School Budgets and Student Achievement in California: The Principal's Perspective

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Heather Rose
Jon Sonstelie
Peter Richardson

2004

Public Policy Institute of California
1994–2004

Library of Congress Cataloging-in-Publication Data
Rose, Heather, 1971-
School budgets and student achievement in California : the principal's perspective / Heather Rose, Jon Sonstelie, and Peter Richardson.
p. cm.
Includes bibliographical references.
ISBN: 1-58213-098-1
1. Education—California—Finance—Congresses. 2. Education—Standards—California—Congresses. 3. School principals—California—Congresses. I. Sonstelie, Jon, 1946- II. Richardson, Peter, 1959- III. Public Policy Institute of California. IV. Title.

LB2826.C2R57 2004
379.1'22'09794—dc22 2004009604

Foreword

A solid education is crucial to many dimensions of life—good jobs, high wages, good health, and active civic engagement. Maybe for good reason, then, parents and the press alike now monitor student performance on standardized tests as if it were equivalent to the Dow-Jones industrial average. In recent years, California has set the most rigorous academic standards in the nation for its elementary and secondary school students. As students, teachers, and principals strive to meet these standards, schools and districts are coping with uncertain resource levels, students with widely divergent backgrounds and levels of preparation, and a shrinking supply of qualified teachers. In this context, the pressing public policy issues are no longer confined to funding equity. Rather, they have extended to adequacy—that is, the notion that school resource levels should enable students to meet performance objectives.

For its part, the state legislature is seeking ways to link the school finance system to the State Board of Education's high performance expectations. In September 2002, it created a Quality Education Commission and asked it to identify and price school resources that would ensure that the "vast majority" of California's students meet the state's academic standards. Linking school resources to specific student outcomes will not be easy for the commission. To assist in the process, Heather Rose, Jon Sonstelie and Peter Richardson developed an innovative approach to calibrating the relationship between school resources and student outcomes. Working with 45 school principals, the authors sought to capture that relationship by combining a professional judgment approach with pseudo-experimentation of the sort economists and other social scientists have employed recently and successfully. Specifically, they gave the principals three budget constraints for two kinds of schools—one with disadvantaged children and the other with children who were better off. Using detailed spreadsheets, the principals

listed the blends of teachers, administrators, support staff, and program specialists they would deploy to maximize the school's score on the state's Academic Performance Index (API).

The findings are remarkable. At the highest budget level (comparable to spending levels in Michigan, Delaware, and Vermont), principals on average predicted that only the schools with the better-off students would manage to reach an API of 800—the goal for all schools. With the low budget, which was roughly comparable to California's funding in 1999–2000, the better-off elementary school was predicted to score an API of 708. Although this predicted score fell well below the state goal, it was still 120 points higher than that of the disadvantaged elementary school. Reviewing the principals' resource allocations and API predictions, the authors looked for patterns in staffing, student programs, professional development, and other investments that principals felt were essential to maximizing student performance. Those local patterns are noteworthy, but the overarching message is clear. Even when principals were allowed to allocate and reallocate relatively ample resources freely, the challenge of meeting state-level test standards was formidable at best.

The adequacy movement is catching hold in many states, and it is easy to see why. It seems odd to expect students to meet state performance standards if school resource levels—which, in California, are also controlled by the state—are inadequate. As the authors of this study note, a range of API scores is likely to flow from any given level of educational investment, and skeptics are right to note that we cannot simply spend our way to high academic performance. But there is little point in setting high academic standards if we lack the resources and strategies to help students reach them. Failure and disappointment are outcomes that no state, especially California, can afford. This report offers a sobering and carefully researched message about how daunting the challenge will be.

David W. Lyon
President and CEO
Public Policy Institute of California

Summary

Over the last decade, K–12 education funding and performance levels have become increasingly important concerns for Californians. By way of response, the state legislature recently opted to include K–12 education in what used to be the California Master Plan for Higher Education. The joint committee to create the new Master Plan assembled working groups of educators, researchers, and policymakers to address a range of issues. It then collected the reports of those working groups, heard testimony, and finished its final report in August 2002. The first piece of legislation emerging from the committee's work was passed in September 2002. AB 2217 called for the formation of a Quality Education Commission and charged it with developing a Quality Education Model. The model should consist of school prototypes with resources such that the vast majority of California's students could meet the state's academic standards.

