AN EVIDENCED-BASED APPROACH TO SCHOOL FINANCE ADEQUACY IN WASHINGTON

Prepared for the

K-12 Advisory Committee

of

WASHINGTON LEARNS

Working Draft

Allan Odden
Lawrence O. Picus
Michael Goetz
Michelle Turner Mangan
Mark Fermanich

Lawrence O. Picus and Associates

Draft
July 18, 2006

Table of Contents

INTRODUCTION 1
Costs Included in the Study ……..… 1
The Evidence- Based Approach to Adequacy……. 2
Six Core Strategies …….. 4
The Madison, Wisconsin Story …… 5
Washington's Reading First Schools …… 7
Rosalia …….. 9
Kennewick …… 13
Six Steps to Doubling Performance …….. 15
Our Vision of a School that can Double Student Performance……. 16
1. GENERAL RECOMMENDATIONS 21
Student Count for Calculating State Aid 21
Full Day Kindergarten 22
School Size.....23
2. RECOMMNEDATIONS FOR THE PERSONNEL ELEMENTS IN PROTOTYPICAL SCHOOLS 27
1. Core Teachers/Class Size.....27
2. Specialist Teachers and Planning and Preparation Time/Collaborative Professional Development 31
3. Instructional Facilitators/School-Based Coaches/Mentors.....33
EXTENDED LEARNING OPPORTUNITIES FOR STRUGGLING STUDENTS 34
4. Tutor.....36
5. English Language Learning (ELL) Students 40
6. Extended-Day Programs 42
7. Summer School.....45
8. Alternative Schools.....48
SPECIALIZED INSTRUCTION.....49
9. Special Education.....49
10. Gifted, Talented, Able and Ambitious Students 53
11. Career and Technical Education 57
ADDITIONAL STAFFING RESOURCES 57
12. Substitute Teachers ……57
13. Student Support/Family Community Outreach 58
14. Aides 60
15. Librarians 60
16. Principal 60
17. School Site Secretarial Staff 63
EFFECT SIZES OF MAJOR RECOMMNEDATIONS 64
3. RECOMMENDATIONS FOR THE DOLLAR PER PUPIL ELEMENTS.....65
18. Intensive Professional Development.....65
19. Technology and Equipment 68
20. Instructional Materials 79
21. Student Activities.....82

Working Draft

4. CENTRAL OFFICE EXPENDITURES.....83
22. Central Office.....83
23. Operations and Maintenance.....88
5. RECOMMENDATIONS FOR WASHINGTON STATE.....93
24. Strategies for Small School and Small District Adjustments 97
6. ADDITIONAL ISSUES 98
REFERENCES 99
APPENDIX.....119

Working Draft

Introduction

Washington is at a school finance crossroad. Historically, the state has focused on school finance equity and a school finance structure designed in the 1970s. Given the Essential Academic Learning Requirements the state has decided all students should be taught, and the performance standards to which all students should achieve, as measured by the Washington Assessments of Student Learning, as well as the student achievement pressures from the federal No Child Left Behind Act, however, it is time to focus on school finance adequacy – to identify what it would take programmatically to attain those standards and fully fund those programs. If the goal is even more ambitious – to have all students acquire the knowledge, skills and expertise needed to attend college or take a job in the global economy – the design of an outcomes oriented finance system is even more important. Such results are the prime objectives of a school finance adequacy study, or in the Washington parlance, perhaps the composition and costs of a newly defined basic education program. The resulting cost figure will set a target for what the state should fund for K-12 education.

Washington cannot be satisfied with improving performance only marginally; such modest gains will not allow the economic vitality needed for the state to continue to prosper, to provide the workers needed for the state's growing knowledge-based economy, or for all individuals to enjoy a good life. Washington's education system – like those in virtually all states – needs to double and triple current performance so that in the short term, 60 percent of students achieve at or above proficiency, and in the longer term 90 percent or more of students achieve at that level. This task is daunting and will require a dramatically different approach to teaching and learning within schools as well as to Washington's public school funding.

This program and finance study provides a blueprint, though not all the program specifics, for how to do both. Schools must redesign the way they operate in order to take advantage of the evidence on educational effectiveness presented in this report. All current and any new dollars will need to be reallocated toward these evidence-based approaches if these ambitious education goals are to be accomplished.

Costs Included in the Study

We note at the beginning that the educational costs included in this study address mainly instructional issues. We will focus on effective strategies, programs and services, and their costs, related to expenditures for the instructional, instructional support, pupil support and site administration functions. We also redesign central office staffing and the operations and maintenance function. We do not address food services, which are assumed to operate on a self-supporting basis. Transportation costs need to be handled separately as transportation costs depend on factors different from programs; transportation is being addressed by a separate study.

This report is focused on answering the following key questions:

1. What are the high impact educational programs and strategies that will allow every school to provide each Washington student with the opportunity to learn to or above proficiency on state standards as measured by the Washington's Assessment of Student

Working Draft

Learning, with proficiency standards calibrated over time to those of the NAEP, or even the performance of students in other countries?

2. How much do those strategies cost, and what is the size of the gap, if any, between current resource levels and adequate levels needed to implement all evidence-based strategies?

3. What is the program and fiscal implementation strategy? First, how can current dollars be used more effectively both through finding inefficiencies and reallocating current resources? Second, how can any new dollars be targeted only to evidence-based practices that produce more results in student achievement?

In our cost analyses, we assume all dollars and programs currently in the system would sunset, and that extant dollars and any new dollars would be used for the general strategies identified in the report.[1] In that sense, we are assuming complete reallocation of current resources to the most effective and evidence-based educational strategies at the classroom, school and district level – the general strategies discussed in this report. Although the state might not want to mandate these actions, our funding recommendations will make these assumptions so that we will not simply propose adding new dollars on top of current dollars, but propose a complete new use of all dollars – first those currently in the system and then any additional dollars if that is the finding of the costing analysis.

We also note that we will be proposing general but not specific programs. Thus, we will propose appropriate class sizes for core and specialist classes, but we will not propose specific reading or math, or art or music programs. Likewise, we will propose a set of resources needed to deploy effective professional development programs, but we will not propose specific professional development programs. The professional development resources recommended are adequate for all major professional development needs, including instructional improvement as well as cultural and ethnic awareness, given the changing demographics of Washington's students. Further, we will recommend tutoring, extended day and summer school resources for giving more instructional time and help to students struggling to learn to standards, but we will not suggest specific tutoring, extended day or summer school programs. Moreover, these resources to extend student learning time also could be deployed in more "year-round" school schedules that have shorter break times than a full summer. Thus, our focused but still general resource recommendations will need to be blended with other more specific programmatic recommendations in order for districts and the state to use the resources we propose in the most effective ways.

The Evidence- Based Approach to Adequacy

This consultant report represents a school finance adequacy study. Since 1990, the school finance community has developed a number of alternative methods for determining school finance adequacy. These are summarized in Odden (2003), an article that identifies

[1] Of course, successful programs can be reinstated, but we start with a zero base in our program and fiscal analyses.

Working Draft

strengths and weaknesses of each approach. For the past several years, we have used the Evidence-Based approach and that is the approach used in this report.[2]

The Evidence-Based approach identifies a set of school-level components that are required to deliver a comprehensive and high-quality instructional program, i.e., which could be termed an updated basic education program in Washington, within a school and the evidence on their effectiveness, and then determines an adequate expenditure level by placing a price (e.g. an appropriate salary level for personnel) on each component and aggregating the components to a total cost. More explicitly, this approach is based on evidence from three sources:

1. Research with randomized assignment to the treatment (the "gold standard" of evidence)
2. Research with other types of controls or statistical procedures that can help separate the impact of a treatment
3. Best practices either as codified in a comprehensive school design (e.g., Stringfield, Ross & Smith, 1996) or from studies of impact at the local district or school level.

The Evidence-Based approach to defining and costing school finance adequacy defers to evidence on the strategies needed to meet pre-determined performance goals much more strongly than on the professional judgment of educators, though professional educator input is solicited.

The following sections of the report take this approach, with which the lead authors for this study, Professor Allan Odden at the University of Wisconsin-Madison and his colleague Professor Lawrence O. Picus at the University of Southern California, have been associated for several years (Odden, Picus, Fermanich & Goetz, 2004, Odden, Picus & Fermanich, 2003; Picus, Odden & Fermanich, 2003; Odden, 2000). It describes how this approach would be used to identify the core educational resource needs of prototypical elementary, middle and high schools in Washington – resources that would constitute the adequate program needed by schools to educate their students to state performance standards. It concludes with Table 1 that identifies an initial set of adequate resources for Washington elementary, middle and high schools. Appendix A summarizes proposals from professional judgment panels in a few other selected states, which are sometimes referenced in the report.

Before proceeding, we should note that we have proposed a definition of education adequacy, which also could be a new definition of the Basic Education Program, and that definition serves as a basis for identifying the resources required for adequate funding. The definition of educational adequacy is:

a. The expectations included in Washington's Essential Academic Learning Requirements (EALRs), which define what all Washington's students are to be taught.

b. The standards included in the state's testing system, the Washington Assessment of Student Learning (WASL), which include a definition of what would be considered a proficient score for each test. The goal is to have all, or all but the most severely disabled, students perform at or above proficiency on these tests (with the proficiency standard calibrated overtime to those of the NAEP of the knowledge required for the

[2] Pursuant to the RFP, we also conducted a successful district approach to school finance adequacy.

Working Draft

emerging, knowledge-based global economy), and to boost the percentage of those performing at the advanced levels – particularly in mathematics and science.

c. The standards implied by the state's evolving accountability system, and the federal No Child Left Behind law, which further require improvement for students at all levels in the achievement range, for all income levels, for all ethnicities, and which also aspire to enhance the learning of the top scoring students as well.

d. Sufficient funding to provide the resources identified in the resource matrix contained in Table 1 of this report.

In short, the report is focused on preparing Washington students so they are:

- Ready for college
- Ready for work in the global economy
- Ready for citizenship.

Six Core Strategies

Full implementation of this definition of an adequate education program with the proposed resources will require most schools to rethink, if not restructure, their entire educational program and reallocate all current and any new resources to a restructured and more effective educational program. Such a system also will work best if it is accompanied by a clear accountability and monitoring program. Our recommendations are premised on six core strategies that Washington needs to:

- Recalibrate goals for student learning. In order to have Washington's students prepared for college, work in the emerging global economy and citizenship, the medium term goal is to double student academic achievement, as measured by the rigorous National Assessment of Educational Progress (NAEP) and the state's testing system. The long term goal is to have at least 90% of students – including low income, students of color, ELL and students with disabilities – achieve to proficiency standards.

    - Our assumption is that work in the global, knowledge-based economy requires virtually the same skills and expertise to enter the work force after high school or go to college.

    - We also assume that in the 21st century, career-tech education is info-tech, nano-tech, bio-tech, health-tech and construction-tech if it is to bolster Washington's economic growth.

- Re-engineer schools to have them deploy more powerful instructional strategies and use resources more productively. Schools need to change the curriculum they use, how they are organized and how they use resources along the lines outlined in the next sections of this report. One core idea is that all students should take a college preparatory curriculum of 4 years of English, 4 years of history and at least 3 years of mathematics and science.

Working Draft

- Redesign teacher development so that all teachers acquire the instructional expertise to educate all students to proficiency and the ability to think, understand, problem solve and communicate. This means using the extensive professional development resources that are included in the funding model in the most effective ways.

- Reinforce achievement for struggling students by providing a series of extended learning opportunities, such as some combination of 1-1, 1-3 and small group tutoring, extended-day and summer school programs, so all students have an equal opportunity to achieve to high standards. The objective is to hold performance standards high and vary instructional time so all students can achieve to rigorous standards. In this process, schools also will close the achievement gap.

- Retool schools' technology so they can tap the educating potential of the Internet.

- Restructure teacher compensation so the state begins to move away from paying teachers on the basis of just years of experience and education units, to a system that pays teachers individually for what they know and can do (a knowledge and skills-based pay system), and collectively a bonus for improving student learning.

To implement these six core strategies, we have a vision of a much more effective school. This vision is not just an academic artifact. Before outlining the new school vision, which incorporates all the elements of the evidence-based funding model outlined in the next sections, we provide several examples of how this vision looks in several places around the country and in Washington that have doubled student learning.

The Madison, Wisconsin Story

Madison, Wisconsin is a medium-sized urban district in south Central Wisconsin. For years, it was a relatively homogeneous community with good schools and high levels of student achievement. In the late 1980s and early 1990s, its demographics began to change. By the mid-1990s it was moving past a 25 percent low income and minority enrollment towards the 50 percent level. And as its diversity grew, so did the achievement gap between its middle class white students and the rising numbers of low income and minority, particularly, African-American students. A mid-1990s analysis of reading achievement showed that only about 30 percent of low income and African-American students met the state's third-grade reading benchmarks, and even worse, almost all such students who scored below the basic level in reading at grade 3 were below basic in grade 8 as well. In other words, if students did not read at or above the basic level by grade 3, they almost never caught up.

Something had to be done. So the district conducted an equity, diversity and adequacy "audit" of the district. As a result it set three overarching goals for the district:

- Produce all students reading at or above proficiency by the end of third grade.
- Have all students take and pass algebra by the end of grade 9.
- Have all students take and pass geometry by the end of grade 10.

Working Draft

These goals have guided the district for nearly the past decade. These three goals were considered as "*gateway*" goals; if students could not meet them, they would have great difficulty exiting high school, in the words of Washington, ready for college, ready for work in the global market or ready for citizenship.

The reading goal made it clear that there was an urgent need to bolster the district's elementary reading program, actually its reading "non-program" because at that time the reading program varied by school, grade and classroom. And it was not working for its new students.

Using a bottom up approach that mirrored the Madison culture for any change, the system created a new, district-wide, research-based reading program over the next several years. This new program included an extensive set of formative assessments so each teacher was aware of what every student knew and did not know in reading. The results were then used to create focused reading instruction, tailored to the needs of each class and each student. Wanting to make sure every teacher in grades K-3 had the skills to implement this complex reading program, the district expanded professional development. It ultimately provided professional development in the new reading program to all its elementary teachers and established an intensive summer induction program for all new teachers. In addition, it provided instructional coaches for all of its highest poverty schools to help all teachers incorporate the new reading strategies into their ongoing instructional practice, reduced the K-3 classrooms in those schools to 15 students, and also provided teacher tutors to help children still struggling after experiencing the regular reading program. All these new resources – smaller class sizes, professional development, instructional coaches and teacher tutors – were supported by reallocating the resources they had been providing to their elementary schools – no new local funds were needed.[3]

The result was a doubling over five years the percentage of low income and African-American students achieving or exceeding the proficiency level on the state's reading test. The district also reduced to almost zero the number of students scoring below Basic in grade 3. The district was successful because:

- They **recalibrated goals** to double the performance of low income and minority students
- They **reengineered schools** with complete instructional change in the reading program and with class sizes of 15 in grades K-3
- They **redesigned teacher development** with extensive summer training followed by provision of instructional coaches in schools to help teachers successfully implement new instructional approaches to reading
- They **reinforced struggling students** with extended learning opportunities that included teacher tutors and summer school.

[3] Since Madison spends about $12,000 per child, much higher than all Washington districts, this level of resource reallocation is probably not possible in many, if any, Washington school districts.

Working Draft

But the district did not have sufficient funds to provide coaches and tutors in all schools. Consequently, when it began its efforts to enhance the mathematics program, it simply could not fund the effort because it had no more resources to reallocate for mathematics coaches or mathematics tutors.

It should be noted, however, that because of the rising ethnic and cultural diversity of the district, it also launched a five year effort to raise the awareness and sensitivity of all district employees to these new demographic realities, and this consciousness raising continues today.

Washington's Reading First Initiative

Washington State's Reading First initiative, which focuses on students in kindergarten through grade 3, shares many similarities with the Madison reading initiative – including the use of focused resources – and has produced even more impressive results. The goal of the program is to produce students who read at or above grade level by the end of third grade. The core of the Reading First process is a scientific research-based reading program; schools are able to select one program from a menu of programs that have been documented through rigorous research, to produce reading proficiency. We note that any educational initiative that is designed to impact student academic achievement, reflected in scores on the state tests, must begin as a curriculum and instructional initiative; and that helps explain the many Washington initiatives embedded in the various content areas, focusing heavily on reading and mathematics, the content areas that are the foundation of every other content discipline. Designers of the federal Reading First program claim – validly from our perspective – that the country has sufficient professional knowledge to insure that all students exit third grade with proficiency in reading in English.

The Washington Reading First process takes a systemic, district approach. The K-3 comprehensive reading programs used by Reading First Schools align with the state's standards in reading, and provide detailed instructional advice to all staff involved in daily reading instruction including teachers and paraprofessionals. At the heart of the Reading First process is the development of a comprehensive assessment system. This system includes screening, progress monitoring, diagnostic, and program assessments. Program or "formative" assessments are commonly linked to the state test, but provide more detailed data to teachers on the exact knowledge, skills and understandings of students in reading at each different grade level. These assessments are then used as guides by teachers who identify specific reading objectives and deploy explicit instructional strategies that are linked both to the state and district reading standards and to the status of the individual teachers' students reading proficiency levels. This intense classroom focus is then bolstered by a district level reading coordinator, reading coaches in all Reading First elementary schools, and reinforced with two tiers of intensive intervention for struggling students. These interventions include very small group tutoring provided by teacher tutors or trained and supervised para-professionals.

In K-3 Reading First classrooms, students receive 90 minutes of uninterrupted minutes of reading instruction daily. This day-to-day instructional treatment, of course, is the core of the program. And if implemented well, it should educate the bulk of K-3 students – including low income and minority students – to reading proficiency in English by the end of third grade. To insure that all staff providing reading instruction and interventions (including teachers and

Working Draft

paraprofessionals) have the instructional expertise and capacity to deliver high- powered reading instruction, Reading First includes intensive professional development each year for its teachers. There are several days of intensive professional development during the summer, and ongoing professional development each month during the school year for district coordinators, principals, reading coaches, teachers and paraprofessionals. Districts and schools use their Reading First grant funds to pay for local professional development in reading and for their staffs to attend state-level training events. The Reading First program provides the funds for the trainers for state-level professional development activities. Further, and very important, Reading First requires at least one reading coach in every school; the role of the coach is to work with teachers in grades K-3 to help them implement all the new instructional strategies into their daily teaching practice.

Importantly, Reading First recognizes that no matter how powerful the K-3 core reading instruction program, some students will need extra help to achieve to the proficiency level. Thus, Reading First also provides funds for two tiers of intervention – 30 minutes of small group (3-5 students) tutoring for students with mild struggles, and an additional 30 minutes of small group tutoring for students with more complex difficulties. Most of the instructors for these extra help interventions are licensed teachers, but in some cases they are specially selected, trained and supervised para-professionals.

The program has produced remarkable results, more than doubling the percentage of students scoring at or above proficiency. It should be noted that most Washington Reading First schools have large numbers of students from low income and minority backgrounds, and present the toughest educational challenges. Producing performance gains in these schools, which have had the lowest levels of student academic achievement, is critical if Washington is to produce students capable of working in the knowledge- and high-skilled economy of the 21st century. The following table summarizes the outcomes:

Student Performance Outcomes in Washington's 51 Reading First Elementary Schools

Performance Standard	Percent of students at this level in 1997	Percent of students at this level in 2003	Percent of students at this level in 2005
Below Basic	26	17	11
Basic	43	42	25
Proficient, Met Standard	19	32	45
Exceeded Proficiency Standard	6	8	18

Washington Reading First was introduced to these schools in 2003. The numbers show that although the schools had been making some progress over the six years from 1997 to 2003, the Reading First intervention dramatically accelerated the progress. The percent of students scoring below the basic level declined by 9 points (1.5 points a year) over the six years from 1997 to 2003, but then declined by 6 points (3 points per year) in the first two years of Reading First, or *double* the previous trend. Similarly although the percent scoring at the proficient level

Working Draft

rose from 19 to 32 percent in the six years from 1997 to 2003 (13 points or about 2 points a year), that percent accelerated after 2003, rising by the same total amount (13 points) but at three times the annual rate (6 points a year), compared to the previous trend. And finally, the percent scoring at or above proficient or standard rose by 15 points from 25 to 40 percent from 1997 to 2003, but then jumped by 23 points to 63 percent in just two years from 2003 to 2005. The data showed that gains similar to these were made by all minority sub-groups in the Reading First schools – African Americans, Hispanics, and Native Americans. These significant results – on the state testing system – show that Reading First is an outcome oriented strategy that weaves together a set of resources to produce student achievement results.

But as just noted, these impressive student achievement results required resources and a strategic orientation on the part of the districts.

- They **recalibrated goals** to get all students up to reading proficiency by the end of third grade

- They **reengineered schools** anchored by a completely new, restructured reading system that reflected national and international evidence on how to teach reading effectively

- They **redesigned teacher development** that provided extensive training, including resources for up to ten days per year of professional development for staff providing reading instruction and intervention (including teachers and paraprofessionals), funds for the trainers, instructional/reading coaches in every school

- They **reinforced learning opportunities for struggling** students that included small group and more individualized tutoring of students who struggled more and needed extra help to meet state reading standards.

Without all the additional resources, most provided by the Reading First grants, performance might have continued at a modest pace but not at the accelerated pace Washington needed.

Similar efforts will be needed to improve student achievement in the other core content areas – mathematics, science, history and world language – and in middle and high schools. And such efforts will require similar targeted resources, nearly all of which are included in the proposed Washington funding model.

Rosalia, Washington

Rosalia School District, a small rural school district with one K-12 school, serves approximately 240 students. The eastern Washington school resides in a small town of less than 1,000 people with a largely agricultural economic base. The highly mobile (30 percent) student population consists of mostly (92 percent) white students, approximately half of whom receive free or reduced-price lunch. In the past five years, the students and school staff have undertaken an extremely successful campaign to improve teaching and learning. This short vignette, based on interviews with the superintendent and principal, conveys the instructional vision that drove

Working Draft

the increase in student performance, and identifies the strategies instrumental in reaching their sustained results.

Before delving into the successful strategies that this school district employed, we highlight performance results their strategies produced, which provides the big picture of where they started and how far they traveled. From 2001 to 2005, reading scores on the Washington Assessment of Student Learning (WASL) increased from 68 to 100 percent of fourth grade students meeting the standard, and from 32 to 94 percent of seventh grade students meeting the standard. From 2003 to 2005, tenth grade students reading scores on the WASL increased from 63 to 100 percent meeting the standards. Writing scores on the WASL also increased from 2001 to 2005 with fourth grade scores starting at 39 percent and increasing to 70 percent, seventh grade scores rising from 55 to 67 percent, and tenth grade scores growing from 58 to 79 percent of students meeting the standard. Similarly, over the same five year period, math scores on the WASL increased from 43 to 85 percent in fourth grade, 36 to 67 percent in seventh grade, and 58 to 74 percent meeting the standard in tenth grade.

Cultural Change Supported by Instructional Leadership**.** For the past five years, cultural change has driven Rosalia staff and students from a norm of mediocrity to an expectation of excellence. Staff developed a shared mission and vision for themselves and their students that culminated in a living document in which they pledged to:

PARTNER with parents
PROVIDE a safe learning environment
EDUCATE all students, and
EMPOWER them to make correct choices.

This change process was ignited and supported by administrator leaders who knew the research on what works, envisioned how to create change, sold the process, acted as change agents, and helped staff get past their resistance. During the first of the five years, they made the mistake of trying to skip the step of getting people on board and implementing change through administrative direction. They then realized that the staff needed to build ownership together and have more of a role in directing the process. A lot of the success is due to teachers' increased leadership role, professional development, and common focus backed by hard work. As the administration took less of a lead, the teachers were given more and more autonomy, and built up their own leadership skills towards decentralized leadership. The improvement process began with a centrally-initiated vision, yet has been implemented from the bottom-up.

Relationships among colleagues and with students became a priority and resulted in a culture of teacher collaboration and connections with students. Staff carved out an hour and half during two days per month for collaborative planning when they discussed how to do better in content strands where they were weak. Then they focused collaboration on improving instruction. Informal evidence of this change is that staff room conversations moved away from non-instructional complaints about students into instructional brainstorming on solutions for improving student learning. For example, a cultural expectation to increase instructional time permeates the school, and when some teachers consistently finished teaching 10 minutes early,

Working Draft

others helped them get better at using every minute of instructional time. They could have been weaker in another culture, but at this school they have to try.

Teachers have taken more responsibility for student learning. Teachers tell students they have to come in for help, which is a cultural shift. Secondary teachers are now teaching students instead of just content and kids respond to this caring. They greet every student coming into classrooms, wanting every student to be touched everyday. Students were surprised at first, but noticed when a teacher missed connecting with them. The fights, weapons, and drugs that were previously a problem in the school have ceased and now students are excelling not only in academics but in extra curricular activities such as band and FFA in which they have won competitions. Rosalia staff created a more academic feel for the students. For example, they mirror a college schedule in the secondary grades with semester finals only two per day and let the students come in late.

Focus on Improving Teaching and Learning**.** Rosalia school staff committed themselves to implement best practice and research-based strategies. They started by looking at WASL scores, established a baseline and used it as a reference point to grow from. For the first few years, they focused on broad areas, and now they analyze the data by strands (student, class, etc.). From the test score data, they set goals in math, reading and writing. Collaboration time is focused on these goals, and enhanced with in-house experts.

They also started selecting curriculum that matched the state content standards, the Essential Academic Learning Requirements (EALRs), and the corresponding Grade Level Expectations (GLEs). Teachers started talking about what they were each teaching, and they started the curriculum mapping process. They wanted to make sure they were teaching with purpose. Essentially, they need to know that students can read and write well, and be able to think analytically. They pulled resources from other districts.

For the first three to four years, the content focus of the improvement effort was in reading in the elementary and then reading in the middle school. After accepting the concept that every teacher is a reading teacher, they incorporated writing and are starting to consider every teacher a writing teacher. The last two years, there has been a strong focus on math with an emphasis on teacher in-service and training. Most students (approximately 90 percent) take algebra by the end of *eighth grade*, and about 30 percent of students take calculus in twelfth grade. Now they are concentrating on improving science instruction.

They also realized that they could make a lot more headway if they intervened earlier in their students' lives. They have had a quality pre-school program for 15 years, but in the last five years they switched the content to a rigorous kindergarten readiness program. They also target children from families with low incomes. It took a couple of years to see results, and now almost all of the delayed kids have caught up to grade level and the average kids are up to one to one and a half years ahead when they enter kindergarten. *By the end of kindergarten, approximately 95 percent of students can read*.

Professional Development**.** Instructional improvement takes an enormous amount of professional development. One of the budgetary decisions that Rosalia staff made was to make

Working Draft

professional development a priority by providing almost unlimited resources for training. They cut back on maintenance, food service, and secretarial staffing to fund ongoing professional development at a high level. They attend workshops, work together to become familiar with the WASL, schedule time together to work on how they can improve in targeted content areas, and build teacher leaders. The state pays for two Learning Improvement Days (LID) per teacher per year, but since Rosalia is a small district they cannot afford additional days. (Larger district have 10-15 days paid by local levy dollars.) The LID days take place before school starts and are led by school and district administration. The district does provide teachers with one and a half hour early release days every other week. Informally, teachers constantly collaborate. They would like and could use more professional development days.

Strategies for Struggling Students**.** Rosalia staff identified struggling students and decided what they would do to help support their learning. Their elementary strategies include identifying students early, prioritizing resources for grades K-3, and breaking the elementary grades into smaller groups for instruction. They utilize paraprofessionals by treating and training them like teachers and give them the same level of professional development. They break down instruction into small groups of five students for literacy and staff them with trained paraprofessionals. There is an administrative mandate barring paraprofessionals to be used for hanging bulletin boards, and it is enforced.

The intervention strategies are based on a three-tier model. The first tier is the teacher instructing all students from a common curriculum. The second tier concentrates on small groups of one to five students who are given a second dose of the content. The third tier is largely one-on-one with an aide all day long.

Extended day help includes one half hour before school and one half hour after school. During both of these times, teachers are available to help students, primarily via one-to-one tutoring. The after school program is required for students with poor grades. K-8 summer school is fairly limited to students who are at risk of regressing during the summer months.

Technology**.** Rosalia School District had a lot of technology training a few years ago. For two summers in a row, a grant paid for all the teachers in the county to learn the basics and then how to integrate technology into the classroom. The school houses three full computer labs and five to seven computers in every classroom, with everything networked. Software is currently utilized in the classroom, especially for assessment purposes. Unfortunately, because of budgetary limitations, they do not have a replacement cycle.

Lessons Learned**.** Rosalia School District has beaten the odds over the past five years by improving teaching and learning in a focused and informed way.

- They **recalibrated** their goals for student learning by setting student performance goals based on WASL data.
- They **re-engineered** their school by changing the focus to improving student learning, and assigned their time and fiscal resources accordingly.
- They **redesigned** professional development for staff by providing almost unlimited resources for training and collaboration.

Working Draft

- They **reinforced** achievement for struggling students by identifying struggling students early, reducing reading class sizes in the elementary grades, providing extended day learning opportunities, and implementing a three-tier intervention model.
- They **retooled** their technology by integrating technology into the classroom and utilizing assessment tools to inform instruction.

By implementing these core strategies, Rosalia staff and students successfully changed their culture to embrace and support excellence in teaching and learning. Although this district has made progress, it needs to make even more progress and show similar improvements in all the core subject areas and at the elementary, middle and high school levels. For this, they will need additional resources, as they have pretty much exhausted potential for reallocating existing revenues and basing large scale improvement on grant funding.

Kennewick, Washington[4]

Kennewick, one of three mid-sized communities in the Tri-Cities area of in southeastern Washington, provides another example of a district that has restructured its schools in order to achieve ambitious student achievement goals. Kennewick serves 15,000 students in thirteen elementary, four middle and three high schools. About one-fourth of its students are ethnic minorities, and about 50 percent are eligible for free and reduced price lunch. In 1995, only 57 percent of its third grade students read at or above the state standard for that level. The school board decided that was not good enough and, with support from the district's leaders, set the goal of educating at least 90 percent of its students to reading proficiency by the end of third grade, a goal similar to that of Madison, Wisconsin. When the federal No Child Left Behind law came along, with its ambitious Adequate Yearly Progress goals, the district simply embraced the somewhat stiffer objectives, viewing them as complementing and reinforcing what the district already was trying to accomplish, rather than opposing them.

At first, principals and teachers were shocked and surprised. They did not feel the goals were attainable. They had been working hard, so what else could they do?

The district, including school board members, began to lead a multiple year awareness and professional development effort. First, the district helped each school – the principal and all faculty – analyze their students' test scores. In the process, each school identified several achievement gaps – the traditional one of lower income students achieving at below average levels, but also new ones. Though differing across schools, all schools identified performance deficiencies in many sub-skill areas. The result was that each school became much more familiar with the "texture" of the achievement profiles of its students, realized there was progress to be made, and became emboldened to think that they could redress many of the achievement shortcomings.

Washington Elementary is a prime example of what happened next. To begin, the school extended learning time for reading instruction, setting aside the two hours from 8:45 to 10:45 every day for intensive reading instruction. Then, the school began to provide teachers with

[4] Taken from Lynn Fielding, Nancy Kerr and Paul Rosier. (2004). *Delivering on the Promise … of the 95% Reading and Math Goals*. Kennewick, WA: The New Foundation Press.

Working Draft

more professional development, both in additional summer classes and during the school year. Third, the school decided that its old reading curriculum was not good enough and adopted a new reading program, that from Open Court. This new reading curriculum emphasized phonemic awareness, phonics and then comprehension, the structured approach many of the school's non-readers needed. Fourth, during the two hours of reading instruction in the morning, the school had every staff member teach reading – core teachers, specialist art, music and PE teachers, and instructional aides. The lowest performing readers were put into smaller classrooms and given the most expert teachers.

After a few years of implementation, when scores improved somewhat but not that much, the school decided that the students most behind needed even more instructional time if they were to catch up and read proficiently by the end of the third grade. So the school began to provide more instructional time to those students, again in small groups, during the afternoon. The students gave up some music and art instruction so they could work more at becoming a proficient reader. The theory was that reading was the cornerstone of good performance in every other subject, including mathematics.

At about the same time, the school and the district adopted the formative testing system of the North West Evaluation Association (NWEA), a group that provides districts and schools with a web-based diagnostic testing system that provides immediate results the next day. These assessment results were used to identify student performance in multiple reading sub-skills. The additional afternoon instruction was then targeted to the specific sub-skills students were struggling to learn. The idea here was to intervene immediately with struggling students so they learned all requisite skills as the year progressed, rather than waiting until the end of the year to see how students were performing.

Simultaneously, the school began to focus on this approach to reading at all grades. Although the most intense focus in the first couple of years had been at grade 3, the school soon realized that hard work on reading should begin at kindergarten and continue through all grades. This all grade focus, combined with the NWEA diagnostic testing and the extra help in the afternoon focused on specific reading sub-skills began to accelerate achievement gains.

Throughout the entire process, the principal provided strong instructional leadership during these transformational changes. He exposed the teachers to effective reading practices, helped the faculty select a new reading textbook, and captured resources to fund ongoing professional development. During the 2 hours of reading instruction each morning, he would walk through all classrooms in "looking for" observations. He was "looking for" the eight key characteristics of the school's reading program, which gave him specific data to discuss with teachers at a later time.

