade, and ratios of staff to students[22]. In addition to the Basic Education Act, the state passed a Levy Lid Act and an Appropriations Act. The Levy Lid Act limited the percentage of revenues that could be raised through local levies to 10% of total basic education revenues. However, the act allowed districts that were already raising more than 10% through local levies a transition period of four years to reach the 10% cap[17]. In an effort to equalize staff salaries among districts, the Appropriations Act placed ceilings on permissible staff compensation increases for districts, and provided differential compensation increases based on the existing compensation levels in each district[17].

The collective purposes of the Basic Education, Levy Lid, and Appropriations Acts were to address and fund basic education, increase equity among districts, and lower districts' reliance on local special levies[17]. With the passage of time, a number of deficiencies became discernable in these legislative acts. For example, legislative equalization of salary levels did not account for regional cost-of-living differences and did not sufficiently account for the costs associated with educating diverse student populations. Large urban districts were not able to address the special needs of their diverse student populations, nor offset their higher cost-of-living for teachers through salary raises[17].

Starting in 1989 and in ensuing years, the Legislature raised the levy lid from the original 10% level. Due to these increases and an increase in the number of districts gaining voter approval for levies, the percentage of total revenue raised from local levies gradually increased. As shown in Figure 8, excess general fund levy revenue as a percent of total operating revenues, increased from 8.0% of total operating revenues in 1980-81 to 15.99% in 2004-05[23]. In 2005, the levy lid theoretically limited the percentage of funds that districts could raise through local levies to a maximum of 24%, although some districts raised more[23].

Figure 8: Excess general fund levy revenue as a percent of total revenue



Source: Office of Superintendent of Public Instruction, School District Property Tax Levies, 2005 Collections. 2005, Author: Olympia, WA.

1.3.6 School Funding II (Doran II)

After the state cut $200 million from its basic education funding during the recession of the early 1980s, 26 school districts filed another lawsuit[17]. Plaintiffs in *Seattle et. al. v. State of Washington* asserted that the Washington Legislature failed to sufficiently fund schools and meet the needs of all districts, particularly districts in urban areas[24]. In 1983, Superior Court Judge Doran ruled that the state had not fulfilled its obligation to fully fund basic education[25]. He further ruled that basic education included special education, pupil transportation for at least some students, English Language Learners (ELL), vocational education, and remedial programs[25]. Finally, the judge ruled that once a program is defined as basic education, the state may not reduce the funding level due to state revenue problems[3]. The Legislature responded to Judge Doran's decision by revising the definition of Basic Education Act to include special education, English Language Learners (ELL), and remedial programs[17].

1.3.7 School Funding III (Doran III)

A third challenge to the adequacy of Washington school funding focused on special education. In 1988, Judge Doran mostly upheld Washington's formula for special education funding. However, he found that a special education funding formula based on average costs systematically over-funds some districts and under-funds others. Therefore, Washington's continued use of a state special education formula based on averages required some means to provide supplementary funding, such as a safety net process.

The 1995 Legislature developed a new special education funding formula that was first implemented in the 1995-96 school year. This formula limited the percentage of special education students that could be

covered by state funds to 12.7% of the total student population of each district. It also included a safety net funding process for districts with unique special education funding needs[17, 22, 26].

1.3.8 Education Reform

In 1991, Washington Governor Booth Gardner formed the Governor's Council on Education Reform and Funding (GCERF) to help reform public schools and improve student performance[17]. Towards these ends, the Washington Legislature enacted SSB 5953 in 1992, which led to the establishment of the Essential Academic Learning Requirements (EALRs) and the Washington Assessment of Student Learning (WASL) to measure these skills. The second major education reform bill, HB 1209, became known as the Education Reform Act of 1993. This bill established the following four educational goals for the students in the state:

- Read with comprehension, write with skill, and communicate effectively and responsibly in a variety of ways and settings;
- Know and apply the core concepts and principles of mathematics; social, physical, and life sciences; civics and history; geography; arts; and health and fitness;
- Think analytically, logically, and creatively, and integrate experience and knowledge to form reasoned judgments and solve problems; and
- Understand the importance of work and how performance, effort, and decisions directly affect future career and educational opportunities.

These reforms marked the formal transition from an emphasis on financial inputs to an emphasis on academic outcomes[22]. The Basic Education Act was amended to define basic education in terms of the above academic outcomes and the broad goal of K-12 Washington education to "provide students with the opportunity to become responsible citizens, to contribute to their own economic well-being and to that of their families and communities, and to enjoy productive and satisfying lives"[22].

1.3.9 Initiatives 728 and 732

In 2000, 72% of Washington voters approved Initiative 728, which designated a portion of state property taxes and lottery revenues to fund student educational achievement[10]. The initiative gave school districts the discretion to use this additional per student amount for the following activities: class size reductions, pre-kindergarten education, extended learning opportunities for students, professional development for educators, and facility improvement to support class size reductions or extended learning

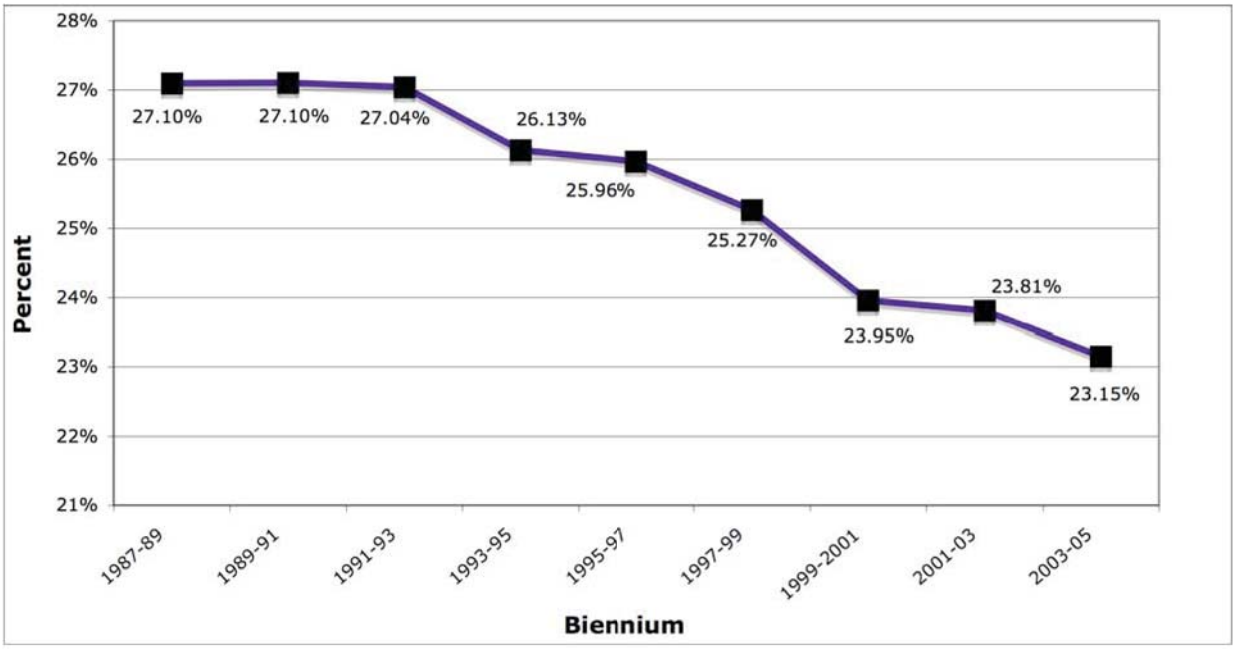
opportunities[22]. Initiative 728 also encouraged the Legislature to "fund salary levels that ensure school districts' ability to recruit and retain the highest quality teachers"[27].

Also in 2000, voters approved Initiative 732, which established an annual cost-of-living adjustment for school employees to ensure that salaries would keep up with inflation, as measured by the Seattle CPI. The Legislature temporarily suspended these cost-of-living adjustments for the 2003-05 biennium, claiming that the adjustments were not protected as part of basic education[28].

1.3.10 Current State of Education Finance

Despite changing student demographics, increased state and federal standards, intense judicial attention, and legislative activity over the last 20 years, the percent of the state budget dedicated to operating and capital expenditures for K-12 public schools has generally declined since the 1987-89 biennium[29]. According to the Washington Office of Financial Management, Washington's operating and capital expenditures budgeted for K-12 public schools declined nearly 4 percentage points between the 1987-89 biennium and the 2003-05 biennium[29] (see Figure 9 below).

Figure 9: Washington K-12 public school expenditures as a percent of state operating and capital expenditures (all budgeted and higher education funds)



Source: Office of Financial Management. Operating and Capital Expenditures by Function: All Budgeted and Higher Education Funds. 2005 Data Book. 2006 January 19 [cited 2006 July 20]; Available from: http://www.ofm.wa.gov/databook/finance/gt06.asp.

In 2003, Washington school funding levels were below the average nationwide[30]. *Education Week*, using regionally adjusted expenditure data, found that in 2003, Washington's per student expenditures were $789 below the United States average, ranking Washington 42nd out of all states and the District of Columbia in per student expenditure[31, 32].

1.3.10.1 Educational Policy Context

The initial responsibility for educational governance lies with the Washington Legislature, which creates the laws and authorizes the budgets applicable to all public schools. The system of laws and budgets passed by the Legislature is implemented and interpreted by a range of agencies and organizations—the State Board of Education, the Superintendent of Public Instruction, the Washington State Professional Educator Standards Board, Educational Service Districts at the regional level, and school districts at the local level[22]. According to OSPI, the responsibilities for these groups are organized in the following manner[22]:

- **State Board of Education**: Establish rules, standards, and guidelines in accordance with state law
- **Superintendent of Public Instruction**:
  1) Gather and report school information to state and federal authorities, prepare requested reports, provide other state government institutions with information needed for policy making and budget preparations.
  2) Secure laws and appropriations and implement enacted statutes.
  3) Apportion, distribute, and monitor funds to Educational Service Districts (ESDs) and school districts.
  4) Administer grant programs, provide facilities services and assist school districts with boundary issues.
  5) Provide technical assistance in finance and curriculum to ESDs and school districts.
  6) Issue certificates for school staff positions.
  7) Act as ex officio member and chief executive officer of the State Board of Education.
- **Washington State Professional Educator Standards Board**: Establish policies and requirements for the preparation and certification of educators.
- **Educational Service Districts**: Provide a wide range of services to school districts that districts would have trouble providing.
- **School Districts**: Maintain final responsibility for policy setting to ensure high quality educational programs and enforce the rules prescribed by the superintendent of public

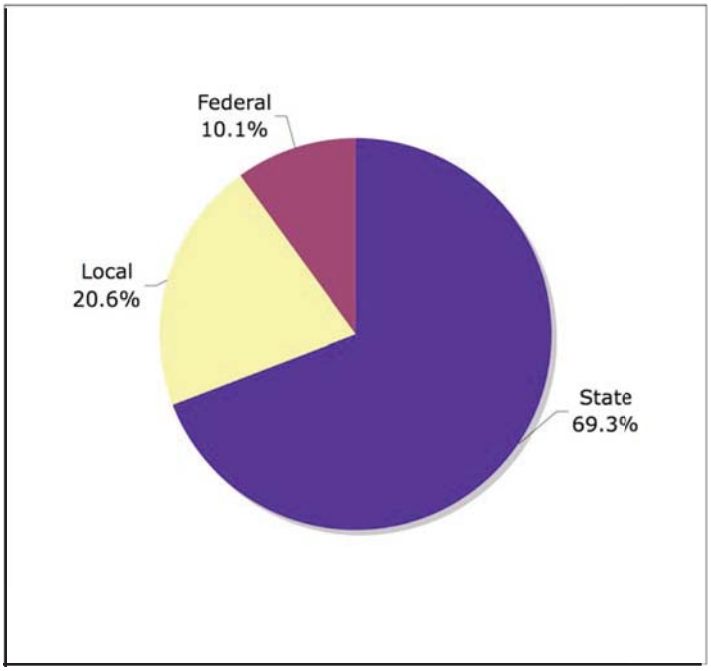
instruction and the state board of education. This includes developing performance criteria and evaluation processes for certificated personnel; determining staff assignments, determining the number of instructional hours; determining the allocation of certificated and classified staff time; establishing curriculum standards; and evaluating teaching materials[33].

Together, these groups are responsible for establishing policies, and administering and supervising public schools[22]. The net effect of this multi-level governance system is to increase and expand the expectations for schools over time as well as the number of specific mandates to which they are required to respond and conform. The cost to schools of all of this policy generation is rarely if ever calculated. The cumulative effect over time may be considerable.

1.3.10.2 Revenue

In the 2004-05 school year, Washington school districts received 69.3% of their revenue from the state, 20.6% from local sources, and 10.1% from federal sources[22], as shown in Figure 10.

Figure 10: Washington K-12 revenue sources in 2004-05



Source: Hazlett, C.M.& Brodie, C.W. Organization and Financing of Washington Public Schools. 2006, Office of Superintendent of Public Instruction: Olympia, WA

The state raises money for school maintenance and operation primarily through taxes. In the 2005-07 biennium, these taxes included the retail sales tax, business and occupation tax, property tax, use tax, real

estate excise tax, public utility tax, and a number of other smaller sources[22]. The main sources of local school district revenues for maintenance and operations were special levies of one to four years in duration that require 60% voter approval[22].

1.3.10.3 Reliance on Local Levies

Of the 296 school districts in Washington, 278 requested voter approval for a special levy in 2005 to supplement state and federal education revenues[23]. Of the 278, 272 districts obtained the requisite 60% voter approval[23]. This suggests that the vast majority of districts perceive a need for supplemental education funds, and they attempt to raise these funds through special levies.

Although the levy lid for most districts in 2005 was set at 24%, 91 districts have been granted additional levying authority ranging from 24.1% to 33.9%[34]. These districts have the potential to raise additional funds through voter-approved levies that are not available to other districts. Forty-four districts raised more than 24% of their total revenue through special levies in 2005. A number of studies have been conducted on excess levies in Washington, and several are discussed further in section 1.3.11 of this report.

1.3.10.4 Expenditures

Every two years, the Governor presents a budget request to the Washington Legislature, which then modifies and revises the request, passes necessary authorizing legislation, and sends these bills to the Governor for signature. This process results in a biennial appropriations budget for school operating and capital expenditures that determines the state funding level for schools, provides information on the formulas and requirements for the allocation of state funds, and appropriates federal funds[22]. These appropriations acts must comply with all constitutional requirements, statutory law, and court decisions.

State funds are distributed based on apportionment formulas and grant programs. In 2005, the Washington Office of Superintendent of Public Instruction (OSPI) distributed funds through 14 formula-driven state programs, 13 state grant programs, 25 federal grant programs and numerous contractual programs between OSPI and school districts[22]. The large state entitlement programs for basic education, special education, learning assistance, and bilingual education are based primarily on district student enrollments[22]. Other factors that affect apportionment include: staff-to-student ratios for different grade levels; staff allocations for administrative, instructional, and classified staff; weights for education and experience; allocations for benefits and non-employee related costs; substitute teacher allocations; small school funding; vocational school funding; and Running Start rates. There are also numerous competitive grants for which districts can apply and receive reimbursements after the expenses

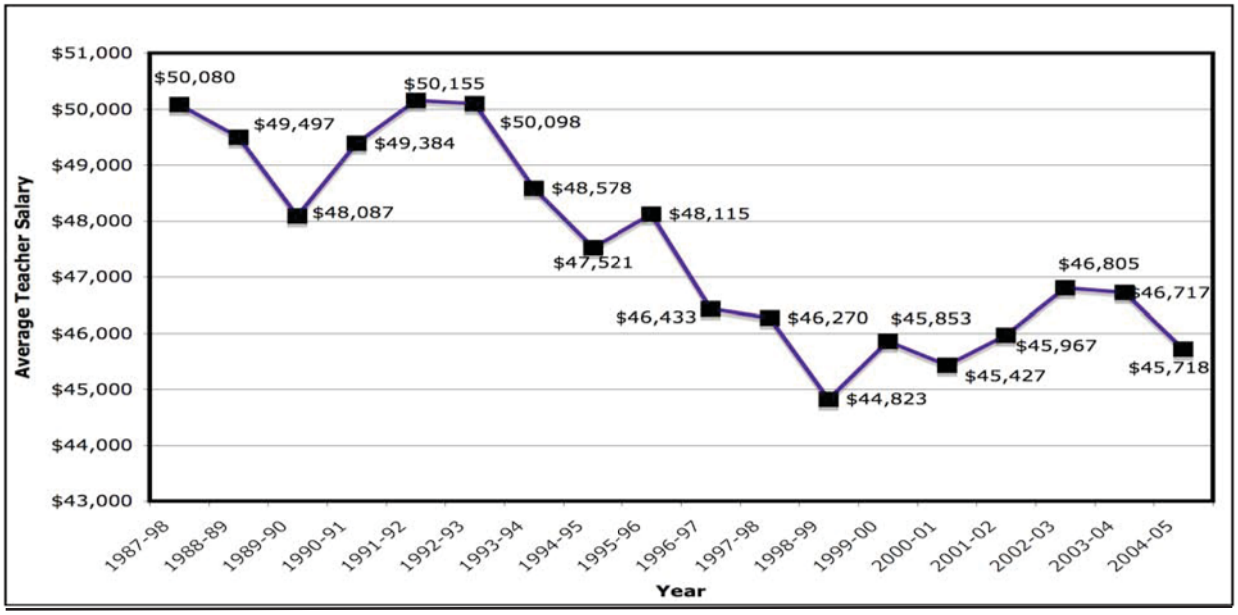
are incurred. The state distributes money on a monthly basis and reimburses when appropriate for competitive grants.

1.3.10.5 Teacher Salaries

The largest single item in the K-12 state education budget is teacher salaries, accounting for 37% of K-12 expenditures. According to the national database compiled by the National Education Association (NEA), the average Washington public school teacher salary of $45,718 fell more than 4% below the national average of $47,674 in 2004-05[6]. Four other states in the western United States had higher average teacher salaries than Washington (California at $57,876, Alaska at $52,424, Oregon at $48,330, and Hawaii at $46,149)[6].

In constant 2005 dollars, the average Washington teacher salary generally declined between the 1987-88 school year and the 2004-05 school year[6, 35]. Figure 11 displays this general decline.

Figure 11: Washington average teacher salary by school year (in constant 2005 dollars)



Sources:
- U.S. Department of Labor- Bureau of Labor Statistics. CPI Data- Seattle-Tacoma CPI, All Urban Consumers. 2006; Available from: http://data.bls.gov/.
- National Education Association, Rankings & Estimates Reports: Original data from OSPI.

1.3.10.6 Per Student Spending

The Digest of Education Statistics provides a historical state comparison of total K-12 education expenditures per student in constant 2004-05 dollars. This comparison accounts for inflation on a national level. From the 1969-70 school year to the 2002-03 school year, Washington per student expenditure

increase was the lowest in the nation[36]. The U.S. average per student expenditure increase during this period was 122%, compared to a 76% increase for Washington elementary and secondary school students[36].

1.3.10.7 Summary of the Current Structure of Washington Education Finance

Washington schools are constrained in their ability to raise revenue on the one hand, but no similar constraint limits what schools are asked, required, and expected to do. Washington schools now rely primarily on other levels of government for their funding. These other levels view schools as only one of many competing areas in need of funding. This fundamental disconnection between the expectations established and the resources provided creates frustration for educators and periodically spurs legal challenges to the school finance system in Washington. One response has been to commission studies of the system, a number of which are summarized in the following section.

1.3.11 Recent Washington Educational System Studies

Over the past decade, Washington's K-12 educational system has been a frequent subject of study by the Legislature, state agencies, education associations, and research organizations. These studies help present a picture of the condition of education in Washington. They also document the ongoing challenges faced by Washington schools. Despite the plethora of studies that identify problems with the educational system and provide recommendations on the best ways to address them, there is little evidence that any major action has been taken to actually address the concerns. This report does not respond to all of the issues raised by the studies, but does recognize the importance of the issues they identify and policies they recommend by revisiting in the final section of the report several of the issues raised in these reports and offering some policy recommendations in these areas.

Many similar themes emerge from the studies. These themes are summarized below under the following general topical headings: the salary structure for certificated and classified staff, professional development and teacher certification, data reporting, educational standards, the levy system, and regional cost variation and districts with high rates of low-income students.

1.3.11.1 Salary Structure

Several studies identify the need for changes to the salary structure for educators. The 2004 Washington House K-12 Finance Workgroup advised that the salary system for educators needs to be more rational and equitable[37]. The Center for Strengthening the Teaching Profession released a 2003 report that emphasized the need for a new compensation structure because districts with high proportions of low-

income students tended to have less-qualified teachers than other districts[38]. The report emphasized that the current state salary system was inexpensive and easy to operate. However, it also found that the structure did not consider cost-of-living differences, did not include necessary incentives for teachers in hard-to-staff schools, and was not aligned with a performance-based system of certification and professional growth[38]. A 2004 report by the Center on Reinventing Public Education (CRPE) found that differences in per student spending were masked because of teacher salary-averaging within the large Seattle School District[39].

The House Education Finance Structure Subcommittee recommended in 2004 that Washington establish a task force to create salary bands for all classified staff[40]. The 1995 Joint Legislative Fiscal Committee on K-12 Finance also advised the state to review the lack of increments in salary allocation for classified staff[33].

1.3.11.2 Professional Development/Teacher Certification

A number of Washington studies reached conclusions and made recommendations regarding professional development and the teacher certification process. Several found that alternative routes to teacher certification successfully prepared teachers for the classroom and should be expanded[41, 42]. Another common theme was the need for consistency within teacher preparation programs, professional development standards, data reporting, and teacher evaluation/feedback[43-45]. Other studies noted that schools and districts may benefit from flexibility in designing curricula that meet their particular needs[43, 46]. Finally, several reports recommended that the state consider implementing teacher mentoring programs for beginning teachers[42, 45, 47].

1.3.11.3 Data Reporting

Another set of Washington studies identified a need for improved data reporting. The House Education Finance Structure Subcommittee recommended that the state accounting system should be more transparent and that reporting requirements for special education should be examined[37]. According to a 2004 Professional Educator Standards Board (PESB) report, several University of Washington researchers concluded that the state's data sources "stopped short of capturing all that matters in providing important facts about the teacher workforce and teaching quality"[48]. In a 1995 report, the Joint Legislative Fiscal Committee on K-12 Finance advised the state to redesign the accounting system and related reports to be more understandable for the public and policymakers[33]. The Joint Legislative Audit and Review Committee (JLARC) Special Education Study of 2001 found that school district reporting of special education expenditures aligned with legislative intent. However, the authors of the

study believed that the reporting would improve if OSPI reported information on the full allocation of funds to school districts and if school districts reported their full costs[49].

The Washington State Institute for Public Policy recommended the implementation of an educational data system that could fulfill the following functions: collect data at the district level; summarize data at the regional and state levels; follow cohorts of students over time; collect basic student demographic data; collect data on educational services provided; measure and assess student achievement regularly; monitor school completion rates; and track post-school outcomes for five years[50]. Finally, the 2005 JLARC K-12 School Spending and Performance Review indicated that it would be helpful to have data on spending at the school level to examine the relationship between spending and student performance. However, the report acknowledged that it may be difficult to collect this type of data[51].

1.3.11.4 Educational Standards

Recent Washington reports emphasize the need to integrate educational standards into the curriculum. In 2001, the Center on Reinventing Public Education interviewed principals at rapidly improving high schools. Their report concluded that improvement at these high schools could be attributed in part to practices that "embraced state expectations and the WASL as positive tools for changing curricula, instruction, and educational programs"[52]. The Washington School Research Center issued a report in 2002 on improving Washington elementary schools that reached similar conclusions—these schools benefited when curriculum and instruction addressed the state EALRs and used assessment results to inform instruction[53]. A 2003 OSPI report identified characteristics of high-performing schools and found that these schools aligned EALRs with their curriculum[44]. Furthermore, teachers at these schools understood the roles of assessments, what the assessments measured, and how student work was evaluated[44].

1.3.11.5 Levy System

Several studies indicated that the district levy system needed improvement[37]. The House Education Finance Structure Subcommittee study advised the state to finish equalizing the grandfathered districts' allocations[37]. The Joint Legislative Committee on K-12 Finance questioned the fairness, necessity, and equality of the long term levy policy as early as 1995[33]. A 1997 Senate Ways and Means & House Appropriations Committees Levy Equalization Study concluded that further study of levies and levy equalization was necessary. The League of Education Voters issued a report in 2002, concluding that the increasing dependence on local levies was inherently inequitable[10]. A 2004 Washington PTA study found that 17 Washington districts had funding levels far below the average[54]. Study authors identified the following possible reasons for these funding discrepancies: relatively low funding from more than one

revenue source, higher-than-average local personnel and resource costs, below-average teacher education and experience, and above-average rates of poor and minority students[54].

1.3.11.6 Regional Cost Variation/ Districts with High Proportions of Low-Income Students

Cost variations between school districts and regions of the state have also been studied frequently. A 1995 report by the Joint Legislative Fiscal Committee on K-12 finance reported that the following factors should be reviewed by the state: potential regional cost-of-living factors for salary allocations, potential regional cost of operations, and the higher costs of educating students in high-stress urban and rural communities[33]. The Center on Reinventing Public Education found in a 2002 study that the districts with the highest child poverty rates and highest percentages of minority students received fewer state and local dollars per student compared to other districts[55]. Furthermore, this study concluded that secondary schools with high percentages of low-income students or minority students were more likely to be taught by teachers who lacked a major in their teaching field[55]. According to a 2004 study cited by the Professional Educator Standards Board, high student poverty districts tended to have less-experienced teachers and fewer teachers with advanced degrees[55].

1.3.11.7 Summary of Washington School Finance

This review of the legal, historical, and political issues surrounding school finance in Washington reveals a complicated input-driven system grappling with how to achieve the desired outputs for public schools in Washington. Schools face demanding changes in both demographics and accountability standards. WASL results show that schools have not reached the student performance ambitions established by the state. The state constitution and subsequent litigation have helped to refine and document the state's obligation to fund education.

This study seeks to determine the level of educational expenditure necessary to make ample provision for the education of all students. This seems a reasonable undertaking in light of the documented changes in the expectations for schools, their ability to raise revenue locally, the characteristics of their student populations, and the policy constraints that affect their ability to adapt to these new expectations.

1.4 Overview of Commonly Employed Methodologies

Efforts to determine the resources necessary to finance an adequate education in states throughout the nation have been undertaken with increasing frequency over the past 25 years. Adequacy funding studies have employed a number of methodologies to accomplish this goal. Each of these methodological

approaches aims to ascertain the resource levels sufficient to address specified educational standards, laws, goals, and results, but each uses a different means to reach its conclusions. Each method ultimately results in an overall educational expenditure figure that some approaches then adjust for students and districts with special needs[56].

In this study, researchers conducted a comprehensive literature review in order to evaluate the methodologies utilized in other studies, assess their strengths and weaknesses, and develop the most appropriate methodology for this study. The following section describes the four most commonly employed methodologies:

- Successful Schools (or Districts) Method
- Evidence-based Method
- Professional Judgment Method
- Cost Function Method

These methodologies may be employed individually or in combination to determine adequate funding levels for different states. This section also describes two supplementary approaches that are not methods per se, but are often used in adequacy funding studies—prototype schools and teacher wage analyses.

1.4.1 Successful Schools (or Districts) Method

The successful schools method calculates adequate expenditures based on the expenditures of a set of schools that meet particular performance criteria. (This methodology can also be applied to districts, instead of, or in addition to schools). The successful schools method assumes that any school can produce the same results as the selected schools if it is provided with the same resources. Researchers first identify a set of schools that meet desired performance levels and then average the total expenditures of these schools. This average expenditure level is then considered adequate for all schools, although some studies may add additional resources to this expenditure level to account for schools with special needs, price differences, and student characteristics. Other studies may exclude outlier schools or districts due to extreme size or expenditure level. One version of the successful schools method, called "Modified Successful Schools," considers the all-important issue of how schools use resources by examining patterns in resource allocation between selected schools and all other schools[57].

The main strength of the successful schools method is that it is based on actual evidence that some schools can successfully meet performance goals at existing resource levels. These schools show patterns of resource allocation that appear to be linked to desired levels of performance and therefore may be good

models for other schools. Researchers can examine these selected schools to identify effective practices and patterns that can be used to inform educational practice and expenditure allocations in lower-performing schools. The model is intuitively appealing and relatively easy to understand after defining what "successful" means.

One potential problem with the successful schools method is that the definition of "successful" can vary across and within studies and may dramatically change the expenditure level considered adequate. Another common criticism of the approach is that the selected schools tend to be demographically homogenous, average to slightly below average-sized non-urban schools. These schools often have the least challenging student populations and may have hidden resources, such as considerable parental volunteering or extra resources from fundraising. The expenditure levels of the selected schools represent the amount of money that successful schools and districts are spending, not necessarily the amount needed to reach adequacy targets. As a result, the average expenditure levels of the selected schools may not actually be adequate for very large or small schools, schools with special needs or diverse populations, or schools located in more expensive urban regions. Thus, it may be necessary to make adjustments to account for the high costs of special needs students and schools with particular challenges.

1.4.2 Evidence-based Method

The evidence-based method uses educational research to identify strategies that are likely to produce the desired student performance outcomes. Strategies may include, for example, class size reductions, interventions for special student populations, summer school, or professional development. Researchers typically undertake a literature review to identify the most effective educational strategies, then estimate the costs of implementing each strategy, and adjust the costs based on school or district differences. The adjusted costs are then aggregated across schools and districts to a total state cost. The model is based on the theory that research-based practices hold the key to educational success.

A main strength of the evidence-based method is that it relies on actual research about how to improve student learning[58]. Research provides evidence that particular strategies can be successful in practice. This method can make use of comprehensive school design models that compile research on best practices[59]. The approach has improved over time due to the increased public focus on educational quality and improvements in educational research. As a result, the pool of research findings is constantly growing and becoming more robust.

Critics of the evidence-based method contend that the selection of educational interventions includes only a limited review of the relevant evaluation literature (i.e., "consultant's choice model"), and question the strength of the available research literature. Another criticism of the model is that it does not address the cost effectiveness of the various employed reforms. The reforms may yield vastly different learning outcomes in relation to the dollars invested. An additional potential limitation of the model is that educational research is not evenly robust at all grade levels and for all student populations. More research exists on schools at the elementary level and for low-income students than at the middle or high school levels or for students in the general education population. Finally, research is not available on many components that are included in costs. This can result in the use of statewide funding averages or proxies that may not accurately estimate the true cost of implementing educational strategies.

1.4.3 Professional Judgment Method

The professional judgment method, also referred to as the resource cost method, is one of the most common approaches utilized in adequacy funding studies. It was developed as a way to identify and assign costs to educational strategies. In this approach, educators, local experts, and/or policymakers work to determine the resources that will enable prototypical elementary, middle, and high schools to meet specified targets. Necessary resources may include staff (quantities, position types, and compensation), equipment, educational programs, central costs, and the length of the school day/year. In addition, panelists usually examine the particular resources required for students with special needs. After agreeing on the essential components that comprise an adequate education and prices of the necessary goods and services, researchers estimate the costs and aggregate these costs to a total expenditure level[60].