Both the Master Plan and AB 2217 subscribe to a particular conception of school funding systems and student performance. That conception is based on the notion of adequacy. Although the term has been used variously over the years, adequacy in this context generally refers to school funding approaches that link resource provision to specific performance levels. This approach, however, presupposes a stronger and more predictable relationship between school inputs and outcomes than most researchers have observed in their studies. As a result, many policymakers have recognized the need to reconsider the most effective ways to deploy scarce public funds to raise student performance.

To help California policymakers with this reconsideration, the William and Flora Hewlett Foundation funded a three-part PPIC project to examine links between school resources, academic standards, and student outcomes. The first report in this series, *High Expectations, Modest Means: The Challenge Facing California's Public Schools*, appeared

in 2003 and offered background information on the state's academic standards, resources, and funding mechanisms. This second report builds on the first by presenting the results of school budget workshops conducted by PPIC and executed by a group of 45 principals from representative schools throughout the state. The workshops were designed to elicit the principals' judgments about links between resources, allocations, school characteristics, and student performance. In those workshops, we asked principals to allocate resources at two schools with differing demographic profiles so as to maximize student performance as measured by the state's Academic Performance Index (API). We then repeated the exercise raising the budget by 15 percent and 30 percent and analyzed the results. (By way of comparison, the medium budget corresponded to per-pupil spending in Illinois, Minnesota, and Indiana, and the high budget was comparable to spending in Michigan, Delaware, and Vermont.) The third report will present the findings of the site visits, interviews, and surveys that preceded and helped structure the budget workshops. Taken together, the three reports are meant to provide the education community with data and conceptual tools for determining the resources California's public schools need to educate students to state standards.

Research Approach

For this study, we designed a new approach to understanding the connections between school resources and student performance. Having reviewed the scholarly literature, we were convinced that any attempt to use observed data and statistical analyses to construct a production function for education—one in which a specific set of inputs can be expected to produce a specific level of academic performance—was unlikely to produce the desired results. As several other states and educational organizations had done, we therefore turned to the professional judgment approach, which relies heavily on the insights of school practitioners. However, we sought to elicit these professional judgments according to specific criteria, thereby converting our budget workshops into a pseudo-experiment of the sort social scientists have used successfully in recent years. First, we chose to focus on principals, largely because they know the most about the academic standards,

resources, and outcomes we have in mind. Second, we decided not to ask principals about individual resources in isolation; rather, we wanted to see how they combined resources to maximize achievement. Third, we wanted principals to combine these resources under a budget constraint. Only this constraint would distinguish desires from needs and reveal the relative value of each resource. Finally, by changing the budget, our analysis focuses mainly on how allocations and predictions changed as the budget changed. This research design allowed us to assume that the principals' choices and predictions reflected the perceived values of the resources and not the influences of unobservable factors.

We invited the principals in our sample to participate in a series of budget simulation workshops conducted in San Francisco. The purpose of the workshops was to elicit their judgments about the optimal allocation of school resources and the connection between those allocations and student performance. To gather these judgments, we used an electronic spreadsheet that listed each resource and asked the principals to enter the quantity they wished to purchase. The prices of each resource and the budgets were also listed on the spreadsheet (Table S.1). The resource prices and the lowest of the three budget levels approximated statewide averages in 1999–2000.

We presented principals with descriptions of two hypothetical schools—one whose student body had a lower socioeconomic status (SES) than the other. The student characteristics in the low-SES school reflected those in actual schools between the 25th and 35th percentile of the California school characteristic index. The student characteristics of the high-SES school corresponded to those in the 65th–75th percentile. Each elementary school served 600 students, each middle school 1,000 students, and each high school 1,800 students.

We instructed principals to assume that the hypothetical schools had satisfactory facilities and personnel. In particular, we asked them to assume that salaries were adequate to attract and retain qualified personnel, that personnel had sufficient time to learn their roles and perform them satisfactorily, and that principals could define those roles. Finally, we instructed them to ignore the restrictions placed on them by the California Education Code and collective bargaining