The result: At Washington, reading scores jumped from having only 70 percent at third grade proficiency in 1996 to 94 percent by 2000 and 98 percent in 2004. Though not quite as high, the district boosted the proportion of third graders reading at proficiency from 57 percent in 1995 to 88 percent in 2004, just shy of its ambitious goal of 90 percent.

Working Draft

The lessons learned from this district and school stories are the following:

- The district and school **recalibrated** their student achievement goals, setting a goal of having at least 90 percent of students finish third grade reading at or above proficiency for that grade.

- They **reengineered** the school, providing two hours of reading instruction to all students every morning, reduced class sizes by having all teachers – including music and PE teachers – teach reading during that time, and provided the best teachers to the lowest performing reading group. Teachers also engaged in ongoing diagnostic testing of their students so they knew exactly what each student did and did not know, and could target instruction to sub-skills needing more attention. It also threw out the old reading program and adopted a brand new reading program, more structured and more relevant to the learning needs of its students.

- They **redesigned** the teacher development system, helping teachers to engage in detailed and sophisticated ongoing formative assessment of their students, and providing additional professional development on more effective reading strategies both during the summer and at different points throughout the school year.

- They **reinforced** the learning of struggling students by providing additional and targeted instruction during the afternoon to all students struggling to learn to proficiency.

- It was led by a principal aggressively engaged in **instructional leadership.**

Though it has made great strides in reading, the district and its schools now need to focus on all the other core content areas, and at the middle and high school levels as well, but it is constrained in these efforts by its limited resources.

Six Steps to Doubling Performance

These powerful stories of actual districts or schools doubling performance show that there is knowledge about how to dramatically improve student performance results – which we summarize by saying doubling performance – and that the schools followed a similar set of six steps after setting new, rigorous performance targets:

1) Analyzed student data to become deeply knowledgeable about performance issues and the nature of the achievement gap. This step underscores the importance of formative assessments. The test score analysis over time included state test results as well.

2) Reviewed evidence on good instruction and effective curriculum. All the schools threw out the old curriculum and replaced it with a different and more rigorous curriculum.

Working Draft

3) Invested heavily in teacher training that included intensive summer institutes and longer teacher work years, as well as resources for trainers and most importantly, instructional coaches in all school.

4) Provided extra helps for struggling students, and with a combination of state funds and federal Title 1 funds provided some combination of tutoring in a 1-1, 1-3, or 1-5 format, and sometimes extended days, summer school, and though not highlighted, English language development for all ELL students.

5) Created smaller classes in early elementary years often lowering class sizes in grades K-3 to 15 citing research from randomized trials

6) Supported by strong leadership around data-based decision making and improving the instructional program, by both the superintendent and principal

However, all the examples were of schools that have boosted student performance in one or two content areas, and at one or maybe two education levels, through a combination of new grants and reallocating extant resources. Now the schools have no more resources to reallocate and they need similar resources to produce similar results in all 5 core content areas and in all elementary, middle and high schools. The evidence-based report is focused on identifying the resources needed by all schools to double student performance in the medium future.

Our Vision of a School that can Double Student Performance

In order to ensure that the following recommendations on school resource needs are effective they need to be woven together into a holistic school vision that is much more productive – doubling student academic achievement – than most schools today. The vision under girding these recommendations includes significant changes from the way most schools currently operate, because the performance improvement goals require quantum improvements. The new school vision is more like the above vignettes, but has the basic education resources to double student performance in all five core content areas and at all school levels.

Doubling student performance cannot be accomplished by working harder in schools as we know them; educators will need to work smarter in re-engineered schools. All current dollars – and any new dollars required to provide the previously recommended resources – will need to be reallocated to this new, more powerful vision of a school.

The vast bulk of educational resources need to be used for more direct services to students, for instructional purposes and for the consistent and ongoing improvement of classroom instruction. The assumption, backed by a wide variety of research, is that better classroom instruction in each core content area is the prime route to improved student performance. Funds need to focus on student needs and surround classrooms with supports that help all teachers dramatically improve their classroom instructional practices. To ensure that young students have minimum academic and social skills so they are ready to learn when they enter school, the new school vision includes preschool and full-day kindergarten, if not for all students, then at least for children entering school from low income backgrounds.

Working Draft

Our new school vision has small classrooms in the early elementary years because learning to read and the basics of numeracy – the foundations for learning everything else – are critically important. The new school vision has class sizes of 25 for grades 4-12. The new school vision then has a comprehensive, integrated and rigorous professional development structure and strategy to help all teachers enhance their instructional practice in quantum leaps. The new school vision also includes intensive extra help strategies so that no student falls behind and any student struggling to learn to standards is provided immediate, intensive help to do so – tutoring in small groups, followed by extended days and summer school if needed.

The new school vision assumes all students will take a common core of rigorous classes, with the goal of taking algebra by the eighth grade and the college preparatory curriculum in high school – the path we believe will prepare Washington's students for college, work in the global market and citizenship.[5] The new school vision includes substantial family outreach and involvement resources. The vision includes funds so that the school can stay up-to-date with computer technology resources and tap the Worldwide Web for instructional materials and even instructional courses – when and if they become available.

It should be clear that this new vision, each element backed by evidence on its effectiveness and used in most examples of school's doubling performance, is very different from typical schools in Washington today. Our proposals take all current school level and instructional resources and reallocates them, plus any new resources, to a proposed set of evidence-based, proven-effective strategies. Some but not many three- and four-year olds experience preschool; we and the Early Learning Advisory Committee support a full preschool program for all three- and four-year olds (whose parents want them), particularly those from lower income families. Full-day kindergarten is not supported by the current school aid program; we support full day kindergarten for all students, beginning with those from lower income families. The typical K-3 classroom today has 25 or more students; we propose 15, based on results from randomized experiments. Classes in grades 4-12 often have 30-35 students; we propose 25 based on best practices.

Many teachers leave Washington's schools because of low salaries and insufficient instructional support; we propose raising salaries where they are behind regional labor markets, linking pay raises more to improved instructional expertise that research shows is linked to value-added student learning gains, and providing intensive instructional support.

Typical professional development is usually a mile wide and an inch deep, with little if any follow through coaching; we propose intensive and ongoing professional development, with two-week summer institutes and coaching in all classrooms to instigate instructional change. Our proposed professional development resources can also be deployed for a strong new teacher induction and mentoring program, so learning how to teach will be structured rather than random.

[5] Having all students take the college prep curriculum in high school is increasingly recognized as the prime way to make students ready for college or the world of work in the 21st century global marketplace (Olson, 2006).

Working Draft

The typical intervention for students not learning to proficiency is a pull out remedial program, with untrained aides often providing the help; we propose the most effective strategy – one-to-one and small group tutoring by certified teachers, as well as academically focused extended day and summer school programs so that instructional time can vary for struggling students but performance standards held constant.

In most schools, guidance counselors, social workers and other pupil support personnel work in isolation with little impact; we propose integrated family/community outreach-pupil support teams stressing those actions parents can take to help their children learn.

For the maximum impact, our resources need to be used to deploy a more effective curriculum program, from too much whole language reading today to a balanced, research-based approach with more phonemic awareness and phonics in the early elementary years, from just basic skills in mathematics today to mathematic concepts with applications to real-world problems, from little science today to science concepts again with applications to real-world issues, and to a stronger approach to U.S history. Our model includes an emphasis on writing and communication, with ample resources for art, music, physical education and advanced work for the gifted, talented and able and ambitious student.

We should note that our new school vision does not propose additional funding for longer school years or longer days for students, except for those who need extended day academic help. It does not include small classes of 20 for students in grades 4-12, as many professional judgment adequacy studies do. The new school vision proposes no assistant principals per se, no deans, and no traditional instructional aides used as teacher helpers. Because the model excludes many high cost proposals and practices seen elsewhere, and our new vision is to have smaller school units, these "support" and non-instructionally oriented resources are not needed.

Over time, we seek to have a larger number of smaller, more personalized, school units – no larger than 650 students – at all levels in the education system. This recommendation is justified by a wide range of research showing that smaller schools work better for all children, especially at the secondary level, and especially for lower income, minority and English language learning students.

Using a car metaphor, we are designing a "hybrid" car which is much more effective, efficient and environmentally friendly than typical cars today. We would like a "hover mobile" running on hydrogen, but that is not possible in the near term.

So our new school vision is quite different from many schools in Washington today, though it may not be as technologically radical as some would want. But we do not yet have evidence for a school vision laden with technology that would be better. We believe our vision could "morph" into such an even stronger vision once that is possible, and we have provided the technology resources to position schools to do so.

<u>Evidence underlying this vision and these ambitious student performance expectations</u>. To those who wonder whether there is a knowledge base for improving student achievement so dramatically, we would direct their inquiry to research – largely from cognitive psychology –

Working Draft

during the past two decades. This research has shown us that virtually all students, except those with significant disabilities, can learn complex materials, and be educated to think, understand, problem solve and communicate in written and oral form effectively. This research was nicely summarized in a recent book from the National Academy of Sciences (Bransford, Brown & Cocking, 1999), which includes chapters not only on student learning, but also on how that knowledge can be translated into curriculum standards for students and professional development for teachers.

These general findings have been articulated into detailed summaries of the instructional practices most effective in teaching students mathematics (Donovan & Bransford, 2005b), science (Donovan & Bransford, 2005c) and history (Donovan & Bransford, 2005a) and join the other many syntheses of effective reading practices (e.g., Cunningham & Allington, 1994). One finding from that research is that students cannot learn to understanding and problem solving levels, unless the curriculum, instructional and testing processes are redesigned to make those demands of all students.

Thus, research shows not only that the vast bulk of students from lower income, minority or English language learning backgrounds can learn complex materials, but also that these students often are the prime beneficiaries of new instructional programs that expect them to learn to those levels, and provide the extra assistance some might need to perform to those levels. Put a different way, although there is a low achievement/high poverty link and a minority/non-minority achievement gap today, it does not have to be that way, or at least the linkages and gaps can be much less than they are. In sum, we believe that the country, Washington and the professional education communities have the professional knowledge base to produce the quantum improvements in student learning, including improvements for lower income and English language learning students, that would be allowed by the adequate funding models we are proposing.

Finally, to those who would quote the education production function studies as concluding that money does not make a difference, we quote from the 3rd edition of our school finance text

> The most often cited research in this field [economic production functions] is the synthesis work of Eric Hanushek (1981, 1986, 1989, 1997). Hanushek has consistently argued that there does not appear to be a systematic relationship between the level of funding and student outcomes (see also Hanushek, 2002, on the class size debate).
>
> Hanushek has now analyzed 90 different studies, with 377 separate production function equations over a 20-year time period. In his 1997 publication, he continued to argue that "These results have a simple interpretation: There is no strong or consistent relationship between school resources and student performance. In other words, there is little reason to be confident that simply adding more resources to schools as currently constituted will yield performance gains among students" (Hanushek, 1997: 148).
>
> Hanushek essentially divided the 377 different findings into two major categories: those indicating a positive and those indicating a negative relationship. He compared the

Working Draft

numbers in each category and found more negative than positive findings. He then concluded that the variation in findings was such that a systematic relationship between money and outcomes had not yet been identified…

Others have analyzed the same studies as Hanushek and reached opposite conclusions. Hedges, Laine and Greenwald (1994a, 1994b; see also Laine, Greenwald & Hedges, 1996; and Greenwald, Hedges & Laine, 1996a, 1996b) concluded that in fact, money can make a difference. They calculated the effect size of the different studies and, rather than counting the number of positive and negative findings, calculated an average effect size; their results produce a significantly positive effect size. The larger effects of the "positive" studies are greater than the smaller effects of the "negative" studies. Relying on this and other evidence, Hedges Laine, and Greenwald, (1994a) concluded that school spending and achievement are positively related. In his rejoinder, Hanushek (1994) argued that while there is evidence that the relationship exists, there is not evidence of a strong or systematic relationship. We side more with Hedges, Laine and Greenwald than with Hanushek, viewing the "effect size" as the way to summarize across studies.

We would, however, note that beyond this more arcane debate about the conclusions of economic production function studies, all analysts conclude that *it is the way money is spent that will make the largest and critical differences*. That is why the most recent National Research Council's book on school finance is entitled *Making Money Matter* (Ladd & Hansen, 1999). And, that is why our report's recommendations, if funded and implemented, would redirect school resources to those strategies for which there is evidence that they do work. As will be clear, each and every one of the proposals is backed by evidence on its effectiveness. If current and new funds in schools were used to implement these recommendations, greater student performance should result – WASL scores should rise – once again showing that it is the way money is used in schools that makes the impact on student performance real and measurable.

Working Draft

1. General Recommendations

This section covers counting students, full day kindergarten and school size.

Student Count for Calculating State Aid

Current Washington policy. Students are counted on a full-time equivalency basis (FTE) for the current Washington school finance formula. School districts report the number of full-time equivalent students enrolled on the fourth school day of September and the first school day of October through May. An FTE student is counted as a student enrolled at least four hours per day in grades 1-3, and at least five hours per day in grades 4-12. The nine pupil counts from September through May are averaged to obtain an average annual FTE enrollment.

Kindergarten students can be counted as a maximum of a 0.5 FTE, and to get that maximum count, kindergarten students must be enrolled for 10 hours or more of instruction a week.

Further, consistent with Washington's open enrollment policy, students are counted in the district where they attend school and not in the district in which they reside.

The evidence. An FTE (or average daily membership in other states) count of students increasingly is the pupil count used by most states in their school finance formulas. An FTE count is the best approximation of the number of students actually needing education services in schools and districts.

Washington also has adopted the most efficient way to count students when they can choose to attend a school outside their resident district. Many states count students in their resident district and then create an unnecessary and complex system of revenue transfers to account for student movement across district lines. But, the easiest and most cost-effective way to address student choice of school and appropriate flow of funds is simply to count each student in the school (and district) that they attend. This insures that dollars follow the student and it eliminates the need for a separate administrative system for transferring funds across districts to accommodate student choice of school.

Finally, there is the issue of declining enrollment and the difficulty districts have in reducing costs in line with enrollment drops. Using a three year rolling average student count to cushion the fiscal impact of declining student numbers is a common practice across the country. This was an approach recommended by Cavin, Murnane & Brown (1985) in a study of this issue in Michigan. As enrollments level off at a lower level, this type of adjustment ultimately uses the actual enrollment count, but gives districts a bit more time to adjust their expenditures to the lower number of students.

However, a rolling three year average was generally not intended for use in all schools, especially those schools experiencing enrollment growth, even though there are fewer rising enrollment than falling enrollment schools in Washington. Schools with rising enrollments should be able to use a pupil count that reflects their growth situation. Washington currently

Working Draft

provides additional resources to districts with rising enrollments if total FTE enrollment is at least 250 and if the FTE enrollment count for at least one day during a given month exceeds the first of the month FTE count by 5 percent or more.

Recommendation. We recommend that Washington continue to use an FTE student count for the basic aid formula. We also recommend that the state continue to use a count of students in the school and district where they actually attend school. Finally, since it is more appropriate to use a rolling three year average FTE count when student decline exists, but the actual FTE for schools with stable or rising student counts, we recommend that the FTE count for the formula be the average of the current and past two years' FTE or the current year's FTE, whichever is larger.

Full Day Kindergarten

Current Washington policy. Currently, Washington allows districts to count kindergarten students for a maximum of a half day program, or a maximum of a 0.5 FTE. To receive this count, a kindergarten student must be enrolled for at least 10 hours a week. As a result, the state school finance program supports only a half-day kindergarten program.[6]

The evidence. Research shows that full-day kindergarten, particularly for students from low-income backgrounds, has significant, positive effects on student learning in the early elementary grades (Fusaro, 1997; Gulo, 2000; Slavin, Karweit & Wasik, 1994). Children participating in such programs do better in learning the basic skills of reading, writing, and mathematics in the primary grades of elementary school than children who receive only a half-day program or no kindergarten at all. The most recent study of such effects was released in mid-2003 by the National Center for Education Research (Denton, West & Walston, 2003). This nationally-representative, longitudinal study showed that children who attended full-day kindergarten had a greater ability to demonstrate reading knowledge and skill than their peers in half-day programs, across the range of family backgrounds. This study also found that the more children were exposed to literacy activities in the home, the more likely they were to perform well in both kindergarten and first grade. Funding full day kindergarten for 5 year-olds as well as for 4 year-olds is an increasingly common practice among the states (Kauerz, 2005).

The effectiveness of full-day kindergarten on student achievement is well established. In the most recent meta-analysis of 23 studies comparing the achievement effect of full-day kindergarten to half-day kindergarten programs, Fusaro (1997) found an average **effect size** of **+0.77**, which is quite substantial.

Recommendation. We recommend that Washington support a full-day kindergarten program. Since recent research suggests that children from all backgrounds benefit from full-day kindergarten programs, we recommend that the state support a full day program for all students, at least for those parents who want their child to have such a program.

[6] In other school finance adequacy studies, we have addressed the issue of pre-school programs for children aged 3 and 4. Since another state committee is addressing pre-school and related issues, this report addresses only students in grades K-12.

Working Draft

The most direct way to implement this recommendation is to have the state school finance system allow each district to count each student in a full day kindergarten program as a full 1.0 student in the formula in order to fully fund a full-day kindergarten program. Using the current state requirements for grades 1-3, this would mean allowing districts to count kindergarten students as a full 1.0 FTE if they are enrolled at least 4 hours each day.

School Size

Current Washington policy. Washington has no specific school policy on school size. And school sizes differ substantially across the state. We will be developing resources for prototypical elementary, middle and high schools, and need to suggest a size in order for the prototypes to indicate the relative level of resources in the schools. Thus, we will make recommendations on the most effective school sizes, but *we also will show how the recommendations provide resources for schools of all size categories*. When the recommendations are for school sizes smaller than currently existing school sites, we will propose that schools divide themselves into schools-within-schools (SWS), and have each SWS operate as semi-independent units. We do not recommend that the state replace all school sites with smaller buildings.

The evidence. Research on school size is clearer than research on class size. Most of the research on school size addresses the question of whether large schools – those significantly over 1,000 students – are both more efficient and more effective than smaller school units (schools of 300 to 500) – and whether cost savings and performance improvements can be identified for consolidating small schools or districts into larger entities. The research generally shows that school units of roughly 400-600 elementary students and between 500 and 1000 secondary students are the most effective and most efficient.

The following is a quote from the third edition of the school finance text of Odden and Picus on this issue (Odden & Picus, 2004, Chapter 6):

> Analysts, however, argue that the expected cost savings from the massive school and district consolidation have not been realized (Guthrie, 1979; O'Neill, 1996; Ornstein, 1990) and that consolidation might actually harm student performance in rural schools (Sher & Tompkins, 1977) as well as have broad negative effects on rural communities (Coeyman, 1998; Seal & Harmon, 1995). If small schools or districts indeed cost more, but consolidation reduces performance and disrupts communities, the better policy choice might be to resist consolidation and provide special adjustments to compensate for the higher costs.
>
> The research on diseconomies of small and large scale generally does not support a consolidation policy. From an economic perspective, the concept of diseconomies of scale includes both costs and outputs. The issue is whether costs per unit of output are higher in small schools or districts, or put differently, whether costs can be reduced while maintaining output as size rises. In an extensive review of the literature, Fox (1981) concluded that little research had analyzed output in combination with input and size

Working Draft

variables, and Monk (1990) concluded after assessing the meager extant research that there was little support for either school or district consolidation.

For elementary schools, research knowledge is thin, but data suggest that size economies that reduce costs by more than one dollar per pupil exist up to but not beyond 200 pupils (Riew, 1986). Thus, very small schools experience diseconomies of small size and, except in isolated rural areas, potentially could be merged into larger ones. But the real opportunities for cost savings from school consolidation from these small sizes are not great, precisely because many such schools are located in isolated rural areas and there are no other schools nearby with which to consolidate.

At the secondary level, the data are more mixed. Few studies exist that simultaneously assess both size and output, so scale diseconomies have not been adequately studied. Riew (1986) found that there were cost savings, below one dollar per pupil, for middle schools with enrollments above 500; again, many middle schools already enroll more than this number. In analyzing whether larger secondary schools actually provided more comprehensive programs, an argument for larger size, Monk (1987) concluded in a study of New York that program comprehensiveness increased consistently in secondary schools only for size increases up to but not beyond about 400 students. In subsequent research, Haller, Monk, Spotted Bear, Griffith, & Moss (1990) found that while larger schools offered more comprehensive programs, there was wide variation among both smaller and larger schools, and there was no clear [size] point that guarantees program comprehensiveness. Further, Hamilton (1983) shows that social development is better in small high schools.

Studies of district size generally analyze expenditures per pupil as a function of size without an output variable, such as student achievement (Fox, 1981). To document diseconomies of district size, however, expenditures, size, and output need to be analyzed simultaneously, since the goal is to determine if costs per unit of output decrease as the number of students in the district increases. Again, in reviewing the literature, Monk (1990) concluded that definitive statements could not be made about district consolidation.

In the most recent review of scale economies and diseconomies, Andrews, Duncombe & Yinger (2002) assessed both cost function and production function research. The studies reviewed generally assessed costs in tandem with student achievement outputs. The authors concluded that there were potential but modest cost savings that could be realized by consolidating districts smaller than 500 students into districts with 2,000-4,000 students; of course this would be an option only for small districts a short distance from each other and not for rural, isolated small districts. The authors also found that the optimum size for elementary schools was in the 300-500 pupil range, and for high schools was in the 600-900 range (see also, Lee & Smith, 1997, on high school size). Both findings suggest that our very large urban districts and schools are far beyond the optimum size and need to be somehow downsized.

Working Draft

In other words, research suggests that elementary school *units* be in the range of 400-600 students and that secondary school *units* be in the range of 500-1000 students (Lee & Smith, 1997; Raywid, 1997/1998). Evidence from comprehensive school designs, however, generally suggests school sizes of about 500 students for both elementary and secondary schools, which we would argue falls within the range of the research findings (Odden, 1997; Stringfield, Ross & Smith, 1996). Such school designers also suggest that larger schools be divided into "sub-schools," and run as "schools within schools." So a secondary school with 2,000 students would be organized into two, 1000-student or four 500-student "sub-schools," each with a separate student body, separate principal and separate entrance, if possible (see also Murphy, Beck, Crawford, Hodges & McGaughy, 2001). Teaming within larger schools is another way to enhance personalization of the social and academic environment for students.

Though some of the research on "schools within a school" is mixed, the bulk of research shows that when such efforts *are fully implemented*, student performance and other outcomes do rise. The recent Borman, Hewes, Overman and Brown (2003) meta-analysis of comprehensive school designs, many of which are implemented as schools within school buildings, is one body of evidence and documents significant positive impacts for fully implement programs. A policy brief by Wonacott (2002) from the Career and Technical Education National Dissemination Center provides an overview of the impacts of smaller learning communities generally and specifically for secondary career academies. The small-school initiative of the GATES foundation is another support for smaller schools; indeed; GATES is providing tens of millions of dollars all around the country for large high schools to break themselves into small school units (see Dobbs, 2003, for example). Washington has several excellent examples of effective schools-within-schools.

Astute readers would have noted that the above conclusions were for school units, not necessarily school buildings. And many Washington districts already have built numerous school buildings larger than the above numbers. Evidence on effectiveness would suggest that the districts build smaller school buildings in the future, but this could increase the cost of education facilities. Further, some parents and students prefer large school buildings, believing such schools offer a larger variety of courses, and more extra curricular activities. At the same time, some districts in Washington have built school buildings of a variety of sizes, reflecting the above research findings.

Going forward, we would recommend that districts build smaller buildings when new schools, especially secondary schools, are needed. We also suggest that districts divide some but not all of their current large school sites into smaller school-units, thus providing smaller, and more personalized, learning environments for some students. And we further suggest that parents and students be allowed to attend their school of choice: a large comprehensive high school, a school unit within a larger school building, or a smaller school that already exists or is built in the future. In this way, Washington could provide parents and children options for the "size" of the educational environment in which the children are educated.

Although we recognize that the above level of school choice may not in fact exist in sparse, rural areas, and that in lower income areas parents often do not have the time or resources

Working Draft

to avail themselves of choice were it to be provided, we believe these conclusions about the issue of school size are sound, nevertheless.

In addition, for secondary schools, research also finds that curriculum offerings should emphasize a solid core of academic classes for all students (Bryk, Lee & Holland, 1993; Lee, Croninger & Smith, 1997; Newmann & Associates, 1996). This research shows that the most effective strategy for having all students perform to proficiency on state standards and to close the achievement gap between minorities and non-minorities is for high schools to offer a strong set of core academic courses in mathematics, science, language arts, history/social science and foreign language and require all students to take the bulk of their courses from this core (Clune & White, 1992; Lee, Croninger & Smith, 1997; Madigan, 1997; Public Agenda, 1997; Steinberg, 1997), excluding altogether such low-level classes as general and consumer math. Indeed, the Education Trust argues that one of the top two strategies for closing the achievement gap between low-income students and students of color from other adolescent Americans is having high schools prepare all students for college, i.e., to take a core of solid academics (Education Trust, 2003; ACT & Education Trust, 2004).[7] As implied by the introduction to this report, this is the kind of secondary education required for full participation in any and all post-high school activities, whether it is taking a job in the global economy of the 21st century, enrolling in a two-year post secondary institution, or attending a college or university.

Recommendation. To indicate the relative level of resources in schools, we will use prototypic school units of 432 elementary students (grades K-5), 450 middle school students (grades 6-8) and 600 high school students (grades 9-12). As discussed in the class size section below, these numbers allow for a whole number of teachers (as opposed to partial FTEs) and facilitate staffing discussions for schools with fewer students. Though these numbers are larger than many of the "small" high school programs that are developing across the county, they more accurately reflect the research on the most effective school sizes (Iatarola, 2005).

Working Draft

[7] The other strategy is to provide a quality teacher in every classroom, a topic addressed later in this report.

2. Recommendations for the Personnel Elements in Prototypical Schools

This section covers all personnel recommendations: core teachers, specialist teachers, teachers for struggling students (tutors, English language learners (ELL), extended day and summer school, alternative learning environments and special education), pupil support professionals, librarians, administrators, and secretaries.

We are aware that Washington does not now distinguish between what we term core teachers and specialist teachers, viewing all teachers as teachers. But we make the distinction below for three reasons. First, identifying two categories of teachers insures that everyone knows we are making provision for art, music, drama, physical education, etc. teachers in the funding model. Second, identifying the two categories of teachers makes a discussion of planning and preparation time and the efficient scheduling of schools more explicit. Third, we view the academic subjects that core teachers teach as the "more equal" subjects of all equal subjects. Mathematics, science, reading, writing, language arts and history are the only subjects that most states test, and except for history, that also is true for Washington. As such, they are more preeminent in the accountability context. Further, American student performance in science and mathematics is critical for the economic growth of the country and of the state of Washington. The importance of these academic content areas to the economic health of the country was the subject of a 2005 Congressional report, and are discussed at length in Tom Friedman's (2005) The World is Flat.

1. Core Teachers/Class Size

Current Washington policy. Washington does not have a statewide policy for core teachers or on class size for all grades. Core teachers would teach such subjects as reading/writing/communication, mathematics, science and history/social studies, as well as perhaps world languages. Washington does, however, have a formula that uses certified staffing ratios based on the number of students in each district to determine the number of staff (instruction, administrative and classified) and ultimately the level of funding for each school district. Initially, the formula provided 50 certified staff (both instructional and administrative) positions for every 1000 students, or one for every 20 students. That ratio was based on actual statewide average practice in the mid-1970s and has been modestly enhanced over the years.

The state provides funding for a minimum of 49 positions for every 1000 students in grades K-3 and of 46 for grade 4. But as an enhancement to basic education districts can receive up to 53.2 CIS for every 1000 students in grades K-4 if they actually hire that many. The funding ratio is 46 per 1000 students for grades 5-12. The current school finance formula also provides administrative staff as a ratio 4 per 1000 students, classified staff at a different ratio (16.67 per 1000 students), and then a non-employee-related cost (NERC) allocation based on the total number of certified staff (instructional and administrative) generated under the state funding formula. Our approach addresses all these issues but in more detail, as described in this and the next section. And we intend all of our recommendations to be a component of an adequate education program in Washington; the Steering and K-12 Committees will need to determine

Working Draft

whether the definition of adequacy should become a new definition of basic education in the state.

Our approach initially is school based and, rather than provide a gross number of certified staff based on school enrollment, we identify numerous categories of staff, all needed for various programs – core teachers, specialist teachers, teachers for struggling students – tutors, English language learners (ELL), extended day and summer school – pupil support professionals, librarians, administrators, and secretaries.. Although our approach ultimately produces a total number of certified, administrative and classified staff for each district, it builds to the total by identifying various staff for numerous educational strategies at the school level, and then adding appropriate district staff as well. This section address core teachers and thus core class sizes.

In staffing schools and classrooms, superintendents and principals must make decisions on class sizes for core teachers – the grade (or multi-grade) teacher in elementary schools, and the core subject (e.g., mathematics, science, reading/English/language arts, social studies and perhaps world language) teachers in middle and high schools. Thus, a school-based model must first specify a class size for core classes.

The Evidence. Research on class size shows that small classes of *15* (not a class of 30 with an instructional aide or two teachers) in kindergarten through grade 3 have significant, positive impacts on student achievement in mathematics and reading (Achilles, 1999; AERA, 2003; Gerber, Finn, Achilles & Boyd-Zaharias, 2001; Grissmer, 1999; Mishel & Rothstein, 2002; Molnar, 1999; Nye, Hedges & Konstantopoulous, 2002). It is commonly also concluded that the impact of small class size is even larger for students from low-income and minority backgrounds (Finn & Achilles, 1999; Krueger & Whitmore, 2001). Because the evidence suggests that a small class policy would benefit all children, we view the evidence as supporting a policy to provide class sizes of 15 in all classrooms for kindergarten through grade 3.

Over time, different analysts have reached different conclusions on the role of resources generally and specifically the role of class size on student achievement. In a late 1970s meta-analysis of the class size research, Glass and Smith (1979) concluded that class sizes needed to be reduced to at most 15 students before an impact on achievement could be produced. However, in a re-analysis of that research, Odden (1990) noted that Glass and Smith had no sample studies of class sizes of 14-17 that actually improved student achievement, and that the class size of 15 finding was a statistical artifact of little if any impact of class size of any size until individual tutoring was provided. And Hanushek (2002) has always questioned the efficacy of small class sizes.

But research in the late 1980s and early 1990s provided new evidence on the impact of class size on achievement. The "gold" standard of educational research is randomized experiments, which provide scientific evidence on the impact of a certain treatment (Mosteller, 1995). Thus, the primary evidence on the impact of small classes today is the Tennessee STAR study, which was a large scale, randomized experiment of class sizes of 15 (actually from 14-17 students) for kindergarten through grade 3 (AERA, 2003; Finn & Achilles, 1999; Word, et al., 1990). The results showed that students in the small classes achieved at a significantly higher level (**effect size** of about **0.25** standard deviations) than those in regular class sizes, and that the

Working Draft

impacts were even larger(**effect size** of about **0.50**) for low income and minority students (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002). Subsequent research showed that the positive impacts of the small classes in the Tennessee study persisted into middle and high school years, and even the years beyond high school (Finn, Gerger, Achilles & Zaharias, 2001; Krueger, 2002; Mishel & Rothstein, 2002; Nye, Hedges & Konstantopulos, 2001a, 2001b). The same research showed that a regular class of 24-25 with a teacher and an instructional aide *did not* produce a discernible positive impact on student achievement, a finding that undercuts proposals and wide spread practices that place instructional aides in elementary classrooms (Gerber, Finn, Achilles, & Boyd-Zaharias, 2001).

Thus, although differences in analytic methods and conclusions characterize some of the debate over class size (see Hanushek, 2002 and Krueger, 2002), as social scientists we side with those accepting the results of class size randomized trials. Specifically, we conclude that the research shows that class sizes of 15 (14-17) students and only for kindergarten through grade 3 boost student performance (Achilles, 1999; Finn, 2002; Grissmer, 1999; Krueger, 2002).

Similar research supporting the above findings on the effect of class size of 15 for students in kindergarten through grade 3 was produced by Project Prime in Indiana (Chase, Mueller & Walden, 1986) and in Wisconsin's SAGE program (Molnar, 1999).

Following California's experience, we would urge any state to phase-in these smaller class sizes to insure that quality teachers are available to staff those classes; California discovered that a fast phase-in required many districts, particularly the large urban districts, to staff class with unqualified teachers, which detracted from the efficacy of the small class size.

Key operating mechanisms. Two main mechanisms have been proposed through which class size reduction effects may operate. Some have suggested that teachers may alter their instructional methods in smaller classes, making greater use of small groups, for example, or assigning more writing. However, several studies including those tied to Project STAR have failed to find consistent instructional practice differences related to class size (e.g., Betts & Shkolnik, 1999; Evertson & Randolph, 1989; Rice, 1999). A more likely operating mechanism is that students respond better to the same instruction in smaller classes. With fewer students per teacher, less time is needed for disciplinary matters and students may be more engaged (Betts & Shkolnik, 1999; Finn & Achilles, 1999; Finn, Pannozzo & Achilles, 2003). Particularly in the early elementary grades, smaller classes facilitate forming social relationships among teachers, students, and their families that may be essential for school success.