One of the advantages of this method is that it reflects the experiences of the people who actually deliver educational programs and services[58]. Panelists may also be able to address unique student needs and propose innovative solutions that do not appear in the research. Moreover, panelists can determine what resources are necessary to meet a broad array of adequacy targets including state laws, requirements, and standards and are not constrained by limited state performance data.

A criticism of this method is that panelists may not consider innovative approaches that are unfamiliar to them and their experience[61]. This issue may be addressed by providing panelists with research findings on effective educational practices[61]. In addition, the composition of the professional judgment panels may directly affect the recommendations. Vocal panelists can conceivably dominate the discussion and obscure the opinions of less vocal participants. There is considerable variation in the actual implementation of the professional judgment methods in terms of panel selection criteria and panel

composition, the process of identifying resources, the process of estimating costs, and other parts of the process. Furthermore, panelists may face potential conflict of interest situations if their findings are going to be used to influence state funding decisions that could benefit them or their schools.

Eric Hanushek, perhaps the most consistent and visible critic of adequacy funding research, labels professional judgment studies as the "educator wish list model," arguing that the design of professional judgment studies encourages panel members to overestimate the required resources[62]. The professional judgment method typically assigns costs after determining the components. When professional judgment panelists do not consider the costs, this may produce recommendations that verge toward ideal schools, rather than adequate schools. To address this potential problem, researchers can constrain the judgment of panelists by providing information on the costs of particular expenditures as participants identify or select them.

Those individuals who criticize this method based on potential panelist conflict of interest fail to take into consideration the fact that most panelists work their entire careers under conditions of restricted resources and do not as a regular matter conceptualize or operate richly funded schools. Building-level educators and administrators in particular are accustomed to getting by with the given resources, and when asked to specify what is adequate, build off these experiences to suggest incremental improvements rather than radical additions. Professional judgment panelists may in fact need to be reminded they may not be fully considering the resources that are actually needed to achieve the full set of state and federal goals.

1.4.4 Cost Function Method

Educational cost function analyses, also referred to as the econometric approach, examine historical data on spending, student learning outcomes, school characteristics, and student population characteristics. These data are used to estimate the statistical relationship between current spending behavior and outcomes and account for key characteristics of the student population and schools that are outside the control of local school administrators. The method then forecasts the costs of achieving desired levels of educational outcomes. Most cost function analyses use district-level data on spending and outcomes, although more recently, school level data are becoming available as states improve their data systems.

A major strength of this methodology is that it directly links costs and student outcomes without any intervening process. It does not rely on research, subjective judgment, or the average expenditure level of a sample of schools. The approach also provides direct estimates of the added costs faced by districts with

particular demographics or unique challenges and takes into account costs across the entire distribution of schools[63].

One potential problem with this method is that comprehensive data are required. It is also impossible for cost function equations to include all the factors that impact student performance. Some factors influencing student performance are simply unquantifiable, while others may be overlooked. Another potential problem is that cost function models are typically estimated using data on current spending behavior, implying that expenditures equate to costs. A final issue with this method is that the underlying mathematical equations, while not overly complex, are generally inaccessible to the layperson. Other methods, by contrast, are reasonably transparent.

In general, the cost function method offers powerful statistical findings that can help inform an overall determination of adequacy. The statistical models generated by the equations are particularly useful for understanding the needs of special categories of schools, such as small schools or those with large populations of students from low-income families.

1.4.5 Creation of Prototype Schools

Although many adequacy funding studies develop prototype schools, this process is not generally considered to be an actual methodological approach. Prototype schools are hypothetical schools with specified characteristics and resources. (Some studies create prototype districts instead of, or in addition to prototype schools.) Typically, studies create prototype schools at the elementary, middle, and high school levels, although some studies may create prototype schools with different grade combinations, such as K-8, 6-12, or K-12. There are two distinct types of prototype schools—baseline prototypes that reflect current expenditures and practices, and adequacy prototypes that represent the level of funding designed to meet particular goals and objectives. Adequacy prototype schools present the results of other methodologies in terms of the necessary resources for a school with particular student enrollments. Although many adequacy funding studies make use of adequacy prototype schools as their primary means to express necessary resource levels, relatively few studies incorporate baseline schools into their designs.

There are advantages and disadvantages to utilizing prototype schools. One advantage of baseline prototypes schools is that they provide an explicit starting point from which to consider adequacy in relation to what already exists. Baseline and adequacy prototype schools present resources in a format that is easy to understand, even for those not highly familiar with educational budgeting. Furthermore, adequacy prototypes demonstrate clearly what is being “purchased” with the additional funds being

allotted to schools to achieve adequacy. The predicament with prototype schools is that they represent schools that are generally reflective of "average" educational conditions statewide. Some schools in the state may have different characteristics than the prototypes and therefore need different resource configurations to achieve the same results as the adequacy prototypes are assumed to achieve. As a result, it may be necessary to make adjustments to the results generated by the prototypes to ensure that the needs of special cases, such as small schools and those with high proportions of low-income students, are taken into account.

1.4.5.1 Baseline Prototype Schools

Baseline prototype schools represent typical or average schools, as derived from analysis of existing fiscal data and other sources of information on current practice. Thus, baseline schools represent actual expenditure, not necessarily adequate expenditure. In order to develop baseline prototype schools, it is necessary to make assumptions about a range of school characteristics. These assumptions encompass such factors as total school enrollment, low-income student enrollment, special education enrollment, and other characteristics relevant to school functioning and resource levels. Baseline schools typically reflect statewide averages in the most important areas of organizational makeup. The advantage of creating baseline prototype schools is that baseline schools provide context for determining what resources would be adequate.

1.4.5.2 Adequacy Prototype Schools

Adequacy prototype schools are vehicles for expressing the necessary expenditure levels within a school with typical or average enrollments and characteristics. These prototypes are often used to present the results of the successful schools, evidence-based, professional judgment, or cost function methodologies. Researchers generally begin with a series of assumptions that cannot be changed. Examples of assumptions might include a total school enrollment of 500 and a grade configuration of K-5. Once the assumptions are set, researchers may evaluate the literature or ask professional judgment panelists to determine adequate resources for a typical K-5 elementary school with 500 students. Thus, an adequacy prototype school would present the resulting number and types of staff, the corresponding compensation levels, and expenditure on supplies, professional development, food services, transportation, and other categories for an elementary school with 500 K-5 students.

1.4.6 Teacher Wage Analyses and Adjustments

Wage analyses for teachers are considered a supplemental methodology. They are designed to account for teacher wage variations that may occur among schools or districts or between teachers and non-teachers.

They are important because such a large percentage of the education budget in most states is devoted to teacher wages. Historically, there are three basic approaches used to address differences in competitive wages for teachers across school districts or broader regions within states—cost-of-living analyses, comparable wage analyses, and hedonic wage analyses. Cost-of-living analyses attempt to compensate teachers for differences in the costs of maintaining comparable quality of life. Comparable wage analyses calculate compensation based on the competitive wages of workers in other industries requiring similar education levels and professional skills as teachers. Hedonic wage analyses identify differences in teacher working conditions that may affect teachers' choices to teach in a particular school instead of another.

Table 2 summarizes the three approaches, their applications, strengths, and shortcomings. The cost-of-living approach is the most problematic, primarily because it often suggests that a higher quality of living for teachers is necessary in school districts that serve more advantaged student populations. When applied to districts rather than broader labor markets, the cost-of-living approach often provides incentives for teachers in disadvantaged districts to take better jobs at higher wages in more advantaged neighboring districts. Comparable wage indices are a significant improvement over cost-of-living indices because they consider the cost of hiring individuals in similar professions to teachers. However, financing schools on the basis of private sector wages may also, in part, lead to the reinforcement of economic disparities across a state. The hedonic wage approach attempts to capture the complete context of non-pecuniary factors that may influence a teacher's choice to work in one district versus another. Nonetheless, the hedonic wage model alone may underestimate adequate teacher salary in states where there is a statewide salary schedule.

Table 2: Summary of wage indexing methods

Approach	Goal	Data	Geographic Unit	Strengths	Shortcomings
Cost-of-living	Identifies uncontrollable costs to employees of living in commutable distance.	Basket of local goods/ services	Labor market	Not/ less influenced by current teacher compensation.	Most often supports higher quality of living for teachers in "advantaged" districts.
Competitive Wage	Wage required to recruit or retain a person with specific education/ knowledge/skills in teaching within a specific labor market.	Wages of comparable professions	Labor market	Not/ less influenced by current teacher compensation. Based on competitive labor market assumptions.	Teachers don't typically move to "comparable" professions. Influenced by inequities across local/ regional economies.
Hedonic Wage	Wage required for recruiting & retaining teacher of specific quality attributes.	Wages of teachers by background attributes & conditions	School or district	Only approach to consider localized work conditions.	Strongly influenced by the current single salary schedule.

Source: 2006 communication with Bruce Baker

1.5 Review of Adequacy Funding Studies

The following descriptions highlight some of the methodologies used by adequacy studies in other states as well as the legal and policy outcomes of the studies. This study profiles these six particular states because in each case, there was a clear link between the findings of the study and the resulting policy or legal decision regarding adequate school funding.

1.5.1 Arkansas

Arkansas' adequacy funding study was precipitated by a lawsuit. The Arkansas Supreme Court in a 2002 adequacy lawsuit, *Lake View School District v. Huckabee,* found the Arkansas educational funding system to be unconstitutional and required that the state perform a cost study and remedy the constitutional violation. This decision led to the creation of the Arkansas Joint Committee on Educational Adequacy. The committee commissioned Picus and Associates to calculate the cost of providing an adequate education for Arkansas students. The Joint Committee defined an adequate education in terms of both the state's current curriculum frameworks and the testing system[64].

Picus and Associates used the evidence-based method to determine adequate school funding, but supplemented this approach with elements of the professional judgment approach. Their model was built around recent research on school resources and student performance. In addition to a literature review, the

researchers analyzed the findings from professional judgment panels in five other states. The results were built into matrices that detailed school size, staffing ratios, and other recommended changes in school structure for elementary, middle, and high schools. Two separate panels of leading Arkansas educators (a total of 70 panelists) then reviewed the matrices and made recommendations pertaining to class size, faculty, and staff, and adjustments for schools of varying sizes[65].

Based on the input of the panelists, Picus and Associates recommended increasing preschool through high school funding by $848.3 million, or 34%. This amount included funds to implement the evidence-based resource matrix, raise teacher salaries, expand preschool programs, expand professional development, and create a needs-based financing formula[65]. Other recommendations included the implementation of a performance-based pay system for teachers and geographic incentives for teachers in hard-to-staff schools and regions. This study was used as the basis of the 84th General Assembly's efforts to launch a new funding system[66].

The Arkansas Legislature missed the January 2004 deadline for complying with the additional funding obligations. Special masters, appointed by the Arkansas Supreme Court, found in June 2005 that the state still did not provide adequate funding for the educational system[64]. The special masters also stated their belief that the Picus study was competent and comprehensive[64]. In December 2005, the Arkansas Supreme Court ruled that the public school funding system continued to be inadequate and set a December 2006 deadline for the Legislature to correct constitutional deficiencies[64]. The Arkansas Legislature approved a $132.5 million increase in school funding in April 2006[67]. The Arkansas Supreme Court declined to close the case in November 2006, reappointing the special masters to oversee state compliance with the standards[68]. In particular, the Supreme Court cited a lack of evidence that the General Assembly had complied with the academic and funding reforms[68].

1.5.2 Maryland

In response to a 2000 Maryland Circuit Court decision regarding adequate school funding, Maryland established a bipartisan commission to determine how the state should fund its schools. This 27-member Commission on Education Finance, Equity, and Excellence was generally referred to as the Thornton Commission. The Thornton Commission hired the firm of Augenblick & Myers, Inc. to perform an adequacy study. Simultaneously, a non-profit citizens' advocacy group called the New Maryland Education Coalition hired the firm of Management Analysis & Planning, Inc. (MAP) to conduct an independent adequacy study. These studies agreed to use the same academic goals as the basis for determining adequate inputs. The specified academic goals were based on the proportion of students

passing the statewide exam, the attendance rate, and the dropout rate. Both of these studies announced their results in a joint press conference in 2001[69].

The Augenblick and Myers researchers used both the professional judgment approach and the successful schools method. For the professional judgment approach, the researchers collaborated with the Maryland Department of Education to determine panelist criteria and evaluate the candidates[70]. Fifty-six candidates were selected and organized into six panels, which determined minimally adequate resources for elementary, middle, and high schools. An overview panel then reviewed the results and added district-level costs. Prices were only assigned to the resources after review by the overview panel. Their professional judgment approach recommended an increase of $2.9 billion over current Maryland school revenues[69].

The Augenblick and Myers successful schools method selected schools according to indicators that were components of the School Performance Index. These components included school wide exam performance, attendance rate, dropout rate, and curriculum factors[70]. The Maryland Department of Education selected 59 schools that met the criteria and estimated the costs for resources used by these schools. A survey of the schools provided additional information on resource allocation at these schools. Because these schools were not demographically representative of average Maryland schools, professional judgment panelists were asked to make adjustments based on average statewide proportions of special education students, LEP students, and low-income students[69]. Researchers also used cost-of-education indices to account for cost-of-living expenses. This successful schools methodology suggested the need for an additional $2.0 billion[69]. Augenblick and Myers attributed differences in the total cost of education between their two approaches to ten additional days of professional development, full-day kindergarten, more activity money, and more technology that were specified in the professional judgment method, but not included in the successful schools method.

The MAP study convened 22 experienced Maryland educators for professional judgment panels. Panelists were divided into three teams, and each panel determined adequate costs for an entire K-12 district. MAP used the same demographic assumptions as the Augenblick and Myers study. However, the MAP study assumed that teacher salaries, central district administrative spending, and educational technology were already adequate[71]. Two of the three panels made adjustments for high concentrations of low-income students, while the remaining panel did not. Overall, this study concluded that at least an additional $300 million was needed to ensure an adequate education for all[71].

The final report of the Thornton Commission relied heavily on the Augenblick and Myers report. The Commission praised the successful schools method used by Augenblick and Myers for two reasons. First, the result of the successful schools methodology linked state standards to empirical education costs. Furthermore, the expenditure amount recommended by this approach represented middle ground between the professional judgment expenditure levels recommended by each of the two firms[69]. Educational advocates across Maryland formed a coalition to support the Commission's proposal. Despite a slow economy, the Maryland Senate passed a bill to adopt the recommendations of the Commission in 2002[69]. A cigarette tax increase provided partial funding, and the Maryland Legislature approved a new budget, including an additional $1.3 billion in state funding, to be phased in over the next six years[69].

1.5.3 Montana

In 2002, five Montana education organizations announced the results of a study to assess actual costs of education in Montana[72]. Myers and Silverstein of the firm Augenblick & Myers Inc., performed the study, which was sponsored by the Montana School Boards Association, the Montana Quality Education Coalition, the Montana Rural Education Association, the Montana Association of School Business Officials, and the Montana Association of County School Superintendents[73].

This study used the professional judgment approach to estimate adequate expenditures. Eighty-three educators were organized into panels to determine the adequate funding for small, moderate, large, and very large K-12 districts, and elementary districts[73]. These panels used both input and output measures to determine adequate funding. Input measures included staffing ratios for administrative personnel, library media services, guidance staff, and class sizes. Output measures included current performance on the Iowa Test of Basic Skills (ITBS) and five-year proficiency measures that comply with NCLB. The prototype districts created by the panels also had to meet particular academic and graduation requirements.

The panels of educators estimated the resources needed to comply with accreditation standards and meet proficiency requirements. Another panel then reviewed the work of these panels and estimated the resources of prototype districts. Finally an expert panel reviewed the work of the previous panels and made choices regarding resource prices[74]. In addition to basic school prototypes, the study added categorical costs associated with students who were at-risk, Native American, or had special education needs. The study did not address transportation or capital outlay. Myers and Silverstein then compared the resources specified by the panels to current state expenditures. The study called for a 17% increase in total K-12 spending[72].

A group of plaintiffs filed suit against the state in *Columbia Falls Public Schools v. State* a month after the study's public release in 2002. The suit alleged that declining state funding was causing schools to cut programs and staff, hampering schools' abilities to attract and retain teachers, and making it impossible to comply with state accreditation, performance, and content standards[72]. Several of the participating educator-panelists testified at trial and endorsed the methodology and results of the study[74]. In April 2004, District Court Judge Jeffrey Sherlock held that Montana's current funding system failed to provide adequate funding for Montana's public schools and that the state did not pay its share of the cost of basic elementary and secondary education[74]. This case was appealed to the Montana Supreme Court, which affirmed that the education system was constitutionally deficient[75]. The court ordered the state to define a quality education, provide the quality education to students, and fund schools based on "educationally relevant factors." During a special session, the Legislature increased funding by 10%. Plaintiffs subsequently filed a motion for additional relief and requested a hearing in Spring 2007 to assess legislative compliance after the 2007 session[72].

The district court utilized the Myers and Silverstein study in reaching its decision. According to the court, the study supported other evidence that Montana was not adequately funding education[74]. Although Judge Sherlock found that the professional judgment approach was superior to the state's current method of determining funding, he found that it would be inappropriate to rely entirely on a professional judgment approach to build a state funding system[74]. In particular, the court found four deficiencies in the professional judgment approach: 1) the results cannot be duplicated; 2) the panel members have no incentive to think about tradeoffs; 3) the process requires many panel members to predict in areas outside of their own experience; and 4) the process may be upwardly biased due to self-serving behaviors of any panelist[74].

1.5.4 New York

In 2003, the New York Court of Appeals ruled in *Campaign for Fiscal Equity (CFE) v. State* that all children in New York State were entitled to a "meaningful high school education"[76]. The court gave the state a year to perform a study to determine the actual costs of providing a sound basic education and fund the actual costs[77]. Prior to this 2003 ruling, CFE and the New York State School Boards Association had contracted for an adequacy study, eventually titled *A New York Adequacy Study*. This study employed successful schools and professional judgment methodologies as well as certain econometric analysis. It was performed by American Institutes for Research (AIR) and Management Analysis and Planning, Inc. (MAP) collaboratively and was released in early 2004[78].

AIR/MAP selected 56 educators through nominations and from a pool of educators at schools that were "beating the odds"[79]. These educators were organized into four general education panels and two review panels. One of the review panels was comprised of participants who were selected from one of the general education panels. The other review team was comprised of non-educators considered stakeholders in this process. The AIR/MAP consultants provided panelists with information on the staffing costs and per student expenditures of schools that were identified as beating the odds. The researchers also gave panelists some information on effective educational practices. Panelists used this information and their own expertise to create adequacy prototype schools that would meet state Regents' educational standards and give 100% of students the full opportunity to reach this level of achievement[79]. The consultants used a public engagement process to determine the output standard that was presented to the professional judgment panels[79, 80]. This study excluded transportation, debt service, and detailed facility costs and included a geographic cost index, pre-K expenditures, and additional per student expenditure weights for students with special needs. The study recommended between $6.2 billion and $8.4 billion in additional funding for schools in 2001-02 dollars (an increase of 19.6%-26.5%)[81].

Two additional New York studies were also released in early 2004. The Governor's Commission on Education Reform hired Standard & Poor's to perform an adequacy study using successful schools methodology. The final adequacy study also used successful schools methodology and was conducted by the New York State Education Department for the New York Board of Regents[78].

Standard & Poor's *Resource Adequacy Study for the New York State Commission on Education Reform* operated with a similar set of inclusions and exclusions as the AIR/MAP study. The researchers utilized four different sets of criteria and up to three years of data to identify successful districts[82]. These criteria included different combinations of NCLB standards, Regents' Criteria, dropout rates, and efficiency factors. The set of selected successful districts was refined when Standard and Poor's eliminated the highest spending 50% of the successful districts. The rationale for this refinement was based on the argument that these lower-spending successful schools were able to achieve similar performance levels as the higher-spending successful schools and therefore the lower-spending schools were operating at a greater efficiency level. Standard and Poor's recommended to the Governor's Commission that the state provide between $1.93 billion and $7.3 billion in additional school funding in 2004, and the Commission accepted the recommendation for the lowest figure[80, 81]. This range was due to the different sets of criteria used to determine success.

The final study relied on New York State assessments and the Regents' Learning Standards to identify successful schools[83]. Researchers included a geographic cost index adjustment and extra expenditure

weights for low-income students, but not for English Language Learners. This study was the only one of the three studies to include "start-up" cost adjustments for schools with resources below the minimum level necessary for reasonable learning to take place (i.e., schools with extreme overcrowding or no libraries). The New York Department of Education recommended an additional $6.0 billion in 2003-04 dollars.

New York State judicial referees found in 2004 that the state failed to meet its deadline for ascertaining the actual costs and implementing a finance system that provided adequate funding for state schools. The judicial referees ordered the state to immediately begin phasing in an additional $5.63 billion annually to ensure a basic education. Furthermore, the referees ordered that the state conduct an adequacy funding study every four years that included professional judgment and successful schools methodologies.

The judicial referees' report referred extensively to the AIR/MAP study and the Standard & Poor's study in its decision. In particular, the judicial referees found that the elimination of the highest-spending 50% of "successful" districts in Standard & Poor's study was based on faulty logic[84]. The report did not find any evidence that these eliminated districts were in fact less efficient. The referees found that the per student expenditure weights for low-income students and the geographic cost adjustment index were too low. In contrast to the referees' opinions on the Standard & Poor's study, the referees found that the AIR/MAP study "offered a reasonable alternate approach to a costing-out analysis"[84].

In March 2005, Judge Leland Degrasse of the New York Supreme Court affirmed the referees' report and recommendations of the judicial referees and ordered the state to comply within 90 days[78]. The Intermediate Appeals Court ordered the state, in March 2006, to phase in increases in New York City schools' annual operating funds and provide facilities funding[85]. The Legislature passed facilities funding that met the appeals court's requirement the next month but failed to support funding for operations[85]. The New York Court of Appeals declared in November 2006 that New York City schools required additional funding ($1.93 billion adjusted from 2004 for inflation), rejected the requirement for a capital improvement plan, and overturned the Supreme Court's affirmation of the referees' report[86]. The court instead found that the state's 2005-07 budget plan was a reasonable calculation of adequacy[86].

1.5.5 Texas

Several high property wealth Texas districts filed a lawsuit in 2001 asserting that a state provision limiting local tax rates was unconstitutional. After the Texas Supreme Court remanded the case for trial in

2003, the case was reshaped. In addition to the initial challenge by the high property wealth districts, the new case also challenged the school funding system as inadequate[87]. The plaintiffs and the state each commissioned a costing-out study to use as evidence at trial. Dr. Andrew Reschovsky and Dr. Jennifer Imazeki performed a cost function study for the plaintiffs. Lori Taylor was hired to conduct the cost function adequacy study for the state. The Texas Joint Select Committee for Public School Finance sponsored the state's study.

Both studies estimated the cost of bringing all Texas districts up to a 55% student proficiency rate in English and math. Each study also calculated the cost of higher proficiency rates. However, the final version of the Taylor study omitted the higher proficiency rates in the final report at the suggestion of the Legislature[87]. The Taylor study concluded that current statewide funding was sufficient to allow all students to meet performance targets for the year. However, if funds could not be redistributed from districts spending at levels above the adequate level, then an additional $226 to $408 million would be needed. The Reschovsky & Imazeki study conducted for the plaintiffs found that between $1.65- $6.17 billion in additional funding was required to meet the 55% performance target[80].

In November 2004, Trial Court Judge John Dietz declared in *West Orange Cove v. Neeley* that the Texas school finance system did not provide an adequate, suitable, and efficient education as required by the constitution. He further concluded that the school finance system should provide districts with sufficient funds for a general diffusion of knowledge. Districts could then use their discretion to raise tax rates in order to provide local enrichment programs.

Judge Dietz's decision relied extensively on the two cost function studies. He found that the Reschovsky & Imazeki study "is methodologically sound and provides strong evidence of the cost of meeting certain performance standards for particular districts"[88]. Judge Dietz found that the Taylor Study was flawed in a number of respects. In particular, it did not include pupil weights for district size; ignored the difference between the TAAS (Texas Assessment of Academic Skills) and the TAKS (Texas Assessment of Knowledge and Skills); did not use the most accurate available measure of teacher salary; operated under the questionable assumption that districts have full discretion over funding from all sources; and put forth several inconsistent numbers[87]. Despite these flaws, the court found that the Taylor study showed that school funding was insufficient to provide an adequate education in many districts[87]. The state of Texas appealed Dietz's ruling to the Texas Supreme Court[87].

In November 2005, the Texas Supreme Court issued its opinion in *Neeley v. West Orange Cove*. The court found that local property tax had evolved into a statewide property tax in violation of the

constitution, but did not find an adequacy violation of the state education article's efficiency provision[89]. The court reasoned that statutory provisions could not be used to fault a public education system that was working to meet its stated goals merely because it has not yet succeeded in doing so. Moreover the court noted, "the undisputed evidence is that standardized test scores have steadily improved over time…NAEP scores…show that public education in Texas has improved relative to other states"[87]. However, the court also stated "It would be arbitrary …for the Legislature to define the goals for accomplishing the constitutionally required diffusion of knowledge, and then to provide insufficient means for achieving these goals"[89].

1.5.6 Wyoming

Wyoming's school finance litigation can be traced back to the 1980 *Washakie County School District v. Herschler* case which established public education as a fundamental right for all students and held the existing school system to be unconstitutional because it depended on districts' abilities to raise funds[90]. Although the Legislature attempted to make the system more equitable, the Wyoming Supreme Court again declared the school finance system to be unconstitutional and inadequate in 1995. The court established education as the paramount priority for the state and indicated that a quality education should include small class sizes, ample and appropriate provision for at-risk students and meaningful standards and assessments[91]. In response to the 1995 decision, the state hired Management Analysis and Planning, Inc. (MAP) to conduct a professional judgment study.

This professional judgment study convened groups of Wyoming education experts to determine the key components of an adequate educational system. MAP also consulted with educational experts in Wyoming, educational experts in other states, national associations, public officials, and observed classrooms across the state. Based on these processes, the researchers determined resource needs, assigned costs and constructed prototype schools. The consultants established costs relying primarily on statewide funding averages and then provided adjustments. The major recommendations of the study were to maintain small schools, small classes, and add more funding for professionals, paraprofessionals, professional development, special education funding, low-income student funding, and English Language Learner (ELL) funding[92]. The results of this study were used to establish a new school finance system that was subsequently challenged in 2001 in *Campbell County School District v. the State of Wyoming*.

Although the Wyoming Supreme Court declared that the funding model built from MAP study was capable of supporting a constitutional school finance system, the court did require a number of modifications. These modifications included biennial inflation adjustments; administrative and classified

salary adjustments; requirements to develop formulas to adequately fund low-income and ELL students; adjustments to the small school formulas; and cost-of-living adjustments[93]. Specifically, the court required that small school adjustments be based on actual differences in costs that are not experienced by larger schools and that all adjustments be based on documented shortfalls[93]. The court declared that statewide average costs must be adjusted for certain components[93]. Finally, the court found the capital funding portion of the new system to be inadequate and ordered the Legislature to remedy facility deficiencies.

1.5.7 Lessons Learned

School adequacy funding is an evolving field. The processes employed to determine adequate expenditure are complex, in part because school finance systems and school needs are also complicated and controversial. Nonetheless, adequacy funding studies provide a rational basis for determining the amount of funding necessary for all students to have equal opportunities to achieve an adequate education. They raise the level of discussion and are a vast improvement over the political decision-making and residual budgeting practices that have been the basis for school funding decisions in the past. In many states, Legislatures and courts have "relied on these studies in formulating their education funding decisions"[80].

While adequacy funding studies have generated discussion, scrutiny, and debate over the amount of funding needed to support an adequate education, several lessons have been learned over the past decade. First, funding for students, schools, and districts with special needs should be considered. Studies should determine whether to include additional opportunities for high need students such as extended day, Saturday school, or health clinics. In other words, studies should evaluate how best to address the needs of all students, including students who may require additional resources.

Second, adequacy study expenditure estimates can provide a rational basis for state education funding. Currently, 40 of the 50 states provide funding to school districts using a foundation program. Under a foundation program, the state sets a guaranteed amount of funding per student (or teacher) referred to as the foundation amount. Districts contribute to this amount through local taxes. Adequacy studies provide reasonable calculations of the necessary foundation amount that allows the state to meet its educational goals.

Third, the methods that are used to reach expenditure estimates make important contributions to understanding the cost of an adequate education, yet each has strengths and weaknesses. For example,

both the evidence-based methods and professional judgment methods typically assign costs after determining resource components. This may provide greater objectivity, but can raise questions related to efficiency. Evidence-based methods, successful school (or district) methods, and cost function analyses use current expenditures to estimate necessary costs. The use of these methodologies implies that some districts within the state are already funded adequately, which is not necessarily true. Professional judgment methods eliminate this issue by building costs from the bottom up. Finally, some adequacy methods rely on outcomes while others rely on student opportunities. Both measures may be necessary in order to define adequacy within a state. Most importantly, however, each method appears to provide a lens by which state-funding requirements may be gauged.

As a result of lessons learned over the past decade, cost studies are becoming more rigorous and hybrid approaches or multiple methods are being employed across the states to build on strengths and address weaknesses of the various approaches. The next chapter lays out the hybrid methodology and design developed by this study, building on the strengths of existing methodologies and making adjustments to overcome the limitations.

2 Methods and Design

This study employed a hybrid methodology to determine what constitutes an adequate education in the state of Washington. The definition of hybrid methodology in this study is one that combines elements of more than one methodology to take advantage of the strengths of each and to compensate for any weaknesses by combining them in a deliberate and purposive fashion. The combination of multiple methods generates a more precise and accurate cost estimate than is possible through the use of one method alone. This chapter provides a general overview of the study methodology, explains each step of the study in detail, and concludes with a discussion of the rationale behind the overall research design.

2.1 Overview of Methods

This study incorporated elements of each of the four commonly used methodologies discussed in the previous chapter. In addition, the study created baseline prototype schools to provide context for decisions and adequacy prototype schools to present findings. This study also utilized teacher wage analyses to precisely calculate adequate teacher salary.

Researchers first collected and analyzed existing information on enrollment, staffing, and school expenditures to construct 2004-05 baseline prototypes at the elementary, middle, and high school levels. The expenditure allocation patterns at the three baseline schools were then cross-referenced against allocation patterns at schools performing at levels higher than expected based on their proportion of low-income students. The study refers to these schools as *Improving Schools*. Principals at these improving schools and several other education administrators examined the baseline prototypes and provided feedback on the ways in which the prototypes could be adjusted to reflect actual expenditure patterns at improving schools. Certain expenditure categories in the baseline schools were then adjusted up or down based on the feedback. However, these changes did not have a net effect on the ***overall*** expenditure levels of the prototype schools. The use of improving schools is an adaptation of the successful schools method. This variation was utilized to ensure that the baseline prototypes reflected efficient allocation of resources.