Table S.1

School Resources Spreadsheet

Resource	Unit of Measure	Cost per Unit ($)	Quantity
Teachers			
Teachers—grades K–3[a]	FTE[b]	59,000	_____
Teachers—grades 4–5[a]	FTE	59,000	_____
Teachers—core[c]	FTE	59,000	_____
Teachers—noncore[c]	FTE	59,000	_____
Teachers—physical education[c]	FTE	59,000	_____
Administration			
Principals	FTE	100,000	_____
Assistant principals	FTE	90,000	_____
Clerical office staff	FTE	37,000	_____
Support staff			
Academic coaches	FTE	67,000	_____
Instructional aides	FTE	29,000	_____
Counselors	FTE	78,000	_____
Nurses	FTE	78,000	_____
Librarians	FTE	67,000	_____
Security officers	FTE	37,000	_____
Technology support staff	FTE	77,000	_____
Community liaisons	FTE	36,000	_____
Specialty teachers[a]	FTE	59,000	_____
Student programs			
Professional development	Hours/year/teacher	No. of teachers x hourly teacher wage	_____
Preschool[a]	Students	4,400	_____
Full-day kindergarten[a]	1 = yes 0 = no	No. of kindergarten teachers x annual teacher wage[d]	_____
After-school tutoring program	Teacher hours/week	1,649	_____
Longer school day	Hours/day	No. of teachers x hourly teacher wage x instructional days per year[e]	_____
Summer school	Students	401	_____
Longer school year	Days/year	No. of teachers x daily teacher wage	_____
Computers for instruction	Computers	300	_____
Other	$ thousands	1,000	_____

NOTE: For elementary schools, the number of teachers counts kindergarten teachers twice because we assume that they teach two sessions of students, each of which needs to stay for the additional hour.

[a]Option available only to elementary principals.

[b]Full-time equivalents.

[c]Option available only to middle and high school principals.

[d]Also includes the cost of professional development and a longer school year for the additional teachers.

[e]Instructional days include days added to the school year in the longer school year category.

agreements. If they wanted to increase class size despite a union agreement to the contrary, they were free to do so.

Working independently, each principal completed six exercises. The first three, which involved the low-SES school, were the same except that the budget gradually increased. The second three exercises focused on the high-SES school and used the same three budget levels. At the end of each exercise, we asked principals to predict the API score of the school they had constructed. To better understand their thinking, we asked principals to describe their rationales in writing. We collected these rationales and discussed the exercises as a group at the end of the day.

Key Results

Elementary Schools

The choices made by elementary school principals are perhaps best understood against the backdrop of K–3 Class Size Reduction, the state program giving school districts financial incentives to reduce class sizes to 20 students in kindergarten through third grade. The low-budget scenario, which roughly reflected California revenue levels in 1999–2000, gave principals the resources to reduce class sizes, but we removed the financial incentives for doing so. Although the principals chose smaller classes for grades K–3 than for grades 4 and 5, they also achieved a more even balance in class sizes between K–3 and grades 4 and 5 than most currently have in their schools. In the low-budget, low-SES scenario, principals created an average size of 21.5 for grades K–3 and an average of 27.4 for grades 4 and 5. That allocation allowed them to use more of their budget for such student programs as full-day kindergarten and after-school tutoring. They also focused a considerable portion of their budget on improving the quality of instruction. Even in the low-budget scenario, principals provided their teachers with the services of a full-time academic coach in addition to a full week of professional development.

As their budgets grew, principals increased expenditures in almost all resource areas, but they allocated the largest share of the additional funds to student support programs. Forty percent of their additional funds

went to such programs as after-school tutoring, preschool, and full-day kindergarten. The increases in the last two areas reflect the state's new academic content standards, which raise academic expectations for kindergarten. Principals also increased the amount of instructional time for all students, adding nearly seven days' worth to the school year through a combination of longer days and more school days. They also focused more resources on improving instruction. As they moved from the low-budget scenario to the high-budget one, principals almost doubled both the time allocated to professional development and the number of academic coaches. In contrast, principals chose only modest reductions in class sizes when moving from the low-budget scenario to the high-budget scenario—a 6 percent reduction in grades K–3 and a 9 percent one in grades 4 and 5. The general allocation patterns were similar for both low-SES and high-SES schools.

Principals predicted that API scores for these schools would vary with budget levels and the school's SES (Figure S.1). With the low budget, principals predicted that the high-SES school would achieve an API of 708—about 120 points higher than the low-SES school with the same budget. With the high budget, they predicted that the high-SES school would achieve an 840 API, well above the state's goal of 800 and also 90 points higher than the API of the low-SES school with the same budget.