Class size in grades 4-12. Evidence on the most effective class sizes in grades 4-12 is harder to find. Most of the research on class size reduction has been conducted at the elementary level. Thus, we look for evidence on the most appropriate secondary class size from typical and best practices to make a recommendation for class sizes for these grades. First, the national average class size in middle and high schools is about 25. Second, nearly all comprehensive school reform models are developed on the basis of a class size of 25 (Odden, 1997; Odden & Picus, 2000; Stringfield, Ross & Smith, 1996), a conclusion on class size reached by the dozens of experts who created these whole-school design models. Although many professional judgment panels in other states have recommended secondary class sizes of 20 (see Appendix

Working Draft

A), none cited evidence to support such proposals. Thus, we use evidence of best practice to recommend that class sizes in grades 4-12 should be no larger than an average of 25.

Recommendation. We recommend that schools be resourced with core teachers for class sizes of 15 for grades K-3 and 25 for grades 4-12.

With these class size recommendations, a K-5 elementary school would have an average class size of 18. With this resourcing formula, an elementary school of 432 students would receive 24 teachers (4 teachers for each of six grade levels), a middle school of 450 students would receive 18 core teachers, and a high school of 600 students would receive 24 core teachers. *We note that these core teachers would not be the only teaching staff in these schools. Several of the following sections recommend a variety of additional teachers for all school levels.*

Fractional teacher units and grouping students for instruction. An issue that often emerges is how to calculate the number of teachers when the number of students in a school, grade level or class is not so neatly divided by 15, 25 or 18, particularly at each grade level for a school. For example, if an elementary grade had 18 students, a 1.0 FTE teacher position is provided. But what would happen if there were 19 students? Would that trigger an additional full FTE teacher, or just a small fraction of an additional teacher? We would suggest that the formula would trigger just the additional fraction, and that all teacher FTE would need to be considered when organizing a school's instructional program. In other states, individuals have suggested a "rounding up" of each calculation so that any small fraction would produce an additional 1.0 FTE teacher; this would allow an elementary grade with 19 students to trigger 2.0 FTE teacher positions. But many view such an approach as too generous – that the additional teacher should be triggered at 22 or 24. Both approaches, however, would create the "step" function, which would require the state to distinguish clearly between a grade with 21 students that triggered just 1.0 FTE teacher and a grade with 22 students that triggered 2.0 FTE positions. A formula that simply calculated FTE teachers to the nearest tenth by dividing the student count by 18 (or 25 for middle and high schools) would solve the "step" function problem but not the numbers of students in the class problem.

The issue here, as well as for very small elementary schools, is how students are grouped for instruction. If students are grouped by grade level, the fact that each grade level does not have a number of students evenly divided by 15, 18 or 25 produces an issue of student placement and numbers of teachers. On the other hand, if schools adopt a multi-age approach, and in elementary schools, for example, create K-1, 1-2, 2-3, 3-4, and 4-5 classes[8] then it would be much easier to create classrooms of approximately 18 students, regardless of the specific number of students in each grade. This approach also would allow for differential placement of students according to their developmental progress, since it is a truism that there is great variability among elementary students in their academic development, even when they are of similar ages, a phenomenon that grade level grouping of students ignores.

Furthermore, research shows that multi-aging of students in elementary classrooms actually is better for students; students in multi-age classrooms achieve at least as much as students in age-grouped classes and usually learn more with **effect sizes** ranging up **to 0.5**

[8] Or in the case of smaller schools, groupings such as K-1, 2-3 and 4-5.

Working Draft

(Gutierrez & Slavin, 1992; Mason & Burns, 1996; Mason & Stimson, 1996; Pavan, 1992; Veenman, 1995). The reasons for increased student achievement are at least twofold. First, as just stated, classes can be organized so that the academic development of children in each class is more homogeneous thus allowing teachers to provide more whole group instruction, which allows teachers to provide more instruction during each day. Second, if teachers stay with a student group over a two-year time period, a process called "looping," then the teacher knows the student for the second year and less time is lost in starting the school year, determining how to organize and manage the class, and learning the academic achievement status of each student. Moreover, a recent report from the Rural School and Community Trust on school finance adequacy (Malhoit, 2005) lists the prevalence of multi-age classrooms in rural schools as one of several advantages that small, rural schools provide.

Multi-aging, though, works best if the teacher instructs the entire class as a group and essentially has a two-year curriculum that all students are taught over a two-year time period. Multi-age classrooms run as "combination" or "multi-grade" classes, in which the teacher provides half a day of instruction for one grade, and instruction for the other half of the day to the other grade, can be a detriment to student learning, in part because each student might receive only a half day instead of a full day of instruction, with effect sizes ranging from -0.1 to 0.0. In short, the way multi-age classrooms are taught impacts whether they are more or less effective for students.

Some states, such as Kentucky, use this research and actually mandate the use of multi-age grouping of students in elementary schools. Though we are not hinting that Washington should mandate multi-age classrooms, we are stating that such an approach is a very effective way to group students for instruction and addresses the fact that the resourcing formulas will not produce a "whole" number of teachers, thus making age grouping of students problematic. We are suggesting that the answer is multi-age grouping of students, not providing more teacher resources, and that this solution has ancillary benefits.

2. Specialist Teachers and Planning and Preparation Time/Collaborative Professional Development

Current Washington policy. There is no specific provision for such staff in Washington education or school finance policy. It is a personnel resource that districts and schools can and do buy with the certified instructional staff positions provided by the current funding formula.

The evidence. Schools need to teach what we would call specialist subjects that include the arts (dance, music, visual arts and theatre), health and fitness, and vocational/career and technical education, all part of the EALRs for the state. Teachers also need some time during the regular school day for collaborative planning, job-embedded professional development, and ongoing curriculum development and review. Providing each teacher one period a day for collaborative planning and professional development focused on the school's curriculum requires an additional 20 percent allocation of specialist teachers needed to provide those planning periods and to teach the above mentioned subjects or other specialist content classes.

Working Draft

The 20 percent additional staff is adequate for elementary and middle schools, and would provide each teacher about one hour a day for planning, preparation and collaborative work on curriculum and instruction.

But a different argument could be made for high schools. If the goal is to have more high school students take a core set of rigorous academic courses, and learn that material at a high level of thinking, problem solving and application, a block schedule that allows for longer class periods would be a better way to organize the instructional time of the school. And typical block scheduling for high schools requires an additional 33 percent of specialist teachers, as most schools create a four 90-minute block schedule, with teachers providing instruction for just three of those 90-minute blocks and having one block – or 90 minutes – for planning and preparation each day. This type of block schedule could be operated with students taking four courses each semester attending the same classes each day, or with students taking eight courses each semester while attending different classes every other day. Such a schedule could also entail some "skinny" blocks for some classes. Each of theses specific ways of structuring a block schedule, however, would require an additional 33 percent of specialist teachers to provide the regular teacher with a "block" for planning and preparation each day.

Based on the findings from cognitive research on how children learn complex materials (Bransford, Brown, & Cocking, 1999; Donovan & Bransford, 2005a, 2005b, 2005c), which suggest longer, more concentrated times for learning, and the rigorous but needed performance expectations for high school students in Washington, we would recommend such block scheduling for high schools, and thus provide more specialist teachers for high schools to permit this scheduling. Block schedules also would allow teachers of English and writing to give more writing assignments and have the time to provide detailed feedback to students, which is needed to help students write better, but is very time consuming with large numbers of students. We should note that a school could provide 60 minutes of this preparation time for planning, preparation and collaborative work with colleagues, and also require that teachers use 30 minutes of this time to provide additional help for struggling students, which could be organized in many different ways by a school.

We should also note that the primary way to provide job-embedded professional development is to provide for and use a significant portion of planning and preparation time within the normal school day for this purpose (see Odden and Archibald, 2001 for examples). This means that the planning and preparation time needs to be provided as 45-60 minutes of uninterrupted time, not 15-30 minutes at different times during the day. Such professional development should provide between 100 and 200 hours of professional development annually for each teacher (we would recommend closer to 200 hours), include extensive coaching in the teacher's classroom (provided by the site-based instructional facilitators/coaches/mentors discussed above), incorporate all faculty and administrators in a school, focus heavily the content and curriculum that each teacher teaches, and be aligned with state/district content standards and student tests (Birman, Desimone, Porter & Garet, 2000; Cohen & Hill, 2001; Desimone, Porter, Garet, Yoon, & Birman, 2002, Desimone, Porter, Birman, Garet & Yoon, 2002; Garet, Birman, Porter, Desimone & Herman, 1999). We expand on the structure and costs of effective professional development below.

Working Draft

Recommendation. We recommend that elementary and middle schools receive an additional 20 percent of the number of core teachers for specialist teachers, and that high schools receive an additional 33 percent, in order to teach specialist classes and also to provide time for teachers to engage in collaborative planning and preparation as well as job-embedded professional development during the period when they do not teach. The 20 percent formula provides an additional 4.8 FTE positions for the prototypical 432 student elementary school, 3.6 FTE positions in the prototypical 450 student middle school, and the 33 percent formula provides an additional 8.0 positions in the prototypical 600 student high school.

In totaling the core plus the specialist teachers from the recommendations above, our recommended total teaching staff for prototypical schools are 28.8 for the prototypical 432 FTE elementary, 21.6 for the 450 FTE middle and 32 for the prototypical 600 FTE high school. *Again, we note that the next set of recommendations provide a variety of additional staff for all schools. These are not the only professional staff or the only teaching staff for each school.*

3. Instructional Facilitators/School-Based Coaches/Mentors

Current Washington policy. There is no specific provision for such staff in Washington education or school finance policy. It is a personnel resource that districts and schools can allocate from the gross number of certified instructional positions provided by the current formula, as well as possibly from the dollars received from the Student Achievement Fund, which was to be $375 for 2007, $450 for 2008 and an amount adjusted by inflation thereafter. Since instructional facilitators are similar to mentors, districts also could use their portion of the state's $2.348 million in 2004 for Mentor Teacher Assistance for these staff resources.

The evidence. Most comprehensive school designs, and the Evidence-Based studies conducted in Kentucky (Odden, Fermanich & Picus 2003), Arkansas (Odden, Picus & Fermanich, 2003), and Arizona (Odden, Picus, Fermanich & Goetz, 2005, call for school-based instructional facilitators or instructional coaches (sometimes called mentors, site coaches, curriculum specialists, lead teachers). The technology intensive designs also require a technology coordinator (see Stringfield, Ross & Smith, 1996). Further, several designs suggest that while one facilitator might be sufficient for the first year of implementation of a school-wide program, in subsequent years an additional 0.5 to 1.0 FTE facilitator is needed. Moreover, the technology designs recommend a full-time facilitator who spends at least half-time as the site's technology expert. Thus, drawing from all programs, we conclude that about 2.5 FTE instructional facilitators/technology coordinators are needed for each school unit of 500 students, i.e., 1 facilitator for every 200 students. This resourcing strategy works for elementary as well as middle and high schools.

These individuals would coordinate the instructional program but most importantly would provide the critical ongoing instructional coaching and mentoring that the professional development literature shows is necessary for teachers to improve their instructional practice (Garet, Porter, Desimone, Birman, &Yoon, 2001; Joyce & Showers, 2002). This means that they spend the bulk of their time in classrooms, modeling lessons, giving feedback to teachers, and helping improve the instructional program. We expand on the rationale for these individuals in our section on professional development below, but include them here as they represent teacher

Working Draft

positions. The technology staff would provide the technological expertise to fix small problems with the computer system, install all software, connect computer equipment so it can be used for both instructional and management purposes, and provide professional development to embed computer technologies into the curriculum at the school site.

The impact of coaches as part of the professional development program is very large. Joyce and Calhoun (1996) and Joyce and Showers (2002) found that when teachers had sufficient time to engage in professional development that was embedded in classrooms with the aid of instructional coaches, teacher practice changed significantly, with **effect sizes** on student achievement of **1.68** in the transfer of training to classrooms, **1.25** for skill-level objectives, and **2.71** for knowledge-level objectives. Effects were almost negligible without the classroom-based coaching.

Recommendation. We conclude the evidence suggests allocating 2.5 FTE instructional coaches for a school of 500 students, or 1 instructional coach for every 200 students. This would translate into 2.2 FTE facilitators for the 432 student prototypical elementary school, 2.25 FTE facilitators for the 450 student middle school, and 3.0 FTE facilitators for the 600 student high school. This formula would produce a 0.5 facilitator for a small 108 student elementary (1/4th the size of the prototype), a 0.75 facilitator for a 150 student middle and high school (1/3rd the size of the middle school prototype and 1/4th the size of the high school prototype).

Although these positions are identified here as FTE slots, schools could divide the responsibilities across several individual teachers. For example, the 2.2 positions in elementary schools could be structured for 4 teacher/instructional facilitators providing instruction 50 percent of the time, and functioning as a curriculum coach in reading, mathematics or technology for 50 percent of the time. The same allocation of functions across individuals could work for the middle and high schools.

Extended Learning Opportunities for Struggling Students

Because not all students will learn to performance standards with just the core instructional program, districts and schools should design a powerful sequence of additional and effective strategies for struggling students, *i.e.*, students who must work harder and who need more time and help to achieve to the state standards. Rather than simply provide a pot of dollars, or a pupil weight, we recommend a series of specific, cost-based extra-help programs for struggling students:

- Tutoring, i.e., immediate, intensive assistance to keep struggling students on track
- Sheltered English and ESL instruction for English Language Learning (ELL) students
- Extended day programs
- Summer school for struggling students still needing extra help to achieve to state standards
- An Alternative School mainly for secondary students who need an environment outside of the regular school structure to succeed.

Working Draft

Our proposals are based on the notion that Washington wants to keep the performance standards constant for all, or nearly all, students but vary the instructional time so that all students have a good chance to learn to state performance standards (National Education Commission on Time and Learning, 1994). Finally, we also note that we propose to increase pupil support resources as the numbers of struggling students in a school increases.

Current Washington policy. Washington has three major programs in this area, in addition to special education, and several small programs. The first is the *Student Achievement Fund*. This program, enacted via a voter initiative, provides $300 per pupil for the 2005-2006 school year; the amount is scheduled to increase to $375 for the 2007 and to $450 per pupil for the 2008 school year. Local school districts can use these funds for smaller classes, extended learning time (both after school tutoring, Saturday school, and summer school), professional development and pre-kindergarten programs.

The second is the *Learning Assistance Program* (LAP) which provides a dollar per pupil amount to each district. For the 2004 school year, the base LAP allocation rate was $435.92 per funded student unit. Prior to 2005, LAP funds were allocated based primarily on norm-referenced test scores with a small additional amount provided based on poverty. In 2005, this formula was changed to one based solely on poverty as measured by free and reduced price lunch (FRPL) student counts. For the 2006 school year, the state allocated $187.87 for each funded student, defined as a student eligible for free and reduced priced lunch. In addition, a district with FRPL enrollment greater than 40 percent of total enrollment received $187.87 for each student in excess of the 40 percent.

The third is the Bilingual Education program. Funding is based on eligible pupils. Eligible students have a primary language other than English and their English language skills are sufficiently deficient or absent to impair learning. Initial assessment must be made by the district to identify eligible students. An individual annual reassessment must be made for a student to continue in the program. A student's program eligibility ends whenever the student scores above the 35th percentile in reading and language arts. A student cannot stay in a bilingual program more than three school years unless English language skills remain below the 35th percentile. The funding rate for 2006 was $758 when there were about 78,789 eligible students. The $758 figure is the cost of salaries and benefits for about 13.5 extra staff per 1000 ELL students, or about 1.35 staff be 100 ELL students.

The additional but smaller programs include the following:

a. Washington Reading Corps, funded at $3.713 million in 2004, but reduced to $850 for 2006. Funding for Reading Corps grants is provided for school with significant numbers of students in grades K-6 not performing well on reading assessments. The competitive grants are to be used for proven, research-based mentoring and tutoring programs that employ comprehensive design, measurable goals and beginning and end-of-program testing.

b. Focused Assistance to Schools, funded at $4.046 million in 2006 Funding is to develop long term long-term capacity for improving student learning. Low-performing schools

Working Draft

are eligible to apply for grants and assistance and are assigned a facilitator to work with a school improvement team. Funding was available for 68 schools in 2003-2005.

c. Mathematics Helping Corps, funded at $1.764 million in 2006. Funding allows schools access to expert math teachers to identify barriers to student learning and develop and implement an action plan for improving learning of math skills. The experts also provide consultation on curricula, research-based instructional math practices, staff training, and family and community involvement programs.

We think that the intent of the Reading and Math Corps programs are incorporated and expanded in our proposals for instructional facilitators and tutors for all schools. We also believe that our generous recommendations for professional development resources subsumes the Focused Assistance to Schools program, but the state might want to retain that as a separate state-to-struggling school help program.

Indicator of struggling students. In terms of an indicator of the presence of struggling students, we have generally used some variation of the number of students who are eligible for free and reduced-price lunch, which nationally is the most used variable to indicate the number of struggling students in a school. This is quite similar to the new count of students eligible for free and reduced price lunch that became part of the new funding formula for the LAP program in Washington. Thus, we would recommend using this pupil count, which we will call the Washington count of students eligible for free and reduced price lunch.

4. Tutors

Current Washington policy. There is no specific provision for such staff in Washington education or school finance policy. It is a personnel resource that districts and schools can buy with the certified instructional allocations, and with funds from the Student Achievement Fund, LAP, Bilingual Education or Reading Corps Programs.

The evidence. The most powerful and effective strategy to help struggling students meet state standards is individual one-to-one tutoring *provided by licensed teachers* (Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993). Students who must work harder and need more assistance to achieve to proficiency levels (i.e. students who are ELL, low income, or have minor disabilities) especially benefit from early and intensive preventative tutoring (Cohen, Kulik, & Kulik, 1982). Tutoring program effect sizes vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but **effect sizes** on student learning reported in meta-analyses range from **0.4 to 2.5** (Cohen, Kulik, & Kulik, 1982; Cohen, Raudenbush, & Ball, 2002; Mathes & Fuchs, 1994; Shanahan, 1998; Wasik & Slavin,1993; Shanahan & Barr, 1995), with an average of about 0.75 (Wasik & Slavin, 1993), so individual or very small group tutoring is one of the most effective and highest impact strategies in the educational improvement handbook.

Theory of action. The theory of action for why individual one-to-one tutoring, as well as other very small student groupings, boosts student learning follows. First, tutoring intervenes immediately when a student is struggling to learn. Second, tutoring is explicitly tied to the

Working Draft

specific learning problem. Third, when provided by a trained professional, tutoring provides the precise and appropriate substantive help the student needs to overcome the learning challenge. Fourth, tutoring should thus remedy short-term learning problems, and in many cases may not be needed on a continuing basis. In short, though potentially expensive, the ability of tutoring to intervene quickly, precisely and effectively to undo an individual's specific learning challenge gives it the ability to have large effects, particularly when the specific learning challenges are key concepts related to a student's learning the grade-level expectations for a content area.

Structure of effective tutoring programs. The impact of tutoring programs depends on how they are structured. The alignment between what tutors do and the regular instructional program is important (Mantzicopoulos, Morrison, Stone, & Setrakian, 1992; Wheldall, Coleman, Wenban-Smith, Morgan, & Quance, 1995). Who conducts the tutoring matters, as does the intensity of the tutoring (Shanahan, 1998). Poorly organized programs in which students lose instructional time moving between classrooms can limit tutoring effects (Cunningham & Allington, 1994). Researchers (Cohen, Kulik, & Kulik, 1982; Farkas, 1998; Mathes & Fuchs, 1994; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin, 1993) have found greater effects when the tutoring includes the following mechanisms:

- Professional teachers as tutors
- Tutoring initially provided to students on a one-to-one basis
- Tutors trained in specific tutoring strategies
- Tutoring tightly aligned to the regular curriculum and to the specific learning challenges, with appropriate content specific scaffolding and modeling
- Sufficient time provided for the tutoring
- Highly structured programming, both substantively and organizationally.

An important issue is how many tutors to provide for schools with differing numbers of at-risk students. The standard of many comprehensive school designs is a ratio of one fully licensed teacher-tutor for every 100 students in poverty, with a minimum of one for every prototypical school. Using a Washington count of the adjusted number of students eligible for free and reduced price lunch, this standard would provide from one to four-plus professional teacher-tutor positions for the prototypical elementary and middle schools, and up to six for the high school.

We note several characteristics of an effective one-to-one tutoring strategy. First, each tutor would tutor one student every 20 minutes, or three students per hour. This would allow one tutor position to tutor 18 students a day. (Since tutoring is such an intensive activity, individual teachers might spend only half their time tutoring; but a 1.0 FTE tutoring position would allow 18 students per day to receive 1-1 tutoring.). Four positions would allow 72 students to receive individual tutoring daily in the prototypical elementary and middle schools. Second, most students do not require tutoring all year long; tutoring programs generally assess students quarterly and change tutoring arrangements. With modest changes such as these, close to half the student body of a 400 pupil school unit could receive individual tutoring during the year. Third, not all students who are from a low-income background require individual tutoring, so a portion of the allocation could be used for students in the school who might not be from a lower income family but nevertheless might have a learning issue that could be remedied by tutoring.

Working Draft

Though we have emphasized *individual* tutoring, schools could deploy these resources provided for intensive intervention in evidence-based ways other than just individual tutoring. In a detailed review of the evidence on how to structure a variety of early intervention supports to prevent reading failure, Torgeson (2004) shows how one-to-one tutoring, one-to-three tutoring, and one-to-five small group sessions can be combined for different students to enhance their chances of learning to read successfully. One-to-one tutoring would be reserved for the students with the most severe reading difficulties, scoring say, at or below the 20th or 25th percentile on a norm referenced test. Intensive instruction for groups of three-to-five students would then be provided for students above that level but below the proficiency level.

The instruction for all groupings, though, needs to be more explicit and sequenced than that for other students. Young children with weakness in knowledge of letters, letter sound relationships and phonemic awareness need explicit and systematic instruction to help them first decode and then learn to read and comprehend. As Torgeson (2004: 12) states:

> Explicit instruction is instruction that does not leave anything to chance and does not make assumptions about skills and knowledge that children will acquire on their own. For example, explicit instruction requires teachers to directly make connections between letters in print and the sounds of words, and it requires that these relationships be taught in a comprehensive fashion. Evidence for this is found in a recent study of preventive instruction given to a group of high at-risk children in kindergarten, first grade and second grade …..only the most [phonemically] explicit intervention produced a reliable increase in the growth of word-reading ability … schools must be prepared to provide very explicit and systematic instruction in beginning word-reading skills to some of their students if they expect virtually all children to acquire work-reading skills at grade level by the third grade …. Further, explicit instruction also requires that the meanings of words be directly taught and be explicitly practiced so that they are accessible when children are reading text …. Finally, it requires not only direct practice to build fluency …. but also careful, sequential instruction and practice in the use of comprehension strategies to help construction meaning.

Torgeson (2004) goes on to state that meta-analyses consistently show the positive effects of reduced reading group size (Elbaum, Vaughn, Hughes & Moody, 1999) and identifies effective experiments with both one-to-three and one-to-five teacher-student groupings. While one- to-one tutoring works with 20 minutes of tutoring per student, a one-to-three or one-to-five grouping requires a longer instructional time for the larger group – up to 45 minutes. The two latter groupings, with 45 minutes of instruction, reduced the rate of reading failure to a miniscule percentage.

If the recommended numbers of tutors are used for such small groups, a one FTE reading position could teach 30 students a day in the one-to-three setting with 30 minutes of instruction per group, and 30+ students a day in the one-to-five setting with 45 minutes of instruction per group. Four FTE tutoring positions could then provide this type of intensive instruction for up to 120 students daily. In short, while we have emphasized 1-1 tutoring, and some students need 1-1

Working Draft

tutoring, other small group practices can also work, with the length of instruction for the small group increasing as the size of the group increases. The interventions only help students to learn to read if they provide the type of explicit instruction described above.

While Torgeson (2004) states that similar interventions can work with middle and high school students, the effect, unfortunately, is smaller as it is much more difficult to undo the lasting damage of not learning to read when students enter middle and high schools with severe reading deficiencies.

Overall, tutoring program **effect sizes** vary by the components of the approach used, e.g. the nature and structure of the tutoring program, but effect sizes on student learning reported in meta-analyses range from **0.4 to 2.5** (Cohen et al., 1982; Mathes & Fuchs, 1994; Shanahan, 1998; Shanahan & Barr, 1995; Wasik & Slavin,1993), with an average about **0.75** for one-to-one tutoring programs based on an meta-analysis of sixteen one-to-one tutoring programs (Wasik & Slavin, 1993).

Recommendation. We recommend that each prototypical school be provided one tutor FTE position for every 100 Washington adjusted students eligible for free and reduced price lunch, with a minimum of one in every prototypical school.

At its May 23, 2006 meeting, the Advisory Committee discussed allowing tutoring to be provided by trained, supervised instructional aides, which are part of Washington's Reading First school programs, thus allowing Washington to have a "mixed model" approach to tutoring. In discussing this modification, the Committee identified the following research evidence of when trained and supervised instructional aides can be effective.

There are two studies that show how instructional aides can be used to tutor students. Farkas (1998) has shown that if aides are selected according to clear and rigorous literacy criteria, are trained in a specific reading tutoring program, provide individual tutoring to students in reading, and are supervised, then they can have a significant impact on student reading attainment. Some districts have used Farkas-type tutors for students still struggling in reading in the upper elementary grades. Another recent study by Miller (2003) showed that such aides could also have an impact on reading achievement if used to provide individual tutoring to struggling students in the first grade. The impact of trained aide tutors is less than that of teachers, but there is evidence that such individuals can have a positive impact on student learning.

We should note that neither of these studies supports the typical use of instructional aides as teacher helpers. Evidence shows that instructional aides can have an impact but only if they are selected according to educational criteria, trained in a specific tutoring program, deployed to provide tutoring to struggling students, and closely supervised, as is the case in the Washington Reading First program. The resources provided for teacher tutors could be used to support a larger number of trained para-professional tutors.

Working Draft

Given all of the above recommendations, we want to note the multiplicity of recommendations *so far* that are focused on getting students to read proficiently by the end of the third grade and to perform at proficiency levels after that:

- Full-day kindergarten
- Classes of 15-18 students for the first four years of school, K-3
- At least 90 minutes of regular reading instruction daily
- An evidence-based reading curriculum, with a balance of phonics, phonemic development, writing and comprehension
- Individual and small group tutoring if all of the above still leave the student struggling.

In sum, our initial recommendations for immediate and intensive extra help for students from lower income backgrounds and struggling to learn to standards comes "after" a series of other evidence-based strategies, all designed and proposed to help the student learn to proficiency.

As is clear below, these strategies are further augmented by additional services for ELL students, extended-day programs, summer school for struggling students who need even more help to learn to state standards, ALE programs, additional assistance for disabled students, and extra pupil support and parent outreach resources based on poverty student counts.

5. English Language Learning (ELL) Students

Current Washington policy. Washington's policy for these students was described in the above section on struggling students.

The Evidence. Next to providing extra teachers for English as a second language instruction to students for whom English is not their primary language, research shows that ELL students need a solid and rigorous core curriculum as the basis from which to provide any extra services. For example, a recent study of what is needed to help English language learners achieve to high performance standards (Gandara, Rumberger, Maxwell-Jolly, & Callahan, 2003) suggested that what is in the core or base program is critically important. That study concluded that ELL students need:

- Qualified teachers – a core goal of all the recommendations in the report
- Adequate instructional materials and good school conditions, included below for each prototypical school model
- Good assessments of ELL students so teachers know in detail their English language reading and other academic skills, and less segregation of ELL students
- Rigorous curriculum and courses for all ELL students, and affirmative counseling of such students to take those courses
- Professional development for all teachers, focusing on sheltered English teaching skills.

Research shows that it is the English language learners from lower income, and generally less educated, backgrounds who struggle in school and need extra help. Triggering tutoring resources on the basis of the economic background of students as previously recommended would provide some extra help resources needed for struggling English language learners.

Working Draft

However, research, best practices and experience also show that when students are both from a low-income background and English language learners, some additional assistance is needed that include some combination of small classes, English as a second language classes, professional development for teachers to help them teach "sheltered English classes, and "reception" centers for districts with large numbers of ELL students who arrive at different times during the school year.

In studying specific strategies to provide ESL instruction during the regular school day by having the ELL students take such a course rather than an elective course, it was clear that additional staff were needed. For example, during one middle school's 7 period daily schedule, the school was providing ESL, i.e., English as a second language, class to its ELL students instead of an alternative, elective class offering. Although initially, it seemed that strategy did not require any additional resources – ELL students were simply taking an ESL class (yes, the teacher needed ESL skills) rather than another class – further analysis indicated that additional resources for this strategy were necessary. Because the district had determined that the ELL students were best served through three levels of ESL classes (each taught during a different period of the day), enrollment in any one of those classes was insufficient to enable the school to reduce the number of non-ESL classes in that time slot. Instead, between two and four ELL students were pulled from each class. ESL classes were organized to accommodate the number of students requiring service, and additional teacher resources were needed to meet this need.

Although there may be the potential to cancel some classes if sufficient numbers of the same class have sufficient numbers of ELL students pulled out, it was generally agreed that if the ELL formula triggered an additional 1.0 FTE position for every 100 ELL students, the staffing resources would be sufficient to allow the provision of the ESL classes. We should note that this school was providing structured English immersion for all ELL students, with ESL as an additional course. Thus, the pull-out class provided ELL students with an additional "dose" of English instruction, reinforcing the key goal of the program as having the ELL students learn English so they could continue their schooling in English language classrooms. A similar level of additional resources would be needed for a bilingual-transition approach.

In a best-evidence synthesis of 17 studies on bilingual education, Slavin & Cheung (2005) found that ELL students in bilingual programs outperformed their non-bilingual program peers. Using studies focused primarily on reading achievement, the authors found an **effect size** of **+0.45** for ELL students.

<u>Recommendation.</u> In other states, we have recommended that the ELL formula provide an additional 1.0 FTE teacher positions for every 100 ELL students. We also make that our basic recommendation for Washington, especially given the additional resources we recommend for ELL students from low income background. The current Washington program provides about 1.35 FTE positions for every 100 ELL students. Since the ways of determining these numbers can be unique to each state, we would be comfortable if the Advisory Committee wished to retain the current Washington ratio of 1.35

It bears repeating that these are not the only resources provided for ELL students. All ELL students from lower income backgrounds (most ELL students) are included in the free and

Working Draft

reduced price lunch counts, which trigger tutoring, extended day and summer school resources (see following discussion), so all of these resources would also be available for ELL students. For example, if a 100 poverty student count were comprised of just free and reduced price lunch and no ELL students, it would trigger 1.0 tutor position, plus the extended day and summer school resources below. But if the 100 poverty student count consisted of ELL students, it would trigger the initial 1.0 tutor position, the extended day and summer school resources below, *plus an additional 1.0 or 1.35 teacher positions*.

6. Extended-day programs

Current Washington policy. Washington has no specific policy on extended day programs, but funds from the Student Achievement Fund, Learning Assistance Program and federal Title I can be used for this strategy.

The evidence. Beginning in elementary school and particularly in secondary schools, after-school or extended-day programs might be necessary for some students. After-school programs are created to provide a safe environment for children and adolescents to spend time after the school day ends, as well as to provide academic support. In a review of research, Vandell, Pierce, & Dadisman (2005) found that well designed and administered after-school programs yield numerous improvements in academic and behavioral outcomes (see also, Baker & Witt, 1996; Dishion, McCord, & Poulin, 1999; Mahoney, Stattin, & Magnusson, 2001; Posner & Vandell, 1994; Schinke, Cole, & Poulin, 2000; Tierney, Grossman, & Resch, 1995; White, Reisner, Welsh, & Russell, 2001).

Several recent experimental studies have documented the potential of extended-day programs. Cosden, Morrison, Albanese, & Macias (2001) found that the Gervitz Homework Project improved sixth grade SAT-9 math and reading scores for participants in the high-program attendance group versus those in the low-program-attendance group, though a third of the control group participated in other after-school programs and over half the program students dropped out. Philliber, Kaye & Herrling (2001) found that the Children's Aid Society Carrera-Model Teen Pregnancy Prevention Program produced significantly higher PSAT scores for program versus control youth. An evaluation of the Howard Street Tutoring Program (Morris, Shaw, & Perney, 1999) claimed significant differences between the treatment and control group in gains on basal word recognition, basal passages, and two measures of spelling. Lastly, an evaluation of the Quantum Opportunities Program (Hahn, Leavitt, & Aaron, 1994; Lattimore, Grotpeter, & Taggart, 1998) found that program members were much more likely than control group members to have graduated from high school and to be in a post-secondary school. The rate of four-year college attendance among members was more than three times higher than the control group rate and their rate of two-year college attendance was more than twice as high. After two years, experimental group average scores for five of the 11 academic functional skills were significantly higher than control group scores. On the other hand, the 21st Century Community Learning Centers (CCLC) Program study evaluation (Dynarski et al., 2003), though hotly debated, indicated that for elementary students, programs did not appear to produce measurable academic improvement. Though critics of this study (Vandell, Pierce & Dadisman, 2005) argued that the control groups had higher pre-existing achievement thus reducing the

Working Draft

potential for finding a program impact, and that the small impacts had more to do with lack of full program implementation during the initial years than with the strength of the program.

Overall, these studies documented positive causal effects on the academic performance of students in select after-school programs, but the evidence is mixed both because of research methods (few randomized trials) and poor program quality and implementation.