In the next phase of the study, researchers employed the evidence-based method to identify a set of educational interventions that are likely to be effective in schools. Researchers conducted an extensive literature review to gather information on effective educational practices that have been shown to directly or indirectly improve student achievement. The educational interventions were then included in an online

budget simulation for each prototype school. The simulations presented a select group of Washington educational administrators with detailed information on baseline school enrollments, staffing, and expenditures. These administrators or panelists could review the list of educational interventions to determine which, if any, were necessary for Washington schools in order to achieve state education goals. The simulations integrated the educational interventions from the evidence-based approach with the professional judgment approach. Researchers asked professional judgment panelists to use the simulations to specify adequate compensation for each staff position, select any necessary educational interventions, as well as adjust staffing and other expenditures to adequate levels.

The budget simulations contained an important feature designed to address one of the criticisms of evidence-based and professional judgment methods. When a panelist changed an expenditure category or selected an intervention, the simulation immediately displayed the actual costs of the change to the baseline prototype school and to the expenditure level statewide at schools of the same level. This feature was designed to introduce a measure of cost-effectiveness into the judgments and recommendations of panelists. As panelists worked through the budget simulation, they could see the fiscal effects of their individual recommendations. This incorporated an element of realism into the process of making changes to existing expenditure levels and selecting educational interventions.

The results from the individual budget simulations were aggregated, analyzed, and then presented to two review panels of Washington educational administrators, most of whom had completed one of the simulations. Researchers facilitated two daylong meetings of panelists, one in Spokane and one in Renton. Panelists discussed and debated the results from the simulations, offered feedback on what should be included in an adequate education in Washington, and further considered the cost-effectiveness of the proposed adequacy changes in relation to the state's ability to fund its public education system. This application of the professional judgment method took place in a highly constrained context, one in which panelists reacted to figures generated from the online simulations.

The study then sought to achieve greater precision in the determination of appropriate teacher compensation, in part because of the size of this budget item and in order to target any potential increase to the schools and districts that need them most. To ensure that the teacher compensation levels in the final adequacy models were sufficient and appropriate, researchers performed a comparable wage analysis and hedonic teacher wage analyses to accurately determine the salary levels required to recruit and retain high quality teachers for schools and districts across the state and particularly in schools and districts with high concentrations of low-income students.

Finally, researchers used the cost function approach to adjust for specific types of schools that were not accounted for sufficiently through the previous methods. Specifically, researchers applied cost adjustments to account for schools with high rates of low-income students or very low enrollments. These adjustments were used to refine cost estimates and to arrive at a final per student school level, and statewide estimate of the cost of an adequate education consistent with state goals and constitutional provisions. The following sections explain the application of each of these methods in greater detail.

2.2 Baseline Prototypes

The three baseline prototype schools calculated in this study represented 2004-05 student enrollments, staffing, and expenditures of Washington schools at the elementary, middle, and high school levels. Researchers utilized existing fiscal, enrollment, and staffing information from state data to create the initial versions of the baseline prototype schools. The study then redistributed resources within these baseline prototypes based on feedback from principals of Washington schools with high levels of performance and the feedback from several higher level education administrators.

The baseline models accounted for all the reported dollars spent on K-12 educational operations in the state (with the exceptions of the small school subsidy and institutional funding). Expenditures that appeared in the baseline prototypes originated from federal, state, local, and reported private sources. The baseline prototypes contained both school level and centralized expenditures, distributing centralized expenditures on a pro rata per student basis. Thus, the prototypes captured all reported educational operations expenditures that directly or indirectly affected Washington K-12 schools in 2004-05 with the exceptions mentioned above.

2.2.1 Rationale for Use of Baseline Prototypes

The primary purpose of creating baseline prototype schools was to provide starting points for considering adequate funding. It is difficult to specify the resources necessary to achieve adequacy without a thorough understanding of the resources that already exist and how they are deployed. The baseline prototypes enabled professional judgment panelists to examine and consider existing resource allocations and levels before determining what resources would be necessary to enable all Washington students to meet state and federal standards. The baseline prototypes gave panelists a common frame of reference that was independent of each panelist's particular school.

One of the difficulties with the baseline prototype approach to adequacy funding is that it relies on statistical averages to specify expenditures. These prototypes may not work as well in situations where bimodal distribution of resources is the norm. For example, some districts may provide ten days of teacher professional development while others may provide only four days. An average of seven days, therefore, does not necessarily represent the distribution of professional development that is offered by different districts. However, the only way to accurately capture these differences is to calculate an average.

Fortunately, research suggests that schools look much more similar than different, which means that using a prototype approach is reasonable as a starting point for reducing the complexity of individual school budgeting to a manageable level. Most schools have very similar staffing configurations and devote similar percentages of their budget to a series of comparable expenditure categories.

The other reason the use of prototypes is appropriate is that the purpose of the adequacy study is to generate an overall figure that specifies the amount of funding necessary to provide an adequate education statewide, not budget for individual schools. As long as the prototypes generally represent current expenditure levels, they are a reasonable place to begin to consider areas that may need additional resources, reduced resources, or resource reallocation.

2.2.2 Baseline Prototype Data Sources

Bill Freund, former Senior Budget Analyst for the Washington Legislature, provided technical assistance to identify, gather, and interpret all relevant data sources required to construct the baseline prototypes. Mr. Freund spent more than 30 years working in Washington state school finance. In his role as Senior Budget Analyst, he was responsible for preparing and reviewing the K-12 budget for the Washington Legislature. Subsequent to his work for the Legislature, he served as a consultant to OSPI on issues related to the K-12 budget requests. He has also been a member of the Shelton School Board for several years. Mr. Freund has a well-deserved reputation as an expert on Washington K-12 finance.

With his guidance, researchers constructed the baseline prototypes using expenditure and staffing data reported by the state. The two main data sources included the F196 form, which summarizes all school expenditures, and the S275 form, which provides supplemental information on personnel expenditures. Another data source used to strengthen the accuracy of the baseline prototypes was the P223 form, which contains student enrollment information. Several additional sources were employed to address specific expenditure categories not covered by these sources.

2.2.2.1 F196

The F196 is a database of school district financial reports collected annually. OSPI compiles this information reported by districts and annually provides summaries in a publication called the *The Financial Reporting Summary*. The state also audits the underlying school district data. The F196 database summarizes statewide K-12 public school expenditures by school district and categorizes expenditures into three types of accounts—activities, objects, and programs. All the reported dollars spent on K-12 educational operations in Washington are classified into one of these F196 accounts. These data represent year-end reporting by school districts including accruals for districts reporting on an accrual basis. The F196 is the primary source of financial data for public K-12 education dollars in the state of Washington.

2.2.2.2 S275

OSPI also prepares the S275 database annually and uses it to track personnel information. This database itemizes the money spent on compensation and benefits and provides important detail about each employee's assignment. The F196 and the S275 expenditure totals differ because the F196 is an account of year-end information while the S275 data represents a snapshot of personnel information as of October 1st. School districts partially update the S275 data throughout the school year. In 2004-2005, the F196 reported roughly $340 million more in personnel expenditure than the S275.

2.2.2.3 P223

The P223 student enrollment database summarizes the funded basic education enrollment by district for the entire state. This study used the P223 database to determine the student population in each of the baseline prototype schools by grade and the student enrollment in special education and English Language Learning (ELL). Researchers used a weighted average to determine the enrollment of each prototype school. There is a wide distribution of grade configurations in Washington, and a weighted average accommodates these differences.

2.2.2.4 Additional Sources

The baseline prototypes relied on several additional data sources to further refine the baseline prototypes. OSPI conducted a computer inventory study to evaluate the 2003-04 state of information technology in Washington[94]. Researchers used the inventory study to supplement data on information technology expenditures. Another source of data was the 2004-05 Washington Personnel Summary Report, which contains tables with updated S275 summary data reported to the National Center for Education Statistics. OSPI Report 1191F for 2004-05 also provided fringe benefit information. Researchers imputed

information on training and development expenditures based on a sample of district contracts from Kennewick, Odessa, and North Thurston.

2.2.3 Assumptions

Both the baseline and adequacy prototypes rely on a certain set of assumptions that are documented in Table 3.

Table 3: Assumptions of the prototypes

Assumptions	Elementary School Prototype	Middle School Prototype	High School Prototype
Grades Served	K-5	6-8	9-12
School FTE Enrollment	475	681	1323
Special Education Enrollment	61	88	170
Learning Assistance Program (LAP) Enrollment	194	255	381
English Language Learner (ELL) Enrollment	37	54	104
Enrollment	Total school enrollment is Full Time Equivalent enrollment, not headcount. Special Education, ELL, and LAP enrollments are headcount.		
Expenditures Captured by the Prototypes	The baseline captures all K-12 educational operating expenditures in the Washington accounting system with the exceptions of the small school subsidy and funding for institutions (see last 2 rows in this table). Revenue sources include local, state, federal, and reported private sources.		
Student-to-Staff Ratios	These prototypes assume that special education, LAP, and ELL students may participate in mainstream classes.		
Staff Qualifications	The teachers, administrators and all other staff included in the prototypes have average experience and education levels.		
Learning Assistance Program	Low-income students are used as a proxy for Learning Assistance Program students.		
Centralized Services	Each school receives support from its district and Educational Service District (ESD).		
Facilities Bonds	Bonds for facilities are not included.		
Technology	Assumes a 4-to-1 student-to-computer ratio at a cost of $1,000 per computer, an average computer lifespan of 6 years, and accounts for hand-me-down computers. These figures are based on the baseline survey, the OSPI computer inventory survey, and market conditions.		
Substitutes	Assumes an average cost per substitute day of $125 per teacher or Educational Staff Associate (ESA) and an average of 7 substitute days per school year per teacher or ESA in the baseline.		
Training and Development	Baseline training and development expenditures are based largely on a sample of district contracts and assume a cost per day of $250 per teacher, and an average of 7-days per teacher. The baseline accounts for teacher, ESA, and classified staff training and development expenditures in supplemental compensation, but the simulation presents these expenditures separately. Researchers manually added the 4-days of additional teacher professional development recommended by panelists back into teacher supplemental compensation.		
Early Childhood	Head Start is included in the baseline Elementary School Prototype. All other pre-Kindergarten programs are excluded from the baseline schools.		
Kindergarten	Based on a survey of kindergarten readiness, 72% of 2004-05 kindergarten students are assumed to be in half-day classes.		
Small Schools	The state Small School Subsidy is excluded from the baseline.		
Institutions	The only types of public education buildings excluded from the prototypes were state institutions, centers, and homes for delinquent or neglected juveniles. These buildings are not accounted for in Washington K-12 expenditure data.		

2.2.4 Procedures

The available data and assumptions guided the actual calculation of the baseline prototypes. The entire baseline calculation process involved a series of complex calculations. This section describes the most important calculations.

2.2.4.1 Student Enrollment

The first calculation involved the distribution of students into prototype schools. The P223 enrollment database provided grade-specific enrollment information for Basic Education, Special Education, and English Language Learners (ELL). Researchers performed separate calculations to determine the distribution of students participating in the Learning Assistance Program (LAP) using OSPI data on the number of students qualifying for free and reduced-price lunch. Those student numbers served as a proxy for LAP enrollees.

Researchers calculated the number of students in each baseline prototype school using a weighted average. A simple average would have ignored the bias caused by schools that do not have the same grade configurations as the baseline prototype schools. For example, K-12 and K-8 schools are not elementary schools, but the baseline schools still must account for the K-5 students in these schools. The weighted average calculation aimed to answer the following question: If I am a third, seventh, or eleventh grader in the state of Washington, on average, how many students are in my school?

2.2.4.2 Building-Driven Expenditures

The next major set of baseline calculations was building-driven expenditures. The building-driven expenditures from the F196 were distributed through the baseline prototypes on a per student basis. The expenditures included supplies, transportation, food services, and compensation expenses for several non-instructional positions. The total expenditure in each category was divided by the statewide FTE enrollment and then multiplied by the total FTE enrollment in each baseline prototype school to reach the categorical expenditure for each baseline school. Expenditures for the special instruction categories were calculated in the same manner, but they were driven by the specific student enrollment of each respective group of these students.

2.2.4.3 Staffing Levels

The next step was to determine baseline staffing levels. Researchers used the S275 to inform staff distribution through each of the baseline schools. The S275 enrollment detail was used to calculate the percentages of students in each grade level. These percentages were applied to distribute staff into

individual grades. The staffing subtotals were then redistributed into the baseline schools using enrollment percentages. The S275 records that were not identified with a specific grade level were distributed into the baseline using two separate calculations. The calculations for certificated staff used student enrollment in each grade as a percentage of total school enrollment. The calculations for classified staff employed a weighted average based on third, seventh, and eleventh grade student enrollment. Once the percentages were determined for both certificated and classified staff, the total S275-reported expenditure was multiplied by those percentages. This process distributed each type of staff member throughout the baseline schools.

2.2.4.4 Staff Compensation

After determining staffing levels, it was necessary to determine staff compensation. Staff salary and insurance benefits were calculated based on Table 7 of the OSPI Personnel Summary Reports. Average total salaries were multiplied by the FTE staff totals to ascertain statewide spending in each staff category.

Insurance benefits are considered separate from mandatory fringe benefits in state accounting data. Insurance benefits may include liability, life, health, health care, accident, disability, and salary protection or insurance. Mandatory fringe benefits consist of employee compensation costs not otherwise included in salaries and insurance-type benefits. Examples of mandatory fringe benefits include social security payroll taxes, unemployment compensation, retirement, and industrial compensation. Mandatory fringe benefits rates for 2004-05 were extracted from OSPI State Summary Report 1191F; these percentages were multiplied by the sum of base contract and supplemental compensation in each category to calculate the average mandatory fringe benefits for each type of personnel.

The baseline schools required personnel detail available only from the S275. One limitation of the S275 is that the data submitted by school districts represent a snapshot of staff employed by districts on October 1 and do not reflect full-year or year-end data. However, the statewide compensation expenditures must add up to end-of-the-year totals from the F196. To reconcile S275 staffing expenditures with year-end expenditure totals, additional salary expenditure line items were added to each major baseline category (Basic Education, Special Education, LAP, ELL). All of the personnel details were calculated and distributed using the S275, and the differences were moved to those additional salary categories.

2.3 Improving Schools Method (Adaptation of "Successful Schools" Method)

This study utilized an adaptation of the improving schools methodology to refine the baseline prototypes in order to ensure they reflected efficient, effective funds allocation. The term *Improving Schools* in this study refers to schools that showed improvement on the reading and math WASLs over the course of three school years and performed at high levels relative to their proportion of low-income students. Section 2.3.3 describes the specific criteria used to select these schools. Principals from these selected schools completed surveys about the staffing and expenditure allocation patterns at their schools. Researchers used the survey feedback to adjust certain expenditure categories in the baseline prototypes to reflect the practices and allocation patterns present in the improving schools. The adjustments shifted resources but did not change the overall expenditure levels of the baseline prototypes. In addition to the feedback from principals, several education business managers verified the accuracy of the baseline prototype schools and provided additional detail in some categories.

2.3.1 Rationale for Use of Improving Schools Method

In contrast to the traditional application of the successful schools methodology, which simply identifies schools that perform at high levels, the improving schools method looked for high performance levels relative to schools with comparable socioeconomic profiles. By identifying a cross section of improving schools that reflected a range of family income levels, the study extracted the schools with the most efficient use of fiscal resources and effective educational programs. It is worth noting that not all of the improving schools met state and federal achievement standards. They therefore represent a relative, not an absolute, reference standard. They serve as the best current examples of efficient resource allocation, but not necessarily ideal allocation.

Existing literature on school spending and student performance generally indicates that expenditure allocation patterns are at least as important as the amount of money spent within a school[95]. The improving schools methodology refined the successful schools method by focusing on the expenditure allocation patterns of schools that demonstrated consistent improvement and using budget information from these schools to refine allocations within the baseline school budgets.

The improving schools method utilized data from schools that manifested improvement in student performance across a wide spectrum of students. It is reasonable to note this pattern of consistent improvement and label it as such. To identify these schools as "successful" implies that they have

achieved all state and federal goals, and done so within the existing resource system, which is not necessarily the case. These schools are examples of the best that can be done with existing resources, not models of how all schools can meet all current accountability requirements at present funding levels.

2.3.2 Assumptions

The improving schools methodology as employed in this study relied on two basic assumptions. First, researchers assumed that the improving schools allocated money more efficiently than the average school. This assumption was based on the higher academic performance these schools achieved relative to schools with comparable rates of students from low-income families. Second, researchers assumed that the principal of each improving school was an effective and capable educational manager and leader and, therefore, was qualified to provide information on how to allocate funds and select effective educational programs. This study did not measure principal leadership skills and therefore this assumption is subject to challenge. However, the literature on school improvement consistently identifies effective leadership as a key prerequisite to sustained improvement[96]. Based on this information, researchers proceeded with the assumption that the principals in the improving schools were worthy sources of information on current expenditure allocation patterns.

2.3.3 Selection of Schools

The availability of data constrained the selection of improving schools. A uniform source of Washington student performance data was the WASL report card data that OSPI maintains and uses for state and federal accountability purposes. Researchers downloaded these data from the OSPI website and subjected the data to a series of filters in order to select a sample of improving schools that met all of the following criteria discussed below.

2.3.3.1 Sufficient Performance Data

Researchers required that each selected school have WASL performance data in math and reading in the school years 2002-03, 2003-04, and 2004-05. Three years of data ensured that the school had an ongoing record of high performance. One year of high student performance may be anomalous, but it is less likely that three years of high performance happen by chance. As a result, this study excluded new schools from consideration. Researchers excluded the science WASL and the writing WASL because the science WASL was not administered in 4^{th} or 5^{th} grade in 2002-03 and the writing WASL was not used for AYP accountability purposes until 2004-05.

2.3.3.2 Schools with 40 or more students in a grade

The study required the selected improving schools to have at least 40 students tested on the WASL in reading and math in 2004-05. This ensured that schools had at least two classrooms at the tested grade levels. Very few schools were eliminated on the basis of this criterion.

2.3.3.3 No special admission requirements

Researchers excluded schools with policies governing admission, such as magnet schools and other schools that rank students to determine enrollment. These types of schools may have high student performance, but they also have the option to select the most motivated and capable students with the most supportive parents. These schools may not actually provide a better education but may simply admit the best students.

2.3.3.4 Traditional grade configurations

Schools that combine elementary, middle, and high school grades into the same building may provide particular advantages or disadvantages when compared to schools with traditional grade configurations. As a result, researchers excluded schools with unusual grade configurations from consideration. Another reason for excluding schools with unusual grade configurations is that principals of these schools are less likely to provide accurate information about the prototype schools with traditional grade structures. An efficient K-8 or K-12 school may allocate resources much differently than an efficient K-5 school.

2.3.3.5 Made AYP in 2004-05

The study required that each selected school attained 2004-05 Adequate Yearly Progress (AYP) goals as defined by NCLB. AYP measures the academic performance of each school as a whole and the academic performance of subgroups within the school. Subgroups include White, African-American, Latino, Asian/Pacific Islander, Native American, low-income, special education students, and students with limited English proficiency. The use of the AYP criterion ensured that the diverse groups of students within each of the selected schools met 2004-05 academic progress standards. Furthermore, AYP includes graduation and attendance rates, which are important indicators of academic performance. Although this study did not use AYP in 2002-03 and 2003-04 as a rigid criterion, researchers examined AYP to ensure that each selected school reached or nearly reached AYP in these two school years. Therefore, not all of the selected schools met AYP standards in all three years.

2.3.3.6 Above average performance

Researchers required that each selected school attained a 2004-05 WASL combined performance in reading and math above the average state performance at that grade level. Researchers also examined the

performance of each school in 2002-03 and 2003-04 to make sure that student performance in those years was consistent with student performance in 2004-05 for schools meeting all the other criteria, although above average performance was not a rigid criterion in the 2002-03 and 2003-04 school years.

2.3.3.7 Improvement

The study did not require every selected school to show improvement in reading and math in ***each*** of three school years. However, the study required that every selected school showed overall improvement from 2002-03 to 2004-05. Schools that did not show improvement from one year to the next were required to meet one of two other criteria in order to remain in the sample: 1) the school's combined WASL performance in reading and math was higher than the state average performance in all three school years; ***or*** 2) the school met AYP goals in each of the school years.

2.3.3.8 Highest performing schools in each low-income student decile

Researchers separated the schools meeting all of the previous criteria into groups of elementary, middle, and high schools. Researchers then classified each school according to the percent of the student population that was eligible for free or reduced price lunch (a proxy for rate of low-income students). Within each low-income student decile, the study ranked schools based on their combined reading and math performance on the 2004-05 WASL. The study selected the top five schools in each decile for further examination.

The purpose of selecting only the top schools in each decile was to attain a more representative cross section of schools. Schools that predominantly serve students from middle- or upper-class families may not allocate their money in the same way as schools that serve predominantly low-income students. This study aimed to capture a variety of allocation patterns by selecting schools with different student populations.

2.3.4 Sample of Schools

Although students in these improving schools performed at high levels in reading and math relative to their level of low-income students and showed overall improvement over the course of three years, not all of the schools met NCLB standards in all three years. With existing resource levels, these schools may be models for other schools even though there is room for improvement at these schools. The criteria employed in this study aimed to identify broadly representative schools that performed at high levels in basic skills when their student income profile was taken into consideration.

The selected sample of improving schools was comprised of 42 elementary schools, 29 middle schools, and 26 high schools, although not all of the selected schools participated in the survey. Table 4,Table 5, and Table 6 compare all Washington schools to the selected sample of improving schools.

Table 4: Elementary school means

2004-05 School Characteristics	All Washington Elementary Schools	Improving Elementary Schools
Total School Enrollment	436.9	451.7
% Eligible for Free and Reduced Price Lunch	42.0	40.8
% of Students in Special Education	13.8	12.9
% of Students who are Transitional Bilingual	11.8	8.8
% of Students who are Asian/Pacific Islander	8.4	9.5
% of Students who are American Indian	2.9	2.8
% of Students who are African-American	6.7	3.5
% of Students who are Hispanic	14.4	13.5
% of Students who are Caucasian	67.0	71.0
Students per Teacher	15.7	15.8
Teacher Experience in Years	13.2	14.1
% of Teachers with Master's Degree	59.0	63.2

Table 5: Middle school means

2004-05 School Characteristics	All Washington Middle Schools	Improving Middle Schools
Total School Enrollment	619.9	634.2
% Eligible for Free and Reduced Price Lunch	38.8	27.2
% of Students in Special Education	11.4	10.2
% of Students who are Transitional Bilingual	6.8	3.3
% of Students who are Asian/Pacific Islander	7.1	8.5
% of Students who are American Indian	3.0	1.9
% of Students who are African-American	5.3	3.1
% of Students who are Hispanic	14.6	7.8
% of Students who are Caucasian	71.1	78.1
Students per Teacher	16.4	16.6
Teacher Experience in Years	12.6	12.3
% of Teachers with Master's Degree	61.2	61.8

Table 6: High school means

2004-05 School Characteristics	All Washington High Schools	Improving High Schools
Total School Enrollment	1047.0	905.9
% Eligible for Free and Reduced Price Lunch	30.6	24.8
% of Students in Special Education	9.5	8.9
% of Students who are Transitional Bilingual	5.1	4.2
% of Students who are Asian/Pacific Islander	6.9	7.0
% of Students who are American Indian	3.4	1.4
% of Students who are African-American	4.6	1.8
% of Students who are Hispanic	10.6	8.0
% of Students who are Caucasian	74.3	81.6
Students per Teacher	17.6	16.9
Teacher Experience in Years	13.8	13.5
% of Teachers with Master's Degree	62.8	68.3

2.3.5 Improving Schools Survey

All of the principals of the selected improving schools were invited to participate in the study. Researchers recruited elementary principals to review the elementary school prototype, middle school principals to review the middle school prototype, and high school principals to review the high school prototype. Invitations were sent by email and fax and followed with individual phone calls to each potential participant to describe the study and explain the obligations of participation. The primary participation requirement was completion of a survey designed to ascertain more information about the expenditure allocation patterns in these schools. The survey was pilot tested with two principals to estimate the time required to complete it and the feasibility of completing it accurately. Both pilot testers agreed that the survey was feasible and would take approximately 45 minutes to complete.

Each participating principal received a customized survey based on the student enrollments at the principal's particular school. One section of each survey presented the baseline school enrollments, staffing, expenditures, and explanations of the components included in each of the baseline categories. The other section of each survey asked respondents to indicate where expenditures in their school differed from the baseline expenditures. For example, the surveys asked respondents if the salary for the assistant principal in the baseline school was similar to the assistant principal's salary in their school. The survey also asked specific questions regarding staff or expenditure totals (e.g., how many ELL teachers worked in the school or the amount spent on supplies).

Researchers encouraged principals to consult any relevant documents and speak with anyone they felt would be helpful in completing the survey. According to conversations with a number of principals, many completed the survey alone. Other principals reported that they made phone calls to the district for more information on some categories. Still another group of principals worked with business managers at their schools to complete the survey. Respondents were advised by researchers that accuracy was much more important than answering every question. Researchers asked principals to answer particular questions only if they were confident in the accuracy of their answers and not to answer if they were unsure. The survey provided respondents with detailed written instructions, and researchers provided technical assistance via email and telephone for principals with specific questions.

Eighteen principals returned surveys to EPIC—nine from elementary schools, four from middle schools, and five from high schools. Researchers utilized the results of the survey to adjust the baseline model to reflect expenditure patterns at these schools. For instance, if principals at most of the schools indicated that they spent a larger proportion of their budgets on information technology than the baseline prototypes indicated, researchers adjusted the baseline models to reflect this pattern.

2.3.6 Educational Business Manager Survey

In addition to the survey described above, researchers also surveyed several educational business managers. The primary purpose of this survey was to verify the accuracy of the baseline data. The secondary purpose was to gather additional information in categories that were not described thoroughly in the state-level data. Although researchers created the unadjusted baseline schools using official state-level data, some of the data lacked the level of detail required in some of the expenditure categories. For example, the data did not provide sufficient information on the average compensation earned by a substitute teacher per day or the average number of days that a permanent teacher may need a substitute.

Consultant Bill Freund recruited the business managers based on their knowledge of school finance in Washington. Three managers completed and returned surveys—an educational service district (ESD) CFO, a district executive director of finance, and a district deputy superintendent of operations.

The school business manager survey presented information in a format similar to the principal survey although it asked different questions. Each of the managers examined all three baseline prototype models (elementary, middle, and high school). The surveys asked the participating business managers to assess whether the data in each of the baseline prototype schools aligned with what they would expect based on

their experience. In some expenditure categories, the survey asked the managers to provide additional detail on the expected expenditure for a school with the specified enrollments.

2.3.7 Adjusting the Baseline Prototypes

Researchers used the detail provided by principals and educational business managers to confirm the funding allocation in some categories and to adjust other categories. The study adjusted expenditure categories both up and down as a result of the survey input. However, none of these changes affected the bottom line expenditure levels. Thus, increases in some expenditure categories were balanced out by decreases in others. The principal survey feedback allowed researchers to make important changes in a number of categories to reflect the practices of the improving schools.

The principal and manager survey input provided additional detail on expenditures in categories that were not well defined by the official state-level data. Two examples of categories that researchers refined based on the survey feedback were information systems and extracurricular expenditures. The survey input provided new information on the average cost per computer and average expenditure at each school level for extracurricular activities. In categories like these, the survey helped researchers achieve a higher degree of accuracy and introduce detail to the baseline schools that was otherwise unavailable.

It is important to note that feedback from the surveys supplemented, rather than supplanted, existing state data that were included in the baseline. EPIC researchers built the unadjusted baseline models with assumptions drawn from statewide staffing and expenditure totals. Those assumptions were based on statistical averages of official public data. In some expenditure categories, it was not appropriate to change the baseline prototypes to reflect the survey feedback. For example, average teacher salaries were not something that could be adjusted up or down even if feedback indicated that salaries in the improving schools were higher or lower than the baseline. The state relies on a salary schedule that determines salary based on education and experience. Salary figures in the baseline models were extracted from the official personnel databases and from OSPI's personnel summary tables. It would have been mathematically incorrect to adjust those official numbers based solely on the feedback from a sample of principals and managers.

2.4 Evidence-Based Method

The evidence-based method in this study began with a comprehensive review of the literature to identify educational strategies or interventions that are likely to be effective in the schools. The purpose of

identifying these interventions was not to make absolute determinations about which should be implemented, but to present the best candidates to a panel of educational administrators (the professional judgment panelists), who were called upon to consider the relative cost effectiveness of each. In effect, this integrated the evidence-based approach with the professional judgment method.

The purpose of this variation on the evidence-based method was to sharpen the judgments of the educator panel by presenting panelists with a set of research-validated educational practices. The study encouraged panelists to select only interventions that they believed would be effective in the prototype schools. Section 2.5 explains that panelists were not restricted to these choices and could add their own suggestions for educational interventions.

2.4.1 Rationale for Evidence-Based Method

The evidence-based method is sometimes characterized as the consultant's choice model. This characterization reflects the common use of this method, in which consultants decide which programs are needed to enable all schools in the state to meet specified goals. As noted above, this study deviates from the norm by relying on the expertise of those providing the services instead of those conducting the study to make the final decisions about the interventions. By employing the professional judgment method in combination with the evidence-based method, the study is also able to present panelists with the opportunity to consider the cost of each recommended intervention. This is explained in greater detail when the professional judgment methodology is introduced.

The study relied on a grounded approach in the use of research findings to inform practice, an approach that is found in numerous other fields as well. It is extremely difficult to find fields that simply take research findings and put them directly into universal practice, particularly in the public arena. In fields that possess high quality research findings (medicine and engineering being two prime examples), practitioners accumulate results over time and verify them before they are implemented on a large-scale basis. During this time, practitioners weigh the emerging evidence to make what are called "probabilistic decisions"[97]. This process can take years and even then, the research-based practice can later be rescinded when new results call current findings into question. There are many examples of this process in the medical research field where a finding is widely adopted and then abandoned when a contradictory finding emerges at some later point. Fields that rely solely on research findings to make policy decisions risk this sort of vulnerability.

Even in these fields, practitioners use their best professional judgment to decide where, when, and to what degree to give precedence to emerging research findings, and when and how much to rely on experience and professional judgment. For example, when the state of Oregon chose to develop the Oregon Health Plan to provide coverage to low-income residents, the state decided to use research to identify a series of "treatment pairs" that were demonstrated to be effective and then to fund treatments as far down the list of treatment pairs as resources allowed.

The initial statistical analysis gave the highest priority to treatment pairs with the strongest research base and lowest costs. However, a cursory review of the list by health care professionals led to the immediate conclusion that the treatment prioritization process needed to include a professional judgment component. An expert review panel then met to develop a list of prioritized treatments that accounted for both research and physician knowledge of how medicine is actually practiced, how effective treatments were in practice, and how effective treatments were in relation to other treatments[98].

The Oregon Health Plan is an example of the use of probabilistic decision-making, which is well established in a wide range of policy environments[99]. The use of highly trained and experienced professionals to make decisions using the best evidence available is a widely-accepted practice in arenas where all the information about a particular problem may never be known, but where a decision is required nevertheless. Probabilistic decision-making occurs whenever a policy is adopted based on the best determinations possible that the policy is the "most probably correct" solution. In the real world of public policy, there are few sure things. Few decisions would be made in modern society if those responsible for making decisions had to be 100% certain before making any particular decision.