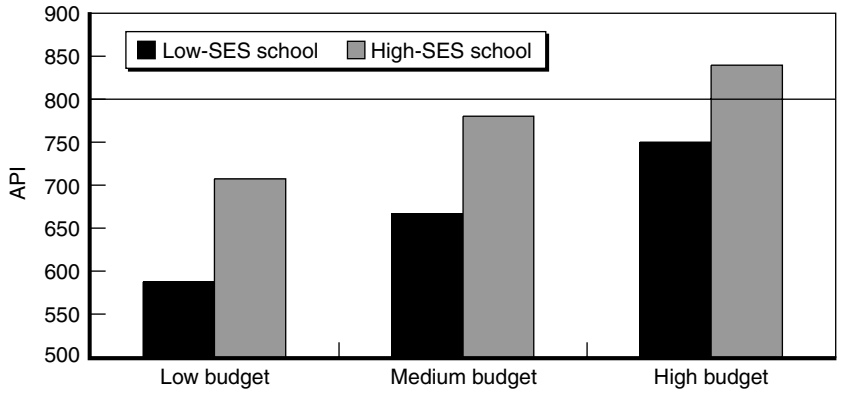

Figure S.1—Average Predicted API for Elementary Schools by SES and Budget

These predictions suggest that the low-SES school would require a higher budget to achieve the same API as the high-SES school. Principals explained that low-SES students arrive at school less prepared and that the school must make up some of this gap. Comparing the average allocations from the high-budget, low-SES school with those of the medium-budget, high-SES school reveals that principals thought that the low-SES school would need almost one more teacher and an additional instructional aide. With the higher budget in the low-SES school, principals also allocated almost one extra day of professional development for its teachers and devoted eight more hours per week to after-school tutoring programs.

Middle Schools

In some respects, the priorities of middle school principals resembled those of their elementary school counterparts. For example, they allocated significant funds to improving the quality of instruction. In the low-budget scenario, they chose nearly a week of professional development—an amount they increased by 60 percent in the high-budget scenario. They also chose to hire 1.2 academic coaches in the low-budget scenario and 3.4 academic coaches in the high-budget one. Also like the elementary school principals, they increased instructional time by lengthening the school day and year the equivalent of almost ten days.

Compared to their elementary counterparts, however, middle school principals chose higher average class sizes. With the low budget, core classes (such as English, math, and history) averaged 27.3 students per class, and noncore classes (such as art, foreign language, and other electives) averaged 33.3 students per class. The principals reduced class sizes (by 10 percent for core classes and 19 percent for noncore classes) as their budgets grew. These larger classes permitted middle school principals to address a common concern—the lack of counselors in California middle schools. On average, the principals chose 1.7 counselors in the low-budget scenario and 2.5 counselors in the high-budget scenario. Principals constantly reminded us that the emotional problems typical of the adolescents they serve make a good counseling staff an important part of a smoothly functioning middle school. Middle

school principals also allocated 1.6 security officers, even in the low budget, to patrol school grounds during the day.

Like their elementary school counterparts, middle school principals predicted that API scores would vary by budget level and student SES, but their average predictions were less optimistic. None of the budgets led to an 800 API in the low-SES school (Figure S.2). To reach an API of 750, the principals predicted that the low-SES school would require 30 percent more funding than the high-SES school—in other words, the difference between the low budget and the high one.

A comparison of the high-SES, low-budget school with the low-SES, high-budget one shows that the latter had five more teachers, one more administrative full-time equivalent (FTE), two more academic coaches, and over six other support staff. Principals also used the additional funds to intensify all the student support programs. For example, they allocated 46 more weekly hours for tutoring programs and provided summer school for 100 more students.

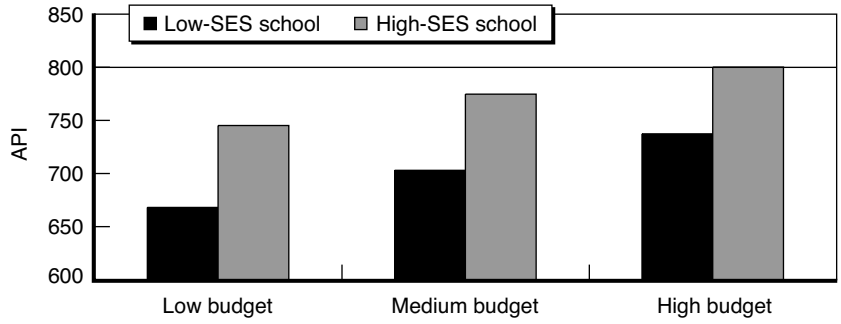

Figure S.2—Average Predicted API for Middle Schools by SES and Budget

High Schools

Compared to elementary and middle schools, high schools are complicated organizations, yet there were similarities between the choices of high school principals and those of their counterparts. For example, high school principals purchased over a week of professional development for their teachers even in the low-budget scenario. In fact, they chose at least 30 percent more time for professional development than middle school principals at all three budget levels. We suspect that

this greater emphasis on professional development reflects the greater challenges of implementing standards-based instruction in high schools. Historically, high school teachers have had more freedom to design their own curricula and thus must work harder to align them with state standards. Also, the state's academic content standards are very ambitious at the high school level.