Theory of action and key structural mechanisms. Several developmental theories have been used to understand how effective after-school programs work, including ecological systems theory, stage-environment fit theory, flow theory, and attachment theory in addition to the roles and function of relationships with peers (Vandell, Pierce & Dadisman, 2005). Using these theoretical frames applied to various programs that have been studied and focusing on the developmental and learning needs of children and adolescents, Vandell and her associates identified positive relationships between program staff and students, rich content-based program activities, and learning- and mastery-oriented content delivery strategies as the major features of effective after-school and extended-day programs (See Figure 1 below). A widely referenced review of extended-day and after-school programs identifies academic, recreational, and cultural components of an effective after-school program with an emphasis on training staff for effective implementation (Fashola, 1998).

These researchers identified several structural and institutional supports necessary for effective after-school programs including:

- Staff qualifications and support (staff training in child or adolescent development, after-school programming, elementary or secondary education, and content areas offered in the program, staff expertise; staff stability/turnover; compensation; institutional supports)

- Program/group size and configuration (enrollment size, ages served, group size, age groupings and child staff ratio)

- Financial resources and budget (dedicated space and facilities that support skill development and mastery, equipment and materials to promote skill development and mastery; curricular resources in relevant content areas; location that is accessible to youth and families)

- Program partnerships and connections (with schools to connect administrators, teachers and programs; with larger networks of programs, with parents and community);

- Program sustainability strategies (institutional partners, networks, linkages; community linkages that support enhanced services; long term alliances to ensure long term funding).

Working Draft

Figure 1
Process and Content Features Characterizing Effective Extended Day Programs

PROCESS ISSUES	
Positive staff-child relationships	• Staff treat children/youth with warmth, acceptance and respect • Staff provide emotional support to children/youth • Staff communicate high expectations/positive norms for child/youth behavior and mastery • Staff set age-appropriate limits for children/youth • Staff affirm cultural identity
Positive peer relationships	• Staff promote tolerance, understanding, and appreciation of differences • Staff promote positive social interactions and communication among youth • Staff encourage inclusion and use strategies for building group identity and focusing group(s) of children/youth on common goals • Staff help youth to develop conflict resolution skills and strategies for addressing threatening/bullying behavior • Staff promote understanding of cultural identity and diversity
Connections with families and the community	• Staff communicate with family about youth experiences • Families are welcome to volunteer and visit the program • Activities for youth connect them with neighborhood resources and to community mentors and leaders
PROGRAM CONTENT AND ACTIVITIES	
Content-based learning opportunities that include a mix of academic and nonacademic skill-building activities	• Arts, aesthetics, culture • Homework and tutorial assistance • Community service • Interdisciplinary and applied content • Opportunities to use written and expressive language to convey ideas, perspectives, and interests in varied contexts • Opportunities to read and exchange ideas about books for varied purposes • Activities and games for practicing and applying everyday and school mathematics • Opportunities to develop planning, decision-making, information-seeking, and critical thinking
Physical/recreation activities	• Formal or informal sports/fitness activities • Recreational activities
DELIVERY STRATEGIES	
Structured and unstructured learning opportunities	• Coaching/tutoring/Co-learning/collaboration/cooperation • Active/hands-on and interactive activities and project-based learning • Discourse, debate, and discussion with peers and adults • Multimodal communication (language, writing, art, music, performance)
Mastery orientation	• Sustained activities and opportunities for practice and skill development • Goal setting, reflection, self-evaluation • Culminating activities
Opportunities for autonomy, choice, and leadership	• Opportunities for making choices, solving problems, setting priorities • Formal and informal leadership opportunities

Working Draft

Recommendation. We recommend that an extended-day program be included in the Washington school prototypes. The resources would be used to provide students in all elementary grades and in secondary schools with additional help – during the school year but after the normal school day – to meet academic performance standards. Because not all poverty students will need or will attend such a program, we recommend that resources be provided for 50 percent of the Washington adjusted free and reduced-price lunch pupil count, a need and participation figure suggested by a recent study (Kleiner, Nolin, & Chapman, 2004). We suggest providing one teacher position for every 15 eligible students (defined as 50 percent of the Washington adjusted free and reduced-price lunch pupil count) and paid at the rate of 25 percent of the position's annual salary to offer a 2 ½ to 3 hour extended-day program 5 days per week. These resources could be used for a different mix of teachers and other non-certified staff, with teachers providing at least one hour of homework help or after school tutoring.

The state should monitor over time the degree to which the estimated 50 percent figure accurately estimates the numbers of students needing extended-day programs. We also recommend the state require districts to track the students participating in the programs, their pre- and post-program test scores, and the specific nature of the after school program provided, to develop a knowledge base about which after-school program structures have the most impact on student learning.

7. Summer School

Current Washington policy. Washington has no specific policy on summer school programs, but funds from the Student Achievement fund, Learning Assistance Program and federal Title I can be used for this strategy.

The evidence. Like many other states, Washington has set high standards for student achievement. Many educators in Washington and other states view summer school programs as having promise to give struggling students the additional time and help to achieve to standards and earn academic promotion from grade to grade (Borman, 2001). Providing additional time to help all students master the same content is an initiative that is grounded in research (National Education Commission on Time and Learning, 1994).

Research dating back to 1906 shows that students, *on average*, lose a little more than a month's worth of skill or knowledge over the summer break (Cooper, Nye, Charlton, Lindsay, & Greathouse, 1996). Summer breaks have a larger deleterious impact on poor children's reading and mathematics achievement, which falls further over the summer break than does that of middle-class students. This loss can reach as much as one-third of the learning during a regular nine-month school year (Cooper et al., 1996). A longitudinal study, moreover, showed that these family income-based summer learning differences *accumulate* over the elementary school years, such that poor children's achievement scores – without summer school – fall further and further behind the scores of middle class students as they progress through school grade by grade (Alexander & Entwisle, 1996). As a result of this research, there is emerging consensus that what happens during the summer can significantly impact the achievement of students from low-income and at-risk backgrounds, and thus reduce (if a summer program is provided) or increase

Working Draft

(if a summer program is not provided) the poor and minority achievement gaps in the United States (see also Heyns, 1978).

Evidence on the effectiveness of summer programs in attaining either of these goals, however, typically has been of poor quality. Although past research linking student achievement to summer programs shows some promise, several studies suffer from methodological shortcomings and the low quality of the summer school programs themselves.

Two reviews of summer school programs (Ascher, 1988; Austin, Roger, & Walbesser, 1972) concluded that summer school programs in elementary mathematics and reading generally produced modest achievement gains, but noted the findings were tentative because none of the evaluations employed random assignment. Austin et al. (1972) also stated that few summer programs established clear academic goals that were easily evaluated, and in many cases funding arrived too late for a full summer program, thus diminishing potential impact. On the other hand, a more recent meta-analysis of 93 summer school programs (Cooper, Charlton, Valentine, & Muhlenbruck, 2000) found that the average student in summer programs outperformed about 56% to 60% of similar students not receiving the programs. Again, however, the certainty of these conclusions is compromised because only a small number of studies (e.g., Borman, Rachuba, Hewes, Boulay, & Kaplan, 2001) used random assignment, and program quality varied substantially.

Nevertheless, research generally suggests that summer school is needed and can be effective for at-risk students. Studies suggest that the effects of summer school are largest for elementary students when the programs emphasize reading and mathematics, and for high school students when programs focus on courses students failed during the school year. The more modest effects frequently found in middle school programs can be partially explained by the emphasis in many middle school summer school programs on adolescent development and self efficacy, rather than academics.

Although Cooper et al.'s (2000) meta-analysis found students who participated in summer school outperformed other students, program effects varied significantly because the nature of the programs varied so widely. Washington should look to those programs with quality research supporting the academic improvement of summer school participants. For example, using a randomize sample of 325 students who participated in the Voyager summer school program, research found that these students showed gains in reading achievement, with an **effect size** of **0.42** (Roberts, 2000).

<u>Theory of action</u>. Though learning at a similar rate during the regular school year, low-income and many minority children experience academic learning losses over the summer, with the losses accumulating every summer leading to larger and larger achievement gaps. A summer school program that focuses on improving mathematics and reading achievement, and courses failed in high school, would help curtail the growth of the achievement loss and help these students learn to state performance standards over time. Cooper et al. (1996) suggest a focus on reading only if a choice must be made for a limited program; a focus on both reading and mathematics will help lower-income students make progress in learning to all state standards.

Working Draft

Key operating mechanisms. Ascher (1988), Austin et al., (1972) and Heyns (1978) identified several programmatic characteristics that undercut program impacts and thus produced the modest effects research has documented so far. They include short program duration (sometimes a result of funding delays and late program start dates), loose organization, little time for advanced planning, low *academic* expectations for either mathematics or reading, discontinuity between the summer curriculum and the regular-school-year curriculum, teacher fatigue, and poor student attendance. In their meta-analysis of summer-program effects, Cooper et al. (2000) noted several program components that are related to improved achievement effects for summer program attendees. These are supported by the recommendations in the most recent book on summer school and how to enhance its impacts (Borman & Boulay, 2004):

- Early intervention during elementary school
- A full 6-8 week summer program
- A clear focus on mathematics and reading achievement, or failed courses for high school students
- Small-group or individualized instruction
- Parent involvement and participation
- Careful scrutiny for treatment fidelity, including monitoring to ensure good instruction in reading and mathematics is being delivered
- Monitoring student attendance.

Recommendation. We recommend that the Washington school prototypes include a summer school provision for 50 percent of all Washington adjusted free and reduced price lunch students in all grades K-12, as an estimate of the number of students still struggling to meet academic requirements (Capizzano, Adelman & Stagner, 2002). We provide resources for a program of eight weeks in length, class sizes of 15 students, and a six hour day, which allows for four hours of instruction in reading and mathematics, though the specific academic focus could be different for high school students. A six hour day would also allow for two hours of non-academic activities. The cost of each FTE teacher position would be estimated using a stipend equal to 25% of his/her annual salary. The 50% estimate of at-risk student need should be monitored over time to determine the degree to which it correctly estimates the number of at-risk students who need a summer school program.

Thus, our overall recommendations for most at-risk students is a sequenced set of connected and structured programs that begin in the early elementary grades and continue through the upper elementary, middle and high school levels, all focused on extending instructional time so that struggling students have the opportunity to learn to the WASL standards. We are proposing that the most academically deficient at-risk students receive one-to-one tutoring, that the next group receives intensive and explicit instruction in groups of three or five, that students still struggling to meet proficiency standards then receive an extended day program that includes an academic focus, and that kids needing even more help then be offered a summer school program that is structured and focused on academics – reading and mathematics for elementary and middle school students, and failed courses for high school students.

Since the exact combination of services that will bring the vast proportion of at-risk students achieving to a proficiency level is not precisely known at this time, we also recommend

Working Draft

that Washington add accountability and reporting requirements to receipt of these funds. Schools should be required to identify the students that receive any and all of these interventions, data should be kept on their performance when they enter and when they exit the programs, and data on program structure and content should also be reported. In this way, the state over time will be better able to identify what features of each of these interventions is most effective in Washington, how much learning gains are produced by the various programs, and also perhaps what sequence of interventions works best for which types of struggling students. In this way, the state can be both providing resources to meet the needs of struggling students and simultaneously learning how to provide these services more effectively over time. Without such a reporting requirement, money will be spent but knowledge about the programs, their design and their effects would be lost.

At its May 23, 2006 meeting the Advisory Committee suggested that both the extended day and summer school funds could be used for a variety of strategies to extend learning time: before school as well as after school programs, Saturday school, as well as year-round schedules that reduce the days in-between school terms. The Committee also discussed allowing "every high school student who has not yet earned a passing score on the WASL tenth grade test be guaranteed funding for a summer school program."

8. Alternative Schools

Current Washington policy. Though several school districts have Alternative Learning Environment (ALE) Schools for high school students who for multiple reasons want an education program different from the regular high school, there is no separate state aid program for funding. Alternative learning experience high schools are authorized (see RCW 28A.150.305). The students in these programs are included in the FTE enrollments for regular aid allocations.

The Evidence. A small number of students have difficulty learning in the traditional school environment. These students, many of whom have some combination of significant behavioral, social and emotional issues, often do much better in small "alternative schools, different from alternative learning environments. We expect that many Washington school districts have various versions of "alternative schools" but there is no extra funding for them, even though they generally are more expensive to operate per pupil than "regular" high schools even those with some alternative learning environment programs. We recommend that it is time for Washington to formally create an Alternative School funding formula.

In our work in other states, the funding formulas differ substantially. But in many such schools, the average staffing ratio is about one administrative position and one teacher position for every seven to eight students, assuming that ALE students are counted on an FTE basis. Since ALE high schools would have a special "at-risk" designation, we conclude that it is wise to recognize them with a separate funding formula and to have the state encourage districts that operate such programs within the regular high school to begin designating these as separate programs, so the students in them can trigger Alternative School resources.

Working Draft

Recommendation. We recommend that Washington provide resources for Alternative High Schools through the new school finance system by providing them with one administrative position (priced at the level of an assistant principal) plus one teacher position for every eight ALE students. This staffing ratio would cover all certified staff in the school – administrators, teachers, specialists, tutors, extended day, summer school, and pupil support. We would be comfortable with identifying this program as an enhancement to the basic education program.

If such a funding formula is accepted, it would also be wise for the legislature to ask the Washington Department of Education to review the rules and regulations for Alternative School student counts to insure that they are appropriate for use in a funding formula and to develop regulations for Alternative Schools to ensure a clear difference between Alternative Schools and regular high schools that have "alternative learning environments."

Specialized Instruction

The following sections discuss three sets of resources that provide specialized instructional services to students: special education, gifted and talented programs and career/technical education.

9. Special Education

Current Washington policy. In the 2004-05 school year Washington's school districts served more than 124,000 students with disabilities, ages 3 to 21, through their special education programs. This represents approximately 12.2 percent of the state's total enrollment. State and federal General Fund spending for these programs totaled $793 million, or about 10 percent of all General Fund K-12 expenditures. State sources provided about 58 percent of the revenues for special education programs, federal sources about 25 percent, and the remaining revenues came from various sources. Washington's funding policy for these students was changed in 1995-96. There are two funding formulas, one for students with disabilities for children from birth to age 2. We make no recommendation for that program as children of that age fall under the responsibilities of the Early Childhood Advisory Committee.

The second is for children with disabilities age 3-21. The formula provides a dollar per pupil amount for the average annual headcount of age 3-21 special education enrollment, limited to a maximum of 12.7 percent of the annual average K-12 FTE basic education enrollment. The dollar per pupil figure is 0.9309 times the district's Basic Education Allocation rate per student (minus the approximately $97 per pupil in federal integration aid), or more generally, about 93% of the district's per pupil basic education allocation. In addition, there is a "safety net" component that provides a district additional funds if the services required in a student's IEP exceeds a high-cost expenditure threshold, which was $14,902 in 2006; the safety net funding was about $10.7 million in 2006. In 2004-05, federal funds were used to pay for all safety net allocations. For 2005-06, safety net costs of between $14,902 and $21,288 are paid from state funds, while safety net costs exceeding $21,288 are paid using federal special education funds.

These funds, except as stated above, are in addition to federal funds for students with disabilities, although the state is beginning to "integrate" the federal dollars into the state

Working Draft

allocation formula. In 2006, the state average basic education allocation rate was about $4,237; the state special education funding was about $3,847 for each student with disabilities, plus an average of $1,462 per student from the federal government, or a total of an extra $5,309 for each student with disabilities or an additional 138 percent above the average basic allocation per pupil

The Evidence. Washington's current funding approach for special education reflects the findings from a study done in 1995, and is also consistent with the most recent findings about a structure for funding special education from a national special education costing study, which found that the average overall extra costs across all categories of disabilities was an additional 90 percent above that spent for the regular education program (Chambers, Parrish & Harr, 2002). We are inclined to recommend that the general contours of Washington's current funding approach for special education be retained with two caveats:

- The base allocation to which the 93% additional funding is applied must be increased to an adequate level, which would be reflected in all the recommendations in this report
- Changes are made in the safety net to insure that the state covers the full excess costs of high need students by streamlining how the excess costs are calculated.

We have read the recent report on special education funding of the Joint Legislative Audit and Review Committee, which was released early in 2006; even though this study focused almost exclusively on reporting special education expenditures and the complexities of determining excess costs, it made no specific recommendation for improving the system. We suggest that the state continue to work toward improving the financial reporting of special education program expenditures, as recommended by the JLARC report. Under the current excess cost accounting method it is very difficult to determine how much is spent for special education programs from the districts' annual financial reports because the costs allocated to the basic education program account are indistinguishable from other basic education spending. Further, while the state requires a specific method for apportioning the salaries of special education teachers between the regular and special education programs (the 1077 Worksheet), districts use varying methods for apportioning other costs, such as for purchased services or instructional materials. The OSPI should continue to work toward improving the financial accounting of special education program expenditures so that data on total expenditures are consistent and readily accessible. The Joint Legislative Audit and Review Committee has suggested several alternatives in its February 2006 report[9] and funding has been provided to the OSPI to develop recommendations for the Legislature prior to next year's legislative session.

Lacking the capacity to account for total school district spending for special education programs also limits the state's ability to adequately monitor and analyze district spending levels and the extent to which the special education funding formula is adequate for meeting the costs of these programs. This is particularly true with regard to the safety net program.

At the same time, we want to mention a new approach to funding programs for students for disabilities, called the Census Approach, which we have recommended in other states and which those states have adopted as the funding approach. The census approach avoids the

[9] Joint Legislative Audit and Review Committee (2006, February). *Special Education Excess Cost Accounting and Reporting Requirements* (Report 06-3). Olympia, WA: Author.

Working Draft

complexities of determining excess costs and is also accompanied by a state requirement to fully fund the costs of the low incidence, high cost students with disabilities. However, since the high incidence, lower cost students are funded at the same rate and level across all districts, this approach might be criticized for the same reasons as the current 12.7 percent cap.

Providing appropriate special education services, while containing costs and avoiding over-identification of students, particularly minority students, presents several challenges.

First, many mild and moderate disabilities, particularly those associated with students learning to read, are correctable through strategic early intervention. For example, several studies (e.g., Borman & Hewes, 2003; Landry, 1999; Slavin, 1996) have documented that through a series of intensive instructional interventions nearly 75 percent of struggling readers identified in kindergarten and grade 1 can be brought up to grade level without the need for placement in special education. That is why our previous recommendations for extended learning opportunities are so important; they are the first service strategy before special education services are needed. This sounds like a common sense approach that would be second nature to school people, but in many cases they have heretofore been rooted in a "categorical culture" that must be corrected through staff development and strong leadership from the district office and the site principal. Allocating a fixed census amount (about 3.0 FTE for a Washington school of about 432 students) would work for mild and moderate disabilities only if a functional, collaborative early intervention model were combined with the resources for the extended learning strategies discussed above.

Second, for more severely handicapped students, clustering them to achieve economies of scale is generally the most effective strategy and provides the greatest opportunity to find ways to mainstream them (to the extent feasible) with regular education students. In very sparsely populated areas this is often not feasible but should at least be worth exploring. Students in these categories generally include: severely emotionally disturbed (ED); severely mentally and/or physically handicapped; and children with the spectrum of autism. The ED and autism populations have been increasing dramatically across the country, and it is likely that this trend will continue in the future. To make the provision of services to these children cost-effective it would make sense to explore clustering of services where possible and design cost parameters for clustered services in each category. In cases where due to geographic isolation students need to be served individually or in groups of two or three it would be helpful to cost out service models for those configurations as well.

Particularly in the case of ED and autism it is well worth building in the capacity to examine at the state level the service models, their effectiveness, and ways to make them more efficient and effective over time. Research on effective service models is growing in both areas and helpful hints for districts on improving services could potentially improve both quality and efficiency. For example, recent research on autism strongly indicates that very early intervention after the onset of the condition (usually between 18 months and 3 years) yields far better outcomes than simply starting services when the child enters school. Federal funding supports special education infant/preschool programs and the strategic application of these services, coupled with ongoing analysis of school programs, could avert costs down the road. If there is

Working Draft

no state capacity to do this it may be cost effective for the state to contract for these research/advisory services.

As mentioned above, a new way states have begun to fund special education services is the "census" approach. The census approach, which can be simply funded by providing additional teacher resources for prototypical schools, assumes the incidence of these categories of disabilities is approximately equal across districts and schools and includes resources for providing needed services at an equal rate for all schools and districts. The census approach has emerged across the country for several reasons:

- The continued rise in the number and percentage of "learning disabled" and continued questioning by some of the validity of these numbers
- Under funding of the costs of severely disabled students
- Over labeling of poor, minority, and ELL students into special education categories, which often leads to lower curriculum expectations, and inappropriate instructional services
- Reduction of paper work.

Moreover, all current and future increases in federal funding for disabled students are to be distributed on a "census" basis. As a result, diverse states such as Arkansas, Arizona, California, and Vermont have moved to provide resources for students with mild disabilities through this strategy.

However, we were concerned that the state did not have adequate program data for successfully implementing the census approach. After consultations with OSPI staff, it appears that the state's child count data may not be detailed enough to permit the state to reliably distinguish between students with mild or moderate disabilities who would be funded through the census portion of the formula, and high cost students with more severe disabilities who would be fully funded by the state. There were further concerns that full state funding of high cost students could potentially provide disincentives for districts to control certain costs without close monitoring of the Individualized Education Plans of these students.

Recommendation: We recommend that the state retain the current special education funding structure. First, the current formula is not a significant departure from the census approach discussed above. The issues with the current formula appear to be less a result of its structure and more of the relatively low Basic Education Allowance that drives its funding level. We believe that replacing the current BEA with the higher funding allowances generated through the evidence-based prototypical schools will raise the base allocation to a level so that the 93 percent extra allocation for special education students would produce adequate funding for special education services. Special education funding would then be provided at the rate of 1.9309 times the newly determined BEA for each FTE student identified as eligible for special education services – up to the current limit of 12.7 percent (or a new level if evidence indicated this number did not accurately reflect the incidence of special education children in most school districts). The "safety net" for children with severe disabilities should be maintained.

Working Draft

We reiterate our suggestion above to streamline the excess reporting system for determining excess costs for the safety net portion of special education funding.

10. Gifted, Talented, Able and Ambitious Students[10]

Current Washington policy. Current code (RCW 28A.185) governs school districts' provision of appropriate programs for gifted and talented, or "highly capable" students. For each district with a gifted student program, the state provides $353 per student for 2 percent of total district enrollment, which equals about $7.06 for all students. The statutory goal is to provide funding to 3 percent of total enrollment.

The evidence. A sound analysis for a basic education program should include the gifted, talented student, most of whom perform above state proficiency standards. Indeed, this is important for Washington as its citizens desire improved performance for students at all levels of achievement not just that all students achieve to or above a proficiency standard. Research shows that developing the potential of gifted and talented students requires:

- Effort to discover the hidden talent of low income and/or culturally diverse students
- Curriculum materials designed specifically to meet the needs of talented learners
- Acceleration of the curriculum
- Special training in how teachers can work effectively with talented learners.

Discovering hidden talents in low-income and/or culturally diverse high ability learners. Research studies on the use of performance assessments (Baum, Owen, & Oreck, 1996; VanTassel-Baska, Johnson & Avery, 2002), nonverbal measures (Naglieri & Ronning, 2000; Naglieri & Ford, 2003), open-ended tasks (Scott, Deuel, Jean-Francois & Urbano, 1996), extended try-out and transitional periods (Borland & Wright, 1994; Maker, 1996), and inclusive definitions and policies (Gallagher & Coleman, 1992) document increased and more equitable identification practices for high ability culturally diverse and/or low-income learners. However, identification is not sufficient; it must be accompanied by services (Rito & Moller, 1989). Access to specialized services for talented learners in the elementary years is especially important for increased achievement among vulnerable students. For example, high ability culturally diverse learners who participated in three or more years of specialized elementary and/or middle school programming had higher achievement at high school graduation than a comparable group of high ability students who did not participate (Struck, 2003). Gains on other measures of school achievement were reported as well.

Access to curriculum. Overall, research shows that curriculum programs specifically designed for talented learners produce greater learning than regular academic programs. Increase in the complexity of the curricular material is a key factor (Robinson & Clinkenbeard, 1998). Large-scale curriculum projects in science and mathematics in the 1960s, such as the

[10] This section is based on an unpublished literature review written by Dr. Ann Robinson, Professor, University of Arkansas at Little Rock.

Working Draft

Biological Sciences Curriculum Study (BCSC), the Physical Science Study Committee (PSSC), and the Chemical Bond Approach (CBA), benefited academically talented learners (Gallagher, J., 2002). Further, curriculum projects in the 1990s designed to increase the achievement of talented learners in core content areas such as language arts, science, and social studies produced academic gains in persuasive writing and literary analysis (VanTassel-Baska, Johnson, Hughes & Boyce, 1996; VanTassell-Baska, Zuo, Avery, & Little, 2002), scientific understanding of variables (VanTassel-Baska, Bass, Ries, Poland, & Avery, 1998), and problem generation and social studies content acquisition (Gallagher & Stepien, 1996; Gallagher, Stepien, & Rosenthal, 1992).

Access to acceleration. Because academically talented students learn quickly, one effective option for serving them is acceleration of the curriculum. Many educators and members of the general public believe acceleration always means skipping a grade. However, there are at least 17 different types of acceleration ranging from curriculum compacting (which reduces the amount of time students spend on material they already know) to subject matter acceleration (going to a higher grade level for one class) to high school course options like Advanced Placement or concurrent credit (Southern, Jones & Stanley, 1993). In some cases, acceleration means *content* acceleration, which brings more complex material to the student at his or her current grade level. In other cases, acceleration means *student* acceleration, which brings the student to the material by shifting placement. Reviews of the research on different forms of acceleration have been conducted across several decades and consistently report the positive effects of acceleration on student achievement (Kulik & Kulik, 1984; Southern, Jones & Stanley, 1993), including Advanced Placement classes (Bleske-Rechek, Lubinski, & Benbow, in press). Other studies report participant satisfaction with acceleration (Swiatek, 2002) and benign effects on social and psychological development (Rogers, 2002).

Access to trained teachers. Research and teacher reports indicate that general classroom teachers make very few, if any, modifications for academically talented learners (Archambault et al, 1993; Westberg, Archambault, Dobyns, & Salvin, 1993), even though talented students have mastered 40 to 50 percent of the elementary curriculum before the school year begins (Reis et al, 1993). In contrast, teachers who receive appropriate training are more likely to provide classroom instruction that meets the needs of talented learners; students report differences and independent observers in the classroom document them (Hansen & Feldhusen, 1994). Curriculum and instructional adaptation requires the support of a specially trained coach at the building level, which could be embedded in the instructional facilitators recommended above (Reis et al, 1993; Reis & Purcell, 1993). Overall, learning outcomes for high ability learners are increased when they have access to programs whose staff have specialized training in working with high ability learners (Delcourt, Loyd, Cornell, & Golderberg, 1994), which could be accomplished with the professional development resources recommended below.

Research on gifted programs indicates that the effects on student achievement vary by the strategy of the intervention. Enriched classes for gifted and talented produce **effect sizes** of about **+0.40** or higher and accelerated classes for gifted and talented produce somewhat larger effectives sizes of **+0.90** (Kulik & Kulik, 1984; Kulik & Kulik, 1992; Gallagher, 1996).

Summary and program and policy implications. Our understanding of the research on best practices in serving gifted and talented students is, at the elementary and middle school

Working Draft

level, to place gifted students in special classes comprised of all gifted students and accelerate their instruction because such students can learn much more in a given time period than other students. When the pull out and acceleration approach is not possible, the most effective strategy is to have these students skip grades in order to be exposed to accelerated instruction. Research shows that neither of these practices produce social adjustment problems; indeed, many gifted students get bored and sometimes restless in classrooms that do not have accelerated instruction. Both of these strategies are essentially no cost, except for scheduling and training of teachers.

The primary approach to serve gifted students in high schools is to enroll them in advanced courses, as well as advanced placement (AP), International Baccalaureate (IB) programs, to participate in dual enrollment in postsecondary institutions (which is already funded by Washington), or to have them take courses through distance learning mechanisms.

Larger districts in Washington and other states operate programs that reflect the best practices approach for elementary and middle schools– pull out and acceleration. For example, medium size districts can create three accelerated classes for gifted children: a K-3 class, a grade 4-5 class and a grade 6-8 class, with the first two having about 18 students and the third about 25 students, all at that state's average funding for elementary and middle schools. This approach is essentially a no-cost approach, except possibly for some professional development for teachers (which can easily be accommodated within our professional development recommendations) and some supplies, which could be purchased with a modest per pupil state grant.

However, medium-size districts have sufficient numbers of students for these accelerated classes for gifted students principally because of a larger number of pupils. Smaller districts can identify gifted students but do not have sufficient numbers of students to operate a full accelerated class at normal class sizes for such students; grade-skipping would be a service option for them.

Even though supported by research as the "next best" service approach, many educators tend not to like the grade-skipping approach for gifted students in elementary and middle schools where there were insufficient numbers of such students to organize special gifted and accelerated classes district wide. Thus, many – if not most – districts provide special services for elementary and middle school gifted students but not through accelerated classes. They provide services through central office staff who travel to different schools to provide enrichment and pull out services for the identified students. These programs roughly cost between $75 and $100 per student. Most districts, however, place gifted high school students in advanced, AP or IB classes, or have them engage in post secondary dual enrollment programs.

Some districts have gifted students enroll in advanced courses provided on the Internet, which are available for students at essentially all grade levels. These approaches are very cost effective.

To confirm our understanding of best practices for the gifted and talented, we contacted directors of three of the Gifted and Talented research centers in the country: Dr. Elissa Brown, Director of the Center for Gifted Education, College of William & Mary; Dr. Joseph Renzulli, The National Research Center on the Gifted and Talented at the University of Connecticut; and

Working Draft

Dr. Ann Robinson, Director of the Center for Gifted Education at the University of Arkansas at Little Rock.

Dr. Ann Robinson of the University of Arkansas, Little Rock, with whom we initially worked in drafting this section, agreed with all of our recommendations. The College of William and Mary Center was in the midst of developing a literature and best practices review, together with analyses of effect sizes of various approaches to serving the gifted and talented, and their relative costs. Their analyses, not yet published, showed that **effect sizes** for placing students into homogeneous classes of gifted students and accelerating instruction, as well as grade skipping, were between **0.5 and 1.0**. Their analyses further concluded that neither approach produced negative social or emotional impacts for students, and many times, enhanced social and emotional adjustment. In addition, they ranked these approaches high to low impact and high to low cost. Their analyses showed that enrichment programs, in which staff worked with gifted students in smaller groups, could have similarly high level effects but were more costly, thus ranking these approaches high impact and medium cost, while the accelerated classes and grade skipping were ranked high impact and low cost.

The University of Connecticut center also agreed with these conclusions and has also developed a very powerful Internet-based platform, Renzulli Learning, which could provide for a wide range of programs and services for gifted and talented students. This system takes students through about a 25-30 minute detailed assessment of their interests and abilities, which produces an individual profile for the student. The student is then directed, via a search engine, to 14 different Internet data systems, including interactive web-sites and simulations that provide a wide range of opportunities to engage the student's interests. Renzulli stated that such an approach was undoubtedly the future for the very bright student. The estimated retail cost of this program is $25 per pupil but the director said that they would be very interested in negotiating a lower figure if Washington were to adopt this program for statewide use.

<u>Recommendation</u>. We recommend that the needs of Washington's gifted, talented, and "highly capable" students be met. But we also conclude that such services can be provided with modest additional funding. Thus, we recommend that the state provide $25 per student (all students) for districts to create programs for gifted, talented and "highly capable) students, which could include purchasing access to the Renzulli Learning Program for all student who want it.

Moreover, many of the proposals already made are directly related to the above recommendations for gifted and talented students, such as intensive professional development. Further, several proposals that might not have a specific rationale for gifted and talented students but will positively impact them, include:

- Classes of 15 students in grades K-3
- Classes of 25 in grades 4-12
- Smaller school size, and smaller schools-within-schools, so a more personalized learning environment would help the teacher identity and respond to gifted, talented, and able and ambitious student needs
- The intensive professional development that over time should include skills to differentiate instruction for the needs of all children, including the top learners

Working Draft

- Improved classroom instruction that focuses on ambitious learning goals of learning to understanding.

11. Career and Technical Education

Current Washington policy. Washington currently provides an enhanced CIS allocation and an enhanced NERC for vocational, career and technical education, in part to reflect both the higher staffing costs of providing vocational education as well as higher equipment and classroom materials costs. The state funded staffing ratio for vocational education is 0.92 certified instructional staff FTEs and 0.08 administrator per 19.95 vocational education student, and the same staffing per 16.64 skills center students. In the 2005-06 school year, the state funded NERC was $22,377 per certificated staff for vocational education programs and $17,362 per certificated staff for skills center programs.

Recommendation. We are in the process of researching this issue. A recommendation in another state is to collect an FTE count of students in vocational education classes, and to weight those students by about 0.3 and divide that number by the high school class size of 25 to produce additional teacher resources for smaller vocational education classes. In addition, we recommended providing approximately $7000 for every vocational education teacher for equipment purchase, update and replacement.

Additional Staffing Resources

The following sections discuss several additional staffing resources including substitute teachers, pupil support/parent-community outreach staff, non-instructional aides, library staff, principals and school secretarial staff.

12. Substitute Teachers

Current Washington policy. For the current 2006 school, Washington provided each school district with $531.09 annually for 91.7 percent of the basic education formula-generated Certified Instructional Staff (CIS). This amount was the same in the past two years.

The evidence. Schools need some level of substitute teacher allocations in order to cover classrooms when teachers are sick for one or two days, absent for other reasons, on long term sick or pregnancy leave, etc. In many other states, substitute funds are provided at a rate of about ten days for all teachers, which is very close to providing an additional 5 percent of teachers for substitute services.