2.4.2 Procedures

To determine the interventions that should be included in the evidence-based component of this study, EPIC researchers located, read, and evaluated hundreds of sources on effective educational practices. The research process first sought to identify educational interventions for which there was direct evidence of improvement in academic performance. Second, EPIC researchers reviewed interventions that may have indirect impacts on performance. For example, behavioral support systems may not lead directly to improvements in student achievement because they do not entail instruction in any content area, but there is evidence that these systems increase time on task and decrease classroom disruption, which are key prerequisites to increasing student learning. Limiting the interventions to only those that directly affect student learning ignores the context within which learning occurs.

The study presented the final list of interventions to panelists in an online budget simulation.* When determining which educational interventions to include for review in the simulation, researchers considered the quantity and quality of studies that supported each intervention. The study included interventions with strong supportive research in the online budget simulations. Each of the interventions is described in section 2.4.4 along with general explanations of the research base for each.

The cost of implementing each intervention at the prototype schools was calculated as directly as possible from the research sources, from actual examples of schools using the intervention, from developers of the intervention, or from the experience of researchers familiar with the intervention. When estimating the cost of each intervention, researchers took into account the resources that were already present in baseline prototypes and limited the intervention cost to new resources required. For example, the literature review indicated that a student-to-counselor ratio of 250-to-1 is adequate for each school. The baseline middle school prototype with 681 students already included 0.51 FTE counselors (a counselor-to-student ratio of 1,335-to-1), so it was necessary to add 2.21 FTE counselors to the prototype instead of 2.72. (681 students/ 250= 2.72. So, 2.72- 0.51 baseline counselors = 2.21 additional counselors required.)

The cost of implementing many of the interventions at a prototype school depends on the compensation level for a particular position. For instance, the cost of reducing class size is directly affected by the cost of additional teachers. The budget simulation was designed to account for compensation. If panelists made changes to teacher baseline compensation on the first page of the simulation, these changes were automatically included in the cost of the class size reduction intervention. This dynamic feature enabled panelists to get a better sense of how recommendations for staff compensation interacted with recommended interventions.

When panelists selected an intervention as part of the budget simulation, the simulation displayed the cost of implementing the intervention at the prototype school, as well as the cost of implementing the intervention at every school at that school level across the state. The purpose of this cost display feature was to inform panelists regarding the fiscal impact of their decisions, in order to encourage panelists to consider cost-benefit relationships for each decision made.

The budget simulation also presented descriptive information on the components necessary to implement the intervention at the prototype school. For example, the elementary school teacher professional

* For more detailed information on the structure and content of the simulations, refer to section 2.5.3 of this report or Appendices A or B.

development intervention contained the following explanation: “Includes 3 additional days of professional development for teachers. Baseline provides 7 days of professional development for teachers.” This information was included to help panelists gauge the net change the intervention may bring about. The budget simulations also presented brief descriptions of the potential effects of each intervention. These descriptions summarized the available research on each intervention and provided some indication of the strength of support for each intervention. This was done to indicate the fact that some interventions demonstrate effectiveness in certain situations, at particular school levels, or for specific groups of students. For the teacher professional development intervention, the potential effect was described as follows: “Research indicates that professional development for teachers has a positive effect on students’ conceptual understanding and maintenance of basic skills, increases in letter production, and phonological awareness. Professional development also may have an effect on student language acquisition.”

The list of interventions was similar, although not identical, for the elementary, middle, and high school prototype models. In addition to the interventions presented in the simulation, there was space for panelists to suggest interventions that did not appear in the list. This feature was designed to ensure that researchers did not overlook potentially significant interventions.

This approach to using the evidence-based method attempted to avoid problems with false precision and to address the limitations inherent in the current educational research knowledge base. The approach taken in this study was to look for interventions that met the test of “preponderance of the evidence,” but not to calculate precise effect sizes or predict the cumulative effect on student learning of the interventions in combination.

2.4.3 List of Interventions

The following list presents the interventions that were included in each prototype school as a result of the evidence-based method in combination with the professional judgment method. Section 2.4.4 provides detailed descriptions of each intervention, and Table 7 provides information on the components included in each intervention. Please note that some of these interventions were added and others were altered as a result of professional judgment input. Thus, they were not all included in the initial simulations presented to panelists.

2.4.3.1 Elementary school level

- Administrator Professional Development
- Behavioral Support Programs
- Class Size
- Counselors
- ELL Support
- Extracurricular Activities (non-academic)
- *Full-Day Kindergarten **Added as a result of meeting feedback*
- Instructional Improvement Coach
- Key Instructional Programs in Core Subjects
- Libraries
- Parent Involvement and Outreach Coordinator
- Special Education Support
- Substitute Teachers
- Summer School (for students not meeting academic standards)
- Teacher Professional Development
- Technology Replacement Cycle
- Technology Specialist
- Tutoring

2.4.3.2 Middle school level

- Administrator Professional Development
- Behavioral Support Programs
- Campus Security
- Counselors
- ELL support
- Extracurricular Activities (non-academic)
- Instructional Improvement Coach
- Key Instructional Programs in Core Subjects
- Libraries
- Parent Involvement and Outreach Coordinator
- Special Education Support
- Substitute Teachers
- Summer School (for students not meeting academic standards)
- Teacher Professional Development
- Technology Replacement Cycle
- Technology Specialist
- *Tutoring **Added as a result of meeting feedback*

2.4.3.3 High school level

- Administrator Professional Development
- Behavioral Support Programs
- Campus Security
- Career Academies
- Counselors
- ELL Support
- Extracurricular Activities (non-academic)
- Instructional Improvement Coach
- Key Instructional Programs in Core Subjects
- Libraries
- Parent Involvement and Outreach Coordinator
- Special Education Support
- Substitute Teachers
- *Summer School (for students not meeting academic standards) **Added as a result of meeting feedback*
- Teacher Professional Development
- Technology Replacement Cycle
- Technology Specialist
- *Tutoring **Added as a result of meeting feedback*

2.4.4 Detailed Descriptions of the Interventions

The following sections summarize the research findings for each included intervention. Each section concludes with a brief summary of the intervention that was included in the simulation.[*]

2.4.4.1 Administrator Professional Development

"Effective schools research has determined that schools that succeed are invariably led by a principal who is recognized as an instructional leader"[100]. Instructional leadership includes: defining and communicating a clear school mission; managing curriculum and instruction; supervising teaching; monitoring student progress; and promoting a climate conducive to learning[101]. Research indicates that principals may have an indirect effect on academic gain through the way that they govern, build collaborative relationships within and outside the school, and organize work patterns[96]. These processes affect the teachers and other school staff and, in turn, impact the students.

Despite their best efforts, it can be extremely challenging for principals to meet all the demands of school management and leadership. Well-structured professional development can help principals develop the

[*] For more information about the specific components included in each intervention, see Table 7.

necessary skills to promote a positive school culture. In addition, professional development may keep principals informed about effective instructional practices and provide information on curriculum development. Research indicates that professional development may improve the actual skills and strategies used by principals in their schools. According to the National Staff Development Council, effective professional development programs for principals should be long term, carefully planned, job-embedded, and focused on how to improve student achievement[102]. Other important components of effective professional development for principals are opportunities for reflection, problem solving work, and collaborative work with other principals[103-106]. Like teachers, principals may benefit from mentor programs, especially new principals[107]. Principal leadership academies, usually held during intensive summer workshops, work to improve principals' leadership abilities and are received well by participating principals[105, 106].

This intervention includes an additional $12.00 per student for principal training and leadership development. This amount was derived from the costs of programs in other states that provide leadership training to administrators. These funds may be spent on workshops, induction programs for new principals, principal leadership centers, and other types of professional development for principals and assistant principals.

2.4.4.2 Behavioral Support Programs

Ideally, schools are places where students can learn in a safe and positive environment. Unfortunately, this is not the case for all students at all schools. In 2003, among students age 12-18, there were 1.2 million thefts and 740,000 violent crimes nationwide[108]. Furthermore, a National Center for Education Statistics (NCES) report found that bullying, weapons, and drugs in schools were widespread[108]. Beyond these concerns, the disruptive classroom behavior of a few students can inhibit learning for everyone in the classroom. One of the methods to improve school safety, reduce school crime, and decrease disruptive behavior is the use of behavioral support programs.

Behavioral support programs are defined as the broad processes of assisting students, with or without disabilities, to acquire adaptive, socially meaningful behaviors. Such programs are designed to identify and prevent potential problems[109]. A meta-analysis of 165 school-based prevention studies found that prevention practices appeared to be effective for reducing alcohol and drug use, dropout rates, non-attendance, and other conduct problems[110]. Another meta-analysis of 99 studies examined types of interventions and found that most students who received treatment for problem behaviors were likely to exhibit decreases in those behaviors[111]. Behavioral support programs with both schoolwide and individual components offer a viable solution to help decrease school crime and disruptive behavior.

This behavioral support program intervention would ensure that there is 1.00 FTE social worker present at every school to help deal with problem behaviors and bridge the gap between school, family, and community. This would add 0.88 FTE social workers at the elementary school level, 0.86 FTE at the middle school level, and 0.77 FTE at the high school level. The social worker may also collaborate with teachers or present training for school staff that would allow them to identify and deal with disruptive student behavior before it escalates. The second component of this intervention is one additional day of building-directed professional development for teachers to enable them to develop skills necessary to fulfill a preventative role in recognizing problem behaviors. Teacher building-directed training and development is accounted for in teacher supplemental compensation that is part of teacher total salary. Thus, it was necessary to add teacher professional development back into total teacher compensation, and this calculation is described in section 3.2.3 and Appendix J.

2.4.4.3 Campus Security

In 2003, 5% of students nationwide reported being the victim of a non-fatal crime at school within the previous six months, 4% reported being the victim of theft, and 1% reported being the victim of violent crime[108]. Students in urban schools were more likely to be the victims of a crime than students in rural areas[108]. From 1999-2003, teachers reported being the victims of approximately 183,000 non-fatal crimes at schools nationwide, which translates to an annual rate of 39 crimes per 1,000 teachers[108]. Behavioral support programs work to reduce crime, but the implementation of additional safety measures is often necessary. Campus security is designed to provide a safe environment for learning. Many potential threats come from students within the school, although other problems originate in the community surrounding the school. In a 1999-2000 nationwide survey, 62% of principals reported that a major limitation on their ability to reduce and prevent crime was inadequate funds[112].

This intervention would add 0.50 FTE additional campus security personnel at the middle school level and 1.00 FTE at the high school level to prevent and handle security problems. The cost of hiring campus security personnel is estimated from a National Education Association article on security professionals and adjusted for inflation to an annual salary of $22,539.29[113, 114]. This intervention would also add $10.00 per student for additional security measures (such as cameras or training in how to deal with violence) in both middle and high school. The presence of a security officer or security cameras on school grounds is likely to deter potential crime, catch perpetrators after a crime, or record crimes in progress. It is assumed that a security officer would work collaboratively with school staff to identify and deal with problem behaviors within the student (or staff) population that may lead to school crime. This intervention does not recommend a particular type of security measure, but allows each school and district

to assess its unique needs. The security needs of an inner-city school may be vastly different than those at a rural school. Please note that FTE campus security personnel are not broken out as distinct expenditure categories in the baseline and therefore, the salary expenditure for campus security personnel is lumped into the baseline category called *other building expenditures* along with the $10 per student for other security measures.

2.4.4.4 Career Academies

The recent national and state emphasis on academic accountability has increased the focus on preparation for college or career. High schools have come under fire for inadequate curriculum content and organization[115]. Educators have begun to look for ways to improve students' transition to postsecondary work or education and increase high school academic achievement and graduation rates [116].

One high school reform effort that has been reasonably well studied and widely implemented is the career academy. A study on the prevalence of career academies estimates that there may be as many as 2,500 career academies in high schools across the country[117]. Career academies are small learning communities (often schools within a school) designed to combine academics with a particular career focus and technical skills[117]. Curriculum and activities may focus on health care, business, or information technology[118]. Career academies are typically designed to enroll a high proportion of at-risk students, involve teacher collaboration, provide below-average class sizes, and take advantage of relationships with local businesses. Students within a career academy may take a block of classes together every day and then participate in normal classes for the remainder of the day[118]. Research has shown that smaller learning communities may help keep students engaged in school[119].

A number of evaluation studies have been conducted regarding career academies. Several studies have found that career academies may have positive effects on student GPAs and student engagement in school[116, 118, 120, 121]. Career academies may also increase attendance rates, high school credits earned, and graduation rates, particularly among at-risk students[116, 118, 120-122]. Career academy students report feeling more prepared for a career in the field of focus and also report increased career aspirations[116]. Studies on postsecondary outcomes of career academies indicate that career academy students may have higher college enrollment rates and improved labor market outcomes after high school[116, 120, 122]. Several studies found these effects were more concentrated among at-risk students[117, 122].

The career academy intervention assumes that 250 students in the high school prototype would be enrolled in career academies, based on student interest and evaluation of which students would benefit most from the career academy approach. The intervention would add 7.81 FTE teachers to help keep career academy class sizes small and provide additional specialized skills to the school, such as skill in health professions. Furthermore, this intervention would add $50.00 per career academy student for specialized career academy supplies and to help establish relationships with local businesses.

2.4.4.5 Class Size (reduction)

Class size reductions are one of the most researched and controversial interventions in education. Proponents of reducing class size argue that students benefit from more individual attention, while other researchers note that class size differences have not been demonstrated conclusively to improve student learning and achievement[123]. Glass and Smith conducted one of the early meta-analyses on class size in 1979. This meta-analysis of nearly 80 studies concluded that class size reductions can have a positive effect on academic achievement if class sizes are reduced to 20 students or fewer[124]. A 1990 study found that class size reductions were most valuable in early primary grades for reading and math achievement and were more beneficial for ethnic minority students than for other students[125].

The most influential study to date is probably the Tennessee Project STAR, a large-scale randomized field study experiment[123]. Project STAR studied kindergarten through 3rd grade and found that students in small classes (13-17 students per class) outperformed students in regular-sized classes (22-26 students per class) even when the regular-sized classes added an aide[126]. The differences were especially pronounced in kindergarten and first grade and among students from low-income families[126]. The methodology used in Project STAR has been debated by a number of researchers, but it is still widely considered the best class size study.

While the evidence indicates that the effect of smaller class sizes is greatest in the early primary grades, it is not clear whether the beneficial effects of smaller classes persist in later elementary school grades. There is, however, some evidence that small class sizes in kindergarten through 3rd grade may have lasting effects in later grades[127-130]. Several studies conclude that students in small elementary classes for three or more consecutive years may experience positive educational outcomes[129]. The literature on class size does not offer definitive conclusions on the ideal class size that would influence student achievement. However, studies generally suggest that a class size of 20 or fewer in a classroom is necessary to achieve any benefits.

The class size intervention would provide 2.34 FTE teachers to reduce the student-teacher ratio to 17-to-1 for students in grades 1, 2, and 3. The full-day kindergarten intervention presented in section 2.4.4.9 includes a 17-to-1 student-teacher ratio for kindergarteners as well.

2.4.4.6 Counselors

Before 1920, the primary role of school counselors was to provide vocational guidance to students[131]. This role has expanded over time, and counselors currently provide a wide variety of services to students and parents and may work with a variety of school staff in this process. A comprehensive school counseling program "helps all students gain competencies in the areas of personal/social, educational, and career development at all educational levels, competencies that underpin students' academic success"[132]. Although not every school with a counselor has a "comprehensive" program, the model of comprehensive programs is widely respected and accurately reflects the diverse role that counselors may assume in schools. Their actual activities may include individual and small group counseling, classroom guidance, consultations, and other activities as needed[133].

The literature consistently documents the positive influence that school counselors may have on students [134-137]. One study found that guidance activities were associated with improved academic achievement among elementary students, while another study found that 83% of the sample's failing elementary school students improved their grades after participating in group counseling sessions[138-140]. Other research on counseling found that underachieving students who received counseling improved their math and language arts grades[135]. In addition to the academic benefits of counseling, a couple of studies conclude that behavioral benefits can result from counseling. These benefits may include decreases in inappropriate behaviors, better student relationships with teachers, and a greater ability to stay on task[140-142]. Counselors may also have positive impacts on students' social skills, self-awareness, and other developmental skills[133, 143-145]. The influence of counselors may extend beyond high school as well. Studies have shown that school counselors may help students define their career plans, increase their future expectations, and decrease the dropout rate[134, 146-149].

The counselor intervention increases the number of counselors in each prototype school to achieve a ratio of 250 students per counselor. Specifically, this adds 1.64 FTE counselors at the elementary level, 2.21 FTE at the middle school level, and 4.21 FTE at the high school level. The 250-to-1 ratio is based on the recommendation of the American School Counselors Association[150]. The prototypes and the Washington S275 Handbook define counselors as the staff members who assist pupils to assess and understand their abilities, aptitudes, interests, environmental factors, personal and social adjustments, educational needs, and occupational opportunities.

2.4.4.7 ELL Support

As noted in the introduction, the number and percentage of English Language Learners (ELL) is increasing in Washington schools. This student population needs English language training in order to succeed in school and in most communities. This training may require unique resources, such as bilingual teachers and language-specific supplies. According to Gandara, Rumberger, Maxwell-Jolly, and Callahan (2003), data from a number of sources reveal that the academic achievement of ELL students lags behind the achievement of students proficient in English[151]. Research has shown that "the long-term academic performance of ELL students is better when students have significant exposure to instruction in both English and their primary language"[152-154]. Despite this conclusion, Washington has not been able to find sufficient numbers of teachers qualified to teach in both English and their primary language[152].

Most research on ELL programs does not provide any operational recommendations for improving the academic achievement of English Language Learners. In particular, there is very little information on what resources are necessary to improve ELL instruction[155]. It is possible, however, to identify that more resources are necessary. One study indicates that language acquisition programs, such as Éxito Para Todos, the Spanish bilingual adaptation of Success for All, "increases chances of academic success by reducing student-to-teacher ratio"[156]. An evaluation of seven Texas schools with high performing ELL students showed an average ELL student-teacher ratio of 24-to-1[157].

This ELL intervention includes the addition of ELL teachers in order to achieve an ELL student-teacher ratio of 25-to-1 in each model—an additional 1.21 FTE ELL teachers at the elementary school level, 1.77 FTE at the middle school level, and 3.48 FTE at the high school level. This number is not intended to designate class size, but to indicate the ratio necessary to support ELL students adequately. It is assumed that some ELL students are taught in separate classrooms, some are taught in mainstream classrooms, and some participate in both types of classrooms, depending on the school. This model assumes that ELL teachers work with mainstream classroom teachers to implement curriculum for ELL students within mainstream classes. The assumption that instructional strategies vary considerably is consistent with a 2003 OSPI report on English Language Learners[152]. Furthermore, these ELL teachers may work as small-group or individual tutors for English Language Learners. This intervention also includes an additional $43.09 per ELL student to bring the total ELL per student expenditure up to $200.00 for each prototype school.

2.4.4.8 Extracurricular Activities (Non-Academic)

The state does not provide funding specifically for student extracurricular activities. Districts or schools that wish to offer these activities must provide the expenditures for extracurricular staff, supplies, and

expenditures from local funds. There is a large body of research examining the influence of extracurricular participation on academic achievement and other student outcomes. Extracurricular activities are also an indicator of a quality education that many parents consider when judging a local school or school district. Its inclusion in this study is recognition both of the research support and its importance as a component of local definitions of quality and adequacy.

The literature consistently identifies a positive relationship between most extracurricular activities and educational outcomes in middle school and high school. There does not appear to be as much research on extracurricular participation at the elementary level, although there is at least some evidence that elementary school activity participation is linked to improved achievement. One study of elementary students found that extracurricular activity participation in kindergarten and first grade was positively associated with reading achievement gains in 1st through 3rd grade and teacher evaluations of math skills in 3rd grade[158].

At the middle and high school levels, participation in extracurricular activities has been linked to commitment to, engagement in, and attachment to school, as well as higher self-esteem[159-162]. Other studies have shown that extracurricular participation is related to decreases in problem behavior and delinquency[159, 160, 163, 164]. Dropout rates and absenteeism are likely to be lower for students participating in extracurricular activities[159, 162, 165, 166]. A number of studies found academic achievement, including higher GPAs, better test scores, and more challenging course selection was associated with extracurricular participation[159-163, 165-169]. Extracurricular participation may even have effects beyond high school. The literature suggests a positive link between high school extracurricular participation and increased aspirations, college attendance, and even subsequent political participation[160-162, 165, 166, 168].

This intervention for extracurricular activity participation adds $50.00 per student at the elementary school level, $65.00 per student at the middle school level, and $125.00 per student at the high school level for compensation, supplies, and other expenditures related to extracurricular activities. These amounts are based on cost estimates from school districts outside Washington that provide more comprehensive extracurricular programs. This assumes that the interest in extracurricular participation increases as students get older and there is a greater demand for extracurricular activities at each successive school level. It also assumes that equipment costs are higher with each successive school level because there are more activities and more diverse activities. Extracurricular activities may include, but are not limited to: clubs, student government, honor societies, sports, performing arts, and publications. Tutoring and other after-school academic assistance are not included in this intervention.

2.4.4.9 Full-Day Kindergarten

The demand for full-day kindergarten has increased along with increases in the number of single parent families and dual-income earner families. At the present time, the state only funds half-day kindergarten, although some districts use other funds to provide full-day kindergarten. Parents and teachers have indicated a preference for full-day kindergarten because there is more time for instruction, instructional flexibility and student creativity[170]. Research has suggested that full-day kindergarten classes are more likely to spend time on math, social studies, and science than half-day classes[171, 172].

Recent studies indicate that students attending full-day kindergarten are likely to make more progress and achieve at higher levels than students in half-day programs[171-177]. A nationwide study conducted by the National Center for Education Statistics found that full-day kindergarteners make greater gains in math and reading even after controlling for race, income, gender, class size, and several other factors[171]. One meta-analysis of 23 studies on full-day kindergarten found that such programs accounted for 60% of the variance in student outcome measures[178]. Other research indicates that full-day kindergarteners tend to perform at higher levels in literacy and mathematics as measured by standardized tests and grades[170, 173, 174]. Some studies suggest that the academic benefits of full-day kindergarten persist through subsequent years[170, 173, 175]. There is also evidence that low-income, minority, or LEP students may benefit even more from enrollment in full-day kindergarten than other students[172, 173]. In addition to the academic benefits, full-day kindergarten may lead to more positive emotional, behavioral, and social outcomes for students[170, 175-177, 179].

This intervention adds 1.96 FTE teachers to staff full-day kindergarten in the prototype elementary school. This study assumes that 72% of students are in half-day kindergarten classes and that half-day kindergarten students would require an additional 0.50 FTE teachers to attend full-time. This 72% figure is based on a Washington statewide survey of kindergarten readiness[180]. These 72% of kindergarten students in each prototype elementary school each require an additional half-day of kindergarten instruction. At a recommended class size of 17 (see class size intervention), this adds 1.96 FTE teachers per prototype elementary school. This intervention also adds additional $20.00 per half-day student for general school supplies.

2.4.4.10 Instructional Improvement Coach

One of the effects of the accountability reform movement is an increased emphasis on teaching quality. Teaching quality is often considered the factor that contributes most to student learning and achievement of academic standards. Research indicates that induction for new teachers and coaching for veteran teachers are practices likely to improve teaching quality. Between the 1999-2000 school year and the

2000-2001 school year, 8% of U.S. public school teachers moved to another school and another 7% left the profession[181]. Twenty-one percent of teachers who left the profession reported that they left to pursue another career[181]. A Washington study found that 25% of novice teachers in Washington were no longer working in the Washington K-12 school system five years later[182].

Effective induction and coaching programs may help decrease teacher attrition and improve instructional quality. Beginning teacher induction "is the process of training and supporting new teachers during the first few years of their teaching careers in order to ease the transition into teaching and improve teacher effectiveness through training in classroom management and effective teaching techniques"[183]. Teaching is one of the few professions where new employees have similar responsibilities to veteran employees. According to a 1999 literature review, it is well-established that teachers with fewer than three years of experience are typically less effective than senior teachers[184]. It is therefore extremely beneficial for new teachers to have opportunities to collaborate with and learn from those with more experience. Research suggests that induction and mentoring during the first few years of teaching may reduce teacher attrition and make teachers more effective because new teachers develop effective teaching strategies and knowledge more quickly by learning from the experience of other teachers[185-189]. A 2001 report found that very few teachers had access to a structured induction or mentorship program that provided regular formative feedback and collaboration[190].

The research on mentoring and coaching for experienced teachers is not as extensive as the research on new teachers. However, research indicates that coaching may increase communication and collaboration between teachers and increase teacher effectiveness and satisfaction[191-194]. Teachers and principals in schools that have piloted coaching programs generally report positive outcomes[192-195]. There is also some evidence that coaching improves the use of new teaching strategies in the classroom[196, 197].

This intervention provides an additional 1.00 FTE coach at the elementary school level, 1.49 additional FTE at the middle school level, and 1.98 additional FTE at the high school level. This coach would mentor and induct new teachers and coach veteran teachers. Essentially, these staff members would work with school staff to improve the quality of teaching within the school. These coaches would spend most of their time observing classroom teachers, providing feedback, conducting demonstrations of particular teaching strategies, facilitating collaboration among all teachers, working with the principal and other administrators to plan for instructional improvement, keeping apprised of research-validated effective practices, and helping teachers implement these practices in their classrooms. The coaches would also help teachers understand state and national standards and align their curriculum and instruction to help students meet the standards. Instructional improvement coaches may carry out these responsibilities on a

full-time or part-time basis, in addition to other responsibilities. It is highly recommended that instructional coaches have substantial teaching experience and receive training on how to mentor in a structured manner. It is important that the instructional coaches provide feedback in a formative manner to improve teaching but do not evaluate teacher performance for employment or discipline purposes[192, 198].

2.4.4.11 Key Instructional Programs in Core Subjects

In 2005-06, less than two-thirds of tested Washington students in 4th, 7th, or 10th grade achieved WASL math standards (58.9% 48.5%, 51.0% met WASL math standards, respectively), and 81.2%, 61.5%, and 82.0% of tested Washington students (in 4th, 7th and 10th grade, respectively) met WASL reading standards[7]. These results suggest that there is a need to improve reading and math instruction in Washington schools. At present, instruction in each classroom does not necessarily align with research on best practices and curriculum standards.

NCLB legislation expects schools to use evidence-based interventions to improve student learning. One educational strategy that has been reviewed in the What Works Clearinghouse is key instructional programs in core subject areas[199]. The Clearinghouse releases reports on effective approaches to teaching reading and math. Examples of programs that have been shown to have positive effects on student achievement in core subjects include: Accelerated Schools, Direct Instruction, Roots and Wings, and Success for All. A study of 29 comprehensive school reform models found significant positive outcomes from these programs, particularly in reading and math[200]. Among other activities, reform models provide the resources necessary to address curriculum and instruction[199].

This intervention adds an additional $26.00 per student to implement research-validated best practices in every applicable classroom and develop specific curriculum to align with the Grade Level Expectations (GLEs) and the Essential Academic Learning Requirements (EALRs). This cost is derived from the implementation costs of a number of commonly used effective instructional programs.

2.4.4.12 Libraries

"School libraries play an important role in making information available to students and in teaching students to obtain and use that information"[201]. Today, school libraries contain a myriad of resources in addition to books. These may include video materials, CD-ROMs, periodicals, microforms, and digital/electronic media. In order to help students utilize these resources, it is important to have at least one and perhaps more than one qualified librarian or library media specialist.

The literature identifies a number of positive effects that libraries may have on academic achievement. Researchers in a variety of studies have found that a qualified library media specialist, a larger library staff, and a library staffed for more hours may increase test performance or grades and improve reading comprehension, research skills, and the ability to express ideas effectively[202-208]. Specifically, it is recommended that each school library have at least one full-time certified library media specialist and one full-time aide or support staff member[208]. Academic benefits of these library components were found across all school levels[205, 207]. There is also some indication that the expenditure level of school libraries is associated with the improvement of student reading achievement[202, 206].

Despite the studies that support the positive effect of libraries, 8.3% of Washington schools did not have a library media center in 1999-2000[209]. Thirty-three other states had a higher percentage of schools with library media centers in 1999-2000 than Washington[209]. Among the Washington schools that did have a library media center, only 78.3% had a paid state-certified library media specialist in 1999-2000, ranking Washington 31st among all states[209].

The libraries intervention would ensure there was 1.00 FTE librarian/media specialist on-site at the elementary school level (an additional 0.17 FTE), add 1.00 FTE library aide, and add $30 per student for library supplies and expenditures. At the middle school level, this intervention would ensure there was 1.00 FTE librarian/media specialist at each school (an additional 0.06 FTE), add 1.00 FTE library aide, and add $30 per student for supplies and expenditures. The libraries intervention would also add 2.00 FTE library aides and $30 per student for supplies and expenditures at the high school level. There is already adequate librarian/media specialist FTE staff at the high school level. This intervention assumes that the librarian/media specialist meets state-certification requirements. It further assumes that the library aide is fully trained to work in the library. EPIC researchers assume that the $30 per student would be used to supplement current Washington library expenditures and provide start-up costs for schools that do not have library media centers.

2.4.4.13 Parent Involvement and Outreach Coordinator

Parent involvement is defined as the act (formal or informal) of collaboration between parents and schools to educate their children. All schools receiving Title 1 funds must have a written parent involvement policy and build capacity to implement the policy[210]. This indicates that parent involvement is considered important for improving education on a national scale. Home is the only place where children typically spend more time than they do at school. As a result, parents usually have many opportunities to influence their children's educational and behavioral development.

The literature confirms the positive impact that parent educational involvement may have on student achievement[211-213]. According to Cotton and Brown, "the most effective forms of parental involvement are those which engage parents directly with their children in learning activities in the home," although other types of involvement are also beneficial[214]. While parental involvement tends to decrease as students get older, studies have shown that involvement remains helpful in improving academic achievement in middle school and high school as well as elementary school[213-216]. Research indicates that parental involvement may positively influence student grades, test scores in all core subjects, credits earned, homework completion, promotion rate, and school attendance[212, 213, 216]. More involved parents also tend to have students with higher graduation rates, higher aspirations, better social skills, improved behavior, and better attitudes toward school[213, 216]. In addition, at-risk students may benefit even more than their peers from a parental involvement program[213-215]. Several studies suggest that a family coordinator is a crucial component of a successful parent involvement and outreach program[214, 217].

This parent involvement and outreach coordinator intervention adds 1.00 FTE coordinator to the classified staff at each of the three prototype schools. EPIC researchers assume that this coordinator would be responsible for all activities and efforts to involve parents. The coordinator may set up parent-teacher conferences and "back-to-school nights," recruit and coordinate parent volunteers, and organize the PTA. This staff member would work with parents to help them better support their children's schoolwork. In addition to these functions, a coordinator could write newsletters, communicate positive feedback to parents, provide training to help teachers work with parents, participate in home visits, and find other innovative solutions to improve communication, particularly among parents who cannot be actively involved in the school[214, 218].