Like their middle and elementary school counterparts, high school principals stressed the importance of increasing instructional time, adding nearly eight days' worth. They also chose larger class sizes in noncore classes than in core classes. In the low-budget scenario, the average class size was 26.6 students in core classes and 34.7 in noncore classes. High school principals also allocated significant resources to counseling, reducing the student-counselor ratio to 300 to 1 in the high-budget scenario. (Ratios of 500 to 1 are common in California high schools.) High school principals hired close to three security officers regardless of the budget level, reflecting the reality that adequate security has become an absolute requirement for high schools.

Like their middle school counterparts, the high school principals, on average, predicted that only the high-budget, high-SES school could attain an 800 API (Figure S.3). A comparison of the medium-budget, high-SES school and the high-budget, low-SES school indicates that the low-SES school would need $525 more per pupil—the difference between the high and medium budget—to achieve an outcome similar

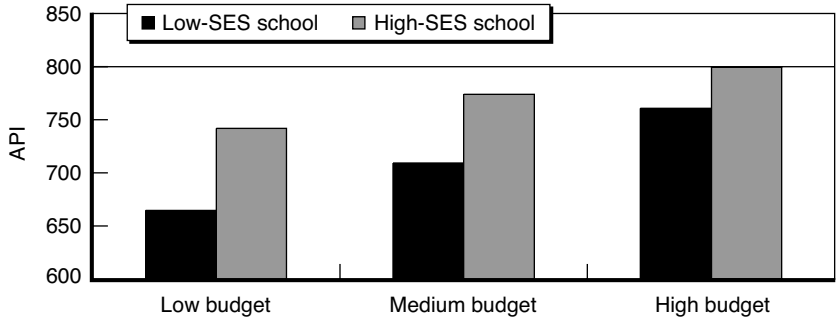

Figure S.3—Average Predicted API for High Schools by SES and Budget

to that of the high-SES school. With the high-budget, low-SES school, principals allocated nearly six more teachers, over one more

administrative FTE, and six more support personnel relative to the high-SES school with the medium budget. Principals also added 37 more weekly hours of teacher tutoring time and provided summer school for 138 more students in the low-SES school.

Policy Implications

The passage of AB 2217 indicates that state policymakers are willing to consider new approaches to funding schools in light of the state's high academic standards. According to the bill, the Quality Education Model should be a list of school resources, along with their costs, that would enable the "vast majority" of pupils to meet the state's academic standards. The language of AB 2217 makes it clear that the Quality Education Commission may produce a series of models, or prototypes, and directs the commission to consider school and demographic characteristics when constructing these models. The bill also specifies that the commission's work is meant to "enable the legislature to make more informed annual budgetary decisions."

Although our study was not meant to develop the prototypes required by AB 2217, the commission may find our research approach, survey instrument, and protocols helpful. AB 2217 stipulates that "parents, classroom teachers, other educators, governing board members of school districts, and the public be involved in the design and implementation of the Quality Education Model." The spreadsheets we developed provide an efficient and inexpensive way of collecting and distilling the views of these and other stakeholders. Both the protocols and the spreadsheet can be adapted in various ways to serve the commission's purposes.

The commission may find our results helpful as well. Even with the low budget, for example, elementary school principals hired teachers to maintain small class sizes. Middle school principals began with larger class sizes and then progressively reduced them as budgets grew. High school principals followed a similar trajectory, but they placed more emphasis on improving teacher quality. Another important though unsurprising result is that all three groups thought that more spending was required for most schools to reach the state's relatively high academic standards. They also indicated that thoughtful allocations, not just

bigger budgets, would be critical for reaching the state's academic standards. Also unsurprisingly, principals thought that the cost of reaching these standards would vary according to SES.