Recommendation. Based on other studies, we recommend that each school receive an amount of money equal to 10 days for all teachers in Sections 1-11 above, funded at the level of $100 per day, plus licensed staff benefits (minus health) for a total of $109.69 per day. This recommendation does not mean that each teacher is provided ten substitute days a year; it means the district needs a "pot" of money approximately equal to 10 substitute days per year for all teachers, in order to cover classrooms when teachers are sick for 1-2 days, absent for other reasons, on long term sick or pregnancy leave, etc. This recommendation also is not for 10 days

Working Draft

above what is currently provided; it simply is a recommendation for an amount of money for substitute teachers estimated at 10 days for each teacher on average.

13. Student Support/Family-Community Outreach

Current Washington policy. There is no specific provision for such staff in Washington school finance policy. It is a personnel resource that districts and schools can buy from the formula generated CIS staff and perhaps the Readiness to Learn program.

The evidence. Schools need a student support and family outreach strategy. Various comprehensive school designs have suggested different ways to provide such a program strategy (Stringfield, Ross & Smith, 1996; for further discussion, see Brabeck, Walsh & Latta, 2003). In terms of level of resources, the more disadvantaged the student body, the more comprehensive the strategy needs to be. The general standard is one licensed professional for every 20-25 percent of students from a low-income background, with a minimum of one for each school of 500 students.[11]

Although there are many ways schools can provide outreach to parents, or involve parents in school activities – from fund raisers to governance – research shows that school sponsored activities that impact achievement address what parents can do at home to help their children learn. For example, if the education system has clear content and performance standards, which Washington's does, helping parents and students to understand both what needs to be learned and what constitutes acceptable standards for academic performance would be helpful. Put succinctly, parent outreach that explicitly and directly addresses what parents can do to help their children learn, and to understand the standards of performance that the school expects, are the types of school-sponsored parent activities that produce discernible impacts on student's academic learning (Steinberg, 1996, 1997).

At the secondary level, the goal of such activities should be to have parents learn about what they should expect of their children in terms of their learning and academic performance in secondary school. If a district or a state required a minimum number of courses for graduation, that requirement should be made clear. Further, if there were similar or more extensive course requirements for admission into state colleges and universities, those requirements should be addressed. Finally, if either average scores on end-of-course examinations or a cut-score on a comprehensive high school test were required for graduation, they too should be discussed. The point is that secondary schools need to help many parents know how to more effectively assist their children in determining both an academic pathway through middle and high school, standards for acceptable performance, and at the high school, an understanding of the course work necessary for college entrance.

At the elementary school level, the focus for parent outreach and involvement programs should concentrate on what parents can do at home to help their children learn academic work for school. Too often parent programs focus on fund raising through the parent-teacher organization, involvement in decision making through school site councils, or other non-

[11] In the resource matrix recommended, funding for these staff are estimated using a ratio of one professional position for every 100 students who qualify for free and reduced price lunch, with a minimum of one per school.

Working Draft

academically focused activities at the school site. Although these school-sponsored parent activities might impact other goals – such as making parents feel more comfortable being at school or involving parents more in some school policies – they have little effect on student academic achievement. Parent actions that impact learning would be to: 1) read to them at young ages, 2) discuss stories and their meanings, 3) engage in open ended conversations, 4) set aside a place where homework can be done, and 5) ensure that their child completes homework assignments.

In addition, middle and high schools need some level of guidance counselor resources. Our recommendation below uses the standards from the American School Counselor Association (ASCA), which is one counselor for every 250 secondary students.

Recommendation. Our general recommendation is to provide one teacher position for every 100 Washington adjusted students eligible for free and reduced price lunch, with a minimum of one for each of the prototypical school models (432 student elementary, 450 student middle and 600 student high school). In addition, we would recommend providing an additional 1.8 guidance counselor position and an additional 2.4 guidance counselor positions in the prototypical middle and high school models, respectively, based on the ASCA standards.

This recommendation would enable districts and schools to allocate FTE staff across guidance counselors, nurses, as well as social workers, in a way that best addresses such needs from the perspective of each district and school.

Readers should note that this recommendation provides substantial and adequate resources for parent outreach and involvement, as well as counseling for students. For an all poverty school, our recommendations would provide 4.3 staff positions for an elementary school of 432 students (so it could have a nurse, counselor, social worker and parent liaison team) and the same staff plus 1.8 additional counselors at the middle school and 6 positions plus an additional 2.4 counselors for the prototypic all poverty high school.

The resources are adequate to create and deploy the ambitious and comprehensive parent involvement and outreach programs that are part of two comprehensive school designs: Roots and Wings/Success for all and the Comer School Development Program. The Roots and Wings program would include a family outreach coordinator, a nurse, social worker, guidance counselor and education diagnostician. This group would function as a parent outreach team for the school, would serve as case managers for students who needed non-academic and social services of whatever sort, and usually also include a clothing strategy to ensure that all students, especially in cold climates, had sufficient and adequate clothes, and coats, to attend school.

The Comer Program is created on the premise of attaching schools more to their communities. It's Parent-School team would have a somewhat different composition and would be focused on training parents to raise expectations for their children's learning, to work with social service agencies and sometimes to even co-locate on school site premises the provision of a host of social services, and to work with the school's faculty to raise their expectations for what students can learn.

Working Draft

14. Aides

Current Washington policy. There is no specific provision for such staff in Washington state education or school finance policy. It is a personnel resource that districts and schools can buy with the classified allocations from the funding formula.

The evidence. Elementary, middle and high schools need staff for such duties as lunch duty, before and after school playground supervision, helping elementary students get off the bus in the morning and on the bus at the end of the school day, etc. We generally have provided funds for such aides at about the rate of 2.0 FTE aide positions for a school of 500.

But the research evidence is not supportive of instructional aides who are used as "teacher helpers". As noted above, the Tennessee STAR study, which produced solid evidence through field-based randomized trails that small classes work in elementary schools, also produced evidence that a regular class with an instructional aide did not produce higher levels of student achievement than a teacher without an aide (Achilles, 1999; Gerber, Finn, Achilles & Boyd-Zaharias, 2001).

Recommendation. We recommend that funds in the amount of 2.0 FTE aide positions be provided to the prototypical elementary and middle school, and 3.0 FTE aide positions for the prototypical high school, to be used for relieving teachers from lunchroom, playground and other non-teaching responsibilities.

15. Librarians

Current Washington policy. There is no specific provision for such staff in Washington education or school finance policy. It is a personnel resource that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. Most schools have a library, and the staff resources must be sufficient to operate the library and to incorporate appropriate technologies into the library system. Further, some elementary librarians could teach students for some of the day as part of special subject offerings.

Recommendation. We recommend that each prototypical school be provided a librarian, and that the high school also be provided a library media technician.

16. Principal

Current Washington policy. Washington currently provides administrative staff at the rate of 4 certified Administrative Staff for every 1000 FTE, or one per every 250 student FTEs. This allocation is designed to cover both site and central office administrative staff. Our goal is to identify administrative staff by both position (principal, assistant principal, superintendent, assistant superintendent, business officer, etc.) and location (school and central office). This section addresses school level certified administrative staff.

Working Draft

The evidence. **Each school unit needs a principal**. There is no research evidence on the performance of schools with or without a principal. The fact is that essentially all schools in America, if not the world, have a principal. All comprehensive school designs, and all prototypic school designs from all professional judgment studies around the country (see for example, Appendix A), include a principal for every school unit. However, few if any comprehensive school designs include assistant principal positions. And very few school systems around the country provide assistant principals to schools with 500 students or less. Since we also recommend that instead of one school with a large number of students, school buildings with large numbers of students should be sub-divided into multiple school units within the building, we recommend that each unit have a principal. This implies that one principal would be required for each school unit.

The importance of instructional leadership. The key role of a school's principal and the importance of instructional leadership is uniformly accepted, but the nature of principal leadership and how that impacts instructional practice has been only partially understood (Hallinger & Heck, 1996). Most researchers and policymakers agree that principals play important roles in schools' successes (Hallinger & Heck, 1996). This is particularly true for restructuring schools, an assumed need for all schools in this report, where Murphy has identified a key role of the principal to be enabling and supporting teacher success (Murphy, 1994).

Although studies have found that principal leadership alone may account for a significant portion of the variation in student test scores among schools, research generally finds that principals have little or no *direct* effect on student achievement. Instead, principals influence school success through indirect means (Hallinger & Heck, 1996, 2002, 2003). In particular, it is the principal's influence on a school's instructional climate and organization that is crucial, and this is especially true for high schools (Murphy, Beck, Crawford, Hodges, & McGaughy, 2001). Principals influence the learning climate within which a school's teachers work by:

- establishing clear instructional goals
- providing programmatic coherence
- communicating relevant information, including best practices, to their teaching staff
- establishing accountability for student learning
- fostering collaboration and building professional community, and
- maintaining student discipline (Bossert, Dwyer, Rowan, & Lee, 1982).

They also support the professional growth of individual teachers through direct classroom supervision, including teacher observation and feedback, and creating professional development opportunities (Hallinger & Heck, 1998, 2002, 2003; Heck, Larsen, & Marcoulides, 1990).

One of the most important aspects of principal instructional leadership is creating a professional community within schools (Halverson, 2003). Professional community has been shown to increase the intellectual quality of instruction as well as the overall level and distribution of student achievement by strengthening the instructional capacity and focus of schools (Louis & Marks, 1998; Newmann & Wehlage, 1995). Newmann & Wehlage (1995) describes professional community as possessing three general traits, in which teachers:

Working Draft

1) pursue a shared sense of purpose for student learning
2) engage in collaborative activities to achieve this purpose; an
3) take collective responsibility for student learning.

Others have identified de-privatization of practice and reflective dialogue as additional elements of professional community (Louis, Kruse, & Marks, 1996; Louis & Marks, 1998; Louis, Marks & Kruse, 1996).

Shared sense of purpose refers to a consensus among school staff as to the mission and principles by which the school operates. Collaborative activity describes the extent to which teachers engage in cooperative practices to achieve the school's goals. Collective responsibility refers to the degree to which all teachers share responsibility for the academic success of all a school's students. De-privatization of practice refers to the practice of teachers interacting professionally, for example observing and providing feedback on each others' teaching. Reflective dialogue is the professional conversation teachers have about specific issues of instructional practice (Louis & Marks, 1998).

In short, a school's instructional team is critical to the success of schools in producing high levels of student achievement. Principals provide instructional leadership by creating professional communities in which teachers provide considerable instructional leadership (see also Spillane, Halverson & Diamond, 2001), developing professional development opportunities for teachers, signaling that instructional improvement and student achievement are core goals, and helping the school as a whole to take responsibility for student achievement increases or decreases, while also managing the non-instructional aspects of the school.

Recommendation. We recommend that each school be provided a principal, that elementary schools with FTE down to 108 also receive a principal, and that middle and high schools with FTE down to 150 also receive a full time principal. We recommend that assistant principal positions for schools larger than the 432, 450 and 600 prototypes be prorated up from the1.0 position. We recommend that the principal position for elementary schools with fewer than 108 students and middle and high schools with fewer than 150 students be prorated down by pupil counts.

School buildings with 2 or more school-unit principals could organize themselves so there was one "super-ordinate" principal in charge. Larger schools with several schools-within-a-school could field combined athletic teams. Our point in providing resources is simply to provide resources for groupings of students in prototypic elementary, middle and high schools, with such resources to include a principal-level position for each of those school units.

Given these recommendations, we note that the prototypical elementary and middle school leadership team would consist of the principal and the 2.3 instructional coach positions, the high school leadership team would consist of the principal and 3 instructional coaches. Schools could organize this leadership team differently than the recommendations, according to the needs and administrative philosophies of the school.

Working Draft

17. School Site Secretarial Staff

Current Washington policy. Washington currently provides classified and clerical staff at the rate of 16.67 staff for every 1000 FTE, or one classified staff per every 60 student FTEs. This allocation is designed to cover both site and central office classified staff. Our goal is to identify classified staff by both position (secretary, custodian, maintenance or grounds worker, etc.) and location (school and central office). This section addresses school level secretarial staff.

The evidence. Every school site needs secretarial support to provide clerical and administrative assistance support to administrators and teachers, to answer the telephone, greet parents when they visit the school, help with paper work, etc.

Recommendation. We recommend that the prototypical elementary and middle schools be provided two secretarial positions, and that the prototypical high school be provided three secretarial positions.

Working Draft

Effect Sizes of Major Recommendations

Throughout the report, we have identified "effect sizes" of the programmatic proposals. Effect size is the amount of a standard deviation in higher performance that the program produces for students who participate in the program versus students who did not. An effect size of 1.0 would indicate that the average student's performance would move from the 50th to the 83rd percentile. The research field generally recognizes effect sizes greater than 0.25 as significant and greater than 0.50 as substantial. The effect sizes of the major recommendations are presented in the following table.

Estimated Effect Sizes of Major Recommendations

Recommended Program	Effect Size
Full Day Kindergarten	0.77
Class Size of 15 in Grades K-3	
Overall	0.25
Low income and Minority Students	0.50
Multi-age classrooms	
Multi-grade Classrooms	-0.1 to 0.0
Multi-age Classrooms	0.0 to 0.50
Professional Development with Classroom Instructional Coaches	1.25 to 2.70
Tutoring, 1-1	0.4 to 2.5
English-Language Learners	0.45
Extended-Day Programs	mixed
Structured Academic Focused Summer school	0.45
Embedded Technology	0.30 to 0.38
Gifted and Talented	
Accelerated Instruction or Grade Skipping	0.5 to 1.0
Enrichment Programs	0.4 to 0.7

Working Draft

3. Recommendations for the Dollar Per Pupil Elements

This section addresses areas that are funded by dollar per pupil amounts, including professional development, instructional materials and supplies, computers and other technology, etc.

18. Intensive Professional Development[12]

Current Washington policy. The current Washington school finance formula provides for two "Learning Improvement Days" for professional development for teachers. However, districts might possibly also use Mentor Teacher Assistance and I-728 funds for some of the additional professional development activities that we propose below.

The evidence. All school faculties need ongoing professional development. Indeed, improving teacher effectiveness through high quality professional development is arguably as important as all of the other resource strategies identified; better instruction is the key aspect of the education system that will improve student learning (Rowan, Correnti & Miller, 2002; Sanders & Horn, 1994; Sanders & Rivers, 1996; Webster, Mendro, Orsak & Weerasinghe, 1998).

Moreover, all the resources recommended in this report need to be used to implement specific and effective education programs that transform the resources into high quality instruction in order to increase student learning (Cohen, Raudenbush & Ball, 2002). And effective professional development is the primary way those resources get transformed into effective and productive instructional practices. Further, as we have stated above, although the key focus of professional development is for better instruction in the core subjects of mathematics, reading/language arts, history and science, the professional development resources are adequate to address the instructional needs for gifted and talented and English language learning students, for embedding technology in the curriculum, and possibly for administrators as well. Finally, all beginning teachers need intensive professional development, first in classroom management, organization and student discipline, and then in instruction.

Fortunately, there is recent and substantial research on effective professional development and its costs (e.g., Elmore, 2002; Joyce & Showers, 2002; Miles, Odden, Archibald, Fermanich & Gallagher, 2002). Effective professional development is defined as professional development that produces change in teachers' classroom-based instructional practice, which can be linked to improvements in student learning. The practices and principles researchers and professional development organizations use to characterize "high quality" or "effective" professional development draw upon a series of empirical research studies that linked program strategies to changes in teachers' instructional practice and subsequent increases in student achievement. These studies include, among others, the long-term efforts of Bruce Joyce (Joyce & Calhoun, 1996; Joyce & Showers, 2002), research on the change process (Fullan, 2002), a longitudinal analysis of efforts to improve mathematics in California (Cohen & Hill, 2001), Elmore's study of District #2 in New York City (Elmore & Burney, 1999), the Consortium for Policy Research in Education longitudinal study of sustained professional

[12] This draws from Odden, Archibald, Fermanich & Gallagher, 2002.

Working Draft

development provided by the Merck Institute for Science Education (Corcoran, McVay & Riordan, 2003; Supovitz & Turner, 2000; Supovitz, Mayer & Kahle, 2000), studies of comprehensive professional development to improve science teaching and learning (Loucks-Horsley, Love, Stiles, Mundry & Hewsen, 2003), and an evaluation of the federal Eisenhower mathematics and science professional development program (Garet, Birman, Porter, Desimone & Herman, 1999).

Combined, these studies identified six structural features of effective professional development:

1) The **form** of the activity – that is, whether the activity is organized as a study group, teacher network, mentoring collaborative, committee or curriculum development group. The above research suggests that effective professional development should be school-based, job-embedded and focused on the curriculum taught rather than a one-day workshop.

2) The **duration** of the activity, including the total number of contact hours that participants are expected to spend in the activity, as well as the span of time over which the activity takes place. The above research has shown the importance of continuous, ongoing, long-term professional development that totals a substantial number of hours each year, at least 100 hours and closer to 200 hours.

3) The degree to which the activity emphasizes the **collective participation** of teachers from the same school, department, or grade level. The above research suggests that effective professional development should be organized around groups of teachers from a school that over time includes the entire faculty (e.g., Garet, Birman, Porter, Desimone & Herman, 1999).

4) The degree to which the activity has a **content focus** – that is, the degree to which the activity is focused on improving and deepening teachers' content knowledge as well as how students learn that content. The above research concludes that teachers need to know well the content they teach, need to know common student miscues or problems students typically have learning that content, and effective instructional strategies linking the two (Bransford, Brown & Cocking, 1999; Kennedy, 1998).

5) The extent to which the activity offers opportunities for **active learning**, such as opportunities for teachers to become engaged in the meaningful analysis of teaching and learning; for example, by scoring student work or developing and refining a standards-based curriculum unit. The above research has shown that professional development is most effective when it includes opportunities for teachers to work directly on incorporating the new techniques into their instructional practice (e.g., Joyce & Showers, 2002).

6) The degree to which the activity promotes **coherence** in teachers' professional development, by aligning professional development to other key parts of the education system such as student content and performance standards, teacher

Working Draft

evaluation, school and district goals, and the development of a professional community. The above research supports tying professional development to a comprehensive, inter-related change process focused on improving student learning.

Form, duration, and active learning together imply that effective professional development includes some initial learning (*e.g.* a two-week – 10 day – summer training institute) as well as considerable longer-term work in which teachers incorporate the new methodologies into their actual classroom practice. Active learning implies some degree of coaching during regular school hours to help the teacher incorporate new strategies in his/her normal instructional practices. It should be clear that the longer the duration, and the more the coaching, the more time is required of teachers as well as professional development trainers and coaches. Content focus means that effective professional development focuses largely on subject matter knowledge, what is known about how students learn that subject, and the actual curriculum that is used in the school to teach this content. Collective participation implies that the best professional development includes groups of and at some point all teachers in a school, who then work together to implement the new strategies, and in the process, help build a professional school community. Coherence suggests that the professional development is more effective when the signals from the policy environment (federal, state, district, and school) reinforce rather than contradict one another or send multiple, confusing messages. Coherence also implies that professional development opportunities should be given as part of implementation of new curriculum and instructional approaches. Note that there is little support in this research for the development of individually oriented professional development plans; the research implies a much more systemic and all-teachers-in-the-school approach.

Each of these six structural features has cost implications. Form, duration, collective participation, and active learning require various amounts of both teacher and trainer/coach/mentor time, during the regular school day and year and, depending on the specific strategies, outside of the regular day and year as well. This time costs money. Further, all professional development strategies require some amount of administration, materials and supplies, and miscellaneous financial support for travel and fees. Both the above programmatic features and the specifics of their cost implications are helpful to comprehensively describe specific professional development programs and their related costs.

From this research on the features of effective professional development, we conclude that the resources needed to deploy this kind of professional development, which is key to transforming all the resources we recommend into student learning, are:

a. **Time during the summer for intensive training institutes**. This training can most easily be accomplished by ensuring that approximately 10 days of the teacher's normal work year will be dedicated to professional development. The state of Washington currently funds 182 teacher work days, which includes 2 days for professional development. This recommendation would be for the state to increase the number of state funded work days by 8 days to a total of 190, to produce the minimum number of 10 days for intensive professional development and training.

Working Draft

b. **On-site coaching for all teachers** to help them incorporate the practices into their instructional repertoire. The instructional facilitators described earlier in this report would provide this function.

c. **Collaborative work with teachers in their schools during planning and preparation periods** to improve the curriculum and instructional program, thus reinforcing the strategic and instrumental need for planning and preparation time during the regular school day. This will require smart scheduling of teachers during the regular school day and week.

d. **Funds for training** during the summer and for ongoing training during the school year, the cost of which is about $50,000 for a school unit of 500 students, or $100/pupil.

Recommendation. For professional development we recommend:

- The number of teacher "learning improvement days" should be extended by 8 days to provide a total of 10 days for intensive summer institutes
- The instructional facilitators included above would provide the instructional coaching
- Collaborative work should be conducted during the planning and preparation time that is included above
- An additional $100 per student, or about $43,000 in the prototypical elementary, $45,000 in the prototypical middle schools and $60,000 for the prototypical high school, would be needed for trainer and other miscellaneous professional development costs.

These professional development resources should be adequate for all professional development needs of all teachers over time. We would cost out the extra teacher days at the average annual teacher salary divided by 205 days, which includes sick days and holidays and is approximately the number of days paid during the nine-month teacher contract.

The state might want to retain its Superintendent/Principal Leadership Internship and Principal Assessment and Mentorships programs, as the above recommendations focus mainly on instructional staff.

At its May 23, 2006 meeting, the Advisory Committee suggested that the additional eight days would not need to be used just for training during the summer, and also discussed expanding the total number for professional days from 10 to 20.

19. Technology and Equipment

Current Washington policy. For non-employee-related costs (NERC), which can include technology and equipment costs, Washington provides a dollar amount for every formula-generated certified staff (instructional and administrative), which was $9112 for the 2006 school year. The NERC rate is increased by inflation every year. This is the prime funding source for technology and related purchases.

The evidence. Over time, schools need to **embed technology in instructional programs and school management strategies**. Although the use of technology in schools may seem vital

Working Draft

to most, the effect it produces depends on how it is used, and the training that is provided for that use. In general research has identified four areas in which education technology can benefit students: 1) student preparation to enter the workforce or higher education, 2) student motivation, 3) student learning or increased academic achievement, and 3) teacher/student access to resources (Earle, 2002).

Student preparation for *higher education or the workforce* concerning technology includes technology literacy and the ability of students to find, sift, manipulate and communicate information using the latest versions of the software. Government organizations, both inside and outside education, view technology use in schools as workforce preparation. In 1991, the Secretary's (of Labor) Commission on Achieving Necessary Skills (SCANS) issued a report that underscored the need for students to be able to select technical equipment and tools, apply technology to specific tasks, and maintain and troubleshoot computers. The 21st Century Workforce Commission (U.S. Department of Labor, 2000) called for students to have technological proficiency to compete in a "highly-skilled" workforce. Dede (2000a, 2000b) echoed this view in an article written for the Council of Chief State School Officers emphasizing the importance of informational and technical literacy. Glister (2000) argued that technology skills go beyond informational and technical literacy, encompassing what he calls *digital literacy*. Most recently, the *National Education Technology Plan* released by the U.S. Department of Education (2004:6) emphasized the need "to help secure our economic future by ensuring that our young people are adequately prepared to meet these challenges [competition in the global economy]." Developing technology expertise is also a goal in Washington.

Aspects of *increased student motivation* include gains in student attitude toward schoolwork, time on task, quality of work, and/or improved attendance. Becker (2000) found that teachers who structure the right type of assignments using technology motivate students to spend more time on them. Teaching methods that encourage students to create their own learning path, a "natural" for good technology (think of the popularity of many complex computer games), produce more excitement than drill-and-practice types of activities (Becker, 2000; Lewis, 2002; Valdez et al, 2000).

The third impact of technology is increased student achievement. There are mixed results on the impact of technology on student achievement, (Archer, 2000; Earle, 2002; Kulik, 1994, 2003). Many studies are based on small cases, evidence in several studies is anecdotal, too many programs are of short duration and not tested through replication, and many studies lack appropriate control groups. Thus, it is difficult to get a clear picture of the impact of technology on student achievement from the studies that exist.

Nevertheless, the reviews document **effect sizes** from embedded technology in instructional programs and school management strategies that range from **0.30** (Waxman, Connell & Gray, 2002) to **0.38** of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

In addition, there are several recent reviews of studies that can help. The Milken Family Foundation (1999) reviewed five large-scale studies of the impact of education technology on

Working Draft

student achievement: 1) the 1994 Kulik study, 2) Sivin-Kachala's (1998) research review, 3) Apple Classrooms of Tomorrow (ACOT) (Baker, Gearhart, & Herman, 1994), 4) West Virginia's Basic Skills/Computer Education (BS/CE) Statewide Initiative (Mann, Shakeshaft, Becker, & Kottkamp, 1999), and 5) Wenglinsky's National Study of Technology's Impact on Mathematics Achievement (1998). Positive effects were found in all of these studies but all studies had caveats. For example, in the Wenglinsky study, eighth grade students using computer simulations had measurable gains in mathematics scores but only if the computers were used correctly and teachers had been trained in, and implemented correctly, proper teaching techniques. The ACOT study showed measurable gains in student *attitude* but no measurable increases in learning. And, in the West Virginia study, scores on the Stanford 9 for 5th graders increased, but it is not clear if technology was the sole cause for the gains.

In qualifying their generally positive conclusions, the Milken (1999: 10) study wrote that although gains were shown in all studies, "learning technology is less effective or ineffective when learning objectives are unclear and the focus of technology is diffuse." In other words, if a teacher does not know exactly what to do with a computer, how to use the right teaching method designed to fit a specific goal, and what software is effective for that goal, then limited or no learning gains will result.

Other research has reached more optimistic findings about the impact of technology on student achievement, specifically a positive impact on student test scores of curriculum programs that embed technology into the instructional delivery system. The reviews documented effect sizes from 0.30 (Waxman, Connell & Gray, 2002) to 0.38 of a standard deviation improvement in test scores (Murphy, Penuel, Means, Korbak, Whaley & Allen, 2002), thus approximating the effects of class size reduction in the early grades.

In one of the most recent meta-analyses of the impact of specific technology programs, Kulik (2003) found that "integrated learning systems," i.e., programs tailored to individual students with ongoing diagnoses and feedback, had average effects of 0.38 in mathematics but much lower (0.06) in reading, although the effects were higher for the Jostens program (now called Compass Learning) – 0.37 in reading and 0.22 in mathematics. For all programs, the effect is larger the greater the amount of time the student spends on them and when students work in structured pairs. Word processing also has significant and positive effects on students' writing proficiency (Bangert-Drowns, 1993; Cochrane-Smith, 1991). Though more work is needed on designing strategies for integrating computer technologies into instruction, the emerging research suggests that doing so can have significant positive impacts on student learning when used effectively.

Finally, education technology has opened schools and their students to a world of resources that can be explored and manipulated. The Internet affords access to information, communication, opinions, simulations, current events, and academic coursework that were formerly inaccessible or delayed. Networks allow districts to communicate and share data with their schools all with the purpose of increasing student achievement.

Looking at technology outside of direct student use, computers and software also have increased importance as an administrative tool. As the demands of NCLB legislation intensify,

Working Draft

schools have begun to rely on data as a means to achieving instructional excellence through gap analysis of student benchmark tests. Student administration systems and other programs that collect, analyze, and assist administrators and teachers to interpret student data more efficiently have become common. Edusoft, Renaissance Learning, Scantron, and other vendors provide such analytical tools. As these programs become more complex their initial and ongoing direct and indirect costs will continue to increase.

In sum, although the evidence is somewhat mixed, we conclude that technology, if used correctly, is important for preparing the student for both postsecondary education and the workforce, can increase student motivation to learn, positively impacts student achievement, and opens a new world of resources for schools and their students.

In terms of identifying the ***costs*** *of purchasing and embedding technology* into the operation of schools, significant advances have emerged over the past decade (COSN, 2001, 2004). One term that has emerged is the *Total Cost of Ownership* (TCO). *Total Cost of Ownership* is a type of calculation designed to help policy makers and administrators assess both the direct and indirect costs of technology. The *direct costs* of technology include hardware, software, and direct labor costs. *Direct labor* refers to those individuals who are specifically hired by the district to repair, update, and maintain instructional technology. *Indirect costs* include the costs of users supporting each other, time spent in training classes, casual learning, self support, user application development and downtime costs (COSN, 2004).

TCO can vary greatly depending on district context, including the age of equipment, and the level to which the district makes education technology an integral part of the instructional and management strategies. Eight case studies conducted by COSN and the Gartner Group (2003, 2004) in various states and in urban, suburban and rural school districts found that total **annual costs** varied from a low of $385 per pupil in a rural district to a high of $1,242 per pupil in a suburban district, with a median at about $750. But these numbers included both direct and indirect costs.

While a total per pupil figure in the TCO model is useful, we will identify direct labor costs separately from direct technology costs, and have incorporated the training costs into our professional development recommendations, so we mainly need to identify the direct costs of purchasing, upgrading, and maintaining computer technology hardware and software. In studies that have been conducted by several states and conducted as part of several professional judgment studies (Appendix A) of this narrower aspect of technology costs, the annual costs per student are about $250 for the purchase, update, and maintenance of hardware and software (Odden, 1997; Odden, Fermanich & Picus, 2003). This figure also is almost exactly what the average direct costs would be for the 8 TCO case studies (COSN, 2004) reported above and adjusted to provide a one-to-three student-to-computer ratio. It also is a figure that was confirmed in our recent school finance adequacy study for Wyoming.

The $250 per pupil figure would be sufficient to purchase, upgrade and maintain computers, servers, operating systems and productivity software, network equipment, and student administrative system and financial systems software, as well as other equipment such as

Working Draft

copiers. Since the systems software packages vary dramatically in price, the figure would cover medium priced student administrative and financial systems software packages.

Allocating the $250 per pupil. Each district and school situation is unique, requiring that an individual technology plan be created at both the district and school levels. Most districts and schools already have technology plans because of the federal funding requirements in the E-Rate and EETT programs. These documents should be meaningful mechanisms used to distribute resources to the areas of most need within the school or district environment.

To assure that all technology needs are met, the recommended $250 per student figure has been assigned subcategories of spending. At the same time that these subcategories have firm dollar figures associated with them, they must be flexible enough to meet the changing needs of the organizations and the ebb-and-flow of technology purchases.

The four subcategories of need include:

1) Purchase, lease and maintenance of computers
2) Refresh of software including operating systems, productivity suites like Microsoft Office, and other essential software that give computers basic functionality
3) Purchase of networking equipment, printers, copiers, and their supplies
4) Purchase and refresh of instructional software (including one-time purchases and subscriptions) and additional hardware that enhances the instructional environment.

The allotted dollar figures are as follows:

- Computers (3-, 4-, or 5-year replacement cycle) $100
- Operating system, productivity and other non-instructional software $50
- Network equipment, printers, and copiers $50
- Instructional software & additional hardware $50

This distribution is based on what a typical school might need if that school had participated in the funding programs made available by the districts and states in the past. It assumes that campuses have been connected through Ethernet and/or fiber cabling and that Main and Intermediate Distribution Facilities (MDFs and IDFs) have been populated with the necessary active electronics (switches). It also assumes that schools own various computers between one and five years old which have a mixture of hardware, operating systems and miscellaneous iterations of instructional software.

1. Computer Purchase, Lease and Maintenance (3-, 4-, or 5-year replacement cycle) (3-to-1, or 2-to-1 student-to-computer ratio. The formula for the expenditure of funds within the subcategory of *Computer Purchase* has multiple variants based on the distinct needs of the school and district. The $100 annual per student allocation for this subcategory was calculated using and average price of $1,200 per computer. This figure may seem high for the purchase of a common workstation, but it is based on the average price of computer within a group of

Working Draft

machines that could include desktop workstations, laptops, high-end video editing stations, and/or wireless mobile carts (20 laptops and cart $60,000) depending on school site need.

All computers should be purchased with a 3-year on-site warranty. These warranties provide benefits to both large and small school districts. Larger districts typically enter into self-servicing agreements with manufacturers to generate funds for additional parts. Smaller districts, by contrast, are served well by the "on site" technical help that warranty agreements provide because these districts lack the ability to hire highly specialized full time personnel.

When purchasing computers, districts should consider including computer monitors that are large enough to prevent eyestrain. LCD flat panel monitors generate less heat and should be considered to save energy costs in the spring and summer months. Each computer should come with the most up-to-date operating system and the latest office productivity suite pre-installed so that computers need only be reconfigured, not re-imaged, at installation.

Regarding computer replacement, for most applications in educational technology a four-year replacement cycle is adequate. There are exceptions. For example, for computers that are used for simple word processing and other such tasks, a five-year replacement cycle (especially with the software replacement outlined below) is appropriate. But, there are various cases in which a five-year replacement cycle is not sufficient. Many classrooms, most notably at the secondary level, demand the latest technology available and should be on a three-year replacement. Examples of courses that require ever-increasing computer power include higher mathematics, art, and other courses that heavily use multimedia or multimedia editing, which can include both biology and social studies. Further, because the student to computer ratio is meant also to provide computers for administrators, "power users" in the school office, such as the individual who processes student data, may require a three-year replacement.