2.4.4.14 Special Education Support

According to a report from the Joint Legislative Audit and Review Committee (JLARC), special education is "instruction designed to meet the unique needs of eligible students with disabilities"[219]. Special education students typically need more individualized attention from staff than basic education students. One study surveyed more than 1,000 special education teachers and administrators in 1993 and reached the following conclusions about special education classes: 1) directors and teachers consistently recommended smaller classes than standards allowed; 2) teachers believed that manageable class sizes with paraprofessionals were not much better than manageable class sizes without paraprofessionals; and 3) special education students in smaller classes achieved at a higher level than special education students in large classes, with reading achievement affected more than mathematics[220].

A literature review on special education and student-teacher ratio concluded that the maximum student-teacher ratio in special education was usually 15-to-1 and that student achievement and behavior were affected by class size[221]. One of the studies cited in the review found significant differences in quantitative and qualitative instructional measures that favored lower student-teacher ratios[222]. A 1994 Virginia study of class size found lower academic achievement in math, reading, and social studies in large special education classes as compared to smaller special education classes[223]. Finally, researchers in New York concluded that larger special education classes were associated with less time spent on academics and a higher incidence of acting out[224].

This special education intervention adds the number of additional teachers necessary to achieve a ratio of 15 special education students to 1 special education teacher: 0.36 FTE at the elementary level, 1.10 FTE at the middle school level, and 3.17 FTE at the high school level. This ratio does not necessarily indicate class size, but instead represents the student-teacher ratio necessary to adequately support special education students. The intervention also adds 0.60 FTE special education classified staff to each prototype to achieve a student-staff ratio of 25-to-1. It was only necessary to add special education classified staff to the elementary school prototype because the baseline middle and high school prototypes already had ratios lower than 25-to-1. The study assumes that some special education students are in separate classrooms, some are in mainstream classrooms, and some participate in both types of classrooms, depending on the school. Furthermore, this intervention assumes that special education teachers work with mainstream classroom teachers to implement curriculum for special education students within mainstream classes.

2.4.4.15 Substitute Teachers

A 1994 literature review found that 5-8% of a student's school year is spent with a substitute teacher[225]. In addition to increasing professional development for classroom teachers, a variety of other factors contribute to the demand for substitute teachers—sick leave, personal/family emergencies, and jury duty, to name a few[226]. Other less obvious reasons for teacher classroom absence are curriculum restructuring, mentoring, and teacher collaboration[226]. The Family and Medical Leave Act has also changed the ways in which teachers take leave and the duration of leaves[227]. The need for a larger substitute pool in order to fill in for teachers has been documented in a number of states. Fifty-one percent of respondents to a nationwide survey indicated that "there are usually or never enough substitutes available"[228]. In fact, the Seattle School District held a substitute summit in order to address the 16% of substitute requests that went unfilled daily[229]. It is important that substitutes are qualified and available to provide consistent instruction when the teacher cannot be in class.

The substitute teacher intervention adds four additional days per year for each FTE teacher to utilize substitutes in each prototype school. These four days would cover the amounts of additional teacher professional development recommended in the teacher professional development intervention (three days) and the behavioral support system intervention (one day). EPIC researchers adjusted this substitute teacher intervention following the professional judgment method to account for the additional FTE teachers recommended by panelists. The intervention assumes that substitute teachers meet all state requirements. In order to recruit enough qualified substitute teachers, it may be necessary to provide incentives, such as bonus pay or benefits. Additional expenditures associated with substitute recruitment are not included in this model, but should be considered if there is an insufficient substitute pool of qualified substitutes.*

2.4.4.16 Summer School (for students not meeting academic standards)

"Compared to the traditional school year, summer programs often feature smaller classes, more individualized attention and a more relaxed learning atmosphere"[230]. Students may benefit from the additional instructional time to learn the material. The research indicates that summer school can help combat summer learning loss, improve academic achievement, and help bring students up to standards. A meta-analysis and a number of other studies conclude that summer school is likely to have a positive effect on the knowledge and skills of students[230-239]. The demand for summer school nationwide is high and is likely to increase. One researcher estimates that 10% of U.S. K-12 students were enrolled in summer school in 1999[237]. Accountability requirements heighten the demand for summer school as students struggle to meet standards.

Research indicates that struggling or disadvantaged students may lose more knowledge and skills during the summer than other students[234]. Middle class students showed overall gains in reading achievement, but declines in reading comprehension over the summer, while disadvantaged students showed overall declines in reading achievement and even larger declines in reading comprehension during the summer[236]. As a result, low-income students may fall farther behind their peers during the summer, further widening the existing achievement gap. Summer school may be particularly helpful for students in early grades when summer school programs are small[238].

The CIM Academy Summer School in Portland, Oregon offered summer school for 5^{th}-8^{th} grade students who did not meet district or state standards in reading, writing, or math[230]. A 2000 evaluation of the

* Please see Appendix C for recommendations on how to recruit additional qualified substitute teachers.

program found that 31-41% of the students enrolled in the program moved to a higher achievement category by the end of summer school[240].

The summer school intervention for students who do not meet standards adds FTE principals, FTE teachers, general school supplies, and other building expenditures to the elementary, middle, and high school prototypes. Please refer to Table 7 for specific information on the components included in this intervention. The intervention would provide summer school for 23 half-day sessions, similar to the Portland CIM. The number of principals and teachers in this intervention was based on the Portland CIM model at the middle school level. Adjustments were made to the Portland model to account for Washington's school year and the number of students served. EPIC researchers assumed that the Washington summer school program would offer non-mandatory free summer school for 194 elementary, 255 middle, and 381 high school students at each respective prototype school. These numbers were estimated using the Learning Assistance Program (LAP) student enrollment of each prototype school. However, summer school would not be limited to LAP students. The primary purpose of summer school would be remediation or development for those who do not meet academic standards; it would not be geared toward enrichment or for students who need to retake a class.

2.4.4.17 Teacher Professional Development

To meet the requirements of the accountability movement in Washington and nationwide, teachers are increasingly required to improve their teaching knowledge, skills, and practices[241]. The theory supporting teacher professional development is that it improves teaching practice and, in turn, improves student achievement. In fact, one study found that the opportunity to increase their teaching skills through professional development was the most compelling reason for teachers to remain in the teaching profession[242].

Research on professional development indicates that it has a positive effect on teacher instructional practice and on student achievement. The literature specifically supports building-directed professional development, meaning that the school or district specifies the type of professional development according to the particular needs of the school or district rather than allowing individual teachers to choose the type of professional development. Several studies recommend that professional development be geared toward teachers from the same school because it allows the teachers to work together toward common goals[243, 244].

Studies have shown that teacher professional development may have an effect on teacher instructional practice in math, science, literacy, and basic reading[245-249]. Research also indicates that professional

development may improve student learning, achievement, and classroom culture[245, 247, 250-252]. One key component of professional development may be the time spent on professional development activities. In particular, professional development appears to be most effective when it is sustained over a longer period of time[241, 243, 245, 249, 252-255].

Based on the research indicating that sustained professional development for teachers is effective, this professional development intervention adds three days of building-directed professional development for each teacher per year. The baseline includes seven days of professional development (five self-directed days and two building-directed days) for teachers. Please note that the behavioral support system intervention also adds one day of building-directed professional development for teachers (see section 2.4.4.2). This addition of building-directed teacher professional development assumes that each school and/or the district is able to accurately assess the needs of the district, school, and the teachers in order to provide professional development that addresses the unique needs. Types of professional development may include immersion strategies, curriculum implementation, curriculum development, examination of classroom practice, or collaborative work[247].* As mentioned in section 2.4.4.2, teacher building-directed training and development is accounted for in teacher supplemental compensation that is part of total teacher salary. Thus, it was necessary to add teacher professional development back into total teacher compensation, and this calculation is described in section 3.2.3 and Appendix J.

2.4.4.18 Technology Replacement Cycle

In this era of data-driven decision-making, it is imperative that students learn how to use education technology for communication, research, and analysis purposes. No Child Left Behind even includes an 8th grade technology literacy requirement[256]. "Educational technology generally refers to the introduction of computers and related pieces of equipment to the classroom"[257].

Studies have demonstrated that the use of educational technology can motivate students and teachers, enhance instruction for special needs students, and improve student attitudes toward learning[258]. In fact, educational technology may have a positive effect on achievement in all major subject areas, from pre-kindergarten through secondary school, and for regular and special needs students[258]. A meta-analysis of 700 empirical research studies found that access to educational technology was positively associated with student gains on a variety of exams[259-261]. One study of New York schools found that schools that had more instructional technology and more technology-related training for teachers had

* See Appendix D for examples of collaborative teacher work that have been utilized in Washington schools.

larger Regents' exam increases in math and reading than other schools[262]. Computer access and sufficient instructional software are positively linked to academic achievement[257, 258, 261, 263-265].

A statewide 2003-04 computer inventory survey was conducted in Washington by OSPI. The data from this survey indicated that 28% of instructional computers were more than four years old[94]. According to OSPI, these older computers do not meet state standards for instructional use[94]. Computers that are older than four years are more likely to malfunction or operate slowly, which makes teaching and learning more difficult.

This intervention includes an additional $37.00 per student to help replace every instructional computer on a four-year cycle (instead of a six-year cycle), update the network, develop distance learning programs, replace other technology, including LCD projectors, and provide Instructional Learning Labs (computer labs with instructional software) to all students.

2.4.4.19 Technology Specialist

The literature on technology and student achievement is described in the previous section. In addition to the need for regular technology replacement, several studies identify a technology specialist as an integral component of computer and technology programs[264, 266-269]. "Teachers must have access to on-site technical support personnel who are responsible for troubleshooting and assisting teachers," and teachers also need professional development "to help them choose the most appropriate technologies and instructional strategies"[264]. One study found that teachers who practiced exemplary computer usage generally worked in school districts that heavily invested in on-site staff to support computer usage and computer-related staff development (particularly training in computer applications and guidance on integration with subject matter)[270]. Teacher professional development in educational technology has been linked positively to math achievement, school environment, student discipline, and test scores[257, 267, 268, 271].

This intervention ensures that each prototype school would have at least one technology specialist on-site, adding 0.87 FTE technical staff at the elementary level, 0.61 FTE at the middle school level, and 0.02 FTE at the high school level. The technology specialist is a staff member who may perform a variety of computer or information technology services within a school. The exact services provided by a technology specialist might vary depending on the needs of the school or district but could include training teachers about how to effectively use these technologies, troubleshooting computer problems within the school, aligning technology instruction to curriculum standards, and maintaining all computers.

Research indicates that a technology specialist is most effective when working with teachers and administrators to integrate technology into the curriculum[269].

2.4.4.20 Tutoring

There is a great deal of research documenting the positive impact of one-on-one or small group tutoring at the elementary school level. A 1982 meta-analysis of 65 studies found that tutoring programs had positive effects on the academic performance and attitudes of tutored students[272]. Smaller-scale evaluations of elementary school tutoring programs produced similar results. Fashola (1999) and Wasik & Slavin (1993) studied nine different language arts tutoring programs and found positive effects on spelling, word recognition, reading comprehension, and vocabulary[273, 274]. Tutoring also may help students improve in math[275, 276]. Many effective tutoring programs are aimed specifically at helping at-risk students, which includes students who are not achieving standards, may be disadvantaged, mildly disabled, or may be English Language Learners[274-279].

This study recommends the use of teachers as tutors for several reasons. Several studies conclude that tutoring programs using certified teachers might have larger effects on student achievement than programs using paraprofessionals[273, 276]. Other research indicates that the most effective tutoring programs are highly structured, integrated with classroom subject matter, and use tutors with subject matter expertise and the ability to speak to students on their comprehension level[272, 273, 280-284]. It is far more likely that certificated teachers would possess these skills and the ability to construct lesson plans than a paraprofessional or volunteer. The research also suggests that students who meet more frequently with tutors are more likely to show academic improvement[285].

There is considerably less support for tutoring at the middle and high school levels than at the elementary level. This may be due in part to a general lack of research on tutoring in middle and high schools. The professional judgment panel, however, believed that tutoring was equally valuable for middle and high school students. For this reason, this intervention was included in all three prototypes.

This intervention would increase the number of Learning Assistance Program (LAP) teachers to a LAP student-teacher ratio of 50-to-1 in each prototype. Specifically, this adds 0.72 FTE LAP teachers at the elementary level, 1.13 FTE at the middle school level, and 1.50 FTE at the high school level. Although these student-teacher ratios are based on the number of LAP students, this intervention assumes that not all LAP students will need tutoring and that some non-LAP students will need tutoring. The intervention also assumes that tutoring will either be conducted outside of regular school hours and/or that students will be pulled out of regular classes for small group/individual tutoring during school hours.

2.4.5 Components of the Interventions

Each of the educational interventions incorporated information on the existing resource availability at each respective prototype school. For instance, special education support at the elementary school level specified a ratio of 25 students per staff member. The elementary school needed additional staff to meet this ratio, while the middle school and high school prototypes already had lower student-to-staff ratios and did not need additional resources in order to meet this requirement.

As a result of differing baseline resource levels and differing enrollments at each of the prototype schools, the resources included in an intervention at one school level are not identical to the resources included in the intervention at another school level. Table 7 presents the components included in each intervention within each prototype school.

The purpose of this table is to present the components that are associated with each intervention. Thus, if a participant selected an intervention for a prototype school, this indicates the additional resources that are then included in the model. The rationale behind each of these interventions is included in individual descriptions of interventions beginning in section 2.4.4 .

Table 7: Components included in the interventions

Intervention	School Prototype	Component			
		Additional FTE	Type of Staff	Costs in Addition to FTE	Type of Expenditure
Administrator Professional Development	Elementary			$5,704.48	Other Training and Development Expenditures
	Middle School			$8,166.97	Other Training and Development Expenditures
	High School			$15,881.97	Other Training and Development Expenditures
Behavioral Support Programs*	Elementary	0.88	Social Worker	1 additional day at the total cost of $250 per teacher	Teacher Building-Directed Training and Development
	Middle School	0.86	Social Worker	1 additional day at the total cost of $250 per teacher	Teacher Building-Directed Training and Development
	High School	0.77	Social Worker	1 additional day at the total cost of $250 per teacher	Teacher Building-Directed Training and Development
Campus Security	Middle School			$18,075.46	Other Building Expenditures
	High School			$35,774.27	Other Building Expenditures
Career Academies	High School	7.81	Non Special-Instruction Teachers	$12,500.00	General School Supplies
Class Size	Elementary	2.34	Non Special-Instruction Teachers		
Counselors	Elementary	1.64	Counselors		
	Middle School	2.21	Counselors		
	High School	4.21	Counselors		
ELL Support	Elementary	1.21	ELL Teachers	$1,612.64	ELL Supplies and Expenditures
	Middle School	1.77	ELL Teachers	$2,308.77	ELL Supplies and Expenditures
	High School	3.48	ELL Teachers	$4,489.78	ELL Supplies and Expenditures

Intervention	School Prototype	Component			
		Additional FTE	Type of Staff	Costs in Addition to FTE	Type of Expenditure
Extracurricular Activities	Elementary			$17,826.51	Extracurricular Staff Compensation
				$5,942.17	Extracurricular Non-Compensation Supplies and Expenditures
	Middle School			$33,178.30	Extracurricular Staff Compensation
				$11,059.43	Extracurricular Non-Compensation Supplies and Expenditures
	High School			$124,077.89	Extracurricular Staff Compensation
				$41,359.30	Extracurricular Non-Compensation Supplies and Expenditures
Full-Day Kindergarten	Elementary	1.96	Non Special-Instruction Teachers	$599.04	General School Supplies
Instructional Improvement Coach	Elementary	1.00	Other Certificated Support Staff		
	Middle School	1.49	Other Certificated Support Staff		
	High School	1.98	Other Certificated Support Staff		
Key Instructional Programs in Core Subjects	Elementary			$12,359.72	General School Supplies
	Middle School			$17,695.09	General School Supplies
	High School			$34,410.94	General School Supplies
Libraries	Elementary	0.17	Librarian/ Media Specialist	$14,261.21	General School Supplies
		1.00	Aides		
	Middle School	0.06	Librarian/ Media Specialist	$20,417.42	General School Supplies
		1.00	Aide		
	High School	2.00	Aides	$39,704.93	General School Supplies

Intervention	School Prototype	Component			
		Additional FTE	Type of Staff	Costs in Addition to FTE	Type of Expenditure
Parent Involvement and Outreach Coordinator	Elementary	1.00	Professional		
	Middle School	1.00	Professional		
	High School	1.00	Professional		
Special Education Support	Elementary	0.36	Special Education Teacher		
		0.60	Classified Special Education Staff		
	Middle School	1.10	Special Education Teachers		
	High School	3.17	Special Education Teachers		
Substitute Teachers	Elementary			$18,880.00	Substitutes
	Middle School			$21,585.00	Substitutes
	High School			$44,580.00	Substitutes
Summer School	Elementary	0.07	Principal	$2,932.63	General School Supplies
		0.85	Non Special-Instruction Teacher	$8,797.88	Other Building Expenditures
	Middle School	0.09	Principal	$3,854.74	General School Supplies
		1.12	Non Special-Instruction Teachers	$11,564.22	Other Building Expenditures
	High School	0.13	Principal	$5,759.44	General School Supplies
		1.68	Non Special-Instruction Teachers	$17,278.31	Other Building Expenditures
Teacher Professional Development*	Elementary			3 additional days at the total cost of $750 per teacher	Teacher Building-Directed Training and Development
	Middle School			3 additional days at the total cost of $750 per teacher	Teacher Building-Directed Training and Development
	High School			3 additional days at the total cost of $750 per teacher	Teacher Building-Directed Training and Development

Intervention	School Prototype	Component			
		Additional FTE	Type of Staff	Costs in Addition to FTE	Type of Expenditure
Technology Replacement Cycle	Elementary			$8,794.41	Computer Hardware
				$4,397.21	Computer Supplies (other than hardware)
				$4,397.21	Other Information Systems Expenditures (other than hardware and supplies)
	Middle School			$12,587.74	Computer Hardware
				$6,295.37	Computer Supplies (other than hardware)
				$6,295.37	Other Information Systems Expenditures (other than hardware and supplies)
	High School			$24,484.70	Computer Hardware
				$12,242.35	Computer Supplies (other than hardware)
				$12,242.35	Other Information Systems Expenditures (other than hardware and supplies)
Technology Specialist	Elementary	0.87	Technical Staff		
	Middle School	0.61	Technical Staff		
	High School	0.02	Technical Staff		
Tutoring	Elementary	0.72	LAP Teacher		
	Middle School	1.13	LAP Teachers		
	High School	1.50	LAP Teachers		

***** *Building-based teacher professional development is accounted for in supplemental teacher salary. Thus, researchers manually integrated this component back into teacher salary. Please see Appendix J for more information.*

2.4.6 Other Considerations

The research indicates that a substantial proportion of the variation in student achievement can be attributed to differences within schools, instead of between schools[286]. This suggests that schools ultimately are responsible for offering high quality programs with the resources they have available to them.

However, the probability of schools doing so increases dramatically when they have adequate resources that are properly allocated. Furthermore, probabilities of successful student learning increase when the interventions presented here can interact with one another. For example, instructional improvement coaches and teacher professional development both contribute to improved instructional quality. Counselors and campus security officers work alongside social workers to identify and assist students with problems.

The evidence-based method as employed in this study did not attempt to parcel out the precise effects of each individual intervention. In fact, it was assumed that interventions interact in school settings. This interaction was one of the strengths of the approach because it considered schools as integrated educational environments. It can reasonably be assumed that the more of the interventions that are implemented in combination, the greater the likelihood of aggregate student learning gains that exceed the results of any individual improvement in isolation. Over 20 years' worth of research on effective schools confirms that schools achieve significant learning gains when they make a series of changes simultaneously that lead to a school culture focused on student achievement[200]. The interventions included here create such a potential for whole school improvement that results in significant increases in student achievement.

2.5 Professional Judgment Process

This study used the professional judgment method in a somewhat different fashion than it has been used in many other studies. EPIC researchers attempted to constrain professional judgment along several important dimensions through additions to the typical professional judgment process. These dimensions included the following: developing baseline models of each prototype school to define current service levels; identifying research-derived educational interventions among which panelists were expected to select; utilizing an online budget simulation that each panelist completed independently outside of a group setting; and generating immediate fiscal impact data on the effects of each change in the prototype schools that a panel member made in the budget simulation. This augmented version of the professional

judgment method concluded with professional judgment meetings. Such sessions typically comprise the entirety of the professional judgment method, but in this case, the meetings were used to review the results from the online budget simulation completed by panelists in which they reviewed evidence-based interventions and made other recommendations. The meetings then utilized the average results from the budget simulations at each level as the starting point for discussions and recommendations.

2.5.1 Rationale

Professional judgment is commonly utilized in adequacy funding studies. In this study, professional judgment operates within a structured iterative process designed to collect and analyze knowledge from both individuals and groups of experts. The experts in this study, primarily principals and district administrators, were asked to complete online budget simulations in which they reviewed interventions and recommended other changes to the baseline prototype schools. They then saw the fiscal impact of each decision they made. They were also invited to participate in a professional judgment panelist meeting. The goal of this multi-staged process comprising individual and group components and fiscal impact information was to help address some of the most frequent criticisms of the professional process, such as “group think” and “educator wish list.”

One of the strongest criticisms of professional judgment methods, however is the inability to control for expert bias. In the arena of school finance, the problem centers on the necessity of drawing experts from within the educational field who may have a conflict of interest with the outcome of the study. The alternative would be to utilize experts from outside of education, for example from the business community, to make recommendations about adequate school resources. The potential problems with this approach are immediately apparent when employing simulations that contain the level of detail reflected by the prototypes in this study. External experts would be hard pressed to review complex school budgets and decide definitively the resource levels necessary to achieve multi-layered state and federal goals that exist in the context of local community expectations and aspirations for their children.

For better or worse, the educational administrators who work in the Washington educational system possess the greatest expertise and are in the best position to make complex judgments about what constitutes an adequate education within the context of the current school system. Others may be able to design entirely new school systems with different resource needs, but such exercises, while intellectually engaging, are not terribly useful for making fiscal decisions the state must make in the current system of school finance.

2.5.2 Panelists and Recruitment

Researchers recruited professional judgment panelists from several sources. The first group was selected from the principals of improving schools. Invitations were emailed to each of the principals who had expressed interest in being a part of the study, even if they had not completed the improving schools survey. The second pool of potential panelists included school administrators recommended by the Washington Association of School Administrators (WASA). WASA recommended these administrators due to their extensive knowledge of building, evaluating, and balancing school budgets. These panelists had also demonstrated interest in school finance through previous involvement with the Ample School Funding Project, through past and present participation in work groups on school finance, and through leadership roles in WASA. A final group of panelists included four highly respected school administrators with extensive knowledge of and experience in school finance matters. These panelists were each recommended by either Bill Freund or a potential panelist. Researchers sent each of these individuals an email invitation to participate in the study and followed up with phone calls to outline the study and describe the commitment required of panelists.

Fifty-eight panelists originally agreed to participate in the study. Of these, 43 completed budget simulations. Several panelists completed a simulation for more than one prototype school, for a total of 47 completed prototypes. Another seven participants were unable to complete an individual simulation, but participated in one of the meetings.[*]

The final pool of professional judgment panelists was comprised of:

- 24 superintendents
- 6 assistant or deputy superintendents
- 13 improving school principals (6 elementary, 5 middle, 2 high school)
- 2 district finance directors
- 5 district directors of instruction/programs/training/special programs/secondary education

[*] See Appendix E for a list of all professional judgment panelists (those who completed the simulation or participated in one of the meetings).

2.5.3 Online Budget Simulation[†]

The purpose of the online budget simulations was to provide an efficient means to specify the resources necessary to ensure an adequate education for Washington students. There were three different online simulations, one for each prototype school level (elementary, middle, and high school), although each was identical in structure. Most panelists completed only one simulation, although several panelists completed more than one. Researchers asked panelists to recommend changes to any and all aspects of the particular prototype school and its associated interventions.

2.5.3.1 Training

Before completing a budget simulation, all panelists were required to participate in a teleconference training session. Panelists logged into the online budget simulation and observed at their computers as researchers guided them through a step-by-step demonstration of the structure and content. In addition to this walk-through of the simulation, researchers provided detailed information on the study's overall methodology and how the simulations fit into the study. Each budget simulation model contained three main sections, called worksheets—compensation, intervention, and adequacy. Researchers trained panelists in the specifics of each worksheet and provided written directions and explanations specific to each worksheet and its elements. Researchers were also available for technical assistance or to answer questions as participants completed the simulation.

After the training, each panelist had three weeks to complete the simulation. Panelists could login at their convenience to the simulation and specify the resources necessary for the prototype school for the 2004-05 school year.

2.5.3.2 Compensation Worksheet

The compensation worksheet presented information on baseline salary and benefits for each position within the prototype school. As noted previously, researchers derived this information directly from fiscal data as reported by Washington schools and adjusted it based on actual allocation patterns in schools that had demonstrated improvement in student learning.

The budget simulation also included comparison salary and benefits data for several staff positions for which such data existed. Comparison data were obtained for teachers, nurses, and office/clerical staff. The

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[†] For a visual representation of the simulations described in sections 2.5.3.2 (Compensation Worksheet), 2.5.3.3 (Intervention Worksheet) and 2.5.3.4 (Adequacy Worksheet), please see Appendices A or B.

comparison salary and benefits represented the compensation earned by those with similar qualifications in comparable occupations in Washington. Specifically, teacher comparison data identified the average salary and benefits earned by the average employee outside of education with qualifications similar to the average Washington teacher. The data for office/clerical staff and nurses compared salary and benefits for the average office/clerical worker and nurse outside of education in positions equivalent to those within schools. This comparison information was provided for reference purposes only. Panelists were encouraged to consider this comparison information only if they found it useful in informing their own decisions about adequate compensation. Its purpose was to provide a frame of reference for the exercise of judgment by panelists.

Using this compensation worksheet, researchers asked panelists to indicate the average salary and benefits for each position within the prototype school that would be necessary to help ensure an adequate education. If panelists did not have enough information to make an informed decision about a particular position or believed that the baseline salary and benefits were already adequate, they were directed ***not*** to adjust the salary or benefits. Adjusting either the salary or benefits for a position caused the total compensation to be automatically recalculated to reflect the adjustments. All changes made in this first worksheet were automatically reflected in the subsequent intervention and adequacy worksheets.

2.5.3.3 Intervention Worksheet

There were two sections to the intervention worksheet. The first section presented all of the educational interventions designed to improve schooling and were derived from the evidence-based research (described in section 2.4). The intervention worksheet described the components necessary to implement each intervention at the prototype school along with short descriptions of each intervention's possible effects. Panelists could choose to include or not include an intervention by checking a box next to the intervention. When panelists checked the box, the worksheet displayed the predetermined costs of implementing the intervention at the prototype school and across the state at schools of the same level. This cost information for each intervention reflected any relevant changes a panelist made earlier in the compensation worksheet. For example, if participants increased the salary of a counselor on the compensation worksheet, this increase was reflected in the cost of the counselor intervention.

The second section of the intervention worksheet provided panelists with space to propose interventions that were not included in the original evidence-based list. If a panelist chose to add an intervention, the worksheet prompted the panelist to provide information on the necessary components, a rationale for including the intervention, and an estimate of the total cost of implementing the intervention at the prototype school. All interventions suggested by panelists were discussed at the subsequent professional

judgment meetings and were either included or excluded based on the overall recommendation of the panelists attending the meetings.

2.5.3.4 Adequacy Worksheet

The adequacy worksheet integrated the panelist input from the compensation and intervention worksheets and presented this cumulative information for review. This worksheet listed all of the expenditure categories in the baseline school. The first section of this worksheet included staffing categories and allowed panelists to make further changes to staff FTE for each staffing position. The second section included non-staffing expenditure categories such as computer hardware and professional development and allowed panelists to further change total school expenditures in each of these categories.

The first section of the adequacy worksheet contained the following information for each expenditure category:

- Baseline Compensation per FTE Staff (including all salary and benefits)
- Baseline FTE Staff
- Baseline School Expenditure
- Baseline Ratio of Students Receiving Services per One Staff FTE
- Baseline Expenditure per Student Receiving Services
- Adequate Compensation per FTE Staff (determined in the Compensation Worksheet)
- Adequate Staff FTE
- Adequate School Expenditure
- Adequate Ratio of Students Receiving Services per One Staff FTE
- Adequate Expenditure per Student Receiving Services
- Statewide Expenditure

Data appearing in the *Adequate Compensation per FTE Staff* cells reflected panelist changes from the compensation worksheet for each respective staff position. If the participant did not make any changes to a particular staff position, this compensation level reflected baseline compensation for the position. Data appearing in the *Adequate Staff FTE* column were the result of the selection of particular interventions or combination of interventions in the previous worksheet. For example, the selection of the class size intervention in the intervention worksheet added additional teacher FTEs to the baseline FTEs and presented the sum as the *Adequate Staff FTE* for teachers in the adequacy worksheet. Blank cells in the *Adequate Staff FTE* column indicated automatic default to the *Baseline Staff FTE*, pending panelist changes. In this section of the adequacy worksheet, panelists could change the *Adequate Staff FTE* further

or enter what they believed to be adequate staff FTE into this column if they did not feel the existing resources were adequate. If panelists did not have enough information about a staffing component or believed the *Baseline Staff FTE* was already adequate, they were instructed NOT to enter any data into this column.

All subsequent columns in this section of the worksheet recalculated based on both the *Adequate Staff FTE* column and the *Adequate Compensation per FTE Staff* column. As a result, panelists could see in real time the effects of their recommended staffing and compensation levels on total prototype school expenditures, student-to-staff ratios, per student expenditures, and statewide education expenditures.

The second section of the worksheet contained the following columns:

- Baseline School Expenditure
- Baseline Expenditure per Student Receiving Services
- Adequate School Expenditure
- Adequate Expenditure per Student Receiving Services
- Statewide Expenditure

In this section of the adequacy worksheet, data appearing in the *Adequate School Expenditure* column reflected the expenditures associated with the selection of particular interventions. For example, the selection of the technology replacement cycle intervention added expenditure in this column to each of the information system expenditure categories. When cells in the *Adequate School Expenditure* column were blank, this indicated automatic default to the *Baseline School Expenditure per Component*, pending panelist input. Panelists could then modify or enter data in the *Adequate School Expenditure* column. The last two columns automatically recalculated based on changes made to the *Adequate School Expenditure* column.

Upon completion of the budget simulation, panelists were able to review an initial adequacy prototype school. This provided each panelist with a comprehensive profile of a school capable of delivering an adequate education and the associated costs of such a program. This approach integrated the evidence-based method and the professional judgment method, while inserting safeguards to help ensure that each panelist gave serious consideration to the effects on student learning of each proposed change along with its cost effectiveness.

2.5.4 Reviewing and Adjusting Simulation Results

When each panelist had completed the simulation, researchers aggregated and averaged the results to produce draft versions of the adequacy prototype schools. An educational intervention was included in a draft prototype if at least half of the panelists selected the intervention for that school level. For each school level, the educational interventions were ranked according to the percent of panelists who selected the intervention. EPIC researchers presented this intervention ranking information to panelists at the professional judgment meetings and asked panelists to comment upon and make recommendations concerning interventions for which there was any question of the level of support for inclusion.