Even in a highly controlled budget simulation, our principals differed somewhat in their optimal allocations and API predictions. As a consequence, our results do not point to specific bundles of resources that would ensure specific performance levels at any school or budget level. The variation we observed, however, does not rule out meaningful discussion of the average responses. Indeed, we came to regard these responses the way we might view model homes in a new housing development—as tangible and whole representations of what certain funding levels might buy, not inflexible prototypes requiring slavish imitation. Although resource allocations at actual schools might vary, the models are useful insofar as they provide a funding benchmark for the legislature. After reviewing the results, our sights shifted from the question, "How much will it cost for all schools to reach an API of 800?" to a slightly different one: How much are Californians willing to spend to increase the probability of a school reaching an API of 800? This question more accurately reflects the uncertainty inherent in such predictions, but it also lends itself to a more nuanced and realistic policy deliberation. For these reasons, the commission may wish to provide the legislature with model schools at several resource and SES levels. For each model school, it could also include the likelihood that such a school would achieve various API scores, perhaps ranging from 800 to 650, which roughly reflected the national median in 1999. Table S.2 provides an example of what such a table might look like.

In addition to estimating the costs of achieving performance levels, this approach would refocus attention on another basic question: What do California schools need to be successful? Answers may differ, but the question is the right one, and it is currently obscured by a school finance system that imperfectly reflects the needs, costs, and challenges of real schools.

Table S.2

Predicted Likelihood of API Scores by SES and Budget: Elementary Schools

	Low-SES School			High-SES School		
API	Low Budget	Medium Budget	High Budget	Low Budget	Medium Budget	High Budget
800 or higher	6%	7%	44%	31%	50%	81%
750 or higher	6	7	56	50	63	94
700 or higher	13	33	88	50	94	100
650 or higher	31	80	94	81	100	100

NOTES: Percentages are based on the distribution in Table 5.2. Even if 100 percent of principals predict a certain API, there is still no guarantee it will be obtained.

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Acknowledgments

We are grateful to the 45 principals who participated in our workshop and made this project possible. We are also grateful to Sharmaine Heng for her excellent research and logistical support and to Ray Reinhard for his expert contributions to the overall project. For helpful comments on a previous draft of this report, we would like to thank Susanna Cooper, Christopher Jepsen, Paul Lewis, Mary Perry, Lawrence Picus, and Fred Silva. We would also like to thank the William and Flora Hewlett Foundation for financial support.

1. Introduction

Over the last decade, K–12 education has become an increasingly important issue for Californians. The PPIC Statewide Survey has shown that residents consistently place it at or near the top of their list of policy concerns. A spate of recent legislative activity, bond proposals, and local initiatives has focused attention on school funding, and a series of state reforms has responded to the widespread perception that California must pay even more attention to student outcomes as measured by standardized tests. By way of response to this concern, the state legislature recently opted to include K–12 education in what used to be the California Master Plan for Higher Education. The joint committee in charge of creating the Master Plan began its efforts by assembling working groups of educators, researchers, and policymakers to address a range of issues. It then collected the reports of those working groups, heard testimony, and finished its final report in August 2002. The first piece of legislation emerging from the committee's work, AB 2217, was passed in September 2002. It called for the formation of a Quality Education Commission and charged it with developing a Quality Education Model. The model should consist of school prototypes equipped with resources such that the vast majority of California's students could meet the state's academic standards.

Both the Master Plan and AB 2217 subscribe to a particular conception of school funding systems and student performance. That conception is based on the notion of adequacy. Although the term has been used variously over the years, adequacy in this context generally refers to school funding approaches that attempt to link resource provision to specific performance levels. California legislators are not the first to explore this approach. As Rose (2001) notes, several other states (including Ohio, Wyoming, and Oregon) have attempted to define and price an adequate education. This approach, however, tends to

presuppose a stronger and more predictable relationship between school inputs and outcomes than has been observed empirically. Indeed, the current state of research suggests a less straightforward connection between resources and achievement, and many policymakers have therefore recognized the need to reconsider the most effective ways to deploy scarce public funds to raise student performance.