If districts decide that it is important to have a two-to-one student-to-computer ratio, school officials can limit the number of higher-end computers they purchase to raise the overall number of computers and lower the student-to-computer ratio. Districts could also take three-year-old computers that are ready to be replaced from more demanding course environments and redeploy these units in less demanding environments thus gaining an additional two years of use.

Using a three-to-one student-to-computer ratio to generate a denominator of 3, and placing the $1,200 cost of the average computer as the numerator, the average cost, per student, per computer becomes $400. Spreading the $400 per student cost over the four year period that a computer would be in service creates a $100 cost, per year, per student figure. Thus, the annual cost per pupil to maintain a three-to-one student-to-computer ratio is approximately $100.

2. Refresh of operating system, productivity software, and other non-instructional software. To compete well in the global economy, students should have access to the latest operating systems and productivity software. Additionally, new operating systems traditionally supply district personnel with more powerful features to secure the network and protect school and student data.

Working Draft

With educational discounts schools can buy the latest operating systems and productivity suites for approximately $55 each. Indispensable antivirus and anti-spyware software can be purchased on an annual basis (approximately $8 - $10 per workstation, per year for the most popular product). Software programs such as Altiris that allow teachers to monitor workstations or "push" their screens to students is expensive and should also be refreshed. Administrators or students may use the latest versions of FileMaker Pro or other databases to analyze data. Server software must also be upgraded. The cost of these upgrades depends on what services are running (e-mail, database, network security, backup software). Larger campuses have at least two servers with various services running. After averaging in the number of servers provided at the district level, the formula for this category assumes three servers per school site.

- Operating System (three years) $ 57
- Productivity Suite (three years) $ 55
- Server Software (every three years) $ 1,500 (depending on services)
- (based on 3 servers per site, average w/district)
- Database (FileMaker Pro, other) (three years) $150
- Antivirus/anti-spyware (annually) $ 10
- Other Network (Novell, Altiris, LanDesk) $ 17

Providing for the three-year refresh cycle of the first four software items on this list and assuming a three-to-one computer ratio divided over the four-year life cycle of the computer, these software refreshes calculate to $51 per year per student. The figure of $50 will be used for ease of use. (((((57+55+1,500+150)/3)+10+17)/3)/4)

This subcategory has some caveats. Depending on how often upgrades/refreshes become available and/or what functionality a new release of software holds, the annual allocation of $50 per student for software could be high or low. In years when the demand is not as heavy in this subcategory, the funds could be used in any of the other subcategories where there is a local need. School officials must be aware though that the price for these refreshes will cut into other subcategories when these upgrades for these software products become available.

Also, districts and schools will gain a year of operating system refresh if the life of a computer is four years. For example, the operating system would probably be refreshed once during the life of a computer, but a new replacement computer would come with a new operating system, effectively "giving" the school district a year of a more advanced operating system. This would also be true with the office productivity suite.

Not all districts and schools use all of the software listed above, but, they might have other software packages that they use to secure and regulate normal computing functions in the district. This formula assumes that these costs will average out.

3. Network Equipment, Printers, and Copiers. Assuming an average campus size of 400 students per site, the $50 per pupil figure for this technology subcategory provides $20,000 per year or $60,000 and $80,000 over three and four years, respectively. Since this subcategory has such diverse components, it is important that districts and schools set aside the funds necessary

Working Draft

to meet that needs of each of these components: network equipment ($26), printers ($18), and copiers ($6).

3a. Network Equipment. To most district and school employees, the network equipment that provides connectivity to the district office, the Internet, and other specialized networks is invisible or transparent. Most networking equipment will have been purchased through facility funds or bond measures. Network equipment does not need to be refreshed as often as computers, but the larger more complex pieces of equipment should be on a maintenance contract with the manufacturer and/or a service contract with a third party vendor. In schools, most of this type of equipment will be used until it breaks or becomes obsolete. Taking this into consideration, the motivating factor for replacement usually is the speed of the product. The speed of networking equipment is measured in megabits per second. Common speeds of networking switches include 10 megabit, 100 megabit, and 1,000 megabit (commonly called gigabit). The current "standard" (or what most schools have) is 100 megabit to the desktop and 1,000 megabit on the backbone (main lines of the network). For almost any application, this is sufficient speed within a campus.

A cost of $2,200 has been assigned to replacing 10% of the school's network equipment annually. In this same school, if each piece of equipment was under a service contract, the service contract would have an approximate annual cost of $4,400 (20% of the original cost of the equipment). Most schools find it more cost effective to contract only for the most vital network pieces and not to maintain service contracts on the smaller switches in the network. Instead, districts purchase additional smaller switches as replacements if one of these pieces of equipment fails. Calculating these figures, the networking portion of this subcategory carries an annual per pupil expenditure of $17 per pupil.

The wide area network (WAN) that provides the gateway to the Internet is one of the main administrative and instructional resources for educators. The data lines that make up this network must remain uncongested for teachers and administrators to maximize their efficiency. Most elementary campuses have at least a T-1 line to their site; middle and high schools commonly have two T-1 lines to their site. The T-1 line has a capacity of only 1.5 megabits. Many times T-1 lines reach capacity at peak times on campuses frustrating users. It is imperative that administrators, teachers, and students understand that there is a limited amount of bandwidth and that it should be used for educational purposes.

Districts usually use E-Rate funds to offset the monthly cost of their T-1 lines which, before discounts, can cost approximately $250 a month, or $3000 a year. District then have to pay an access charge to an Internet provider to provide Internet service. This cost varies by service provider, but can be estimated at around $500 per school per year. So the total school cost of linking a 400-pupil school to the Internet is $ 3,500 per year, or $ 9 per pupil.

Calculating the per-pupil price of network related expenses based on the costs of a T-1 line per site, 10% replacement annually of network equipment, and maintaining service contracts on all networking equipment, the network portion of this subcategory approximates $26 dollars per pupil annually.

Working Draft

3b. Printers. Computer prices listed in the *Computer Purchase* subcategory do not include the initial costs for workstation printers, but each computer must have some method available to print. Some schools purchase higher-end laser printers for each classroom instead of attaching ink-jet printers to each individual work station (laser printers are more cost effective). In addition to classrooms, each school should have at least one mid-range color laser printer for communications that are sent to community members and parents. Since most small districts do not have the in-house expertise to repair printers, we suggest that they contract with an outside vendor and common practice around the county is to so contract.

The cost of an inkjet printer is a nominal $100. A high quality laser printer suitable for heavy classroom use is $1,200. Assuming that a 400-student school contains 16 classrooms with one laser printer, and at least two laser printers in the office, each with a life cycle of four years, the initial cost per student for the printing equipment would approximate $18,000 or $45 a student. Assuming a printer life cycle of four years, the annual cost for this element is $11 per pupil. The real costs of printing depend on the frequency of use and the volume of printing done (cost of paper, ink, and toner). Teachers, students and administrators will print as much the budget can support. Assigning a cost of $7 per student annually to a 400-student campus provides the campus with an annual budget of $2,800 for supplies such as paper, ink, toners, etc. Thus, printing per pupil annually would be $18.

Depending on size, each elementary school should have a high-speed copier that can meet the demands of its teachers. Depending on size, secondary schools will need additional copiers. Most districts maintain contracts with vendors for the repair and maintenance of these machines. Many sign lease agreements and pay for service on a "per click" basis ("per click" meaning printing per page). Whether a machine is bought or leased can play a factor in the final costs. Life cycle of specific machines and the volume of copying required by leasing companies determine whether one or the other method is more cost effective for any particular school or district. When paper, toner, service contracts, leases and other costs are factored, the average cost per copy approximates $.025 per copy. Assigning a $6 per pupil per year cost for photo copies allows each student 240 copies a year or 26 copies a month (9 month school year). This may not seem like a large number but when combined with the output of the printers listed in the previous paragraph, the overall number is more than adequate.

4. Instructional Software and Hardware. This subcategory could be termed the "innovation fund." The $50 per pupil figure for this technology subcategory provides $20,000 per year for the 400-pupil school. Funds in this subcategory should be split evenly among components until sufficient hardware has been purchased (hardware $25, software $25).

Many districts only have the ability to provide the funds for the earlier three subcategories and have no funds left to purchase additional instructional hardware such as LCD projectors ($900 - $1,700), smart boards ($2,000 depending on features), document cameras ($1,500), digital cameras ($300), etc. This additional hardware allows teachers to bring multimedia resources alive. It also gives students the opportunity to bring their own experience into the classroom through digital pictures and images.

Working Draft

Assuming $10,000 per year ($25 per student annually for a 400 student school) for this component in the 400-student, 16-classroom school, school officials might install three LCD projectors a year (there are some installation costs), buy 10 digital cameras that could be checked out by teachers and students, and setup one smart board. With some slight variations, within four years each classroom could have an LCD projector and various other items of innovative equipment.

As these pieces of equipment are installed, there will be more opportunity to use multimedia instructional software typified in student courseware and assessment packages. Reading packages such as Accelerated Reader, writing assessments like My Access, mathematics courseware represented by River Deep, and multimedia resources such as Discovery.Com, each present digital curricular solutions. Each of these products is based on an annual subscription costing from $5 - $15 per student for each individual package.

Administrative solutions that help administrators analyze test scores include products like Edusoft. Costs of a student administration system might also be considered a part of this component. Costs of these systems vary greatly ($5-$15 annually).

If the costs of all these instructional packages were totaled, the amount would exceed the $25 per student annually assigned to this component, but not every school will use all packages. Schools and districts must analyze their needs and then rank order those packages that target the needs of their population. Additionally, after all classrooms have been better equipped, funds from the hardware component of this subcategory can be shifted to instructional software component.

No portion of the $250 per pupil is intended for staff. Staff to help train teachers in use of technology and to do minor computer fixing and software installation is included in 0.5 FTE of the instructional facilitators. Further, a technology network manager is included in our central staff design (see Section J2).

Sources of additional funding. There are two federal sources of funding for educational technology that augment the above proposals for state support. The first is Title II D of the No Child Left Behind Act (NCLB), also known as the Enhancing Education Through Technology grant (EETT). These funds are distributed to state departments of education based on a formula which includes the number of disadvantaged students. Many states have used these funds for innovative technology programs, the fourth category below. Though the level of funding for this federal program fluctuates over time, it should be viewed as a strategic additional resource that states can deploy for whatever specific new technology needs that might arise.

The second federal support for educational technology is the E-Rate program that helps schools connect to the Internet and build internal networks within their buildings. This program is administered by the Schools and Library Division (SLD) of the Federal Communications Commission (FCC). Districts apply directly to the federal government to participate. The assistance this program provides can be significant to a district. Since funding is substantially based on the percentage of disadvantaged students within a district, this program mainly helps districts with concentrations of students from lower income backgrounds, and offers limited

Working Draft

participation to other more economically advantaged districts. Nevertheless, this source of funding should b e viewed as a second strategic resource to augment the above core recommendations for funding for computer and related technologies.

Staff. We should note that these resources would be used effectively only if the professional development, funded above, provides training to teachers and administrators in how to embed technology into the instructional and management programs of each school. Moreover, as noted earlier in this report, a partial role for at least one of the instructional facilitators is to have the skills to install software programs on a school's network and its computers, to be the onsite expert who can fix modest network and computer problems, and who can help teachers and administrators use the technology equipment effectively. We have allocated 0.1 FTE staff for every 200 students for this particular role. Finally, we anticipate that central office staffing resources will include a position for a technology coordinator/director.

Recommendation: We recommend that each school receive $250 per pupil to keep local technology working and updated and for schools to purchase (or lease) computers, servers and software, including security, instructional and management software, in order to have an overall ratio of one computer to every two to three students. This level of funding would also allow for the technology needed for schools to access distance learning programs, and for students to access the new and evolving local web-based testing programs. Fortunately, Washington has developed a substantial technology infrastructure over the years, so most if not all schools are linked to the Internet and to district offices and/or a state network. This allocation would be sufficient for small schools as well, particularly today when schools begin with some current level of technology resources.

Many schools and districts today, however, have hired numerous staff to repair and maintain computers and might feel the need for additional staff resources for that purpose. However, many of these same schools have computers that are outdated and the high cost of fixing them is largely due to outmoded technology. In other states, educators have concluded that the $250/pupil figure would enable them to have newer equipment which would allow them to reduce their maintenance expenses.

Further, we also would recommend districts either incorporate maintenance costs in lease agreements or, if purchasing the equipment, buy 24-hour maintenance plans. For example, for a very modest amount, one can purchase a maintenance agreement from a number of computer manufacturers that guarantees computer repair on a next business day basis. In terms of educator concerns that it would be difficult for a manufacturer's contractors to serve remote communities, the maintenance agreement makes that the manufacturer's or contractor's problem and not the districts'. Indeed, these private sector companies often take a new computer with them, leave it, and take the broken computer to fix, which often turns out to be more cost effective than to send technicians all around to fix broken computers.

Working Draft

20. Instructional Materials

Current Washington policy. For non-employee-related costs (NERC), which can include textbooks and other instructional materials, Washington provides a dollar amount for every formula-generated certified staff, which was $9112 for the 2006 school year.

Evidence. The need for current, up-to-date instructional materials is paramount. Newer materials contain more accurate information and incorporate the most contemporary pedagogical approaches. To ensure that materials are current, twenty states have instituted adoption cycles in which they specify or recommend texts that are aligned to state learning standards (Ratvitch, 2004). Many states that adopt textbooks encourage districts to purchase recommended texts by requiring that funds specified for instructional materials be used only to purchase approved texts. Other states, like Washington, allow districts "local control" to purchase texts approved by the local school board.

Up-to-date instructional materials are expensive, but vital to the learning process. Researchers estimate that up to 90 percent of classroom activities are driven by textbooks and textbook content (Ravitch, 2004). Adoption cycles with state funding attached force districts to upgrade their texts instead of allowing these expenditures to be postponed indefinitely.

The type and cost of textbooks and other instructional materials differ across elementary, middle school, and high school levels. Textbooks are more complex and thus more expensive at the upper grades and less expensive at the elementary level. Elementary grades, on the other hand, use more workbooks, worksheets and other consumables than the upper grades. Both elementary and upper grades require extensive pedagogical aides such as math manipulatives and science supplies that help teachers to demonstrate or present concepts using different pedagogical approaches. As school budgets for instructional supplies have tightened in the past, consumables and pedagogical aides have typically been the first items to be cut as teachers have been forced to make due or to purchase materials out of their own pockets.

The price of textbooks ranges widely. In reviewing the price of adopted materials from the states of California, Texas, and Florida patterns emerge creating price bands (Figure 2 below). Although there are texts with prices that lie outside of these bands, most publishers seem to keep within or close to these constraints. The top end of the high school price ban is notable at $120 per book. Ten to fifteen years ago such prices for textbooks at the high school level were uncommon, but as more students move to take advanced placement courses, districts have been forced to purchase more college-level texts at college-level prices.

Working Draft

Figure 2
Costs of Textbooks and Instructional Supplies by School Level
(in annual dollars per pupil)

	Elementary School	Middle School	High School
Textbooks	$45 - $70 ($60)	$50 - $80 ($70)	$75 - $120 ($100)
Consumables and Pedagogical Aides	$60	$50	$50
Subtotal Textbooks and Consumables	$120	$120	$150

The subtotal figure for textbooks and consumables would not need to be adjusted for the size of school or school district because it is assumed that costs for adopted textbooks would be negotiated at the state level. Additionally, the total figure would also provide sufficient funds for adequate instructional materials and texts for most non-severe special education students. Modifications for severe special education cases would need to be funded from Special Education funds.

Adoption Cycle. The assumption of the purchase of one textbook per student annually allows for a six year adoption cycle. The six year adoption cycle in Washington fits nicely with the structure of a secondary pupil's schedule of six courses in a six period day. It also comes close to matching the content areas covered at the elementary level.

	Washington Potential Secondary Six Year Adoption Cycle					
Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Content Area	Science Health P.E.	Social Studies	Foreign Language	Fine Arts	English Language Arts	Mathematics

At the elementary level, there are fewer subject areas to be covered leaving the opportunity for a sixth year in the cycle to be used for purchasing not only additional supplementary texts but also consumables/pedagogical aides.

	Washington Elementary Six Year Adoption Cycle					
Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Content Area	Language Arts	Mathematics	Social Studies	Science/ Health	P.E., Visual and Performing Arts	Supplements, Consumables, Manipulative

Library Funds. The average national per pupil expenditure for library materials in the 1999-2000 school year was $15 (excluding library salaries). This average varied by region with the West spending $14 per pupil annually and the Eastern states spending $19. Reflecting the

Working Draft

national average, for example, schools in the state of Washington spent an average of $15 per pupil in that same year (excluding salaries). Over 2/3 ($11) of the $15 that Washington schools spent on libraries were used to purchase books and the remainder was spent on other instructional materials and/or services such as subscriptions to electronic databases (Michie & Holton, 2005).

As the world shifts to more digital resources, libraries are purchasing or using electronic databases such as online catalogs, the Internet, reference and bibliography databases, general article and news databases, college and career databases, academic subject databases, and electronic full-text books. In 2002, 25 percent of school libraries across the nation had no subscriptions, 44 percent had 1-3 subscriptions to electronic databases, 14 percent had 4-7 subscriptions, and 17 percent had subscriptions to 7 or more. Usually larger high schools subscribed to the most services (Scott, 2004).

Electronic database services vary in price and scope and are usually charged to school districts on an annual per pupil basis. Depending on content of these databases, costs can range from $1-5 per database per year per pupil.

Thus, to adequately meet the needs of the school libraries, it is recommended that the funding system provide elementary, middle, and high schools $20, $20, and $25 respectively on a per pupil annual basis for library text and electronic services. These figures outstrip the national average allowing Washington librarians to strengthen print collections. At the same time, it allows schools to provide, and experiment with, the electronic database resources on which more and more students rely (Tenopir, 2003).

Total per Pupil Apportionment for Instructional Materials. Taking the recommended apportionment for "library texts and electronic services" and adding it to the "textbook and consumables" figures, results in the totals listed in Figure 3 below.

Figure 3
Total Annual Costs Per pupil for Instructional Materials and Library Resources

	Elementary School	Middle School	High School
Library Texts and Electronic Services	$20	$20	$25
Textbook & Consumables Subtotal	$120	$120	$150
Total Instructional Materials	$140	$140	$175

Professional Development for Adoptions. It should be noted that these cost figures do not include the cost of the professional development necessary for teachers during the adoption process. On a six-year cycle, professional development for teachers at the secondary level only comes once every six years when their particular content area is reviewed. At the elementary level, professional development would be necessary every year since each teacher teaches each

Working Draft

subject area. Professional development in an adoption cycle usually requires one day of initial training and then one follow-up day later in the semester after the teachers have familiarized themselves more with the use of the new materials. The professional development resources that are included in the recommended Washington evidence-based funding model would be adequate to meet these needs.

The Adoption Process. The adoption process is time intensive and has the potential to be politically charged. States need to understand what potential timelines might exist for the adoption process by observing models in other states. Districts, depending on their size, usually have content area committees at the secondary level and grade level committees at the elementary level. Depending on the model used at the state level for adoption, these local district committees will have a driving role in the selection of textbooks if offered a list of recommended texts from the state department of education. Because these committees already exist at the district level, no additional funding at the district level needs to be stipulated for the selection process.

Recommendation. We recommend that the new Washington funding model include $140, $140 and $175 per pupil for instructional materials, books, supplies, including library resources, for elementary, middle and high schools, respectively.

21. Student Activities

Current Washington policy. There is no specific provision for such staff in Washington education or school finance policy. It is a set of services that districts and schools can buy with local and state equalization dollars in the general fund.

The evidence. Elementary, middle and high schools typically provide an array of after-school programs, from clubs, bands, and other activities to sports. Teachers supervising or coaching in these activities usually receive small stipends for these extra duties. Further, research shows, particularly at the secondary level, that students engaged in these activities tend to perform better academically than students not so engaged (Feldman & Matjasko, 2005), though too much extra curricular activity can be a detriment to academic learning (Committee on Increasing High School Students' Engagement and Motivation to Learn, 2004; Steinberg, 1997).

In the past, we have recommended amounts in the range of $60/pupil for middle school students and $120/pupil for high school students. But we have found that these figures are far below what districts and schools actually spend. An amount in the range of $200-250/pupil would more accurately reflect an appropriate level of student activities resources.

Recommendation. We recommend the state provide $200 per pupil for student activities.

At its May 23, 2006 meeting, the Advisory Committee suggested that these funds could also be used to buy equipment for students who have difficulty with such costs entailed in participating in extra-curricular activities.

Working Draft

4. Central Office Expenditures

This section covers two areas not covered above: central office administration, and operation and maintenance of buildings. The report does not address transportation, food services, or debt service.

22. Central Office

Current Washington Policy. Washington currently provides administrative staff at the rate of 4 certified Administrative Staff for every 1000 FTE, or one per every 250 student FTEs. This allocation is designed to cover both site and central office administrative staff. Our goal is to identify administrative staff by both position (principal, assistant principal, superintendent, assistant superintendent, business officer, etc.) and location (school and central office). This section addresses district level certified administrative staff.

Evidence: The district office has the responsibility to organize and manage all aspects of the district including the curriculum and instructional program, as well as to implement national, state, and local reforms, oversee budgets, and provide necessary materials, equipment, facilities, and repairs to the schools. Its ultimate purpose is to facilitate and support the educational program at schools so that teachers are able to teach and students are able to learn. The reform group, School Communities that Work (2002), succinctly states the purposes of the central office: equity and results. The group elaborates that equity—what others may prefer to call adequacy—means to provide varying resources based on individual student's needs so that all will demonstrate achievement results. In the Washington context, the prime goals of the central office are to provide leadership for the district and insure that the district office and its schools function as an integrated system focused on increased student achievement through improved instructional practice in the core content areas.

The Cross City Campaign for Urban School Reform (Burch & Spillane, 2004), sees a district office's primary responsibility as facilitating and encouraging an exchange of information and expertise among schools and among instructional leaders. Burch and Spillane (2004) view with special significance the mid-level district staff, who exist primarily in larger districts and whose job it is to translate "big ideas like 'improving literacy district-wide' or 'closing the achievement gap' into strategies, guidelines, and procedures that are handed down to schools" (p. 1).[13] This is consistent with the content leaders that are part of Washington's reading and mathematics programs. In providing these leadership and interpretive roles, district staff members can hinder or assist the efforts of classroom teachers and site administrators, and their success and assistance can mean increased achievement for children.

Some question whether or not central offices are necessary to the operation of a school district. Berg and Hall's (1997) study of central offices that had downsized and the effects of that restructured environment over a three-year period provides important evidence to support the relevance of a central office. The districts studied had downsized as a way to reduce costs due to budget constraints and in response to public criticism of bloated bureaucracies. What

[13] In some Washington districts, such mid-level managers do not exist due to the small size of the district. In such districts, this responsibility would fall to the central office administrators the district chooses to hire.

Working Draft

Berg and Hall found over the three years of the study was that initially districts seemed to take the central office reduced-staff changes in stride and even relished the idea of being more productive and efficient. Later, the euphoria employees felt often turned to burn-out as so much more individual effort and time was required to complete important tasks. Often, tasks that could no longer be completed at the district level were sent to principals, thus leaving them with fewer hours to be instructional leaders. The principals who were interviewed expressed feeling deserted by the central office. Some districts studied had hired back retirees temporarily or part-time as a cost-effective way to meet the demands on staff due to growing student populations or new state mandates regarding standards and assessment. The researchers reasoned that central offices are not irrelevant as some critics have insisted.

Berg and Hall (1997) conclude that central offices are necessary to complete several essential tasks, which otherwise would need to be accomplished by site personnel. One of their main findings is that the workload for these particular site personnel had become so exhausting as to be detrimental to the core purpose of teaching and learning. The researchers also find that without a fully functioning central office, districts tend to recreate one at each site, which not only diverted personnel from the core function of instruction but also reduced the efficiency they were seeking.

Relying on personal experience and consultant work, DuFour (2003) argued that central district offices are essential to the operation of a school district. She suggested that central offices can be effective role models of a learning community focusing on student improvement if they limit the number of district goals or initiatives to one or two and have their staff members all contribute toward that goal or goals. DuFour emphasized the importance of central offices as service oriented centers whose staff members collaborate and focus on results. Again these broader research conclusions are consistent with Washington's call for district leadership in each of the core content areas.

Flynn (1998) claimed the central office's primary role is to prepare site personnel to make decisions, largely around curriculum and instructional issues. He provides details from his own district that was restructured to provide the typical support and guidance roles to principals as well as monitoring and auditing functions. He stated that the central office must teach collegiality and cooperative relationship building so that students will benefit from the site-based decision-making model.

Indeed, as schools and districts implement versions of standards-based education reform around the country, a new appreciation for the roles of good central offices is emerging. Although the practices of many central offices fall far short of what is desired, there are virtually no proposals for eliminating central offices. Thus, the issue becomes one of design; what should the size and composition of central offices be?

The difficulty here is that little research exists to help determine what an appropriate staffing configuration might be. The problem is complicated by the frequent employment of special education administrators and federally funded administrators in district offices – many of whom are funded partially with district funds and partially with Federal and/or special education funds.

Working Draft

We are aware of two efforts to correct this deficiency in the research literature. In our work in Kentucky (Picus, Odden & Fermanich, 2003), we held a professional judgment panel session that attempted to estimate the appropriate staffing pattern for a prototype school district of 3,500 pupils. The discussion bogged down over how to treat administrators for categorical programs, and a satisfactory solution to the question of appropriate numbers of central office administrators was not reached. Instead, we relied on the average per pupil spending for central administration and applied that average to each district in the state.

Recently, however, under the direction of Lawrence O. Picus, an Ed.D. student at the Rossier School of Education at the University of Southern California completed a series of focus groups in California that considered the issue of staffing for a school district's central office (Swift, 2005). Using a prototype district of 3,500 students, the focus groups suggested the central office staffing pattern depicted in Figure 4.

The panelists identified four primary functions of a central office:

- District leadership
- Instructional leadership
- Business Operations
  - Budgeting and finance
  - Personnel
  - Maintenance and operations
- Technology

Using the model developed by Swift's focus groups (Swift, 2005) the central office of a 3,500 student district would include 6 administrative positions, 3 professional positions, and 12 clerical, technical or support positions. Both of the computer technical support positions can be eliminated because the proposed Washington evidence-based prototypical school models include 0.1 technical support position for every 100 students in the instructional facilitator allocation at the school levels. The one maintenance worker and two groundskeepers also can be eliminated because those positions will be included in the recommendations for operation and maintenance. Since food services is not being addressed and is assumed to operate on a self sustaining basis, and food services costs would include a central office food services director, we also can drop that position as well. That leaves us with 6 administrative positions, 2 professional positions and 7 clerical positions.

Working Draft

Figure 4

Composition of a Central District Office for a District with 3,500 Students: Results from Four Professional Focus Groups

Position Title
1 Superintendent (admin) 1 Assistant Superintendent (admin) 1 Executive Assistant (clerical) 1 Personnel Technician (clerical)
1 Director of Curriculum and Instruction (admin) 1 Director of Pupil Services/Special Ed (admin) 1 Nurse (professional) 1 Secretary—Special Ed (clerical) 1 Data Steward (clerical) 1 Clerk (clerical)
1 Business Manager (admin) 1 Payroll Clerk (clerical) 1 Accounts Payable Clerk(clerical
1 Director of Technology (admin) 1 Media Technician I (tech) 1 Media Technician III (tech)
1 Director of Maintenance/Operations (professional) 1 Maintenance Worker (support) 2 grounds keepers (support) 1 Director of Food Services (professional)

Working Draft

After querying several districts of around 3500 students in Wisconsin, we would suggest upgrading the position of personnel technician to a director of human resources in the business office and adding a secretary for that position. We also would eliminate the nurse position, assuming that kind of more specialized position could be provided in a larger district. Finally, we would provide the Director of Operations and Maintenance with a secretary. Thus, our recommended central office design is in Figure 5. This model would provide 8 administrative/professional and 9 secretarial/clerk positions for the central office for a district with 3500 students.

Figure 5
Proposed Central Office Staffing for a District with 3500 Students

	Superintendent Office	Business Office	Curriculum and Pupil Support	Technology	Operations and Maintenance
Administrative	1 Superintendent 1 Asst. Super. for curriculum and instruction	1 Business Manager 1 Human Resources Manager	1 Director special Ed 1 Director Pupil Services	1 Director of Technology	
Professional					1 Director of Maintenance/ Operations
Clerical	2 Secretaries	1 Payroll Clerk 1 Accounts Payable Clerk 1 Secretary	3 Secretaries		1 Secretary

Working Draft

For the average Washington district of 2000 students, this model would provide 4.6 senior administrative and 5.14 secretarial positions, and half that, or 2.3 senior administrative and 2.57 secretarial positions for the 1000 student district. Prorating up to the 7000 and 14,000 student district would provide 16 and 32 administrative/professional and 18 and 36 secretarial positions, respectively. It could be that central office staff resources could be less for larger districts given possible economies of large size, but we would like to discuss that issue with the K-12 Advisory Committee, and administrative leaders in large Washington school districts at the Professional Judgment Panels that will be held in late April.

In addition to these staff positions, the central office would need resources for supplies, materials, equipment, legal and insurance, and other miscellaneous items. We estimate at this point is that this would total $300 per pupil.

Recommendation. We tentatively recommend that the central office staffing be based on the above identified resources for the 3,500 student prototypical district, (prorated according to actual district size) to which we add $300 per pupil for miscellaneous expenses such as legal

expenses, insurance, materials, supplies board of education expenses and other central office functions. We will modify this preliminary recommendation on the basis of discussion and feedback with the K-12 Advisory Committee and the Professional Judgment panels.

23. Operations and Maintenance

Current Washington policy. Washington currently provides classified and clerical staff at the rate of 16.67 staff for every 1000 FTE, or one classified staff per every 60 student FTEs. This allocation is designed to cover both site and central office classified staff. Our goal is to identify classified staff by both position (secretary, custodian, maintenance or grounds worker, etc.) and location (school and central office). This section addresses school level custodial and district level maintenance and grounds keeping staff, resource typically expended under operations and maintenance.

The Evidence: Operations and maintenance can reasonably be treated as three functions, school level custodial functions, district level maintenance functions and district level groundskeepers. Each is discussed below.

Custodians: Today, most school districts across the United States rely on a relatively simple model for custodial staffing. The model can be summarized as:

[(Actual Students + Actual Inside Building Square Footage)/2 x (8) hours].

Cafeterias/multipurpose rooms, lockers and shower cleaning as well as food services related activities are generally considered extra responsibilities and not included in the formula. Custodial workers' duties are time-sensitive, are structured and varied. Zureich (1998) estimates the time devoted to various custodial duties:

- Daily duties (sweep and vacuum classroom floors; empty trash can and pencil sharpeners in each classroom; clean one sink with faucet; and, security of room), which take approximately 12 minutes per classroom.

- Weekly duties (dust reachable surfaces; dust chalk trays and clean doors; clean student desk tops; clean sink counters and spots on floors; and, dust chalk/white boards and trays), each of which adds 5 minutes a day per classroom.

- In addition to these services, non-cleaning services (approximately 145 minutes per day) provided by custodians include: opening school (checking for vandalism, safety and maintenance concerns), playground and field inspection, miscellaneous duties (teacher/site-manager requests, activity set-ups, repairing furniture and equipment, ordering and delivering supplies), and putting up the Flag and PE equipment.

A formula that takes into consideration these cleaning and non-cleaning duties has been developed and updated by Nelli (2006). The formula takes into account teachers, students, classrooms and Gross Square Feet (GSF) in the school. The formula is:

Working Draft

- 1 Custodian for every 13 teachers, plus
- 1 Custodian for every 325 students, plus
- 1 Custodian for every 13 classrooms, plus
- 1 Custodian for every 18,000 Gross Square Feet (GSF), and
- The total is divided by 4.

The formula provides a numeric equivalent of the number of custodians needed at prototypical schools. The advantage of using all four factors in estimating the number of custodians needed is it will accommodate growth or decline in enrollment and continue to provide the school with adequate coverage for custodial services over time.

To show how this formula translates into a per pupil cost for custodial services, we have assumed prototypical schools of 432 K-5 elementary students, 450 6-8 middle school students and 600 9-12 high school students. Assuming a roughly equal number of students per grade, and using the pupil teacher ratios of 15:1 for grades K-3 and 25:1 for grades 4-12, we use the Washington school facility standards to estimate the number of custodians and cost of custodial supplies at each prototypical school and then convert those figures into per pupil cost estimates. For this exercise, we use a prototypical district with two 432 student elementary schools and one middle and high school.

Figure 6 summarizes the custodial computations for this prototypical school district. Column 2 displays the enrollment of each school. Column 3 indicates the number of classrooms that enrollment generates at the pupil teacher ratios described above. Column 4 provides the number of teachers at each school relying on both the core and specialist teachers generated through the Evidence Based model. Using Washington Facility standards of 90 square feet per pupil for elementary schools, 117 square feet for middle school students and 130 square feet for high school students, column 5 displays the gross square footage of the prototypical schools in the district. The number of custodians in each school is displayed in Column 6. In addition, we recommend an additional half time custodian for the high school to accommodate the higher number of after school and evening activities that typically occur at high schools.