2.5.5 Professional Judgment Meetings

The professional judgment meetings were held on May 23rd and May 25th, 2006, in Spokane and Renton, respectively, to discuss the results of the simulations and recommend changes as needed. These meetings were held to ensure that panelists had the opportunity to hear and consider each other's decision rationale. The combination of individual simulations and group discussions helped to address inherent limitations of utilizing each data collection approach in isolation. Panelists participated in the meetings by attending in person or via videoconference. Most of the panelists had completed the simulation and all were familiar with the process that had been conducted to date.

All panelists received copies of the aggregated draft adequacy models. In addition, each panelist received the rankings of the educational interventions and a worksheet where they could provide detailed feedback. Each meeting began with a presentation of the study and a brief question and answer period, followed by group discussions of the simulation results for each model. Panelists reviewed each component of the adequacy model and commented upon those of interest. They also raised issues of concern, identified areas they felt had not been adequately addressed, and offered general comments on the prototypes.

Researchers then used panelist feedback to adjust the adequacy prototypes. The final calculations based on all panelist input are referred to in this study as *Professional Judgment Expenditures.* It is worth noting that these expenditures include the additional building-directed professional development recommended by panelists as part of teacher salary. The Washington educational accounting system codes this professional development expenditure into teacher supplemental compensation that comprises part of teacher final salary. Thus, researchers manually added the recommended professional development back into teacher salary (recommended teacher salary + recommended building-directed teacher professional development).

The study concluded that the best method for determining adequate teacher compensation was to use specific data on teacher wages and the wages of comparable professions in order to target wage adjustments. This conclusion was reached based on the significant proportion of the state education budget devoted to teacher compensation and the need to achieve the most accurate determination of adequacy in this important category of expenditure. Section 2.6.1 describes the rationale for the teacher wage analyses along with descriptions of the analyses.

2.6 Teacher Wage Analyses and Adjustments

The next inputs into the model were adjustments to teacher compensation. As described in the previous section, professional judgment panelists had the opportunity to adjust teacher compensation to levels they considered adequate. The input of the professional judgment panelists was an essential part of the simulations as it gave panelists information about the fiscal impact of changes in teacher compensation on education costs at the school level and statewide. It was necessary for panelists to complete salary information for them to have a more accurate fiscal projection of all the costs that they were adding to the prototype school—personnel, non-staff expenditures, and salaries. However, it is unlikely that panelists had access to information about the most effective ways to target teacher salary changes, nor could researchers expect panelists to take into account regional variations, salaries in non-educational professions, and other factors that might influence necessary salary.

Due to the fact that teacher compensation is generally the largest expenditure within a school, it was important to conduct the most specific analysis of teacher compensation possible. The extensive data available on teacher salaries and comparable profession salaries allowed for comparisons between teachers and other professionals within certain labor markets. It also allowed for complex comparisons between teachers in different schools and districts. Researchers used the wage analyses described below instead of panelist recommendations about teacher salary in order to capture wage variation and target teacher wage increases to particular schools and districts that would benefit the most from increases. Research suggests that targeted teacher salary increases may be more effective than across-the-board increases[287].

The wage analyses identified wage patterns that may make it more difficult for certain schools and districts to recruit and retain the highest quality candidates, and then adjusted compensation in these schools. This next section describes the rationale and processes for conducting teacher wage analyses and adjusting teacher salaries.

2.6.1 Rationale

Teacher quality is generally considered to be one of the most important components of educational quality and student academic performance. A number of studies document the relationship between teacher characteristics and student achievement. Hanushek, Kain and Rivkin conclude that at least 7% of student test score variation may be explained by teacher quality[288]. Other research supports the link between student outcomes and two other specific measures of teacher quality—teacher performance on a statewide certification exam and selectivity of the colleges attended by teachers[289, 290]. Although 98.9% of 2004-05 Washington classes were taught by teachers meeting NCLB highly qualified standards, it may be possible to employ even better teachers who are capable of meeting the highest possible quality standard for teaching. Consequently, the teacher wage analyses conducted in this study sought to determine if increases in teacher compensation are likely to help schools employ the best teachers available.

The research indicates that targeted teacher salary increases may help schools with difficult working conditions recruit and retain quality teachers, while across the board teacher salary increases may be less effective[75, 291-295]. Specifically, schools or districts that pay a higher teacher salary relative to other schools or districts may be able to recruit higher quality teachers than lower paying schools or districts[291, 292, 294]. In addition, the literature suggests that schools or districts offering higher salary levels may be able to recruit or retain teachers who may otherwise choose another profession[293, 296-299].

The state of Washington recognizes the potential value of targeted teacher salary increases. OSPI is considering a proposal to offer financial incentives to attract excellent teachers to hard-to-staff schools in the 2007-09 biennium[300]. According to the proposal, data indicate that “the poorest schools are often staffed with the least experienced staff”[300]. Furthermore, the report notes that “teacher salaries in Washington state are becoming less competitive when measured against salaries in other fields”[300]. One of the proposed solutions is to offer a salary increase for teachers who teach in schools where 60% or more students qualify for free or reduced price lunch[300].

In this study, the comparable wage approach is used to determine the level of compensation needed to recruit and retain the best teachers in a competitive labor market, while the hedonic wage approach is used to determine the level of compensation necessary to give all schools an equal chance to employ the best teachers. These analyses attempt to account for as many factors as possible that may affect teacher career decisions. However, this study does not claim to quantify or capture all factors that may have an

impact on teacher choices because the data are simply not available to do so. For example, a supportive principal or proximity to family members may entice teachers to remain in a particular school despite a high labor market demand for their skills outside of education. There is no current data set that captures all of the factors that influence teacher career choices.

2.6.1.1 Comparable Wage Rationale

The comparable wage approach seeks to determine the adequate level of teacher compensation that will allow schools to compete with other professions for the best teachers. A number of studies have found a link between districts' salary levels and teacher characteristics that may be related to teacher quality[291, 292, 296]. One study suggested that teachers in higher paying districts are less likely to leave the profession than their peers in lower paying districts[298, 299, 301]. The research indicates that teachers also compare the financial benefits of teaching to other professions when making career decisions[293, 297, 299, 302, 303]. There is evidence that teacher salary levels may indirectly impact student outcomes. For instance, one study estimated that when other factors are equal, a 10% raise in teacher wages would reduce student dropout rates by 3-6%[287]. Goldhaber and Player note that the opportunity costs associated with teaching are not the same for all teachers and that single salary systems (such as Washington's statewide salary schedule) may hinder schools in their recruitment of high quality teachers who are in high demand in the labor market[293].

2.6.1.2 Hedonic Wage Rationale

The hedonic model is an equity analysis that seeks to give all schools an equal opportunity to employ the best teachers. The research documents general teacher preferences for employment in schools with high achieving, higher income students[293-295]. These preferences result in an unequal distribution of the best teachers to high performing, high wealth schools that may present fewer teaching challenges.

Recent Washington studies (as identified in section 1.3.11.6) suggest that schools with higher rates of low-income students may be at a competitive disadvantage when it comes to recruiting and retaining the best teachers. A 2005 report by the University of Washington Center for Strengthening the Teaching Profession found in a study of 20 Washington school districts, that schools with higher proportions of low-income students generally retained fewer teachers over a five-year period[182]. Another study suggests that teachers in particular regions of Washington are less likely to hold advanced degrees and tend to have less teaching experience than teachers in other regions[38].

The results of these studies suggest that schools and districts with more low-income students may need to offer incentives such as higher teacher compensation in order to recruit and retain the best teachers. One

study concludes that within particular labor markets, the districts paying the highest salaries also tend to employ the most qualified teachers[291]. Another study by the same author suggests that schools may be able to lure high quality established teachers from other districts by offering higher salaries[292]. This finding supports the conclusion that a district's salary level relative to other districts is an important factor in enticing teachers to switch districts[294]. The hedonic wage model provides necessary insight about how to target teacher wage increases to the schools and districts that need them most.

2.6.2 Data Sources

The teacher wage analysis data were extracted from a number of sources. Student demographic and enrollment data were downloaded from OSPI's report card website. The S275 reports provided teacher-level data for school years 2000-01 to 2004-05. These data included information on more than 50,000 Washington teachers from 2000 to 2005, with details on teacher education level, experience, current work assignment, and salary. School level personnel budgets were also calculated from data in the S275 reports. FTE assignments and relevant salaries of all certificated and classified staff were collapsed from this file into school level personnel budgets (per student) for school years 2004 and 2005. Outliers and/or schools with significant missing and/or irregular data were then extracted from the data set. Some school characteristics were unavailable in some of the years.

Other data sources included the U.S. Census Bureau's Integrated Public Use Micro-data System (IPUMS), with information on 5% of all employed individuals in the State of Washington between the ages of 25 and 65. This study also used regional and economic data from the U.S. Census data that were processed for Washington by Claritas Inc. School spatial calculations utilized Microsoft MapPoint and school building geo-coding data from OSPI.

These analyses relied largely on U.S. Census data, and the last year of Census data collection was 1999. Therefore, the comparable wage analyses began by using 1999 data that were subsequently adjusted to 2005 dollars.

2.6.3 Comparable Wage Approach Procedures

The comparable wage approach in this study accounted for wage differences that may exist between teachers and other professions within individual labor markets, with the goal of making the teaching profession more economically competitive in labor markets where teacher wages differ from wages in other professions. Comparable wage adjustments for teachers were estimated by evaluating the competitive wages of workers in other industries requiring similar education levels and professional skills

as teachers. The study assumed that the wages of non-teachers vary across regions within Washington and thus evaluated each labor market individually. This study also assumed that teacher wages within these regions should be competitive with other local industries requiring comparable skills or teachers and potential teachers may choose to work in those industries instead of teaching.

The study utilized two samples of non-teachers. Both of the samples were restricted to individuals holding Bachelor's or Master's degrees (like the vast majority of teachers). Both samples also excluded high-wage professional degree holders, including doctors and lawyers, and postsecondary faculty, because these individuals may not be evenly distributed across the state. Finally, both non-teacher samples excluded individuals earning less than $20,000 a year. The first non-teacher sample included all non-teaching individuals who met the set of specifications described above, while the second sample of non-teachers excluded individuals in leadership and management positions because these individuals tend to have different levels of responsibility than teachers within their organizations. This second sample also excluded individuals working in highly specialized fields such as architecture or nurse anesthetists because these fields are unlikely choices for teachers and teacher candidates as shown in Appendix F. The first sample is referred to henceforth as *all non-teachers,* and the second sample is referred to as *non-teachers with exclusions*.

Thus, both samples of non-teachers met the following specifications:

- Included only individuals holding Bachelor's or Master's degrees
- Excluded high wage professional degree holders (such as doctors, lawyers, and postsecondary faculty)
- Excluded those earning less than $20,000 per year

The second sample (non teachers with exclusions) also met the following specifications:

- Excluded individuals in leadership and management positions
- Excluded individuals in highly specialized fields (such as architecture and nurse anesthetists)

In order to perform the comparison between teachers and both samples of non-teachers, researchers used a regression model comparing salaries within a number of Washington labor markets. The comparable wage model controlled for occupation, industry, and personal factors, including education level and age. The comparable wage model in this study utilized the same data and same basic equation structure as the recently released NCES Comparable Wage Index model[304].

The regression model is specified as follows:

$$\mathbf{Wage_i = f(Work_i, Education_i, Personal_i, Region)}$$

Wage is the income from wages (natural log) reported by individuals to the U.S. Census Bureau in 1999. Non-teacher salaries were adjusted to account for the shortened teacher calendar. However, the study could not quantify the incentive of working a shortened school year. The model included *Work* dummy variables for each individual's occupation and industry. *Education* is a dummy variable indicating that an individual holds a Master's degree (versus a Bachelor's degree only). *Personal* attributes included age (as a proxy for work experience), race, and gender. Individuals whose occupation was "teacher" and industry "elementary/secondary education" were excluded. Dummy variables were also included for the metropolitan area or *Region* that is the worker's place of work.

The comparable wage approach examined the incentives to choose teaching as a profession for individuals who desire to live and work in a particular labor market. This comparable wage approach does not look at teachers who are mobile and willing to change schools, districts, or move into or out of the state. The hedonic model, however, addresses teacher mobility between schools and districts.

2.6.4 Hedonic Wage Approach

The purpose of the hedonic wage approach was to ensure that all schools and districts have an equal chance to recruit and retain the best teachers available. Educational research indicates that teachers' career choices are driven primarily by their working conditions[295]. There are a number of school working conditions that are typically considered outside the control of school administrators and educational policy makers. These include location, student population characteristics, crime and safety issues, and, to some extent, facility quality and age. Therefore, it may be necessary to offset poor working conditions by offering other incentives to entice the best teachers to work in schools with challenging working conditions. The hedonic model in this study measured how much variation in salary would be required to give schools and districts with high rates of low-income students an equal chance to recruit and retain the top teachers. The model accounted for work-related factors, personal and professional attributes, and external conditions such as cost of living, access to amenities, and working conditions.

Researchers estimated a hedonic wage model for teacher compensation using a regression model and data on individual teachers. The analysis produced two sets of salary calculations. For illustrative purposes, the first set of calculations included base contract teacher salary only, and the second set utilized final salaries, including supplemental teacher salary beyond the base contract. The recommended adjustments

were based on final teacher salary including supplemental salary because these results are more sensitive to differences in working conditions.

The basic structure of the hedonic model is specified below:

$$\mathbf{Wage_t = f(Degree_t\ Experience_t, Assignment_t, Working\ Conditions_s, Amenities_r, Costs_r, Demand_d)}$$

Wage refers in one set of models to the teacher base contract salary and in another set to the teachers' total final salary, including supplemental pay. *Degree* and *Experience* level, along with characteristics of the teachers' *Assignment*s (e.g., FTE days and hours), were also included at the teacher level. *Working Conditions* were included at the school level and include school size characteristics, grade level and student population characteristics. *Amenities* variables were included to account for the tastes of teachers for access to certain amenities. It is generally assumed, for example, that employees may be willing to trade wages for access to greater amenities, such as those available in larger cities or towns. Some of the higher costs of living in a metropolitan area may be offset by the amenities that come with the opportunity to live in the area. *Cost* variables were included to capture distributional characteristics of the housing market that may influence cost of living for teachers. Finally, two *Demand* factors were included in the model—the percent of families with school-aged children and taxable property wealth of the local public school district. These factors were included to capture the likelihood of local support for circumventing statewide salary restrictions or, in other words, to help discern whether districts are paying teachers more because of costs or because of local demand.

Researchers performed analyses at the district and school level. The district-level hedonic model assessed factors that may impact teacher salary in districts across the state and also districts within King County. Then, a separate school-level hedonic model of Seattle assessed the need for salary adjustments for schools with very high levels of low-income students. This school level model was estimated because this study produced prototype ***schools*** instead of prototype ***districts***. Researchers examined King County districts and Seattle schools in particular because both have large numbers of teachers.

Researchers used the results of the comparable wage and hedonic models to determine the overall teacher wage adjustments needed across the state. The results of the wage analyses were integrated into the professional judgment results in order to calculate the *Wage Analysis Expenditures*.

2.6.5 Integration of the Teacher Wage Analyses with the Professional Judgment Approach

The results of both the comparable wage and hedonic wage analyses (described in section 3.2) indicated that teacher wage adjustments were needed for teachers in particular schools and districts. The total effects of the recommended adjustments from both approaches were averaged across all teachers in the state. The calculation of a statewide average teacher salary should not be misinterpreted to indicate that a single statewide salary system is the only way to achieve adequacy. Instead, the study recommends that teacher wage increases be targeted to schools that would benefit the most from the increases. The statewide average accounts for the necessary teacher salary adjustments only for teachers in particular schools and districts where adjustments are needed to help recruit and retain the best teachers. The effect of the targeted increases naturally raises the state average.

This average adequate teacher salary, as determined by the wage analyses, was included in the aggregate prototype budget simulations from the professional judgment approach. However, it was first necessary to account for the increased building-directed teacher professional development that was recommended by panelists because this component is accounted for as part of teacher final salary. The inclusion of teacher professional development in teacher final salary increased the salary level slightly. Please see section 3.2.3 for a description of this complex calculation.

Researchers determined the adequate teacher benefit level by using the benefit-to-salary ratio that panelists recommended for teachers in the budget simulations and multiplying this percentage by final adequate teacher salary. When researchers included new salary and benefits in the aggregate prototype simulations, new expenditure totals were calculated for each prototype school. The new expenditures were referred to in this study as the *Wage Analysis Expenditures*.

To summarize:

1. The teacher wage analyses indicated the necessity for teacher salary adjustments in particular schools and districts.
2. Researchers used these targeted teacher salary increases to calculate an average adequate salary for teachers statewide.
3. The additional building-directed teacher professional development expenditures recommended by panelists were added to the average adequate teacher salary.

4. Adequate teacher benefits were determined by multiplying the average adequate teacher salary by the same benefit-to-salary ratio proposed by the professional judgment panelists.
5. Both the adjusted adequate teacher salary and adequate teacher benefits were inserted into the aggregate professional judgment budget simulation for each prototype school.
6. The budget simulation produced *Wage Analysis Expenditures* for each prototype school.

2.7 Cost Function Method

The final analytic framework applied in this study was the cost function method, which was utilized in order to determine how variations in student family income and school size affect schools and to adjust the prototypes based on this information. The cost function was not used to create cost adjustments for any other factors in large measure because no other variable yielded significant differences among schools in a fashion systematically related to the variable.

2.7.1 Rationale

The cost function method was utilized in this study to capture the variance present among the entire range of Washington schools and to identify any particular variable that necessitated targeted adjustments in school funding above and beyond the findings generated by the adequacy prototypes. The prototype school approach is an appropriate way to identify a set of adequate resources for schools with characteristics similar to the prototype schools. However, the prototype school approach is not as effective in dealing with schools that are vastly different from the prototypes. This is not a terribly problematic issue for schools with very few differences from the prototypes. These schools are likely to do as well or better than the prototypes with the resources provided. Schools that differ dramatically on one or more variables however may require specifically targeted resources to achieve similar results.

The study identified two key areas where some Washington schools vary considerably from the prototype schools. These are small schools and schools with high concentrations of students from low-income families. It is generally accepted that schools in these categories require more resources in order to educate students adequately.

One way to account for small school size or a high proportion of students from low-income families is to construct different prototype schools to represent these different conditions. Such an approach suffers from an inability to be adjusted to the extremes. A prototype school with 75 students may not represent

well the situation faced by a school with 25 students. A school with 70% of its students eligible for free or reduced price lunch may be different in important ways from one where 100% of its students are eligible. The cost function method has the advantage of calculating an adjustment appropriate for each school along the continuum or variable being studied. This allows for the distribution of cost differences across the entire range of the variable. As a result, this approach provides more precise adjustments to the per student expenditures for students in small schools and in schools with high proportions of students eligible for free or reduced price lunch.

2.7.2 Data Sources

The data used in the cost function analyses were extracted from many of the same sources as the wage analyses data. In addition to the S275, the cost function analyses utilized a number of other sources. Expenditure data were extracted from OSPI's F196 reports, and enrollment data were taken from OSPI's P223 reports. In addition, data collected from the P105 were used to provide grade-by-grade enrollment information at the school level. These P105 data reflect snapshot headcounts in the fall of 2004 and the spring of 2005. The P105 is the only available statewide source containing unduplicated building-by-building enrollments for each grade. A final data set was downloaded from OSPI's report card website. This set included information on WASL scores, student demographics, enrollments, graduation rates, and special education participation rates. Total school building personnel costs were estimated by summing the salary and benefits of all certificated and non-certificated staff in each school.

This study generated overall cost indices for each school in the state of Washington and then observed how those indices varied across schools by rates of low-income students and by size. One unique feature of the analysis was the estimation of a school-level cost function, which is not common. Most cost function analyses use district-level data on spending and outcomes.

2.7.3 Procedures

The cost function analyses utilized recent data on spending, schooling outcomes, student characteristics, and school characteristics to determine how costs vary across schools. These data were included in regression equations that showed how Washington schools distributed along a continuum on these variables. The resulting calculations demonstrated how costs were distributed across the range of schools, where adjustments needed to be made, and how much adjustment was required to enable all schools along the continuum to deliver an adequate education when particular variables were taken into account. The

analysis highlighted schools that incur costs significantly greater than the prototypes reflect in particular areas.

This allowed for targeted increases to be calculated only for those schools for which special conditions exist. The calculation restricted the amount of the increase to the amount above what the schools would already receive under the adequacy prototypes. In other words, the cost function equations yielded a total amount of money that is required to address the special needs of particular types of schools. That figure was added to the total amount generated by the adequacy prototype schools. It is assumed that the state would then distribute those funds specifically to those types of schools and that the total amount of money in the state education budget would be adequate to allow for such a distribution.

EPIC researchers used the cost function method to forecast the costs of achieving desired levels of educational outcomes, where outcomes are a measure of product (educational quality). One of the assumptions of the cost function method was that some students cost more to educate than others, and some school configurations cost more to operate than others. The educational cost function method accounted for the fact that educational costs vary from school to school in certain important categories and that it is necessary to adjust resources for schools facing particular challenges, such as high proportions of low-income students or very low enrollment.

The cost function equation included variables that represent spending per student, inefficiency, student performance outcomes, student demographic information, school and district organization, and regional price of goods and services. These factors were assembled into an equation that is derived from research and previous education cost function analyses conducted by Thomas Downes and Thomas Pogue (1994), William Duncombe and John Yinger (1998), Andrew Reschovsky and Jennifer Imazeki (2001), and Timothy Gronberg, Dennis Jansen, Lori Taylor, and Kevin Booker (2004)[305-308].

The primary difference among the approaches taken by various authors is in the accommodation of inefficiency in the model. Within current spending behavior of schools or districts, the equations in this study assumed and accounted for at least some inefficiency. While perfectly efficient schools should always be the goal, no organization of any complexity is able to approach perfect efficiency. Schools are no exception in this regard. In the cost model, factors may be grouped as those within and those outside of district or school control. Student characteristics, for example, are outside district or school control. Student outcomes and district inefficiency are within control of the district or school. This cost function was designed to isolate the costs of achieving outcomes less any inefficiency. The method yields

appropriate and reasonable estimates of costs that distribute across the entire range of schools with a measure of impartiality.

The cost function equation utilized in this study is specified below:

$$\textbf{Spending per Student}_s - \textbf{Inefficiency}_s = f(\textbf{Outcomes}_s, \textbf{Students}_s, \textbf{Organization}_{sd}, \textbf{Price}_r)$$

Spending per Student represents per student expenditure at the school level. *Inefficiency* is the difference between any one school's actual expenditure and its predicted expenditure, if it produced outcomes as efficiently as the most efficient schools. The *Outcomes* measure is constructed by summing the percentages of students scoring proficient or higher across the four subject areas tested by the WASL—science, writing, reading, and math. This creates an index value ranging from 0 to 4 theoretically, and from 0.15 to 3.86 in 2005. To create predicted costs, the outcome measure is set to the average cumulative index value for schools at specific grade levels, for each year. Predicted costs are based on costs of achieving state average proficiency rates across the four tests, for schools at each grade level. Thus, the cost models estimate how costs vary across children and settings to achieve state average outcomes across the four WASL subject areas. *Students* represents student population characteristics such as family income levels and language proficiency rates at the school level. *Organization* encompasses school and district organizational characteristics such as size, location, and grade range. *Price* is the regional or labor market costs of hiring teachers. This variable helped to capture cost-of-living factors but was also constrained by the statewide salary system.

The results from the cost function analysis suggested that the prototype expenditure levels required further adjustments. These specific adjustments are discussed in detail in the findings section. In order to make adjustments to the prototypes, the cost function calculations included the *Wage Analysis Expenditure* for each prototype school. However, the cost function analyses utilized the enrollment numbers from actual Washington schools. These individual schools do not all have grade ranges that conform to the study's prototype ranges of K-5, 6-8, and 9-12. As a result, it is not possible to calculate an adequate expenditure level per student by prototype school. Instead, the adjustments based on the cost function analyses produce only one final per student expenditure level for all students. This is what is reported in the findings section and the executive summary.

2.8 Design Rationale

The field of education finance policy has changed markedly over the past 20 years. For most of the 20th century, school finance policy discussions focused primarily on equity issues related to the wide ranges in per student expenditures across districts within a state and the dramatic variations in property tax base from district to district[309]. During the 1990s, as state education policy became more concerned with student learning outcomes, education finance policy shifted its focus to the relationship among state expectations for schools, education funding and student achievement. This focus led to the emergence in the early 1980s of adequacy funding lawsuits and their more frequent appearance during the 1990s and the first decade of the 21st century.

Adequacy funding studies have been the subject of controversy and debate since they first emerged. One of the most vocal critics is Erik Hanushek, an economist at Stanford University, who contends that the methods employed by adequacy studies are not scientific and are not proven to calculate expenditure levels that are guaranteed to produce particular student outcomes for every student[310]. His critiques are built around a certain logic that is impossible to refute fully because there is no way currently nor will there likely ever be a way to determine the exact dollar amount that will guarantee that each and every student will meet a particular academic standard. Each student is unique, and it is impossible for any study to measure all potential factors that affect student performance. The expenditure level that would enable one low-income student with limited English proficiency to meet standards may not be sufficient for another student with the same characteristics but less motivation. Indeed, the complex process of first identifying and then quantifying the innumerable variables necessary to improve educational outcomes makes it difficult to develop a fully "scientific" and formulaic approach to adequacy.

This challenge, however, is not unique to the field of education finance policy. Much of educational research and social science research in general is faced with the reality of limited empirical findings to guide resource and policy-making decisions. This imperfect reality, however, does not negate the necessity of making informed policy decisions. This study uses an approach that captures the best evidence, methods, and data currently available in order to estimate as accurately as possible the amount of money needed to fund Washington schools adequately.

This study operates within the conceptual framework of probabilistic decision-making, which "is primarily concerned with making the best decisions based on less than perfect information"[311, 312]. Probabilistic decision-making can be found in many arenas that affect daily life and is commonly employed in many areas that require forecasting—economics, political science, engineering, planning,

and meteorology. Probabilistic decision-making has proven essential to modern life, where most human activity occurs within or is directly affected by complex systems that cannot be fully understood or measured.

Critics have called into question the viability of using probabilistic costing-out methods. As Hanushek remarks, “Costing out studies lack a sound scientific basis and typically point to inefficient and ineffective policies”[313]. However, summarily dismissing all costing-out methods in educational finance because they are not completely “scientific” is akin to arguing that no decision should be made in any area where some form of estimation is required as an element of a decision. If this were the case, policy decisions would be severely restricted in areas such as state revenue forecasting or highway planning[62], among many others. The probabilistic adequacy approach utilized in this study is analogous to the contingent valuation method (CVM) employed in environmental economics. As Duncombe describes it, “CVM research attempts to develop forecasts for complex phenomena (e.g., willingness to pay for environmental quality), and the results of this research have been used as evidence in high-profile litigation”[62]. The use of probabilistic decision-making is both ubiquitous and necessary in a world of imperfect information.

A second conceptual framework for this study is operations research. This approach helps determine what scientific methods and techniques are most appropriate given the nature of a study. Operations research is typically used to inform decisions in fields such as engineering, the military, urban planning, factory work, scheduling, and a variety of other fields where efficiency is of primary importance. It uses existing data to determine an optimal solution for an operation or system given particular constraints and system-wide goals[314, 315]. This study employs operations research concepts to identify the optimal research design. The result that emerged is a hybrid design composed of six parts: modified versions of the four prevailing cost-of-adequacy methodologies, baseline prototypes, and a teacher wage analysis. This hybrid design is one of the key strengths of the study and is grounded in operations research notions of how best to analyze complex systems problems. The results of the mixed methodology employed in this study represent the expenditure level that is the most accurate estimate of adequacy possible based on the current research, data, and methods available.

Hybrid designs have been used in other studies to make resource allocation decisions. An example that was introduced earlier in the report comes from the public health arena in Oregon. In developing the Oregon Health Plan (OHP) beginning in 1989, the state created a Health Services Commission. The Commission was charged with developing a list of health services prioritized from the most important to the least important in order to make difficult resource allocation decisions. After working with hundreds

of medical specialists, actuaries, and the public, the Commission developed thousands of condition/treatment (CT) pairs that included information about treatment effectiveness, public values and priorities of treatment importance, and the costs of these treatments. The Commission first tried a formulaic approach to prioritization, developing a cost-benefit value for each CT pair. The results of this cost-benefit approach were unacceptable to the state because the approach conflicted substantially with the judgment of all Commission members, both physicians and non-physicians. The problem was that very inexpensive, very effective treatments for trivial conditions (for example, malocclusion or displacement of teeth due to thumb sucking), ranked higher than moderately expensive, moderately effective treatments for very serious conditions.

The lesson learned was that while a cost-benefit analysis could gauge the *cost* of remedying a condition, it could not address the *importance* of treating the condition in the first place[311, 312]. In the end, the Commission prioritized the CT pairs based on public input that was then scrutinized and refined by experts. This use of professional judgment was later challenged in court, and the court determined that the use of expert collective judgment was a legitimate method of determining the OHP priorities[311, 312].

School funding experts across the nation continue to debate the best way to estimate the cost of a constitutionally adequate education. In the absence of a definitive formula to determine adequate school funding, this study employs a mixed methodology in order to maximize the utility of the current approaches and minimize the associated limitations. The hybrid methodology developed for this study can be regarded as the best available means to understand the costs of delivering an adequate education.

3 Findings

The methodology of this study was designed to capture the costs of an adequate education after taking into account the current level of education programming (baseline and improving school methods), effective educational interventions (evidence-based method), and the experience of educators (professional judgment method). The study then adjusted the resulting costs of the prototype schools based on two additional methods. First, a teacher wage adjustment component calibrated teacher compensation to a level necessary to ensure high quality teachers in schools statewide. Second, a cost function analysis determined how to accommodate schools that enrolled high proportions of low-income students or that had few students.

This section provides a summary of the study findings as well as the findings from each method, beginning with the baseline prototype schools, then proceeding to the professional judgment results, the teacher wage analyses adjustments, and, finally, the cost function adjustments. To be specific about how findings from one method connect with results from each subsequent method requires some redundancy in this section. In particular, this study presents findings in different iterations throughout this section in order to show how each consecutive methodological step is connected to the previous steps.

The study's overall finding is that the per student expenditure level needed to provide an adequate education to every K-12 Washington student is $11,678. Table 8 reports the per student adequacy expenditure level generated by each method. *Baseline Expenditure Per Student* numbers are the baseline prototype totals calculated from actual Washington K-12 expenditures in 2004-05 and adjusted by the improving schools methodology. *Professional Judgment Expenditures Per Student* represents the prototype expenditures per student based on the decisions made by panelists. *Wage Analysis Expenditures Per Student* adds teacher wage adjustments to the professional judgment recommendations (minus Professional Judgment teacher compensation recommendations). The *Adequate Expenditure Per Student* total is the final result that incorporates the cost function adjustments. All figures are in 2004-05 dollars.

Table 8: Summary of results (2004-2005 dollars)

	Prototype Schools			
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	Average Across All Prototypes
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065
Professional Judgment Expenditure Per Student	$11,386	$10,293	$10,495	$10,825
Wage Analysis Expenditure Per Student	$11,667	$10,517	$10,733	$11,078
Adequate Expenditure Per Student with Cost Function Adjustments				$11,678

These figures include teacher professional development expenditures in teacher salary. Please see Appendix J for a technical description of how and why these were combined.