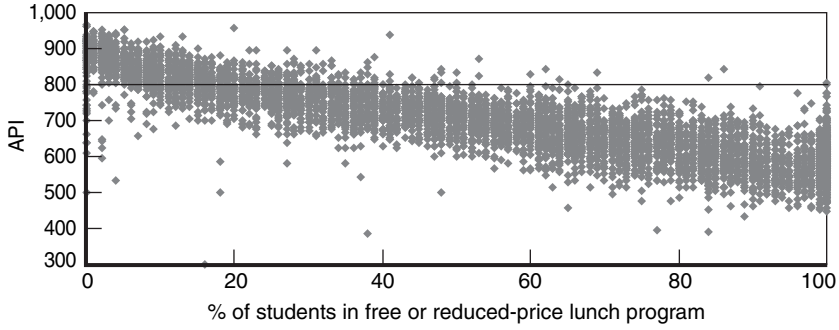
To help California policymakers with this reconsideration, the William and Flora Hewlett Foundation funded a three-part PPIC project to examine links between school resources, academic standards, and student outcomes. The first report in this series, *High Expectations, Modest Means: The Challenge Facing California's Public Schools*, appeared in 2003 and offered background information on the state's academic standards, resources, and funding mechanisms. This second report builds on the first by presenting the results of school budget workshops conducted by PPIC and executed by a group of principals from representative schools throughout the state. The third report will present the findings of site visits, interviews, and surveys at these representative schools. Taken together, the three reports are meant to provide the education community with data and conceptual tools for determining the resources California's public schools need to educate students to state standards.

As the first report noted, most of California's academic standards were created and implemented between 1995 and 1998. Designed to improve instruction and accountability in the K–12 system, these academic standards now include numerous and specific learning objectives in most subjects and at each grade level. California's standards are very rigorous; indeed, the Fordham Foundation, one of the nation's leading proponents of high academic standards, has deemed them the best in the nation. As for measuring achievement at the school level, the state relies heavily on the Academic Performance Index (API). Drawing on a battery of test scores, the API rates school performance on a scale ranging from 200 to 1,000, and the State Board of Education has set a score of 800 as the goal for all California schools.[1] To put this goal into

[1]See Rose et al. (2003) and California Department of Education (2002b) for details on how the API is calculated.

a national context, an 800 API requires that roughly 70 percent of students at any given school perform above the national median—a tall order. The state standards, therefore, cannot be faulted for lack of ambition. However, even they are eclipsed by the standards in the federal No Child Left Behind Act, which was signed into law by President Bush in January 2002. That law would have all students scoring the equivalent of an 875 on the API by 2014.

Since the implementation of these reforms, API scores have been rising, especially at the elementary school level. Even so, only 20 percent of California's elementary schools met the goal of 800 in 2002, and the percentages are significantly lower for middle and high schools. Moreover, API scores continue to exhibit a strong correlation between achievement and socioeconomic status; specifically, very few elementary schools with high concentrations of high-poverty students have met the state's API standard (Figure 1.1), and the patterns for middle and high schools are similar. Because achievement correlates so consistently and strongly with socioeconomic status, the state produces a "similar schools" API ranking, which measures a school's achievement scores against those of schools serving students with similar demographic characteristics. Even so, the ultimate goal—an API of 800—remains the same for all schools. If the state hopes to meet this objective, most of the progress must come from schools serving students from low-income families.



NOTE: Each point represents one elementary school.

Figure 1.1—Academic Performance in California Elementary Schools by Student Poverty Level, 2002

In addition to reviewing academic standards and student performance, our first report also gauged the level of resources the state has devoted to K–12 education. Despite high expectations for its students, California provides its schools with relatively modest resources. It spends less per pupil than most states, even though resource costs, especially salaries, are higher in California than elsewhere. As a result, California students receive significantly fewer school resources than other students. Even in 1999–2000, three years after the state implemented Class Size Reduction, California had 25 percent fewer teachers per pupil than the rest of the United States. It also had 54 percent fewer counselors per pupil, 32 percent fewer administrators, and 44 percent fewer support staff. Although California districts serving poor students tend to receive more revenue than others in the state, the pattern is inconsistent, and as Figure 1.1 shows, those extra outlays have not raised low-income students to the performance goals laid out for all students.

As we completed the first report and presented its findings to various policy audiences, we began to focus our efforts on learning what we could from principals at a representative selection of California elementary, middle, and high schools. The full rationale for this focus is presented in Chapter 2, but the main reasons are straightforward. Principals are familiar with school funding and budgeting, have strong incentives to improve school achievement, and possess a detailed knowledge of the state's academic standards. No less important, principals are in the best position to know what schools need to run smoothly. To receive state funding, for example, schools need staff to monitor attendance every day—whether or not that routine improves test scores. Schools also need custodians to maintain the facility; indeed, that need would persist even if research showed, somehow, that students at safe, well-maintained schools did not perform better than students at dilapidated ones. Principals also know who their good teachers are, how much their counselors are contributing to their students' welfare, and what auxiliary services are necessary for schools to function. This knowledge allows principals—indeed, requires them—to make judgments about the relative efficacy of each school resource. Taken together, their judgments about the links between school resources and student achievement, although not necessarily definitive, are an

indispensable part of any serious discussion of what California's schools should look like and how students might meet the state's academic standards.