Working Draft

Figure 6
Prototypical District Custodial Computations

1	2	3	4	5	6
School Type	**Enrollment**	**Classrooms**	**Teachers**	**Gross Square Feet**	**Custodians**
Elementary	432	26	30	38,880	1.95
Elementary	432	26	30	38,880	1.95
Middle	450	18	22	52,650	1.84
High School	600	24	32	78,000	2.62

Using the figures in Figure 6, and rounding up to the nearest full FTE personnel count suggests that the prototypical school district developed here would require 9 custodians – 2 at

each elementary school, two at the middle school and three at the high school. We also assume that a tenth custodian would be needed to provide services to a central office building. Using the average national salary for custodians of $25,595, adjusted by the ratio of teacher salaries in Washington to the National average of 97.2 percent (NEA, 2005) amounts to an average custodian salary of $24,878.34. If we apply the classified benefit rate of 12.22 percent plus $6990 for health benefits, the total compensation for custodians would be $34,908. Ten custodians would generate a total personnel cost of $349,080 or $182 per pupil for the prototype district.

Maintenance Workers: Maintenance workers function at the district level, rather than at individual schools. Core tasks provided by maintenance workers include preventative maintenance, routine maintenance and emergency response activities. Individual maintenance worker accomplishment associated with core tasks are: (a) HVAC systems, HVAC equipment, and kitchen equipment; (b) Electrical systems, electrical equipment; (c) Plumbing systems, plumbing equipment; and, (d) Structural work, carpentry and general maintenance/repairs of buildings and equipment (Zureich, 1998).

Zureich (1998) recommends a formula for maintenance worker FTEs incorporated into the funding model for instructional facilities as follows:

[(# of Buildings in District) x 1.1 + (GSF/60,000 SqFt) x 1.2 + (ADM/1,000) x 1.3 + General Fund Revenue/5,000,000) x 1.2] / 4 = Total number of Maintenance Workers needed.

Since we have not yet estimated the total costs of an adequate funding system, we can only provide an example of how this formula would be applied to the prototypical district in this example. For the purpose of this estimate, we have assumed that per pupil revenues would amount to $7,500 per FTE student. Using the formula above generates the following estimates:

Factor	Result
Buildings in district (including central office)	5.0
GSF/60,000 x 1.2 (central office = 20,000 sq. ft.	2.7
ADM/1,000 x 1.3	2.5
General Fund Revenue / 5,000,000	2.9
Total Divided by 4 = number of Maint. Workers	3.275

Using the average national salary for maintenance personnel of $35,000, adjusted by the ratio of teacher salaries in Washington to the National average of 97.2 percent (NEA, 2005) amounts to an average maintenance salary of $34,020. With benefits at an additional 12.22 percent plus $6990 for health, the estimated salary and benefits of a maintenance worker would be $45,167, and the cost of 3.275 maintenance workers would be $147,922 over 1914 students, or $77 per pupil.

Maintenance and Custodial supplies are estimated at $0.55 per gross square foot or a total of $74,044 or $39 per FTE pupil.

Working Draft

Grounds Maintenance: The typical goals of a school grounds maintenance program are generally to provide safe, attractive, and economical grounds maintenance (Mutter & Nichols, 1987). This too is a district level function. A theoretic example of a work crew's responsibility at various school levels in acres and days per year is expressed in the following table which uses the prototypical schools described above:

Facility Type	Crew Members	Site Acres	Days	Factor
Elementary School	3 Groundskeepers	16	62 days = [31 acre site hours x 16 acres / 8 hrs per day]	1.0
Middle School	3 Groundskeepers	24	93 days = [31 acre site hours x 24 acres / 8 hrs per day]	1.5
High School	3 Groundskeepers	40	155 days = [31 acre site hours x 40 acres / 8 hrs per day]	2.5

These factors can be used for the prototypical Washington school district to estimate the total number of Grounds staff needed grounds keeping as follows:

School	Acres	Days	Factor	Total Days
Elementary	16	62	1	62.0
Elementary	16	62	1	62.0
Middle	24	93	1.5	139.5
High school	40	155	2.5	387.5
Total Days Required				651.0
Number of FTE at 220 days per FTE				3.0

Using the average national salary for grounds workers of $29,894, adjusted by the ratio of teacher salaries in Washington to the National average of 97.2 percent (NEA, 2005) amounts to an average grounds worker salary of $24,878. When benefits are included at 12.22 percent plus $6990 for health, this represents an average cost of compensation of $34,908 or $104,724 for three groundskeepers in the prototypical district. This amounts to $55 per pupil.

The total so far is the following:

- Custodians $ 182 per pupil
- Maintenance 77

Working Draft

- Groundskeepers 55
- M & O supplies 39
- Partial total $ 353 per pupil.

This compares to a total of $771 per pupil for operations and maintenance in the 2004-2005 school year. This higher figure, however, also includes $209 per pupil for utilities, $47 per pupil for insurance, and $13 per pupil for security. The insurance figure should be added to our above partial total for a new total, excluding utilities and security, of $400 per pupil. Since utilities costs vary by region and quality of building, we would suggest that the model include the actual utilities costs for each district. This would bring our statewide total to $609 per pupil, which is still below the $771 per pupil actually spent.

Working Draft

5. Recommendations for Washington State

Our initial draft recommendations for resources in Washington's prototypical elementary, middle and high schools are included in Table 1. Table 2 summarizes the school-level personnel resources generated for schools at many different sizes, including very small schools.

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

School Element	Elementary Schools	Middle Schools	High Schools
School Characteristics			
School configuration	K-5	6-8	9-12
Prototypic school size	432	450	600
Class size	K-3: 15 4-5: 25	6-8: 25	9-12: 25
Full-day kindergarten	Yes	NA	NA
Number of teacher work days	190 state funded teacher work days; an increase of 8 days	190 state funded teacher work days; an increase of 8 days	190 state funded teacher work days; an increase of 8 days
% Disabled	12.3 %	12.3 %	12.3 %
% Poverty (free & reduced lunch)	36 %	36 %	36 %
% ELL	7.1 %	7.1 %	7.1 %
% Minority	29 %	29 %	29 %
Personnel Resources			
1. Core teachers	24	18	24
2. Specialist teachers	20% more: 4.8	20% more: 3.6	33% more: 8.0
3. Instructional Facilitators/Mentors	2.2	2.25	3.0
4. Tutors for struggling students	one for every 100 poverty students: 1.55	one for every 100 poverty students: 1.62	one for every 100 poverty students: 2.16
5. Teachers for ELL students	An additional 1.00 teachers for every 100 ELL students who 0.3	An additional 1.00 teachers for every 100 ELL students 0.31	An additional 1.00 teachers for every 100 ELL students 0.42
6. Extended Day	1.3	1.35	1.8
7. Summer School	1.3	1.35	1.8

Working Draft

Table 1 (Continued)
Recommendations for Adequate Resources for
Prototypical Washington Elementary, Middle and High Schools

School Element	Elementary Schools	**Middle Schools**	**High Schools**
School Characteristics			
8. Alternative Schools	NA	NA	1 AP plus 1 teacher for every 8 ALE students
9. Students with disabilities	93 % of Base funding capped at 12.7 % of students	93 % of Base funding capped at 12.7 % of students	93 % of Base funding capped at 12.7 % of students
9. Very high cost disabled students	Enhance and streamline Safety Net	Enhance and streamline Safety Net	Enhance and streamline Safety Net
10. Teachers for gifted students	$25/student	$25/student	$25/student
11. Career/Technical Education	NA	NA	To be determined
12. Substitutes	10 days per teacher	10 days per teacher	10 days per teacher
13. Pupil support staff	1 for every 100 poverty students: 1.55	1 for every 100 poverty students plus 1.0 guidance/250 students 3.42 total	1 for every 100 poverty students plus 1.0 guidance/250 students 4.56 total
14. Non-Instructional Aides	2.0	2.0	3.0
15. Librarians/media specialists	1.0	1.0	1.0 librarian 1.0 Library technician
16. Principal	1	1	1
17. School Site Secretary	2.0 Secretaries	2.0 Secretaries	3.0 Secretaries

Working Draft

Table 1 (Continued)
Recommendations for Adequate Resources for
Prototypical Washington Elementary, Middle and High Schools

School Element	Elementary Schools	**Middle Schools**	**High Schools**
Dollar per Pupil Resources			
18. Professional development	Included above: Instructional facilitators Planning & prep time 10 summer days Additional: $100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time 10 summer days Additional: $100/pupil for other PD expenses – trainers, conferences, travel, etc.	Included above: Instructional facilitators Planning & prep time 10 summer days Additional: $100/pupil for other PD expenses – trainers, conferences, travel, etc.
19. Technology	$250/pupil	$250/pupil	$250/pupil
20. Instructional materials, equipment, including textbooks	$140/pupil	$140/pupil	$175/pupil
21. Student Activities	$200/pupil	$200/pupil	$200/pupil
Central Office Expenditures			
22. Central Administration			
23. Operations and Maintenance	$609 per pupil	$609 per pupil	$609 per pupil

Working Draft

Table 2
Summary of Personnel By Prototype of Various Sizes

Personnel Resource Category	Elementary			Middle			High School		
School Enrollment	**108**	**216**	**432**	**150**	**300**	**450**	**150**	**300**	**600**
Core Teachers	6.0	12.0	24.0	6. 0	12.0	18.0	6.0	12.0	24.0
Specialist Teachers	1.2	2.4	4.8	1.2	2.4	3.6	2.0	4.0	8.0
Instructional Facilitators	0.55	1.1	2.2	0.75	1.5	2.25	0.75	1.5	3.0
Teacher Tutors (state avg.)	0.39	0.78	1.55	0.54	1.08	1.62	0.5 4	1.08	2.16
ELL Teachers	0.09	0.20	0.4	0.13	0.27	0.41	0.13	0.28	0.56
Extended Day Program	0.33	0.65	1.3	0.45	0.90	1.35	0.45	0.9	1.8
Summer School	0.33	0.65	1.3	0.45	0.90	1.125	0.45	0.9	1.8
Special Education	93% of Base Funding plus an enhancement of the Safety Net								
Substitutes	10 days for each ADM generated teacher positions at $___/day plus ___%								
Aides	0.5	1.00	2.0	0.67	1.33	2.0	0.75	1.5	3.0
Pupil Support	0.39	0.78	1.55	1.14	2.28	3.42	1.14	2.28	4.56
Librarian media technician	0.25 0.0	0.5 0	1.0 0	0.3 0	0.67 0	1.0 0	0.25 0.25	0.5 0.5	1.0 1.0
School Administration	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Secretary/	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.5	3.0

Working Draft

Strategies for Small School and Small District Adjustments

Washington has many elementary schools below the 108 pupil figure and many middle and high schools below the 150 pupil figures in Table 2. In addition, Washington has schools that serve K-12, K-8 and 6/7-12 students, as well as a multitude of other school configurations that require special funding considerations. The current system of funding provides roughly $43 million in small school and district adjustments, taking into consideration the increased costs of operating some aspects of these organizations. The proposed model addresses the issues surrounding small schools, specifically addressing the need for increased funds for "necessarily small schools,"[14] or those schools that have no choice but to serve few student FTEs given geographic sparcity, as well the issues pertaining to maintaining "necessarily small districts."

For necessarily small schools with student FTEs from 1 to 75, the adequacy model provides resources at the rate of 1 FTE assistant principal position plus an additional 1 FTE teacher position for every 7 students, with a minimum of 2 FTE per school. This formula provides 1 assistant principal FTE and 1 teacher FTE for a 1 to 7 student school, 3 FTE positions for the 14 student school, 4 FTE positions for the 21 student school, etc., and prorated FTE for student counts in between these figures. This mechanism of resourcing is not designed to imply how to staff schools, but rather to trigger adequate total resources for schools of this size. Resources could be allocated in a variety of ways to staff these schools, (e.g. teachers, aides, traveling specialists and principals, and combined positions for secretarial, custodial and other classified responsibilities).

For necessarily small elementary schools with 75 to 108 FTE students and for middle and high schools with 75 to 150 FTE students, the model pro-rates down all staff positions from the 108 FTE school and 150 FTE, respectively, except for teachers. The model resources a minimum of 7 teachers (5 core and 2 specialist teachers) for the 75 to 150 student FTE middle and high school.

For K-12, K-8 and 6/7-12 prototypes and other prototypes that cross the elementary, middle, and high school designations, the model:

a. Resources any necessarily small school, whether elementary, middle or high school, or whether K-5, K-6, K-7, K-8, K-12, or 9-12, or 8-12, etc. with 75 or fewer students using the formula of 1 FTE assistant principal position plus 1 FTE teacher position for every 7 FTE students.

b. Triggers, in all cases of a school with more than 75 FTE students, principal and secretary resources at the highest level (elementary, middle or high school) of student population. If any student within the school exist in grades 9-12, these two positions are resourced at high school levels for the entire student FTEs in the school. If no 9-12 grade students exist, but 6-8 grade students exist, the model triggers middle school level resources for principals and secretaries for the entire student population of the school.

[14] The Washington Department of Education determines which schools are deemed "necessarily small."

Working Draft

c. For non-principals and secretarial staff positions, the model resources schools configured across elementary, middle, and/or high school grades with elementary formulas for grades K-5, middle school formulas for grades 6-8, and high school formulas for grades 9-12.

d. Schools with an FTE greater than 75 and configured as K-5 and K-6 are resourced as elementary schools; schools with 5-8 and 6-9 grade configurations are resourced as middle schools; and schools with 8-12 grade configurations are resourced as high schools.

For necessarily small districts,[15] the model, sets a minimum of resources for one superintendent and one secretary. This mechanism of resourcing is not designed to imply how to staff district offices, but rather to trigger adequate central office resources for small districts. Resources could be allocated in a variety of ways to staff these offices (e.g. part-time superintendents, consultants, secretaries).

6. Additional Issues

In costing out the proposed models, we initially use the actual average teacher, administrator and support staff salaries in 2004-2005 to determine the total cost of the proposals. More precisely, we will use the salary grids and education and experience factors that are used in the current formula. However, we also have conducted a labor market analysis of teacher salaries, as well as developed a comparative wage index to adjust salaries across regions in the state, and we use numbers from these analyses to further cost out the proposals.

We also proposed a new model for a skills and knowledge based teacher salary structure, with a performance evaluation/assessment system that would nicely complement and strengthen Washington's current initiatives in licensing teachers. At the March 23 meeting of the Advisory Committee, we described how such a knowledge and skills-based structure could look and operate (see also, Odden & Kelley, 2002; Odden & Wallace, forthcoming; Odden & Wallace, 2006).

Working Draft

[15] Necessarily small districts are designated by the Washington Department of Education. Currently, this designation is given to any district with at least one necessarily small school.

REFERENCES

Achilles, C. (1999). *Let's put kids first, finally: Getting class size right*. Thousand Oaks: Corwin Press.

Alexander, K., Augenblick, J., Driscoll, W., Guthrie, J., & Levin, R. (1995). *Proposals for the elimination of wealth-based disparities in public education*. Columbus, OH: Department of Public Instruction.

Alexander, K.L., & Entwisle, D.R. (1996). Schools and children at risk. In A. Booth, & J.F. Dunn (Eds.). *Family-school links: How do they affect educational outcomes?* (pp.67-89). Mahwah, NJ: Lawrence Erlbaum Associates.

American College Testing Service and Education Trust. (2004). *On course for success; A close look at selected high school courses that prepare all students for college.* ACT and Education Trust. Downloaded from www.act.org or www.edtrust.org

American Educational Research Association. (2003). Class size: Counting students can count. Res*earch Points: Essential Information for Education Policy*. 1(2).

Andrews, M., Duncombe, W., & Yinger, J. (2002). Revisiting economies of size in American education: Are we any closer to a consensus. *Economics of Education Review,* 21(), 245-262.

Archambault, F.X., Jr., Westberg, K.L., Brown, S., Hallmark, B.W., Zhang, W., & Emmons, C. (1993). Regular classroom practices with gifted students: Findings from the Classroom Practices Survey. *Journal for the Education of the Gifted*, 16, 103-119.

Archer, J. (2000). The link to higher scores. In R. Pea (ed.) *The Jossey-Bass reader on technology and learning* (pp. 112-123). San Francisco: Jossey-Bass.

Ascher, C. (1988). Summer school, extended school year, and year-round schooling for disadvantaged students. *ERIC Clearinghouse on Urban Education Digest, 42,* 1-2.

Austin, G.R., Roger, B.G., & Walbesser, H.H. (1972). The effectiveness of summer compensatory education: A review of the research. *Review of Educational Research, 42*, 171-181.

Augenblick, J. (1997). *Recommendations for a base figure and pupil-weighted adjustments to the base figure for use in a new school finance system in Ohio.* Columbus, OH: Ohio Department of Education.

Augenblick, J. (2001). *Calculation of the cost of an adequate education in Maryland in 1999-2000 using two different analytic approaches.* Denver, CO: Augenblick and Meyers.

Working Draft

Augenblick, J., Myers, J., Silverstein, J. & Barkis, A. (2002). *Calculation of the cost of a suitable education in Kansas in 2000-2001 using two different analytic approaches*. Report prepared for the Kansas Legislative Coordinating Council.

Baker, D., & Witt, P. (1996). Evaluation of the impact of two after-school recreation programs. *Journal of Park and Recreation Administration, 14*(3), 23-44.

Baker, E.L., Gearhart, M., & Herman, J.L. (1994). Evaluating the apple classrooms of tomorrow. In E.L. Baker, and J.F. O'Neil, Jr. (Eds.). *Technology assessment in education and training.* Hillsdale, NJ: Lawrence Erlbaum.

Bangert-Drowns, R.L. (1993). The word processor as an instructional tool: A meta-analysis of word processing in writing instruction. *Review of Educational Research*, 63(1), 69-93.

Baum, S.M., Owen, S.V., & Oreck, B.A. (1996). Talent beyond words: Identification of potential talent in dance and music in elementary students. *Gifted Child Quarterly*, 40, 93-101.

Becker, H. J. (2000). Pedagogical motivations for student computer use that lead to student engagement. Retrieved on May 5, 2005 from http://www.crito.uci.edu/TLC/FINDINGS/spec_rpt_pedegogical/.

Berg, J., & Hall, G. (1997). *Downsizing of central office: Does anyone care?* Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL, March, 1997).

Betts, J.R. & Shkolnik, J.L. (1999). The behavioral effects of variations in class size: The case of math teachers. *Educational Evaluation and Policy Analysis, 21,* 193–215.

Birman, B. F., Desimone, L., Porter, A.C., & Garet, M.S.. (2000). Designing professional development that works. *Educational Leadership, 57*(8), 28-33.

Bleske-Rechek, A., Lubinski, D., & Benbow, C.P. (in press). Meeting the educational needs of special populations: Advanced Placement's role in developing exceptional human capital. *Psychological Science*.

Borland, J.H., & Wright, L. (1994). Identifying young potentially gifted, economically disadvantaged students. *Gifted Child Quarterly*, 38, 164-171.

Borman, G.D. (2001). Summers are for learning. *Principal, 80*(3), 26-29.

Borman, G.D.& Boulay, M. Eds. (2004). *Summer learning: Research, policies and programs*. Mahwah, NJ: Lawrence Erlbaum Associates.

Borman, G.D. & Hewes, G. (2003). Long-term effects and cost effectiveness of Success for All. *Educational Evaluation and Policy Analysis*, 24(2), 243-266.

Working Draft

Borman, Geoffrey D., Gina Hewes, Laura Overman & Shelly Brown. (2003). Comprehensive school reform and achievement: A meta-analysis. *Review of Educational Research*, 73(2), 125-230.

Borman, G., Rachuba, L., Hewes, G., Boulay, M., & Kaplan, J (2001). Can a summer intervention program using trained volunteer teachers narrow the achievement gap? First-year results from a multi-year study. *ERS Spectrum,19*(2), 19-30.

Bossert, S., Dwyer, D., Rowan, B., & Lee, G. (1982). The Instructional Management Role of the Principal. *Educational Administration Quarterly, 18*, 34-64.

Brabeck, M.M., Walsh, M.E., & Latta, R. (2003). *Meeting at the hyphen: Schools-universities-communities-professions in collaboration for student achievement and well being*. *The One-hundred and second yearbook of the National Society for the Study of Education, Part II*. Chicago: National Society for the Study of Education.

Bransford, J., Brown, A., & Cocking, R. (1999). *How people learn*. Washington, DC: National Academy Press.

Bryk, A., Lee, V., & Holland, P. (1993). *Catholic schools and the common good*. Cambridge, MA: Harvard University Press.

Burch, P., & Spillane, J. (2004). *Leading from the middle: Mid-level district staff and instructional improvement*. Chicago: Cross City Campaign for Urban School Reform.

Capizzano, J., Adelman, S., & Stagner, M. (2002). *What Happens When the School Year is Over? The Use and Costs of Child Care for School-Age Children During the Summer Months*. (Assessing the New Federalism, Occasional Paper, No. 58). Washington, D.C.: Urban Institute.

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

Chambers, Jay G., Parrish, Thomas B., & Jennifer J. Harr. (2002). What Are We Spending on Special Education Services in the United States, 1999–2000? (Report 02-01.) Palo Alto: American Institutes for Research, Center for Special Education Finance.

Chase, C. I., Mueller, D. J., & Walden, J. D. (1986). *PRIME TIME: Its impact on instruction and achievement*. Indianapolis: Indiana Department of Education.

Clune, W. & P. White. (1992). Education Reform in the Trenches: Increased Academic Course Taking in High Schools with Lower Achieving Students in States with Higher Graduation Requirements. *Educational Evaluation & Policy Analysis,* 14(1), 2-20.

Working Draft

Cochrane-Smith, M. (1991). Word processing and writing in elementary classrooms: A critical review of related literature. Review of Educational Research, 61(1), 107-155.

Coeyman, M. (November 24, 1998). Small-town schools: Changing times and budgets put the squeeze on. *Christian Science Monitor*, 90(252), 15.

Cohen, D.K., & Hill, H.C. (2001). *Learning Policy: When State Education Reform Works*. New Haven, CT: Yale University Press.

Cohen, P., Kulik, J., & Kulik, C. (1982). Educational Outcomes of Tutoring: A Meta-analysis of Findings. American Educational Research Journal. 19(2), 237-248.

Cohen, D. K., Raudenbush, S. W., & Ball, D. L. (2002). Resources, Instruction, and Research. In R. Boruch & F. Mosteller (Eds.), *Evidence Matters: Randomized Trials in Education Research* (pp. 80-119). Washington, D.C.: The Brookings Institution.

Committee on Increasing High School Students' Engagement and Motivation to Learn. (2004). Engaging schools: Fostering high school students' motivation to learn. Washington, DC: National Academies Press.

Consortium for School Networking [COSN] (2001). *A School administrator's guide to planning for the total cost of new technology*. Retrieved May 8, 2005 from http://classroomtco.cosn.org/tco2class.pdf.

Consortium for School Networking [COSN] (2004). Taking TCO to the classroom [website]. Retrieved May 5, 2005 from http://classroomtco.cosn.org/gartner_intro.html

Cooper, H, Charlton, K., Valentine, J.C., & Muhlenbruck, L. (2000). Making the most of summer school: A meta-analytic and narrative review. *Monographs of the Society for Research in Child Development, 65* (1, Serial No. 260).

Cooper, H., Nye, B., Charlton, K., Lindsay, J., & Greathouse, S. (1996). The effects of summer vacation on achievement test scores: A narrative and meta-analytic review. *Review of Educational Research, 66,* 227-268.

Corcoran, T., S. McVay, & K. Riordan. (2003). *Getting it right: The MISAE approach to professional development*. Philadelphia, PA: University of Pennsylvania, Graduate School of Education, Consortium for Policy Research in Education.

Cosden, M., Morrison, G., Albanese, A. L., & Macias, S. (2001). When homework is no home work: After school programs for homework assistance. *Journal of Educational Psychology, 36*, 211–221.

Cunningham, P. & Allington, R. (1994). *Classrooms that work: They can all read and write*. New York: HarperCollins.

Working Draft

Dede, C. (2000a). Implications of emerging information technologies for states' education policies. In Council of Chief State School Officers, *2000 State educational technology conference papers*.

Dede, C. (2000b). Rethinking how to invest in technology (pp. 181-194). In Jossey-Bass Inc. (ed.) *The Jossey-Bass Reader on technology and learning.* San Francisco: Jossey-Bass Inc.

Delcourt, M.A.B., Loyd, B.H., Cornell, D.G., & Golderberg, M.C. (1994). *Evaluation of the effects of programming arrangements on student learning outcomes* (RM94108). Storrs, CT: The National Research Center on the Gifted and Talented, University of Connecticut.

Denton, K., West, J., & Walston, J. (2003). *Reading—Young children's achievement and classroom experiences: Findings from the Condition of Education 2003*. Washington, DC: National Center for Education Statistics.

Desimone, L.M., Porter, A.C., Garet, M.S., Yoon, K.S., & Birman, B.F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. *Educational Evaluation and Policy Analysis 24*(2), 81-112.

Desimone, L., Porter, A.C., Birman, B.F., Garet, M.S., & Yoon, K. S. (2002). How do district management and implementation strategies relate to the quality of professional development that districts provide to teachers? *Teachers College Record 104*(7), 1265-1312.

Dishion, T. J., McCord, J., & Poulin, F. (1999). When interventions harm: Peer groups and problem behavior. *American Psychologist, 54*(9), 755-764.

Dobbs, Michael. (2003). Big schools reborn in small world. *Washington Post.* November 28, 2003.

Donovan, Suzanne & John Bransford. (2005a). *How students learn – history in the classroom*. Washington, DC: National Research Council.

Donovan, Suzanne & John Bransford. (2005b). *How students learn – mathematics in the classroom*. Washington, DC: National Research Council.

Donovan, Suzanne & John Bransford. (2005c). *How students learn – science in the classroom*. Washington, DC: National Research Council.

DuFour, R.B. (2003). Central office support for learning communities. *School Administrator, June*. Retrieved March 24, 2005 at www.aasa.org/publications/sa/2003_05/DuFour_Burnette.htm.

Working Draft

Dynarski, M., Moore, M., Mullens, J., Gleason, P., James-Burdumy, S., Rosenberg, L., et al. (2003). *When schools stay open late: The national evaluation of the 21st Century Community Learning Centers program.* Princeton, NJ: Mathematica Policy Research.

Earle, R. S. (2002) The integration of instructional technology into public education: Promises and challenges. *Educational Technology*, 42(1), 5-11.

Education Trust. (2003). *Zap the gap: Gap closing strategies in high-performing classrooms, schools, districts and colleges*. Washington, DC: Author.

Elbaum, B., Vaughn, S., Hughes, M.T., & Moody, S.W. (1999). Grouping practices and reading outcomes for students with disabilities. *Exceptional Children*, 65: 399-415.

Elmore, R.F. (2002). *Bridging the gap between standards and achievement: The imperative for professional development in education*. Washington, DC: Albert Shanker Institute.

Elmore, R.F., & Burney, D. (1999). Investing in teacher learning: Staff development and instructional improvement. In L. Darling-Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice*. San Francisco: Jossey-Bass.

Evertson, C.M. & Randolph, C.H. (1989). Teaching practices and class size: A new look at an old issue. *Peabody Journal of Education, 67,* 85–105.

Farkas, George. (1998). Reading one-to-one: An intensive program serving a great many students while still achieving. In Jonathan Crane (Ed.), Social programs that work. New York: Russell Sage Foundation.

Fashola, O. S. (1998). *Review of extended-day and after-school programs and their effectiveness* [Report No. 24]. Washington, DC: Center for Research on the Education of Students Placed at Risk (CRESPAR), Howard University.

Feldman, A.F. & J.L. Matjasko. (2005). The role of school-based extracurricular activities in adolescent development; A comprehensive review and future directions. *Review of Educational Research*, 75(2), 159-210.

Finn, J. (2002). Small classes in America: Research, practice, and politics. *Phi Delta Kappan*, *83*(7), 551-560.

Finn, J.D. & Achilles, C.M. (1999). Tennessee's class size study: Findings, implications, misconceptions. *Educational Evaluation and Policy Analysis, 21,* 97-109.

Finn, J. D., S.B. Gerger, C. M. Achilles & J.B. Zaharias. (2001). The enduring effects of small classes. *Teachers College Record*, 103(2), 145-183.

Finn, J.D., Pannozzo, G. M., & Achilles, C.M. (2003). The "Why's" of Class Size: Student Behavior in Small Classes. *Review of Educational Research*, 73(3), 321-368.

Working Draft

Flynn, P. (1998). Ready, set, decide? *School Administrator*. Retrieved March 24, 2005 from www.aasa.org/publications/sa/1998_03/flynn.htm.

Fox, W. F. (1981). Reviewing economies of size in education. *Journal of Education Finance*, *6*(3), 273-296.

Friedman, Thomas. (2005). The world is flat. New York: Farrar, Straus & Giroux.

Fullan, M. (2002). *The new meaning of educational change*. New York: Teachers College Press.

Fusaro, J. A. (1997). The effect of full-day kindergarten on student achievement: A meta-analysis, *Child Study Journal, 27*(4), 269-277.

Gallagher, J. (1996). The strange case of acceleration. In C. Benbow & D. Lubinski (Eds.), *Intellectual talent* (pp. 83-92). Baltimore: Johns Hopkins Press.

Gallagher, J. (2002). *Society's role in educating gifted students: The role of public policy* (RM02162). Storrs, CT: The National Research Center on the Gifted and Talented, University of Connecticut.

Gallagher, J., & Coleman, M.R. (1992). *State policies on the identification of gifted students from special populations: Three states in profile*.

Gallagher, S., & Stepien, W. (1996). Content acquisition in problem-based learning: Depth versus breadth in American studies. *Journal for the Education of the Gifted*, 19, 257-275.

Gallagher, S., Stepien, W., & Rosenthal, H. (1992). The effects of problem-based learning on problem solving. *Gifted Child Quarterly*, 36, 195-200.

Gandara, P., Rumberger, R., Maxwell-Jolly, J., Callahan, R. (2003). English learners in California schools: Unequal resources, unequal outcomes. *Education Policy Analysis Archives.* 11(3).

Garet, M.S., Birman, B., Porter, A., Desimone, L., & Herman, R. (1999). *Designing effective professional development: Lessons from the Eisenhower Program*. Washington, DC: United States Department of Education.

Garet, M.S., Porter, A., Desimone, L., Birman, B., & Yoon, K. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal, 38*(4), 915-945.

Gartner Group (2003). *Taking TCO to the classroom* [website]. Retrieved May 5, 2005 from http://classroomtco.cosn.org/gartner_intro.html

Working Draft

Gartner Group (2004). *Taking TCO to the classroom* [website]. Retrieved May 5, 2005 from http://classroomtco.cosn.org/gartner_intro.html

Gerber, S., Finn, J., Achilles, C., & Boyd-Zaharias, J. (2001). Teacher aides and students' academic achievement. *Educational Evaluation and Policy Analysis, 23*(2), 123-143.

Glass, G.V., & M. L. Smith. (1979). Meta-analysis of research on class size and achievement. *Educational Evaluation and Policy Analysis, 1*(1), 2-16.

Glister, P. (2000). Digital literacy (pp. 215-225). In Jossey-Bass Inc. (ed.) *The Jossey-Bass Reader on technology and learning.* San Francisco: Jossey-Bass Inc.

Greenwald, Rob, Hedges, Larry V., & Laine, Richard D. (1996a). The effect of school resources on student achievement. Review of Educational Research 66(3), 361-396.

Greenwald, Rob, Hedges, Larry V., & Laine, Richard D. (1996b). Interpreting research on school resources and student achievement: A rejoinder to Hanushek. *Review of Educational Research 66*(3), 411-416.

Grissmer, D. (1999). Class size: Issues and new findings. *Educational Evaluation and Policy Analysis. 21*(2). [Entire Issue].

Gullo, D. (2000). The long-term effects of full-school-day kindergarten on student achievement: A meta-analysis. *Early Child Development and Care, 160*(1), 17-24.

Guthrie, James W. (1979). Organizational scale and school success. *Educational Evaluation and Policy Analysis*, *1*(1), 17-27.

Gutierrez, Roberto & Robert Slavin. (1992). Achievement effects of the nongraded elementary school: A best evidence synthesis. *Review of Educational Research*, 62(4), 333-376.

Hahn, A., Leavitt, T., & Aaron, P. (1994, June). *Evaluation of the Quantum Opportunities Program: Did the program work?* Waltham, MA: Brandeis University.

Haller, E., Monk, D.H. Spotted Bear, A., Griffith, J., & Moss, P. (1990). School size and program comprehensiveness: Evidence from *High School and Beyond. Educational Evaluation and Policy Analysis, 12*(2), 109-120.

Hallinger, P., & Heck, R. H. (1996). Reassessing the principal's role in school effectiveness: A review of empirical research, 1980-1995. *Educational Administration Quarterly*, 32(1), 5-45.

Hallinger, P., & Heck, R. H. (1998). Exploring the principal's contribution to school effectiveness: 1980-1995. *School Effectiveness and School Improvement*, 9(2), 157-191.

Working Draft

Hallinger, P. & Heck, R.H. (2002). What do you call people with visions? The role of vision, mission and goals in school leadership and improvement. In K. Leithwood and P. Hallinger and Colleagues (Eds.), *The Handbook of Educational Leadership and Administration (2nd Edition).* Dordrecht: Kluwer.

Hallinger, P. & Heck, R.H. (2003). Understanding the principal's contribution to school improvement. In M. Wallace and L. Poulson, Editors. *Learning to read critically in educational leadership and management.* London: Sage.

Halverson, R. (2003). "Systems of practice: How leaders use artifacts to create professional community in schools." *Educational Policy and Analysis Archives*. v11, n37. Accessible on-line at http://epaa.asu.edu/epaa/v11n37/

Hamilton, S. F. (1983). The social side of schooling: Ecological studies of classrooms and schools. *The Elementary School Journal, 83*(4), 313-334.