The remainder of this section presents the results from each of these approaches in succession, beginning with the baseline prototype schools and the adequacy prototype schools as determined by the professional judgment panels, then the results from the teacher wage analyses, and, finally, the cost function analysis.

3.1 Baseline and Professional Judgment Prototypes

The baseline prototypes represent all K-12 operating expenditures in the state of Washington in 2004-05 (with the exceptions of the small school subsidy and institutional funding). The baseline prototype expenditures are the product of a series of complex statistical procedures and assumptions that are explained in greater detail in section 2.2.* The adjustments based on the improving schools methods are included in these totals, although the adjustments did not change the prototype schools' bottom line expenditures. Per student expenditures were highest at the elementary school level and lowest at the middle school level, as shown in Table 9. Across all K-12 Washington students, the average baseline expenditure was $8,065.

This baseline expenditure level is $189 higher than the per student expenditure figure presented in the 2004-05 OSPI School District & ESD Financial Reporting Summary, Section One[316]. The difference can be attributed to different enrollment numbers used to make this calculation. OSPI uses a broader enrollment base to calculate dollars per student by including institutional enrollment and 0- to 4-year-old special education populations. This study, however, excludes institutional enrollment and 0- to 4-year-old

* For a breakdown of the baseline expenditure categories, please see Appendix H.

special education enrollment. The method used in this study is consistent with the calculation method used by the Washington Office of Financial Management and the Washington Legislature.

Table 9: Baseline Prototype Results

	Prototype Schools			
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	Average Across All Prototypes
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065

These figures include teacher professional development expenditures in teacher salary. Please see Appendix J for a technical description of how and why these were combined.

Professional judgment panelists indicated the need for a number of changes to the baseline prototype schools. Table 10 presents a summary of the changes made to all three levels of prototype schools. Table 11, Table 12, and Table 13 present the additional changes made to specific levels of prototype school based on panelist input.

Table 10: Major changes to all school prototypes

Change from Baseline
Increase School Administrator compensation to a more competitive level to help schools recruit and retain the best candidates.
Increase Teacher compensation to a level that enables schools to recruit and retain the highest quality teachers.
Increase Educational Staff Associates (ESA) compensation to a more competitive level for those who support students.
Increase Classified Staff compensation to a more competitive level for those who provide essential school services.
Increase Principal FTE to account for summer school.
Increase Classified Principal's Office Staff FTE to provide additional support for the leadership and help to meet the increasing duties associated with accountability mandates.
Increase Teacher FTE to staff summer school, decrease the student-teacher ratios for ELL and special education, and provide additional tutoring/small group instruction for students who need additional attention.
Increase Counselor FTE to achieve a ratio of 250 students per 1 Counselor to provide support for students.
Increase Social Worker FTE to ensure there is at least one FTE at every school to help recognize, prevent, and deal with problem behaviors among students.
Increase Nurse FTE to ensure there is at least one FTE at every school.
Increase Other Certificated Support Personnel FTE to improve instructional quality through the observation, coaching, feedback, and mentoring of teachers.
Increase Aide FTE to add additional support personnel in the library.
Increase Classified Professional FTE to add a Parent Outreach Coordinator at each school.
Increase Technical FTE to ensure there is at least one FTE on site to update and maintain computers, troubleshoot problems, and train teachers about how to integrate computers into their instruction.
Increase the number of substitute teachers to provide 4 additional days of absence per FTE teacher per year in order to allow teachers to take advantage of professional development opportunities.
Increase English Language Learner (ELL) supplies and expenditures to provide additional language textbooks and other supplies.
Increase expenditure on general supplies to help improve instruction in reading and math, to improve library supplies, and to use in summer school.
Increase expenditures on information systems to replace hardware, software, and other computer supplies before they become antiquated.
Add 4 additional days of building directed teacher training and development to provide training that is specific to school goals and teach teachers how to identify and deal effectively with problem behaviors among students.
Increase other training and development expenditures to provide training and development for principals.
Increase other building expenditures necessary to operate the school during summer school.
Increase extracurricular compensation and expenditures to provide a variety of extracurricular activities at each school.

Table 11: Additional changes to the elementary school prototype

Change from Baseline
Increase Assistant Principal FTE to provide additional leadership and support for the Principal.
Increase Teacher FTE to staff full-day kindergarten and decrease class size.
Increase Librarian FTE to ensure there is at least one FTE at every school.
Increase Classified Special Education Staff FTE to achieve a ratio of 25 special education students per 1 Classified Special Education Staff.
Increase expenditure on general supplies to provide full-day kindergarten to all students.

Table 12: Additional changes to the middle school prototype

Change from Baseline
Increase Assistant Principal FTE to provide additional leadership and support for the Principal.
Increase Librarian FTE to ensure there is at least one FTE at every school.
Increase other building expenditures in order to increase the security of the school campus.

Table 13: Additional changes to the high school prototype

Change from Baseline
Increase Teacher FTE to offer career academies within the high school.
Increase expenditure on general supplies to provide career academies within the high school.
Increase other building expenditures in order to increase the security of the school campus.

Table 14 displays the numerical findings from the professional judgment methodology.

Table 14: Baseline and professional judgment results

	Prototype Schools			
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	Average Across All Prototypes
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065
Professional Judgment Expenditure Per Student	$11,386	$10,293	$10,495	$10,825

These figures include teacher professional development expenditures in teacher salary. Please see Appendix J for a technical description of how and why these were combined.

These results of the professional judgment methodology suggested the need for a 40% expenditure increase at the elementary school level, a 29% increase at the middle school level, and a 31% increase at

the high school level. Across all K-12 Washington students, the panelists determined that an additional $2,761 per student was necessary to achieve adequacy, which is an expenditure increase of 34%.

3.2 Teacher Wage Analysis Results

The teacher wage analyses informed the specific adjustments to teacher salary. In order to conduct the teacher wage analyses, it was necessary to use baseline (actual) teacher salaries in order to compare existing teacher salaries across the state. Thus, the teacher wage adjustments did not incorporate the recommendations of the professional judgment panelists regarding teacher compensation. Panelist recommendations on teacher compensation were removed and replaced with the adequate teacher salary determined by the wage analysis findings, but panelists did recommend a salary increase of $6,200 for the average teacher in the prototype schools, indicating recognition of the need for adjustments to teacher salary to improve education. The teacher wage analyses were utilized in place of panelist recommendations because the analyses allowed teacher salary adjustments to be calculated based on the assumption that they were being targeted to the schools and districts that would benefit the most from increased teacher salaries. This was more precise than the across-the-board recommendations generated by the Professional Judgment method.

The comparable wage analysis first identified necessary teacher salary adjustments based on the salaries earned by individuals in comparable professions within particular regions of the state. These analyses identified metropolitan areas with significantly higher salaries for non-teachers and then compared teacher salaries to these non-teacher salaries in order to determine necessary adjustments. The hedonic wage analyses identified and adjusted for teacher salary inequities among districts and schools.

3.2.1 Comparable Wage Analysis

As discussed in section 2.6.3, the comparable wage analysis presents comparisons between K-12 teachers and two other distinct samples—all non-teachers, and non-teachers excluding leadership, management, and highly specialized professions (non-teachers with exclusions). The non-teacher salaries were adjusted to account for the shortened teacher calendar. Table 15 compares the average salary of individuals in each metropolitan area to the average salary of individuals outside of an identifiable metropolitan area for each sample. The table does not compare average teacher salaries to average non-teacher salaries. The row *Not in identifiable metro area* is empty because it is the comparison row for every other metropolitan area. In Table 15, three stars in the column $P>t$ indicates when this variation was statistically meaningful. No stars in the $P>t$ column indicates that the average salary for that particular region and sample is not

statistically different from the average salary for the sample outside of an identifiable metropolitan area. The *coefficient* is an indicator of the relative size of the difference. For example, the average salary for all non-teachers in Richland is higher than the average salary for all non-teachers outside of an identifiable metropolitan area.

Table 15: Comparable wage model estimates for Washington State in 1999

	All Non-Teachers		Non-Teachers with Exclusions[a]		K-12 Teachers	
	N=24,759		**N=14,459**		**N=2,679**	
Metro Area	Coefficient	P>t	Coefficient	P>t	Coefficient	P>t
Not in identifiable metro area						
Bellingham	-0.006		-0.021		-0.029	
Bremerton	0.027		0.015		0.005	
Olympia	0.024		0.026		-0.020	
Portland-Vancouver	0.087	***	0.058	***	-0.005	
Richland	0.114	***	0.096	***	-0.013	
Seattle	0.105	***	0.083	***	-0.014	
Spokane	-0.020		-0.016		-0.011	
Tacoma	0.062	***	0.055	***	0.007	
Yakima	0.042	*	0.037		-0.021	

[a] Excluding leadership/management positions, architecture and engineering, and healthcare professions
**p<.10, **p<.05, ***p<.01*

Using the most recent and available U.S. Census data from 1999, the analysis found that teacher wages did not vary significantly between different regions of the state. Specifically, the analysis showed that teacher salaries were not statistically different outside of a metropolitan area than they were in any particular labor market. This result is not surprising considering that the statewide salary system constrains wages based on education and experience. In contrast, the salaries of both samples of non-teachers showed considerably more variation. The results of this analysis indicated that the salaries of both non-teacher samples in Portland-Vancouver, Richland, Seattle, and Tacoma were each statistically different from the salaries of these respective samples of non-teachers outside of an identifiable metropolitan area. These findings are consistent with findings from the recently released National Center for Education Statistics (NCES) Comparable Wage Model for the state of Washington[304].

Table 16 presents the results of a direct comparison between Washington teachers and both samples of Washington non-teachers. In particular, it shows teacher salary as a percent of non-teacher salary within each labor market in 1999. IPUMS is the U.S. Census Bureau's Integrated Public Use Micro-Data System that contains data on 5% of all employed individuals between the age of 25 and 65 in Washington State.

Table 16: Salaries in 1999 (Census 2000 IPUMS)

Metro Place of Work	1999 Teacher Salary as a % of All Non-Teachers	1999 Teacher Salary as a % of Non-Teachers with Exclusions
Not in identifiable metro area	92%	99%
Bellingham	86%	94%
Bremerton	84%	95%
Olympia	85%	91%
Portland-Vancouver	75%	85%
Richland	74%	85%
Seattle	71%	78%
Spokane	87%	94%
Tacoma	85%	93%
Yakima	86%	90%

This table holds age, education level, hours and weeks worked constant for teachers and for both samples of non--teachers.

This table indicates that teacher salaries were significantly below the average salaries of both samples of non-teachers in Seattle, Richland, and Portland-Vancouver, at similar age and education levels.

EPIC researchers then adjusted salaries from 1999 levels to 2005 levels based on regional economic growth rates determined by the U.S. Bureau of Labor Statistics and the Washington State Employment Security Department, Labor Market and Economic Analysis Division[35, 317]. Table 17 compares 2005 average teacher salaries in each region to the average salaries of both non-teacher samples. This table also presents the Comparable Wage Index (CWI) that is proposed to adjust teacher wages. The CWI is the teacher salary multiplier needed to achieve comparability with the sample of non-teachers with exclusions. For example, this study recommends multiplication of 2005 average teacher salary in Seattle by 1.28 in order to enable the Seattle schools to attract and retain teachers of quality comparable to employees in other sectors who are similarly educated and qualified. The CWIs for each region were calculated using regression equations to control for other variables and are based on comparison to the sample of non-teachers with exclusions because this sample is likely to be more similar to the teacher sample in terms of skill and job opportunity.

Table 17: 2005 salary comparison and Comparable Wage Index (CWI)

	2005 Teacher Wages	2005 All Non-Teachers Wages	2005 Non-Teachers with Noted Exclusions Wages	Comparable Wage Index
Bellingham	$46,490	$50,837	$46,490	1.00
Bremerton	$46,383	$54,960	$48,702	1.05
Olympia	$46,503	$50,261	$46,968	1.01
Portland-Vancouver	$46,374	$61,510	$54,257	1.17
Richland	$46,457	$67,986	$59,000	1.27
Seattle	$46,563	$65,696	$59,601	1.28
Spokane	$46,329	$52,895	$49,109	1.06
Tacoma	$46,510	$58,888	$53,952	1.16
Yakima	$46,343	$53,542	$50,977	1.10

Source: IPUMS 2000 (5% sample) & Bureau of Labor Statistics Occupational Employment Statistics
- This table holds constant age, education level, hours and weeks worked for teachers and for both samples of non-teachers.
-All numbers are rounded. Therefore, multiplying the teacher wages in column 2 times the comparable wage index in column 5 may not exactly equal the non-teachers with noted exclusions wages in column 4.

The regression analyses that produced the CWIs also suggested the need for a 17% wage adjustment for teachers working in schools in the Portland-Vancouver area, 27% for teachers in Richland schools, 28% for teachers in Seattle schools, and 16% for teachers in Tacoma schools. The teacher salary adjustments specified by the CWIs were applied to teachers in these four labor markets. The use of the CWIs from the *all teachers with exclusions* sample is more conservative than using the other sample because it excludes highly specialized professionals and managers.

3.2.2 Hedonic Wage Models

As noted previously, the labor-market adjustments proposed as a result of the comparable wage model do not address teacher movement within the profession between schools and districts. The hedonic wage model is a useful way to identify these wage differentials and determine the resources necessary to ensure school districts statewide have access to teachers of comparable quality. The hedonic model produced two sets of calculations—one for base contract salary and one for final salary with supplemental compensation. The final salary with supplemental compensation was used to inform adjustments, while the base contract salary numbers are provided for illustrative purposes only.

The district-level hedonic wage analysis was conducted to evaluate whether there were significant teacher salary differences between districts despite the existence of a statewide salary system. The hedonic model first compared salaries in districts across Washington and then examined a subset of districts within King County. The next step was a school-level hedonic model of Seattle schools that provided specific

information on teacher salary differences at the school level. The reason for performing a school-level analysis was that the prototypes created in this study were school prototypes, rather than district prototypes. Thus, the goal was to estimate weights that applied at the school level.

3.2.2.1 District Level

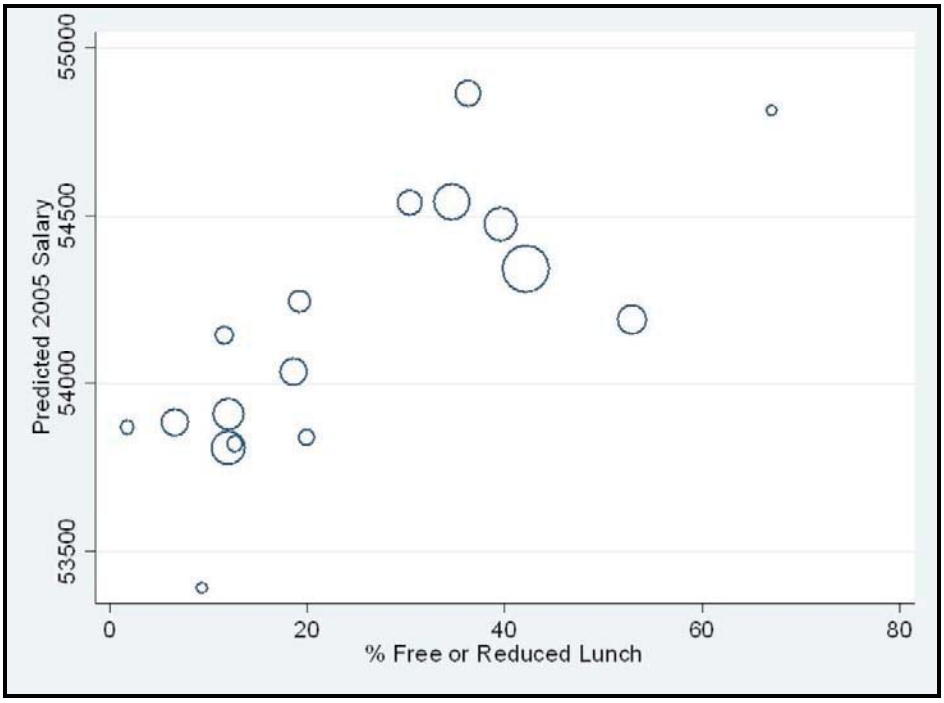
Researchers used the district-level hedonic wage model to predict teacher wages in each district holding other key factors constant. The model revealed a number of expected results. For example, teachers with a Master's degree earned about $6,000 to $6,500 more (in base contract and final salary, respectively) than teachers with only a Bachelor's degree. Teachers with 30 or more years of experience also tended to earn significantly more in base contract or final salary than teachers with 11-15 years of experience. The state salary system is based on teacher education and experience. It is therefore not surprising that the district–level regression model captured the effect of these variables on teacher salary because the salary system utilizes these two variables to determine salary.[*]

Another notable result of the district-level analysis was a slightly higher salary (controlling for other factors) for teachers in schools with higher levels of low-income students (as measured by *percent eligible for free and reduced price lunch*). The model suggested that after controlling for a plethora of other factors, it costs more to hire teachers of similar degree level and experience in schools with high proportions of low-income students.

A second district-level hedonic analysis confirmed the relationship between the rate of low-income students and teacher salary. This second district-level hedonic wage model was limited to the school districts within King County. Figure 12 displays the results of the analysis based on the regression model of teacher final salaries (with supplemental compensation beyond the base contract).

[*] Please see Appendix G for a complete table of district-level regression results.

Figure 12: Predicted salaries for King County school districts

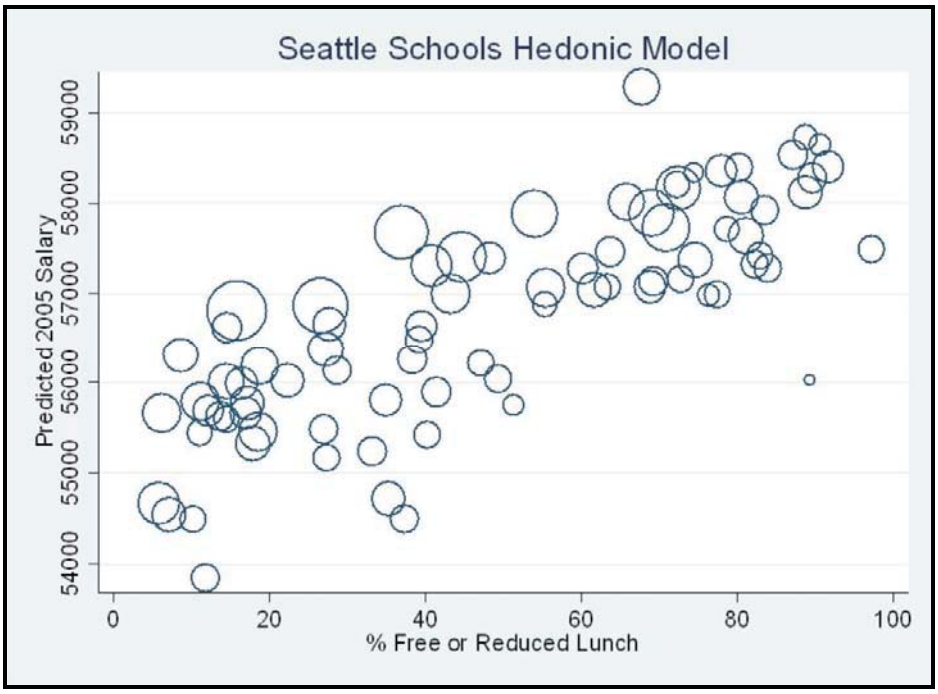


The results indicated that average teacher salary increased with the level of low-income students. Average teacher salaries were slightly higher (about $2,000 per student) in districts within King County that approached an 80% low-income student level (as measured by eligibility for free and reduced price lunch) compared with districts with almost no low-income students. According to the analysis of King County school districts, it is likely that an additional $2,000 in compensation would be required to recruit or retain similarly qualified teachers in districts with high rates of low-income students in order to offset more difficult working conditions. The district-level hedonic model suggested a need for small adjustments to account for district-level working conditions, although these adjustments were minimal because of the general lack of teacher wage variation across the state.

3.2.2.2 School Level: High Need School Wage Adjustment

The school-level hedonic wage model was based on Seattle public schools. The Seattle School District was analyzed in this study because Seattle has a large number of schools and teachers and therefore provides the amount of data necessary for reliable calculations. Figure 13 displays the relationship between the percent of low-income students and 2005 teacher salaries in Seattle elementary and middle schools.

Figure 13: School-level hedonic model for Seattle public schools (elementary and middle schools only)



The figure shows a positive relationship between average teacher salary and rate of low-income students. The analysis indicated that schools with very high levels of students eligible for free or reduced price lunch (the most common measure of parental income) may pay up to $5,000 more than schools with very few low-income students to recruit and retain teachers with similar qualifications. Based on this school level hedonic wage analysis, this study recommends salary adjustments for teachers working in schools with high levels of students eligible for free or reduced price lunch. These would increase teacher wages to a level that would allow these schools to have an equal chance to recruit and retain the best teachers. The adjustments include increases in base pay of $3,000 per year for each teacher working in schools where 60% to 80% of students are eligible for free or reduced price lunch and $5,000 per teacher working in schools where at least 80% of students are eligible for free or reduced price lunch.

3.2.3 Integration of the Teacher Wage Analyses with the Professional Judgment Approach

Table 18 summarizes the wage analysis adjustments. Researchers applied the comparable wage and hedonic model adjustments to all teachers who met the criteria and then averaged the increases across all Washington teachers. The criteria and adjustments are described in the following table.

Table 18: Summary of wage analysis adjustments

Model	Salary Increase	Recipient of the Adjustment
Comparable Wage	17%	All Portland-Vancouver teachers
Comparable Wage	27%	All Richland teachers
Comparable Wage	16%	All Tacoma teachers
Comparable Wage	28%	All Seattle teachers
District-level Hedonic Wage	Variable around Mean	All teachers (by district)
School-Level Hedonic Wage	$3,000	Each teacher in schools where 60%-80% of the students are low-income
School-Level Hedonic Wage	$5,000	Each teacher in schools where 80%-100% of the students are low-income

When this study specified that every teacher in Richland receive a 27% salary increase, every teacher in Tacoma receive a 16% salary increase, every teacher in a school with high rates of low-income students receive a $3,000 to $5,000 salary increase, and all other increases were applied to the noted recipient, this averaged out across the entire state to a teacher salary level of $59,362—an average increase per teacher of $9,156 over the baseline teacher salary level. The large number of teachers in Seattle and Richland in particular contributed disproportionately to the size of this increase.

It is worth noting that panelists in this study recommended adding four teacher professional development days to each of the prototypes, and these expenditures are classified as supplemental compensation. Washington defines supplemental compensation as any compensation beyond the base contract amount. This generally consists of professional development and additional compensation included in a contract. In order to avoid double-counting professional development expenditures, it was necessary to make several further calculations based on a set of assumptions. This study assumed that supplemental compensation comprised the same percent of both baseline salary and the adequate wage adjusted salary of $59,362 (8.94%, which is $4,490 in the baseline and $5,309 after teacher wage adjustments). This assumption resulted in an adequate base contract teacher salary of $54,053 and average supplemental compensation of $5,309 ($54,053 + $5,309= $59,362).

It was then assumed that this adequate teacher salary of $59,362 already included some additional teacher professional development, but the exact amount needed to be calculated. EPIC researchers assumed that teacher professional development comprised the same proportion of supplemental compensation in both the baseline and adequate wage adjusted teacher salary (38.98%). Based on this assumption, researchers calculated the amount of *additional* professional development already included in the adequate wage adjusted teacher supplemental compensation: ($5,309- $4,490 = $819, then $819 * 38.98%= $319).

Thus, adequate supplemental compensation already included $319 of the recommended additional teacher building-directed professional development expenditures.

EPIC researchers still needed to add the remaining professional development recommended by panelists into teacher supplemental compensation. Professional judgment panelists recommended an increase of four days of professional development. At a cost of $250 per day, this is a total professional development cost per teacher of $1,000 (4 * $250= $1,000). The study then subtracted out the $319 additional professional development expenditure that was already included ($1,000- $319= $681) to ensure that the model did not double-count professional judgment expenditures. Finally, the study added the additional professional development ($681) into teacher supplemental compensation. This increased supplemental compensation to $5,990 ($5,309 + $681= $5,990) and total compensation to $60,043 ($59,362 + $681= $60,043 or $5,990 + $54,053= $60,043), but did not change base contract teacher salary ($54,053). This study calculated adequate benefits at the same benefit-to-salary ratio (24.64%) proposed by panelists. Adequate benefits per teacher were calculated as $14,793 ($60,043 * 24.64%= $14,793). Table 19 presents final adequate teacher compensation after all professional development expenditures are included.

Table 19: Adequate teacher compensation breakdown

Teacher Compensation Type	Amount
Base Contract Salary	$54,053
Supplemental Compensation (including 11 total days of professional development)	$5,990
Total Salary	$60,043
Benefits	$14,793

Please also see Appendix J for a technical description of the integration of teacher professional development into the Wage Analysis Expenditure.

EPIC researchers then inserted the adequate wage-adjusted teacher salary and benefit averages into the prototypes that resulted from the professional judgment panelist recommendations. With these adjustments included, per student expenditure totals were calculated for each prototype school, and these totals are presented in Table 20 as the *Wage Analysis Expenditures*. These expenditures represent a 43% expenditure increase from the baseline at the elementary level, a 32% increase at the middle school level and a 34% increase at the high school level. Across all Washington K-12 students, the total per student increase recommended based on the integration of the professional judgment and wage analyses was $3,013, an increase of 37% from the baseline prototype schools. Although the wage adjustments calculated an average teacher salary for Washington teachers, this finding is not meant to serve as a figure

upon which to base an across-the-board increase for all teachers. Targeted wage adjustments as described previously were deemed more likely to improve the quality of teachers for all schools and districts.*

Table 20: Wage analysis results

	Prototype Schools			Average Across All Prototypes
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065
Professional Judgment Expenditure Per Student	$11,386	$10,293	$10,495	$10,825
Wage Analysis Expenditure Per Student	$11,667	$10,517	$10,733	$11,078

These figures add teacher professional development expenditures into teacher salary due to Washington's conventions for determining teacher compensation. Please see Appendix J for a technical explanation of how and why these were combined.

3.3 Cost Function Results

This study uses the cost function analysis to determine necessary adjustments to per student funding in schools with high levels of students who qualify for free or reduced price lunch or with very low student enrollment. The results of the cost function analysis suggest that it is necessary to adjust the adequate per student expenditure level to take into account both the rate of students who qualify for free or reduced price lunch and small school size.

Table 21 presents the results of the cost function regression equations. The *coefficients* in this table provide information about how personnel expenditures vary under particular conditions. Empty rows are control or comparison rows for a particular category, and three stars in the *P>t* column indicate that the difference between the comparison and the row with three stars is statistically significant. For example, schools with fewer than 50 students were likely to spend more per student on personnel than schools with 600 students, and the *coefficient* size is an indicator of the relative size of this difference. In other words, as the percentage of students eligible for free and reduced price lunch increased, personnel expenditures also increased.

* For a breakdown of the wage adjusted results including the teacher salary and benefits, the cost of each intervention at the prototype school level and statewide, and total costs per student, please see Appendix B. Also, please see Appendix H for a comparison between the baseline and wage analysis expenditures by prototype school level and expenditure category.

Table 21: Cost function analysis

Dependent Variable = Personnel Expenditure per Student (natural Log)	Coefficient	Standard Error	P>t
Outcomes			
% Meeting Standard/Index	0.0332	0.0165	**
Student Population			
% Transitional/Bilingual	-0.0004	0.0006	
% Disability	0.0085	0.0014	***
% Free or reduced price lunch	0.0023	0.0005	***
School Enrollment			
0 to 50	0.8277	0.1851	***
51 to 100	0.3019	0.0885	***
101 to 150	0.2770	0.0472	***
151 to 200	0.1935	0.0477	***
201 to 250	0.1791	0.0296	***
251 to 300	0.1340	0.0219	***
301 to 400	0.1170	0.0190	***
401 to 500	0.0691	0.0128	***
501 to 600	0.0414	0.0130	***
Over 600			
Regional Labor Costs			
CBSA Comparable Wage Index	-0.0625	0.0685	
School level			
Elementary			
Middle	0.0047	0.0161	
Secondary	0.0881	0.0192	***
Other	0.0620	0.0238	**
Year			
2005	0.0081	0.0083	
Intercept	7.7927	0.1190	***

**p<.10, **p<.05, ***p<.01*

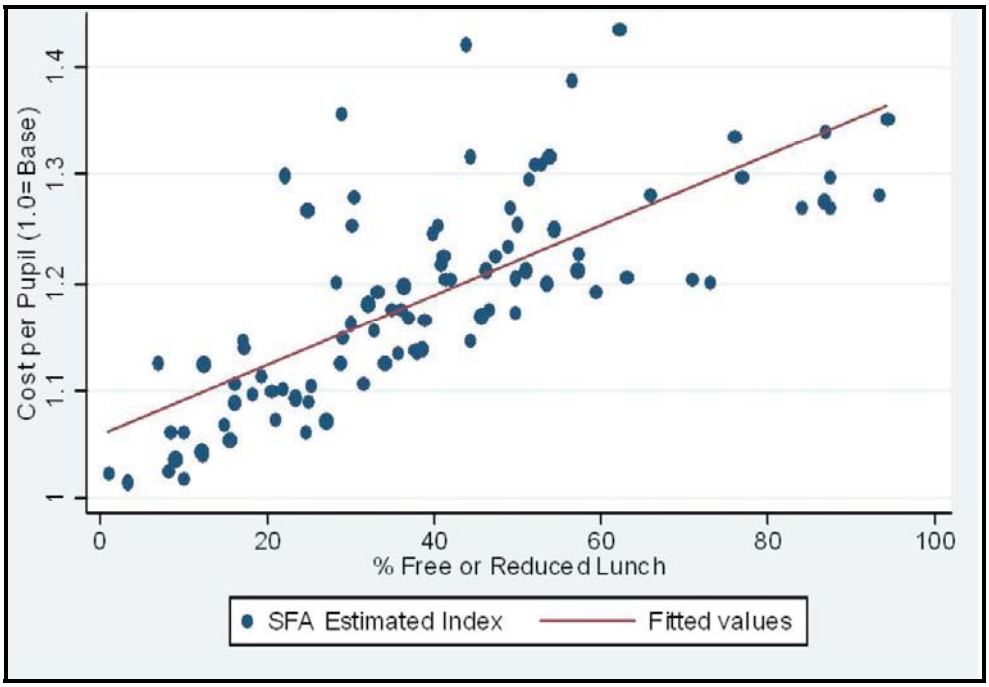
This table indicates that the percent of children meeting academic standards at each school was positively associated with the measure of school-level personnel spending. Simply stated, schools that spent more on personnel were statistically more likely to achieve high outcomes or, conversely, students who achieved at high levels were more likely to attend schools that spent more on personnel. Additionally, the cost function analysis found that the percent of students who qualify for free or reduced price lunch within a school was positively related to the costs of outcomes. Thus, it cost more to achieve a given level of outcomes in a school with high numbers of students who qualify for free or reduced price lunch than a school with fewer such students. In addition, an economy of scale effect was found to exist for schools

with more than 50 students. In other words, it cost more to achieve the same results in schools with fewer than 50 students than in schools with more than 50 students.