Hansen, J., & Feldhusen, J.F. (1994). Comparison of trained and untrained teachers. *Gifted Child Quarterly*, 38(3), 115-121.

Hanushek, Eric A. (1981). Throwing money at schools. *Journal of Policy Analysis and Mangement,* 1(1), 19-41.

Hanushek, E. (1986). The Economics of schooling: Production and efficiency in public schools. *Journal of Economic Literature*, 24(3), 1141-1177.

Hanushek, Eric. (1989). The impact of differential Expenditures on Student Performance. *Educational Researcher*, 18(4), 45-52.

Hanushek, Eric A. (1994). Money might matter somewhere: A response to Hedges, Laine, and Greenwald. *Educational Researcher*, 23(3), 5-8.

Hanushek, Eric A. (1997). Assessing the effects of school resources on student performance: An update. *Educational Evaluation and Policy Analysis*, 19(2), 141-164.

Hanushek, E. (2002). Evidence, politics and the class size debate. In L. Mishel & R. Rothstein (Eds.), *The class size debate (pp. 37-65)*. Washington, DC: Economic Policy Institute.

Heck, R. H., Larsen, T. J., & Marcoulides, G. A. (1990). Instructional leadership and school achievement: Validation of a causal model. *Educational Administration Quarterly*, *26*(2), 94-125.

Hedges, Larry, Laine, Richard D., & Greenwald, Rob. (1994a). Does money matter? A meta-analysis of studies of the effects of differential school inputs on student outcomes. *Educational Researcher*, 23(3), 5-14.

Working Draft

Hedges, Larry, Laine, Richard D., & Greenwald, Rob. (1994b). Money does matter somewhere: A reply to Hanushek. *Educational Researcher*, 23(3), 9-10.

Heyns, B. (1978). *Summer learning and the effects of schooling.* New York: Academic Press.

Iatarola, Patrice. (2005). Learning from Experience: New York City's Small High Schools. *PEA Bulletin*, 30(1), 1-2, 3-5.

Joint Legislative Audit and Review Committee (2006, February). *Special Education Excess Cost Accounting and Reporting Requirements* (Report 06-3). Olympia, WA: Author.

Joyce, Bruce, & Calhoun, E. (1996). *Learning experiences in school renewal: An exploration of five successful programs*. Eugene, OR: ERIC Clearinghouse on Educational Management.

Joyce, Bruce & Showers, B. (2002). *Student achievement through staff development (3rd Ed.).* Alexandria, VA: Association for Supervision and Curriculum Development.

Kauerz, Kristie. (2005). *Full day kindergarten: A study of state policies in the United States*. Denver, CO: Education Commission of the States.

Kennedy, M. (1998). *Form and substance in inservice teacher education, (Research Monograph no. 13).* Madison: University of Wisconsin, National Institute for Science Education.

Kleiner, B., Nolin, M.J., & Chapman, C. (2004). *Before and after school care programs, and activities through eighth Grade: 2001*. Washington, D.C.: U.S. Department of Education, National Center for Education Statistics.

Krueger, A. (2002). Understanding the magnitude and effect of class size on student achievement. In L. Mishel & R. Rothstein (Eds.), *The class size debate (pp. 7-35)*. Washington, DC: Economic Policy Institute.

Krueger, A. B., & Whitmore, D.M. (2001). *Would smaller classes help close the Black-White achievement gap? (*Working paper #451). Princeton, NJ: Princeton University. [On-line]. Available: http://www.irs.princeton.edu/pubs/pdfs/451.pdf.

Kulik, J. (1994). Meta-Analytical studies of findings on computer-based instruction. In E. Baker & H O'Neil, Jr. (eds), *Technology assessment in education and training* (pp. 9-34). Hillsdale, NJ: Erlbaum Associates, Inc.

Kulik, J. (2003). *Effects of using instructional technology in elementary and secondary schools: What controlled evaluation studies say*. SRI Project Number P10446.001. Arlington: SRI International.

Working Draft

Kulik, J. (1994). Meta-analytical studies of findings on computer-based instruction. In E. Baker & H O'Neil, Jr. (Eds.), *Technology assessment in education and training* (pp. 9-34). Hillsdale, NJ: Erlbaum Associates, Inc.

Kulik, J.A., & Kulik, C.C. (1984). The effects of accelerated instruction. *Review of Educational Research*, 54(3), 409-425.

Kulik, James & Chen-Lin Kulik. (1992). Meta-analytic findings on grouping programs. *Gifted Child Quarterly*, 36(2), 73-77.

Ladd, H.F., & Hansen, J. (1999). *Making money matter*. Washington, DC: National Academy Press.

Laine, Richard D., Greenwald, Rob, & Hedges, Larry V. (1996). Money does matter: A research synthesis of a new universe of education production function studies. In Lawrence O. Picus and James L. Wattenbarger (Eds.), *Where does the money go? Resource allocation in elementary and secondary schools* (p. 44-70). Thousand Oaks, CA: Corwin Press

Landry, S. H. (1999). "Issues in developing effective interventions for children with developmental disorders." In S. Broman and M. Fletcher, (eds.) *The Changing Nervous System: Neurobehavioral Consequences of Early Brain Disorders*. Oxford University Press, N. Y., N. Y., pp. 341-364

Lattimore, C. B., Grotpeter, J. K., & Taggart, R. (1998). *Blueprints for violence prevention, book four: Quantum Opportunities Program*. Boulder, CO: Center for the Study and Prevention of Violence.

Lee, V., Croninger, R., & Smith, J. (1997). Course taking, equity and mathematics learning: Testing the constrained curriculum hypothesis in U.S. secondary schools. *Educational Evaluation and Policy Analysis, 19*(2), 99-122.

Lee, V., & Smith, J. (1997). High school size: Which works best, and for whom? *Educational Evaluation and Policy Analysis, 19*(3), 205-228.

Lewis, L. (June, 2002). Teaching with technology: Creating the student-centered classroom. *From Now On,* [electronic journal]. Retrieved on May 5, 2005 from http://www.fno.org/jun02/teachingreview.html

Loucks-Horsley, S., N. Love, K. Stiles, S. Mundry & Peter Hewson. (2003). *Designing professional development for teachers of science and mathematics.* Thousand Oaks, CA: Corwin Press.

Louis, K. S., S. D. Kruse, & H. M. Marks. (1996). Schoolwide professional community. In Fred Newmann and Associates (Eds.), *Authentic achievement: Restructuring schools for intellectual quality* (pp. 179-203). San Francisco: Jossey-Bass.

Working Draft

Louis, K. S., & Marks, H. M. (1998). Does professional community affect the classroom? Teachers' work and student experiences in restructuring Schools. *American Journal of Education*, 106, 532-575.

Louis, K., H. Marks, & S. D. Kruse. (1996). Teachers' professional community in restructured schools. *American Educational Research Journal*, 33(4), 757-798.

Madigan, T. (1997). *Science proficiency and course taking in high school: The Relationship of science course-taking patterns to increases in science proficiency between 8th and 12th grades*. Washington, DC: National Center for Education Statistics.

Mahoney, J. L., Stattin, H., & Magnusson, D. (2001). Youth recreation center participation and criminal offending: A 20-year longitudinal study of Swedish boys. *International Journal of Behavioral Development, 25*(6), 509-520.

Maker, C.J. (1996). Identification of gifted minority students: A national problem, needed changes and a promising solution. *Gifted Child Quarterly*, 40, 41-50.

Malhoit, Gregory C. (2005). *Providing rural students with a high quality education: The rural perspective on the concept of educational adequacy*. Raleigh, NC: The Rural School and Community Trust, Rural Education Finance Center.

Mann, D., Shakeshaft, C., Becker, J., & Kottkamp, R. (1999). *West Virginia's Basic Skills/Computer Education Program: An analysis of student achievement*. Santa Monica, CA: Milken Family Foundation.

Mantzicopoulos, P., Morrison, D., Stone, E., & Setrakian, W. (1992). Use of the SEARCH/TEACH Tutoring Approach with middle-class students at risk for reading failure. *Elementary School Journal, 92*, 573-586.

Mason, DeWayne & Burns, Robert. (1996). Simply No worse and simply no better" may simply be wrong: A critique of Veenman's conclusion about multigrade classes. *Review of Educational Research*, 66(3), 307-322.

Mason, D.A., & Stimson, J. (1996). Combination and non-graded classes: definitions and frequency in twelve states. *The Elementary School Journal,* 96(4), 439-452.

Mathes, P.G., & Fuchs, L.S. (1994). The efficacy of peer tutoring in reading for students with mild disabilities: A best-evidence synthesis. *School Psychology Review*, 23, 59-80.

Meyers, J., & Silverstein, J. (2002). *Calculation of the cost of a suitable education in Montana in 2001-2002 using the professional judgment approach.* Denver, CO: Augenblick & Myers, Inc.

Working Draft

Michie, J. & Holton, B. (2005). *Fifty years of supporting children's learning: A history of public school libraries and federal legislation from 1953 to 2000* (NCES 2005-311). U.S. Department of Education. National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Miles, K.H., Odden, A., Archibald, S., Fermanich, M., & Gallagher, H.A. (2002). *A cross-district analysis of professional development expenditures in four urban districts*. Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research, Consortium for Policy Research in Education.

Milken Family Foundation (1999). *The impact of education technology on student achievement: What the latest current research has to say*. Retrieved on December 26, 2001 from http://www.mff.org/pubs/ME161.pdf.

Miller, Samuel D. (2003). Partners in reading: Using classroom assistants to provide tutorial assistance to struggling first-grade readers. *Journal of Education for Students Placed At Risk, 8*(3), 333-349.

Mishel, Lawrence & Rothstein, R. Eds. (2002). *The class size debate*. Washington, DC: Economic Policy Institute.

Molnar, Alex. (1999). Evaluating the SAGE program: A pilot program in targeted pupil-teacher reduction in Wisconsin, *Educational Evaluation and Policy Analysis.* 21(2), 165-177.

Monk, D. (1987). Secondary school size and curriculum comprehensiveness. *Economics of Education Review, 6*(2), 137-150.

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

Morris, D., Shaw, B., & Perney, J. (1990). Helping low readers in grades 2 and 3: An after-school volunteer tutoring program. *The Elementary School Journal, 91*(2), 133–150.

Mosteller, F. (1995). The Tennessee study of class size in the early school grades. *The future of children: Critical issues for children and youths*, 5: 113-127.

Murphy, J. (1994). Transformational change and the evolving role of the principal: Early empirical evidence. In J. Murphy & K. Seashore Louis (Eds.), *Reshaping the principalship: Insights from transformational reform efforts* (pp. 20-53). Thousand Oaks, CA: Corwin Press.

Murphy, J., Beck, L., Crawford, M., Hodges, A., & McGaughy, C. (2001). *The productive high school: Creating personalized academic communities.* Thousand Oaks: Corwin Press.

Murphy, R.F., Penuel, W.R., Means, B., Korbak, C., Whaley, A., & Allen, J.E. (2002). *E-desk: A review of recent evidence on the effectiveness of discrete educational software*. Palo Alto, CA: SRI International. Available online at:www.sri.com/policy/ctl/html/synthesis3.html

Working Draft

Mutter, Davida & Randolph. (1987). A Step-By-Step Plan for an In-house Maintenance Audit of School Buildings, *Educational Facility Planner*, (25)4, July-August.

Naglieri, J.A., & Ford, D.Y. (2003). Addressing under representation of gifted minority children using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly*, 47(2), 155-160.

Naglieri, J.A., & Ronning, M.E. (2000). Comparison of White, African-American, Hispanic, and Asian children on the Naglieri Nonverbal Ability Test. Psychological Assessment, 12, 328-334.

National Education Association (2005). *Rankings and estimates: Rankings of the states 2004 and estimates of school statistics 2005*. Washington DC: National Education Association. http://www.nea.org/edstats/images/05rankings.pdf

National Education Commission on Time and Learning. (1994). *Prisoners of time.* Washington, DC: Author.

Nelli, R. (2006, May). *Operations and maintenance adequacy in California public schools: An evidence-based approach*. Dissertation. Los Angeles, CA: Rossier School of Education, University of Southern California.

Newmann, F., and Associates. (1996). *Authentic achievement: Restructuring schools for intellectual quality*. San Francisco: Jossey-Bass.

Newmann, F., & Wehlage, G. G. (1995). *Successful school restructuring: A report to the public and educators*. Madison, WI: University of Wisconsin-Madison, Wisconsin Center for Education Research, Center on Organization and Restructuring of Schools.

Nye, B. A., L. V. Hedges, & S. Konstantopulos. (2001a). The long-term effects of small classes in early grades: Lasting benefits in mathematics achievement at grade nine. *Journal of Experimental Education*, 69(3), 245-258.

Nye, B. A., L. V. Hedges & S. Konstantopulos. (2001b). Are effects of small cumulative: Evidence from a Tennessee experiment, *Journal of Educational Research*, 94(6), 336-345.

Nye, B., Hedges, L.V., & Konstantopoulos, S. (2002). Do low-achieving students benefit more from small classes? Evidence from the Tennessee class size experiment. *Educational Evaluation & Policy Analysis 24*(3), 201-217.

O'Neill, G. Patrick. (1996). Restructuring education : Lessons from Chicago, Edmonton and Wellington. *House 70*(1), 30-31.

Odden, A. (1990). Class size and student achievement: Research-based policy alternatives. *Educational Evaluation and Policy Analysis, 12*(2), 213-227.

Working Draft

Odden, A. (1997). How to rethink school budgets to support school transformation. *Getting better by design series*, *Volume 3.* Arlington, VA: New American Schools.

Odden, A. (2000). Costs of sustaining educational change via comprehensive school reform. *Phi Delta Kappan, 81*(6), 433-438.

Odden, Allan. (2003). Equity and adequacy in school finance today. *Phi Delta Kappan,* 85(2), 120-125.

Odden, A. & Archibald, S. (2001). *Reallocating resources: How schools can boost student achievement without asking for more*. Thousand Oaks, CA: Corwin Press.

Odden, A., Archibald, S., Fermanich, M., & Gallagher, H.A. (2002). A cost framework for professional development. *Journal of Education Finance 28* (1), 51-74.

Odden, A., Fermanich, M., & Picus, L. O. (2003). *A State-of-the art approach to school finance adequacy in Kentucky*. Report prepared for the Kentucky State Department of Education. North Hollywood, CA: Lawrence O. Picus and Associates.

Odden, A., & Kelley, C. (2002). *Paying teacher for what they know and do: New and smarter compensation strategies to improve schools*. Thousand Oaks, CA: Corwin Press.

Odden, A., & Picus, L.O. (2000). *School finance: A policy perspective* (2nd edition). New York: McGraw Hill.

Odden, A., & Picus, L.O. (2004). *School finance: A policy perspective* (3rd edition). New York: McGraw Hill.

Odden, A., Picus, L. O., & Fermanich, M. (2003). *An evidence-based approach to school finance adequacy in Arkansas*. Report prepared for the Interim Legislative Committee on Educational Adequacy. North Hollywood, CA: Lawrence O. Picus and Associates.

Odden, A., Picus, L. O., Fermanich, M., & Goetz, M. (2005). *An evidence-based approach to school finance adequacy in Arizona*. Report prepared for the Rodel Charitable Trusts.

Odden, A. & M.C. Wallace. (Forthcoming). *New directions in teacher pay*. St. Paul, MN: Freeload Press.

Odden, A. & Wallace, M.C. (2006). *Rewarding teacher excellences: A teacher compensation handbook for state and local policy makers*. Madison, WI: University of Wisconsin, Wisconsin Center for Education research, Consortium for Policy Research in Education.

Olson, L. (2006). Economic trends fuel push to retool schooling. *Education Week*, 25, 28, March 22, 2006.

Working Draft

Ornstein, Allen C. (1990). How big should schools and districts be? *Education Digest, 56*(2), 44-48.

Pavan, Barbara. (1992). Recent research on nongraded schools: The benefits of nongraded Schools. *Educational Leadership*, 50(2), 22-25.

Philliber, S., J. W. Kaye, & S. Herrling. (2001). *The national evaluation of the children's aid society carrera-model program to prevent pregnancy*. Accord, NY, Philliber Research Associates.

Picus, L.O., Odden, A., & Fermanich, M. (2003). *A professional judgment approach to school finance adequacy in Kentucky.* North Hollywood, CA: Lawrence O. Picus and Associates.

Posner, J., & Vandell, D. L. (1994). Low-income children's after-school care: Are there beneficial effects of after-school programs? *Child Development, 65,* 440-456.

Public Agenda. (1997). *Getting by: What American teenagers really think about their schools.* New York: Author.

Quality Counts, 2004. Washington, DC: Editorial Projects in Education.

Ravitch, D. (2004). The mad, mad world of textbook adoption. Fordham Institute. Maryland: District Creative Printing. Also available at www.edexcellence.net.

Raywid, M.A. (1997/1998). Synthesis of research: Small schools: A reform that works. *Educational Leadership, 55*(4), 34-39.

Reis, S.M., & Purcell, J.H. (1993). An analysis of content elimination and strategies used by elementary classroom teachers in the curriculum compacting process. *Journal for the Education of the Gifted*, 16(2), 147-170.

Reis, S.M., Westberg, K.L., Kulikowich, J., Caillard, F., Hebert, T., Plucker, J., Purcell, J.H., Rogers, J.B., & Smist, J.M. (1993). Why not let high ability students start school in January? The curriculum compacting study (RM93106). Storrs, CT: The National Research Center on the Gifted and Talented, University of Connecticut.

Rice, J.K. (1999). The impact of class size on instructional strategies and the use of time in high school mathematics and science courses. *Educational Evaluation and Policy Analysis, 21,* 215–229.

Riew, J. (1986). Scale economies, capacity utilization and school costs: A comparative analysis of secondary and elementary schools. *Journal of Education Finance, 11*(4), 433-446.

Rito, G.R., & Moller, B.W. (1989). Teaching enrichment activities for minorities: T.E.A.M. for success. *Journal of Negro Education*, 58, 212-219.

Working Draft

Roberts, Greg (2000, September). *Technical Evaluation Report on the Impact of Voyager Summer Programs*. Austin, TX: University of Texas.

Robinson, A., & Clinkenbeard, P.R. (1998). Giftedness: An exceptionality examined. *Annual Review of Psychology*. 49(1), 117-139.

Rogers, K.B. (2002). Effects of acceleration on gifted learners. In M. Neihart, S.M. Reis, N.M. Robinson & S.M. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* (pp. 3-12). Waco, TX: Prufrock Press.

Rowan, B., Correnti, R. & Miller, R.J.(2002). What Large-Scale, Survey Research Tells Us About Teacher Effects on Student Achievement: Insights from the *Prospects* Study of Elementary Schools. *Teachers College Record*, (104)8, 1525-1567.

Sanders, W. L., & Horn, S. P. (1994). The Tennessee Value-Added Assessment System (TVAAS): Mixed-Model Methodology in Educational Assessment. *Journal of Personnel Evaluation in Education*, 8, 299-311.

Sanders, W.L. & Rivers, J.C. (1996). Cumulative and residual effects of teachers on future student academic achievement. Knoxville: University of Tennessee Value-Added Research and Assessment Center.

Schinke, S. P., Cole, K. C., & Poulin, S. R. (2000). Enhancing the educational achievement of at-risk youth. *Prevention Science, 1*(1), 51-59.

School Communities that Work. (2002). *School communities that work for results and equity*. Providence, RI: Annenberg Institute for School Reform at Brown University. (June).

Schweinhart, L.S. (2005) The High/Scope Perry Preschool Study Through Age 40. Ypsilanti, MI: High Scope Educational Research Foundation.

Scott, L. (2004). School library media centers: Selected results from the longitudinal study of 2002 (ELS:2002) (NCES 205-302). U.S. Department of Education. National Center for Education Statistics. Washington, DC: U.S. Government Printing Office.

Scott, M.S., Deuel, L.S.S., Jean-Francois, B., & Urbano, R.C. (1996). Identifying cognitively gifted ethnic minority children. *Gifted Child Quarterly*, 40, 147-153.

Seal, K.R., & Harmon, H.L. (1995). Realities of rural school reform. *Phi Delta Kappan, 77*(2), 119-124.

Shanahan, T. (1998). On the effectiveness and limitations of tutoring in reading. *Review of Research in Education, 23*, *217-234*. Washington, DC: American Educational Research Association.

Working Draft

Shanahan, T, & Barr, R. (1995). Reading recovery: An independent evaluation of the effects of an early instructional intervention for at-risk learners. *Reading Research Quarterly, 30*(4), 958-997.

Sher, J., & Tompkins, R.B.. (1977). Economy, efficiency and equality: The myths of rural school and district consolidation." In J. P. Sher (Ed.), *Education in rural America*. Boulder, CO: Westview Press.

Sivin-Kachala, J. (1998). *Report on the effectiveness of technology in schools, 1990-1997*. Software Publisher's Association.

Slavin, R. E. (1996). Neverstreaming: Preventing learning disabilities. *Educational Leadership*, 53(4), 4-7.

Slavin, R.E., Karweit, N., & Wasik, B. (1994). *Preventing early school failure: Research policy and practice*. Boston: Allyn & Bacon.

Slavin, R, & Cheung, A. (2005). A synthesis of research on language of reading instruction for English language learners. *Review of Educational Research*, 75(2), 247-284.

Southern, W.T., Jones, E.D., & Stanley, J.C. (1993). Acceleration and enrichment: The context and development of program options. In K.A. Heller, F.J. Monks & A.H. Passow (Eds.), International handbook of research and development of giftedness and talent (pp. 387-410). Exeter, United Kingdom: Pergamon.

Spillane, J. P., Halverson, R. and Diamond, J.B. (2001). Investigating school leadership practice: A distributed perspective. *Educational Researcher*,30(3): 23-27.

Steinberg, L. (1996). *Beyond the classroom: Why school reform has failed and what parents need to do*. New York: Simon and Schuster.

Steinberg, Laurence. (1997). Standards outside the classroom. In D. Ravitch, (Ed)., *The state of student performance in American schools: Brookings Papers on education policy, volume 1*. Washington, DC: Brookings Institution.

Stringfield, S., Ross, S., & Smith, L. (1996). *Bold plans for school restructuring: The New American Schools designs*. Mahwah, NJ: Lawrence Erlbaum (1996)

Struck, J. (2003, April). A study of talent development in a predominantly low socioeconomic and/or African American population. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Supovitz, J., & Turner, H.M. (2000). The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching, 37*(9), 963-980.

Working Draft

Supovitz, J. D. Mayer & J.B. Kahle. (2000). The longitudinal impact of inquiry-based professional development on teaching practice. *Educational Policy*, 14(3), 331-356.

Swiatek, M.A. (2002). A decade of longitudinal research on academic acceleration through the study of mathematically precocious youth. *Roeper Review*, 24(3), 141-144.

Swift, E. (2005). *Estimating the central office resources necessary for an adequate educational program*. Doctoral dissertation at the USC Rossier School of Education. Los Angeles, CA: University of Southern California.

Tenopir, C. (2003). Use and users of electronic media sources: An overview and analysis of recent research studies. Washington DC: Council of Library and Information.

Tierney, J., Grossman, J. B., & Resch, N. (1995). *Making a difference: An impact study of Big Brothers/Big Sisters*. Philadelphia, PA: Public/Private Ventures.

Torgeson, J. K. (2004). Avoiding the Devastating Downward Spiral. *American Educator*, 28(3), 6-19, 45-47.

United States Department of Education (2004). *Toward a new golden age in American education: How the Internet, the law, and today's students are revolutionizing expectations: National education technology plan.* Washington D.C: U.S. Department of Education. Also available at www.NationalEdTechPlan.org.

United States Department of Labor. (2000). *A nation of opportunity: Building America's 21st Century workforce*. Retrieved May 5, 0205 from http://www.ilr.cornell.edu/library/downloads/keyWorkplaceDocuments/21Century Workforce/combined 21st century.pdf

Valdez, McNabb, Foertsch, Anderson, Hawks and Raack (2000), Computer-Based Technology and Learning: Evolving Uses and Expectations. North Central Regional Laboratory (NCREL). Retrieved May 5, 2005 from http://www.ncrel.org/tplan/cbtl/toc.htm.

Vandell, D. L., Pierce, K. M., & Dadisman, K. (2005). Out-of-school settings as a developmental context for children and youth. In R. Kail (Ed.) *Advances in Child Development and Behavior*. Volume 33. Academic Press.

VanTassel-Baska, J., Bass, G., Ries, R., Poland, D., & Avery, L.D. (1998). A national study of science curriculum effectiveness with high ability students. *Gifted Child Quarterly*, 42(4), 200-211.

VanTassel-Baska, J., Johnson, D.T., & Avery, L.D. (2002). Using performance tasks in the identification of economically disadvantaged and minority gifted learners: Findings from Project STAR. *Gifted Child Quarterly*, 46, 110-123.

Working Draft

VanTassel-Baska, J., Johnson, D.T., Hughes, C.E., & Boyce, L.N. (1996). A study of language arts curriculum effectiveness with gifted learners. *Journal for the Education of the Gifted*, 19, 461-480.

VanTassel-Baska, J., Zuo, L., Avery, L.D., & Little, C.A. (2002). A curriculum study of gifted student learning in the language arts. Gifted Child Quarterly, 46, 30-44.

Veenman, Simon. (1995). Cognitive and Noncognitive Effects of Multigrade and Multi-Age Classes: A Best Evidence Synthesis. Review of Educational Research, 65(4), 319-381.

Wasik, B., & Slavin, R.E. (1993). Preventing early reading failure with one-to-one tutoring: A review of five programs. *Reading Research Quarterly, 28*, 178-200.

Waxman, H.D., Connell, M.L., & Gray, J. (2002). A quantitative synthesis of recent research on the effects of teaching and learning with technology on student outcomes. Oak Brook, IL: North Central Regional Educational Laboratory. Available online at: www.ncrel.org/tech/effects

Webster, W. J., Mendro, R. L., Orsak, T. H., & Weerasinghe, D. (1998, April). *An Application of Hierarchical Linear Modeling to the Estimation of School and Teacher Effect*. Paper presented at the Annual Meeting of the American Educational Research Association, San Diego, California.

Wenglinsky, H. (1998). Does it compute? The relationship between educational technology and student achievement in mathematics. *Educational Testing Service Policy Information Center*.

Westberg, K.L., Archambault, F.X., Jr., Dobyns, S.M., & Salvin, T. (1993). The classroom practices observation study. Journal for the Education of the Gifted, 16, 120-146.

Wheldall, K., Coleman, S., Wenban-Smith, J., Morgan, A., & Quance, B. (1995). Teacher-child Oral Reading Interactions: How do Teachers Typically Tutor? *Educational Psychology*, 12, 177-194.

White, R. N., Reisner, E. R., Welsh, M., & Russell, C. (2001, November 1). *Patterns of student-level change linked to TASC participation, based on TASC projects in year 2*. Washington, DC: Policy Studies Associates.

Wonacott, Michael. (2002). *Career Academies as Smaller Learning Communities: In Brief No. 20.* Columbus, OH: Career and Technical Education National Dissemination Center.

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

Zureich, Mike (1998). *CASBO: Custodial handbook*. Pleasanton, CA: Research and Development Committee, California Association of School Business Officials. #0900.

Working Draft

Appendix A

Other State Professional Judgment Panel Recommendations

In this Appendix, we compare the staffing and resources proposed above with similar prototypical school proposals that emerged from several recent professional judgment approaches to determining adequacy in several states around the country. We have selected five other studies, one recently completed by Picus, Odden and Fermanich (2003) for the state of Kentucky, and four completed by the firm of Augenblick and Meyers during the past 3 years for Kansas, Nebraska, Montana, and Maryland (Alexander, Augenblick, Driscoll, Guthrie & Levin, 1995; Augenblick, 1997, 2001; Augenblick, Myers, Silverstein & Barkis, 2002; Meyers & Silverstein, 2002). Tables A1, A2 and A3 display the characteristics for each of prototypical elementary, middle and high schools.

Working Draft

Table A1
Summary of Resources for Prototypic Elementary Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyers	Nebraska, Augenblick & Meyers	Montana, Augenblick & Meyers	Maryland, Augenblick & Meyers
School configuration	K-5	K-5	K-6	K-5	K-5
School size	400	430	350	360	500
Class size	~20	~20	~17.5	~21	~15
Full day kindergarten	Yes	Yes	Yes	Yes	Yes
Length of teacher work year	200 days				
% Disabled	10 % moderate	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~ 4 %	4 %	5 %	5 %	3 %
% Minority	--	---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	0	0	0	0	1
Instructional Facilitators/Mentors	1	0	0	0	1
Teachers	24	22	20	17	33
Specialist teachers	~5	4.4	2	3	6
Instructional aides	8	1	0	3.5	15
Teachers for struggling students	1/each 25% poverty: 2	4	1	0	0
Teachers for students with disabilities	5	6	3.5	3.2	5.5

Working Draft

Table A1 (Continued)
Summary of Resources for Prototypic Elementary
Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
Teachers for ELL students	1	1	1	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students		10	6	4	6
Pupil support staff	3	3	2.1	1.6	7
Librarians/media specialists	Included in specialists	1	1	1	1.5
Technology resource teachers	1	1	0.5	1	2
Substitutes	1 permanent plus additional funds for typical use	2 permanent	10 days for each professional staff	$19,800	3 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days plus $500/teacher	5 days plus $200/teacher	8 days	10 days
Technology	$265/pupil	$250/pupil	$250/pupil	$275/pupil	$160/pupil
Instructional materials, equipment, student activities	$250/pupil	$270/pupil	$90/pupil	$300/pupil	$205/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

Working Draft

Table A2
Summary of Resources for Prototypical Middle Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
School configuration	6-8	6-8	7-8	6-8	6-8
School size	500	430	680	630	800
Class size	20	~22	~20	~25	~22
Length of teacher work year	200				
% Disabled	10 %	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~4 %	4 %	5 %	5 %	3 %
% Minority		---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	0	1	1	1.5	3
Instructional Facilitators/ Mentors	1	0	0	0	0
Teachers	25	19.5	24	25	36
Specialist teachers	20 % more: 5	6.5	20	10	9
Instructional aides		1	0	6	10
Teachers for struggling students		4	3	0	0

Working Draft

Table A2 (Continued)
Summary of Resources for Prototypical Middle Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
Teachers for students with disabilities	7, plus 1 more if % poverty > 75%	7	5	6.25	7
Teachers for ELL students	1	1	2	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students	0	13	8	7	6
Pupil support staff	4.5	3.8	4.8	3.2	10
Librarians/media specialists	1	1.5	1	1.5	2
Technology resource teachers	1	1	1	1.5	2
Substitutes	1 permanent Plus dollars for more	3 permanent	10 days for each professional staff	$34,650	3 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days + $500/teacher	5 days + $200/teacher	8 days	10 days
Technology	$265/pupil	$250/pupil	$250/pupil	$275/pupil	$137/pupil
Instructional materials, equipment, student activities	$250/pupil + $60/pupil for extra duties for teachers	$465/pupil	$190/pupil	$600/pupil	$305/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

Working Draft

Table A3
Summary of Resources for Prototypical High
Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyer	Nebraska, Augenblick & Meyer	Montana, Augenblick & Meyer	Maryland, Augenblick & Meyer
School configuration	9-12	9-12	9-12	9-12	9-12
School size	800	1150	1900	1300	1000
Class size	20	~23	~19	~20	~17
Length of teacher work year	200 days, including 10 summer PD days				
% Disabled	10 %	14 %	13 %	12 %	13.5%
% Poverty (free & reduced lunch)	50 %	36 %	32 %	24%	31 %
% ELL	~4 %	4 %	5 %	5 %	3 %
% Minority	--	---	---	5 %Native American	46 %
Principal	1	1	1	1	1
Assistant Principal	1	3	6.5	3	5
Instructional Facilitators/ Mentors	2	0	0	0	0
Teachers	40	49.5	120	81	69
Specialist teachers	20% more: 8	14.5	--	--	--
Instructional aides		2	--	6.5	4
Teachers for struggling students	8	10	8	0	0

Working Draft

Table A3 (Continued)
Summary of Resources for Prototypical High
Schools from Professional Judgment Panels in Several States

School Element	Kentucky, Picus & Odden	Kansas, Augenblick & Meyers	Nebraska, Augenblick & Meyers	Montana, Augenblick & Meyers	Maryland, Augenblick & Meyers
Teachers for students with disabilities		15	14	12	8
Teachers for ELL students	2	2	5	Extra 24 % for each Native American student	0
Teachers for gifted students	0	0	0	0	0
Aides for categorical students	--	24	13	14	7
Pupil support staff	8	7	11	7	8
Librarians/ media specialists	2	2	2	2	2
Technology resource teachers	2	1	1	2	2
Substitutes	2 permanent + typical use for illness and PD	9 permanent	10 days for each professional staff	$80,000	6 permanent
Professional development	10 summer days included in 200 day year, plus $500/teacher	5 days + $500/teacher	5 days + $200/teacher	8 days	10 days
Technology	$264/pupil	$250/pupil	$250/pupil	$275/pupil	$162/pupil
Instructional materials, equipment, student activities	$150/pupil plus $120/pupil for extra duties for teachers	$635/pupil	$530/pupil	$900/pupil	$850/pupil
Teacher salary levels	National Average	State average	State average	State average + 4.4 % to comparative state average	State average + 1.6 % to comparative state average

Working Draft