3.3.1 Schools with High Rates of Low-Income Students

The cost function analysis generated an overall cost index for each school (by grade level configuration). This cost index identified the cost of achieving average state outcomes for the grade range served at the school. Figure 14 shows how the cost of achieving student outcomes varies across elementary schools (with 300 or more students) from low to high rates of students who qualify for free or reduced price lunch. In elementary schools with fewer than 300 students, the effect of high proportions of students who qualify for free or reduced price lunch may be obscured by a small school effect and, therefore, schools with fewer than 300 students were not included in this figure.

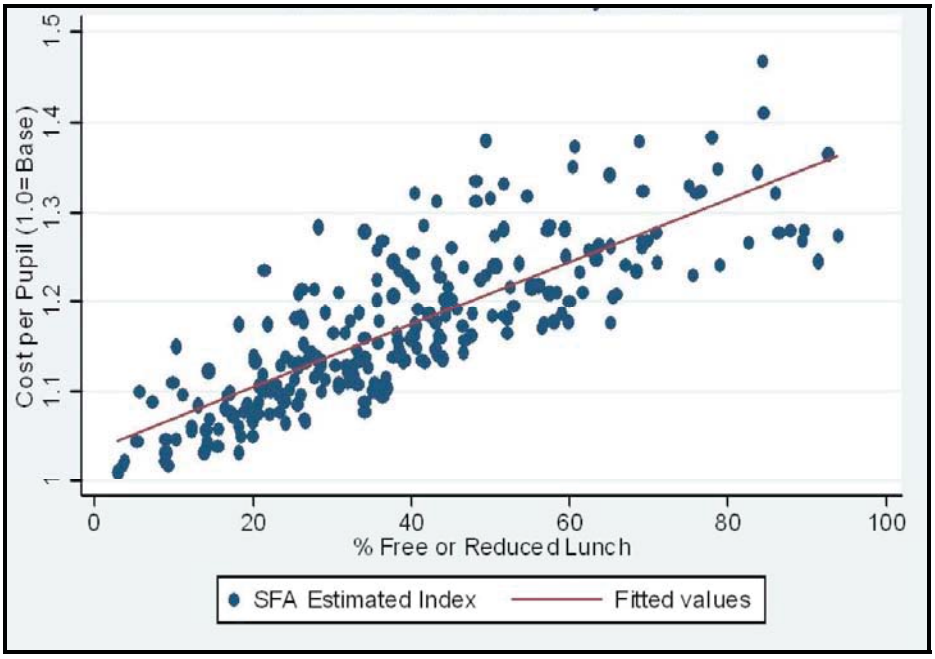
Figure 14: Elementary school low-income cost effect



This figure indicates that costs increased as the percentage of students eligible for free or reduced price lunches increased. On average, in an elementary school with 100% of students eligible for free or reduced price lunch, costs were 39% higher than in a school where no students were eligible.

Figure 15 shows the same relationship between the cost of achieving average student outcomes and rates of students who qualify for free and reduced price lunch in Washington middle schools.

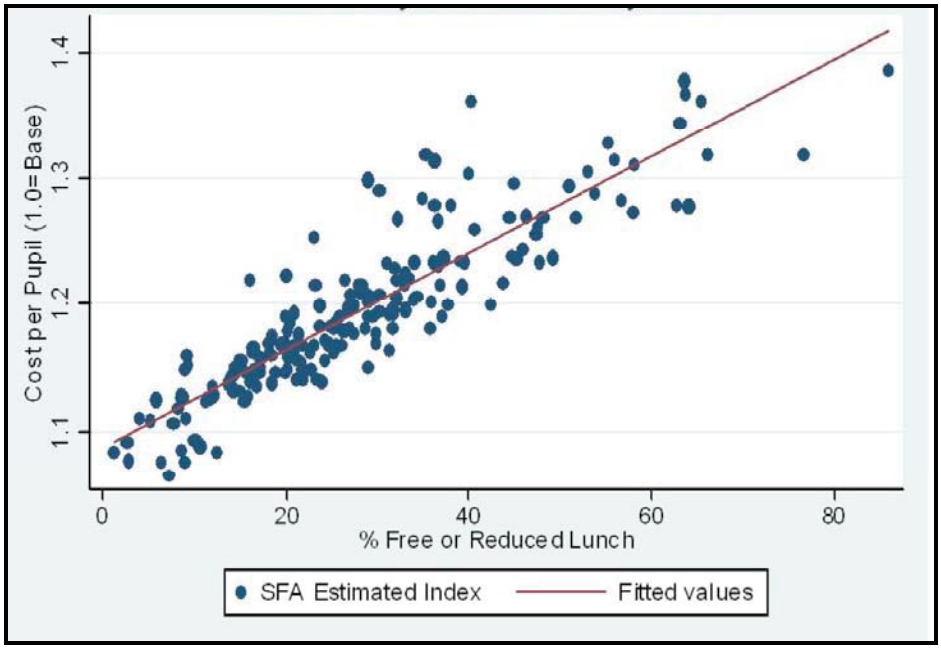
Figure 15: Middle school low-income cost effect



This figure indicates similar results at the middle school level; educational costs rose as the percent of students eligible for free and reduced price lunch rose. On average, in a school with 100% of students eligible for free or reduced price lunch, costs were 38% higher than in a school where no students were eligible.

Figure 16 shows the relationship between cost of average outcomes and the proportion of students eligible for free and reduced price lunch in secondary schools.

Figure 16: Secondary school low-income cost effect



The data indicated similar results at the secondary school level. On average, in a secondary school where 100% of students are eligible for free and reduced price lunch, costs per student of achieving state average outcomes were 50% higher than in a high school where 0% of students were low-income. These findings indicated the necessity of applying a student income weight to reflect the need for additional funding at schools with high levels of low-income students.

3.3.1.1 Adjustments based on student income level

The cost function analysis suggested that students who qualify for free and reduced price lunch cost more to educate than other students and, therefore, schools with high rates of students eligible for free and reduced price lunch require additional resources in order to enable their students to meet Washington goals. Because professional judgment panelists made their recommended changes based on prototypes with average levels of students eligible for free and reduced price lunch, adjustments were necessary to account for schools with above average levels of students eligible for free and reduced price lunch. Based on the cost function analysis, this study recommends that every school with an above-average proportion of students eligible for free and reduced price lunch receive an adjustment proportional to the rate of such students in the school.

In order to apply an adjustment for the proportion of students eligible for free and reduced price lunch, EPIC researchers first calculated the number of weighting-eligible students at each grade level, where

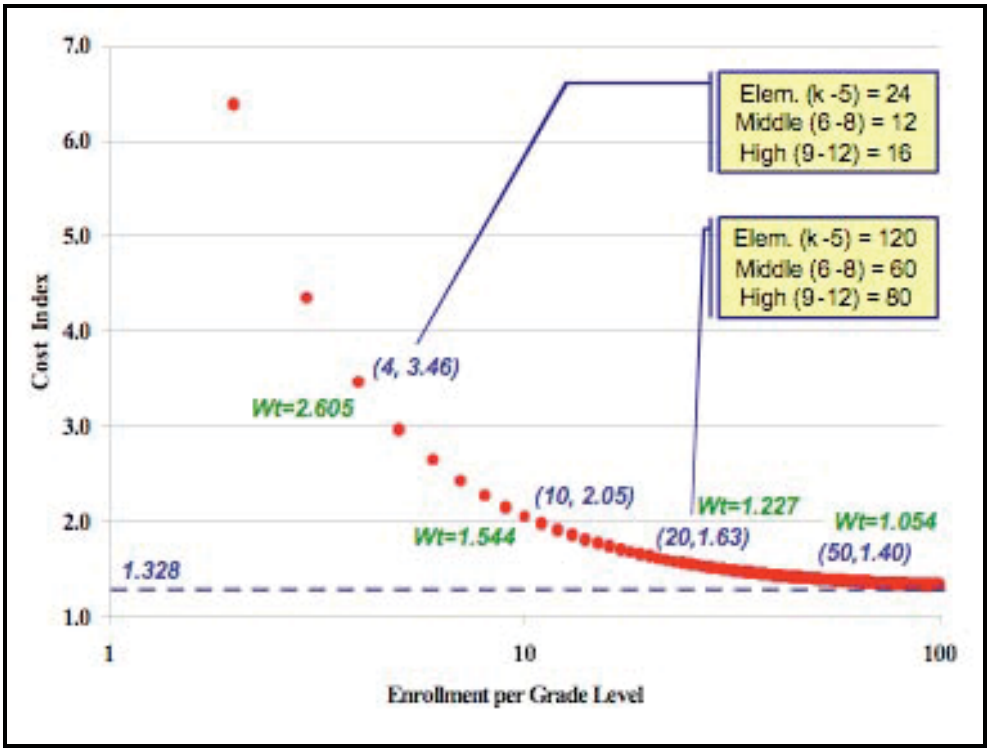
weighting-eligible students include the number of students eligible for free or reduced price lunch above the expected percentage (the average percentage from each of the prototypes, respectively). The number of weighting-eligible students was then multiplied by 140%, in order to account for the additional resources needed by these schools. This figure was derived from the cost function analyses and is consistent with results from other studies that predict the cost of outcomes based on the percent of students eligible for free and reduced price lunch[318]. This income adjustment increased statewide per student expenditure from $11,078 to $11,468. Note that the assumption is that funds generated by this adjustment would be distributed to schools based on this calculation.

3.3.2 School Size (Economies of Scale)

In addition to the analyses of low-income student rates and costs, the cost function analysis, as illustrated in Figure 17. showed the effects of school size on the costs of achieving outcomes. Since actual schools do not all precisely fit the prototype school grade configurations, the school size (economies of scale) analyses were based on each school's number of students per grade level.

Figure 17 presents the analysis of the effect of school size on the cost of achieving average student outcomes. Schools with more than 100 students per grade level did not experience higher costs per student and required no adjustment. The costs were marginally higher for schools with 50-100 students per grade level. A school with 50 students per grade level, such as a K-5 elementary school of 300 students, or a high school of 200 students in grades 9-12, each required a 5.4% cost adjustment. The costs per student increased substantially as school size dropped below 50 students per grade level. A school with only 20 students per grade level, such as a K-5 elementary school of 120 students, or a high school of 80 students in grades 9-12, required a 22.7% adjustment. At schools with fewer than 20 students per grade level, costs began to climb even more sharply. As the number of students at each grade level decreased, the costs of achieving outcomes increased, particularly when there were fewer than 10 students at each grade level. A middle school with only four students per grade level or a total enrollment of 12 students would need a 246% per student increase to reach economies of scale.

Figure 17: Economies of scale by students per grade level



The cost function school size adjustments described in Figure 17 were then applied to schools across the state that met the criteria for the low-income student adjustment. As noted previously, the assumption is that these funds would be distributed to small schools on a basis consistent with the results from the cost function analysis. Table 22 provides a summary of all the cost function adjustments.

Table 22: Summary of cost function adjustments

Type of Adjustment	Adjustment Weighting	Applied to
Low-Income Adjustment	40% weight (increase per student expenditure by 40%, to 140% for each student above the threshold)	Every low-income student above the mean low-income student rate of 41% for an elementary school
Low-Income Adjustment	40% weight (increase per student expenditure by 40%, to 140% for each student above the threshold)	Every low-income student above the mean low-income student rate of 37% for a middle school
Low-Income Adjustment	40% weight (increase per student expenditure by 40%, to 140% for each student above the threshold)	Every low-income student above the mean low-income student rate of 29% for a high school
School Size	Scale Adjustment- the smaller the enrollment, the larger the adjustment. See Figure 17.	Schools with fewer than 100 students per grade

EPIC researchers then added these student income and school size cost function adjustments to the *Wage Analysis Expenditure* figures for each prototype school. The student income adjustments increased the overall per student expenditure from $11,078 to $11,468, and the school size adjustments increased the adequate per student expenditure level to its final figure, $11,678. It is not possible to calculate the adequate expenditure for individual prototype levels (elementary, middle, high) because the cost function analysis incorporates data from schools with a wider range of grade configurations than the three prototypes.

The average per student expenditure level of $11,678 as determined by this study represents an increase of $3,613 over the baseline, or an increase of 45% over current expenditure levels. Table 23 presents a final summary that includes all of the study adjustments.

3.3.3 Summary of Adequacy Funding Costs

The study finds that the cost of an adequate education in Washington is $11,678 per student. This section summarizes once again the step-by-step process employed to calculate the final amount. First, the professional judgment method generated adequacy prototype expenditures of $11,386, $10,293, and $10,495 for elementary, middle, and high school, respectively, or an average of $10,825 across all Washington K-12 students. The results of each major step of the method are presented in Table 23.

Table 23: Summary of results with all adjustments

	Prototype Schools			
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	Average Across All Prototypes
Baseline Expenditure Per Student	$8,146	$7,960	$8,039	$8,065
Professional Judgment Expenditure Per Student	$11,386	$10,293	$10,495	$10,825
Wage Analysis Expenditure Per Student	$11,667	$10,517	$10,733	$11,078
Adequate Expenditure Per Student with Cost Function Adjustments				$11,678

These figures include teacher professional development expenditures in teacher salary. Please see Appendix J for a technical description of how and why these were combined.

The comparable wage and hedonic wage analyses then found that further adjustments were needed for teachers in some labor markets, districts, and schools to give all schools the opportunities to recruit and retain the best teachers. The teacher salary adjustments based on the teacher wage analyses were averaged and included in the simulation. This brought the per student expenditures to $11,667 for elementary

school, $10,517 for middle school, and $10,733 for high school, or an average of $11,078 for all students.*

Finally, the cost function analysis identified the need for additional adjustments for schools with high rates of students who qualify for free or reduced price lunch and for schools with few students, and these adjustments were applied to the prototypes. Not all Washington schools conform to the same grade ranges as the prototype schools. Therefore, the cost function analysis cannot adjust each prototype individually, and the final resulting adequacy figure represents an average across all students and grade levels. When EPIC researchers incorporated the cost function adjustments, the result was an average per student expenditure of $11,678. This is the amount of money the study finds necessary and sufficient to offer an adequate education to all Washington public school students in the 2004-05 school year.

* Please see Appendix H for a list of all elements and components as determined by the wage analysis.

4 Conclusions

4.1 Purpose of the Study

The purpose of this study was to determine as precisely as possible the amount of money necessary to make ample provision for the education of all Washington students in the state's public K-12 education system. Ample provision was defined as the amount of resources necessary to provide an education that enables all students to meet state and federal education goals in the context of local educational expectations. The study utilized multiple methodologies to increase the probability that the funding estimate neither overstated nor understated significantly the resources necessary for schools to function, consistent with constitutional intent. It defined the necessary resource level without reference to whether the funding derives from local, state, or federal sources.

The study does not presume that there is only one way for schools to be organized to achieve Washington standards, nor does it purport to mandate a particular set of strategies and programs. The adequacy prototype schools reflect a series of interventions and resources estimated to be sufficient to permit a well-managed school to improve student achievement to levels expected by current educational policy. The goal of the prototypes is not to standardize educational practice statewide. Instead, the prototypes establish the feasibility of delivering a fully adequate education to all students. They serve as proof-of-concept models rather than as operational blueprints that all schools should follow in detail. Successful achievement of state goals remains contingent on the performance of administrators and educators in Washington's schools. However, the resource levels specified in this report should be sufficient to allow competent and capable teachers and administrators to achieve the goals that are expected of Washington's schools.

The multi-method approach was utilized in this study precisely because it is neither feasible nor desirable to try to specify one set of educational practices for all schools in the state. However, the assumption implicit in the analysis is that if the adequacy prototype schools are theoretically capable of achieving all federal and state goals, then well-managed schools that choose to allocate funds and organize programs differently than the prototypes would still be accountable for comparable levels of achievement if provided with funding equivalent to the levels identified in this study.

Within this scenario, the study provides a framework for the state to fulfill its obligation to make ample provision for the education of all children within a general and uniform system. Local school districts may then reasonably be held accountable for the decisions they make and the degree to which they

achieve or fail to achieve applicable goals. This study makes it possible to establish a fair and appropriate accountability system within which schools have a high probability of succeeding and within which the state has sound justification for intervening if a school consistently fails to meet expectations.

4.2 Findings on Costs

This study estimates a total per student expenditure level of $11,678 in 2005 dollars as necessary and sufficient to provide an adequate education to all Washington students. Based on 2004-05 enrollment figures (955,976.45 FTE students), this brings K-12 expenditures from all sources to $11,163,909,215, an increase of $3,454,253,320 over the baseline, or an additional $3,613 per student stated in 2005 dollars.[*] This amounts to a 45% increase over the average baseline expenditure level. When this $11,678 figure is adjusted for inflation, it becomes $12,133 per student in 2006 dollars and $12,587 per student in 2007 dollars.[†] Table 24 presents all of the results after they are adjusted from 2005 to 2007 dollars. Inflationary adjustments for 2006 and 2007 are *estimates only* and are based on inflation from previous years.

Table 24: Summary of results adjusted to estimated 2007 dollars

	Prototype Schools			
	Elementary School (K-5)	Middle School (6-8)	High School (9-12)	Average Across All Prototypes
Baseline Expenditure Per Student	$8,780	$8,579	$8,665	$8,692
Professional Judgment Expenditure Per Student	$12,272	$11,094	$11,312	$11,668
Wage Analysis Expenditure Per Student	$12,575	$11,335	$11,568	$11,940
Adequate Expenditure Per Student with Cost Function Adjustments (estimated)				$12,587

Table 25 provides a comparison of the per student expenditure levels calculated in this study to per student expenditures in the other 49 states and the District of Columbia[304, 319, 320]. For comparison purposes, all expenditure levels were adjusted for regional cost differences, and Washington expenditures were adjusted for both inflation and regional cost differences to 2004 values using the NCES Comparable Wage Index[304, 319, 320]. As a result of these adjustments, baseline Washington expenditures adjust from $8,065 to $7,440 and Washington Adequate Expenditures adjust from $11,678 to $10,773 per student.

[*] The cost function and baseline school data sets include different enrollment numbers. This number is based on the total baseline enrollment of 955,976.45.
[†] Please see Appendix I for the presentation of final calculations.

***Table 25**: Statewide spending per student adjusted for regional cost differences (in 2004 dollars)*

State	Per Student Expenditures	% of US average
Utah	$5,460	65.7%
Nevada	$6,403	77.1%
Arizona	$6,540	78.7%
North Carolina	$6,935	83.5%
California	$6,952	83.7%
Tennessee	$6,994	84.2%
Texas	$7,164	86.2%
Oklahoma	$7,270	87.5%
Florida	$7,437	89.5%
Washington Baseline	**$7,440***	**89.5%**
Mississippi	$7,466	89.8%
Alabama	$7,478	90.0%
Idaho	$7,631	91.8%
Virginia	$7,700	92.7%
Kentucky	$7,731	93.0%
Colorado	$7,743	93.2%
Georgia	$7,808	94.0%
South Carolina	$7,953	95.7%
Arkansas	$8,310	100.0%
US Average	$8,310	
Louisiana	$8,320	100.1%
Oregon	$8,328	100.2%
Missouri	$8,364	100.6%
Illinois	$8,425	101.4%
New Mexico	$8,572	103.2%
Minnesota	$8,658	104.2%
Maryland	$8,796	105.8%
Hawaii	$8,981	108.1%
Kansas	$9,092	109.4%
North Dakota	$9,109	109.6%
Iowa	$9,128	109.8%
South Dakota	$9,259	111.4%
Michigan	$9,339	112.4%
Ohio	$9,400	113.1%
Indiana	$9,486	114.1%
Wisconsin	$9,727	117.0%
New Hampshire	$9,871	118.8%
Delaware	$10,052	121.0%
Nebraska	$10,058	121.0%
West Virginia	$10,088	121.4%
Massachusetts	$10,163	122.3%
Pennsylvania	$10,219	123.0%
Connecticut	$10,403	125.2%
Montana	$10,547	126.9%
Alaska	$10,695	128.7%
District of Columbia	$10,731	129.1%

State	Per Student Expenditures	% of US average
Washington Adequacy	**$10,773***	129.6%
Rhode Island	$10,966	132.0%
New York	$11,307	136.1%
Wyoming	$11,535	138.8%
Maine	$11,653	140.2%
New Jersey	$11,858	142.7%
Vermont	$13,263	159.6%

** Adjusted for inflation (to 2004 dollars) and for regional cost differences*
Sources:
- Taylor, L.L. and W.J. Fowler, Jr., State CWI. 2006, U.S. Department of Education- Education Finance Statistics Center.
- Taylor, L.L. and M. Glander, Documentation for the NCES Comparable Wage Index Data File. 2006, U.S. Department of Education: National Center for Education Statistics: Washington, DC.
- Johnson, F., Current Expenditures for Public Elementary and Secondary Education: School Year 2003-04. 2006, U.S. Department of Education- National Center for Education Statistics: Washington, DC.

Adjusted for regional cost differences and expressed in 2004 dollars, Washington baseline expenditure is 10.5% below the U.S. average, placing Washington in the bottom 10 states nationally on this measure. If Washington were to raise its funding to the level identified in this study ($10,773 with the 2004 inflation and regional cost adjustments), this would move the state nearly 30% above the U.S average, where it would rank in the top seven states nationwide in per student expenditure.

4.3 Additional Supporting Recommendations

In the process of developing an adequate expenditure estimate for Washington education, the study identified a range of related issues that should be considered at the same time or in the same context within which adequate funding is considered. School funding does not exist in a vacuum; it exists within a complex set of organizational, political, and social systems. Numerous forces affect both the process of allocating funds and the effectiveness with which they are utilized. The following recommendations address some of these contextual issues and outline some of the attendant issues that should be addressed simultaneously with any attempt to make funding fully adequate by implementing the provisions of this study.

These recommendations derive from two primary sources—participant input and EPIC research staff observations and analysis. Throughout the process of assembling the data for this study, the EPIC research team interacted with dozens of educators and others affiliated with the state education policy system. These individuals shared their observations regarding the full set of changes that needs to be made for adequate funding to have the greatest possible positive impact. The EPIC research staff carefully collected and processed those observations and attendant recommendations.

The second source is the EPIC research staff members themselves. This is the fourth adequacy funding model developed by the project's principal investigator, and many of the issues identified in this study as unique to Washington in fact exist in many other states as well. The principal investigator identified issue areas based on this experience with other studies and then determined which were applicable to the Washington context. The following section contains the recommendations generated from these two sources.

4.3.1 Adjust Distribution Formulas

The Legislature should consider adjusting the formulas used to distribute funds to districts, in order to direct fiscal resources to the schools and students in amounts proportional to need. The fundamental change here would be to fund individual schools directly, rather than school districts. Such funding would be based on a much more sophisticated series of pupil weightings related to student characteristics and other mitigating factors that affect student learning. Such a policy would be consistent with the notion of prototype schools that are adjusted for the challenge factors that schools face. The adequacy prototypes can be used as the starting point in a process to develop the student weightings by adapting the prototypes to different assumptions about the composition of a school. It should be noted that at least one Washington school district has explored this approach already and has learned a great deal about how to implement it successfully. Furthermore, the study additionally provides information on the funding needs of two special categories—schools with high proportions of students from low-income families and schools with very small enrollments.

The fundamental reasons for considering such a significant change are equity and the opportunity to learn. Evidence is clear that different types of students require different types of supports if all are to reach the same standards. Once the state shifted the measure of education from provision of programs to achievement of student learning results, equity and opportunity to learn issues immediately became much more important and difficult to avoid. An adjusted allocation formula acknowledges these fundamental issues of equity and opportunity to learn and is consistent with constitutional intent. A redesigned distribution formula will help achieve the fundamental goal of adequate funding, which is a high quality education for all students, one that enables each student to meet federal and state goals and be prepared for the future.

4.3.2 Develop Better Means to Implement Evidence-Based Practices Statewide

Evidence-based adequacy funding studies are often criticized for not being able to access quality research on every aspect of education. They are also criticized on the grounds that schools seldom implement most or all of the evidence-based methods identified by the study. These criticisms, while certainly containing some truth, overlook the realities of the relationship between research and practice in every area of society. No profession is strictly evidence driven. All take into account individual experience, expertise, unique situations, and characteristics of clients. In all areas, there is some lag time between the emergence of evidence, its acceptance by the field, and its full implementation.

Schools can and should move toward the goal of using evidence-based practices more regularly without being condemned because they currently are not fully evidence-driven. This process begins by utilizing existing findings to build a culture of decision-making in schools that considers evidence about student learning when allocating resources. Once this process is in place, it can build upon and reinforce itself. As successful use of evidence leads to improved student learning, educators will look to evidence more often to determine what to do in new situations. When external research results are insufficient, educators will be encouraged to gather their own evidence and make the best decision available with the information they have at hand. This type of process is a significant step forward on the road toward the regular use of evidence in schools.

The state can encourage this evolution in evidence-based decision-making by helping schools develop better means of implementing evidence-based practices and by expecting that progressively more practices are evidence based over time. This can be accomplished through a combination of increased state support and increased state monitoring. State support can be provided in the form of identification of evidence-based practices as well as through sponsorship of research on problems of particular interest to Washington educators. Such targeted programs of research, which can be undertaken in partnership with foundations or research institutions, can yield an ever-increasing database of identified effective practices that educators can then be expected to employ statewide. An example would be evidence-based curricular and instructional techniques to help more high school students progress rapidly in math in order to meet WASL standards.

In addition to support for identifying and implementing new best practices, the state should more closely monitor the evidence used by educators to inform their decisions about program selection or resource allocation. School quality reviews can focus on the evidence used to implement a program or meet the

needs of particular groups of students who are not making adequate progress toward state goals. The result of the reviews would be to specify areas of the school's program that have weak justification and need to be reviewed to determine whether there is evidence of effectiveness for current practices. The desired effect would be for schools to scrutinize all processes and practices to determine the reasons for each practice, the evidence supporting the practice, and the evidence of its effectiveness in practice.

4.3.3 Help Schools Become More Efficient

Helping schools to become more efficient is probably essential to the success of any school funding policy. While it is worth noting that no form of government was invented for the purpose of being efficient, education has a particular challenge in its role *in loco parentis.* Few families are organized primarily for efficiency. Instead, when a family works well, it is because it is organized to provide support, guidance, love, encouragement, and assistance to its members.

Schools, which seek to emulate families in many ways, could certainly be made dramatically more efficient, but at a price most parents would not be willing to accept. A kindergarten of 40 children might well be cheaper, as would high school classes the size of typical college lecture courses, in the range of 200-250 students. On the rare occasions when these hyper-efficient models have been attempted, they have been quickly abandoned due to the deleterious side effects they tend to generate. Therefore, attempts to make schools more efficient should be focused on areas that lend themselves most to efficiency improvements that do not violate the fundamental purposes of schooling, which encompass the development of the whole child.

School districts are often subject to external audits to ascertain their efficiency. Conducted by accounting or management consulting firms, these studies often make recommendations that affect business operations, not instruction. Ironically, many of the recommendations would require the expenditure (on a one-time basis) of more money. This is the nature of business, to invest resources to improve efficiency. Schools are not currently funded in ways that allow or encourage such investments.

One action the state might take is to put provisions in place that help school districts invest or reinvest a larger portion of their annual budgets in measure to improve operational efficiency. Examples include new information management systems and other productivity tools that help free teachers and administrators to focus on student learning. An additional means to improve efficiency is for the state to sponsor periodic efficiency audits where external experts review all district functions with an eye toward improving efficiency wherever possible.

4.3.4 Develop Better Data Reporting Systems Statewide

Key to achieving the goal of increased use of evidence-based practice is the existence of a comprehensive, sophisticated statewide data reporting system. Such a system is necessary for several reasons. In addition to helping determine the effectiveness of educational practice, a system of this nature would allow for a more multifaceted definition of educational effectiveness, one that would encompass a wider range of educational activities. This expanded definition would allow the state to determine the quality of the overall education program offered in state schools, not just in mathematics, English, and science.

This single dataset would contain information on student outcomes, demographics, and enrollments that could be compared to fiscal expenditure patterns for individual schools. Such a data system creates the possibility to establish cause-and-effect relationships between expenditures and student learning to a much greater degree. The data set needs to be able to disaggregate data at the level of the individual student, classroom, grade level, school, district, and ESD. This dataset would allow the state to track the relationship between inputs and outputs and enable the state to identify effective school strategies and then share those strategies statewide, as mentioned in the previous recommendation.

A thorough data reporting system would provide information to policymakers on the degree to which the educational system was utilizing adequate resources efficiently and effectively. This would create a self-reinforcing loop that would result in the biennial budget process becoming successively more scientific and data-driven. While politics will always be an important dimension in the democratic process of passing a state education budget, the political dimensions can be augmented by increasingly precise information on how best to expend funds to achieve state goals.

This sort of data-driven decision-making within a political context is employed in numerous other sectors of the economy. Monetary policy is only one example where the quality of the data on the functioning of the economy is used as the primary means to make a decision that has significant political implications. In fact, because the decisions are so important, every effort is made to constrain the influence of politics by maximizing the use of data.

However, the data continue to be imprecise measures of the actual economy, and decision-making has a level of uncertainty to it even in this arena where many more quantitative indicators exist. This is the nature of probabilistic decision-making—human beings have to make the best decisions possible based on the best information currently available. The goal should be to improve the quality of that information to

better inform the decision-making process and to consistently strengthen the relationship between information, decisions, and results.

4.3.5 Monitor Schools with High Concentrations of Students from Low-Income Families Closely to Ensure Improvement

This study is somewhat unusual in its recommendation that schools with a higher percentage of students from low-income families receive additional funding based on the number of these students in the school. This adjustment is important in principle because it is clear that these schools face significant educational challenges and that they may need to employ specific educational interventions that are not necessary or appropriate in more advantaged schools.

However, it will be critical in practice to have some greater monitoring of these schools if a full adequacy funding model is implemented. Monitoring does not necessarily mean the type of sanction-based approach embedded in NCLB legislation. Instead, monitoring as suggested here is built around a partnership between the state, district, and those schools with high proportions of low-income students to ensure student learning is improving. This partnership, which may be welcomed by some schools and resisted by others, is designed to ensure that state dollars are leading to desired results. If the state is providing extra, targeted funding to schools with high concentrations of children from low-income families, the state has reasonable justification to ensure that the extra funding is achieving the desired results.

In practice, this may mean that the state ensures that the leadership of the school is effective, that the teachers are all highly qualified and properly compensated, that the educational programs used are all effective, and that student educational needs are being properly diagnosed and addressed. Furthermore, the state may monitor school climate and safety more closely as well as maintenance and upkeep of facilities. In short, the state can help ensure that the district is doing its job to support the school with a level of resources consistent with those allocated in principle through the adequacy funding model. If the previous recommendation to allocate funding on a per-school basis using pupil weighting is implemented, some of this potential problem is eliminated, but the need to monitor quality of implementation will remain.

In short, an adequacy model that does not achieve results for all children cannot be considered a success, and these policy changes are necessary to help achieve the overall goals the state has for the education of all Washington children.

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