The decision to consult these practitioners also reflects a new educational reality. Recent reforms based on standards and accountability have transformed California's schools, and relationships between inputs and outcomes that held in the past are unlikely to hold now. Principals are on the front line of this transformation, and they are currently in the best position to understand what schools need to be effective in this new era. As always, principals evaluate teachers and allocate revenues received through a broad and complicated array of categorical programs. Now, however, they also take responsibility for reaching performance targets and ensuring that specific learning objectives are met in each classroom. As we found on our site visits, principals are taking these responsibilities very seriously. As the educational leaders at these school sites, their jobs are on the line, and it makes sense to heed their observations as the state strives to improve student performance and school accountability. In this sense, our decision to consult principals chimes well with other approaches, including that of Ouchi (2003), that emphasize the centrality of school site management in enhancing student performance.

In addition to interviewing principals at their schools, we chose to draw on their experience by inviting them to participate in school budget workshops held last year in San Francisco. At the outset of the workshops, we described two hypothetical schools with varying demographic profiles and asked them to allocate resources so as to maximize the API score at each school. We gave each principal three budgets, the first of which was roughly equal to the one received in 1999–2000 by public schools for the included resources. The other two budgets were 15 and 30 percent bigger. After they allocated the resources in the way they thought would maximize student performance, we asked them to predict API scores for each of the six schools they created (two schools at three budget levels). In this way, we sought to collect their professional judgments about the relationship between well-allocated resources and expected student outcomes.

We explain our reasons for this novel approach in Chapter 2, which also discusses why past research efforts have not settled the question of what constitutes adequate funding. Chapter 3 describes what we learned about key school resources from our sample of principals during the pre-workshop interviews. Chapter 4 describes the budget workshops and their protocols, and Chapters 5 through 7 give the results for elementary, middle, and high schools, respectively. The final chapter considers how state policymakers can use this research approach and these results as they consider ways to help California's students reach the state's academic standards.

2. A Rationale for Budget Workshops

California's relatively high academic standards raise the question of what levels and combinations of resources are needed for the state's students to meet them. This chapter explains why that important question is so difficult to answer and why we have addressed it through a series of budget workshops with school principals. Despite repeated efforts to understand the connection between school resources and achievement levels, social scientists have not produced findings that would guarantee specific academic outcomes based on school inputs, especially in a state as large and diverse as California. The reasons for this failure cannot be attributed to a lack of effort or ingenuity within the research community. The main difficulty is that the effectiveness of a school depends on many factors that cannot always be observed, measured, or estimated. These factors obscure the link between school resources and student achievement and may lead to biased estimates of that link.

Our workshops attempt to overcome those biases through a pseudo-experiment designed to hold unobserved factors constant as school resources change. Our approach follows from basic statistical principles, which we explain through a series of simplified examples. Although the examples are intended to motivate our approach, they also identify key issues that any approach must confront.

Education Production Functions

Underlying the question of adequate resources is the common sense notion that resources are systematically linked to student achievement by what researchers call an education production function (Hanushek, 1986). For example, a very simple education production function might be

$$API = 50T,$$

where API is the Academic Performance Index for a school and T is the number of teachers in the school. Each additional teacher lowers the average class size, enhances student learning, and increases the school's API by 50 points. With 16 teachers, therefore, the school attains an API of 800 when we hold all other factors, including the number of students, constant. If education were this simple, the adequacy question would be easy to answer by simply observing the number of teachers and the performance level in schools. Schools with 16 teachers would be considered adequate because all of them would be achieving a score of 800.

Education is not nearly this simple, however. Most experts agree, for example, that student motivation, parental involvement, and teacher effectiveness play important roles in the educational process, yet none of these factors lends itself to easy observation or measurement. Such factors move the discussion of adequate resources from the realm of observation and measurement to the realm of statistics. To illustrate the difference this move makes, a more realistic production function would include a measure of teacher quality. This factor is denoted by Q, and it takes on just three values. If a school's teachers are below average, $Q = -1$; if they are average, $Q = 0$; if above average, $Q = +1$. The education production function is then

$$API = 50T + 50Q.$$

A school with 16 teachers could have one of three different APIs depending on the quality of its teachers. If its teachers are below average, its API is 750. If its teachers are average, its API is 800. If they are above average, its API is 850. The problem is, however, that we can only observe the number of teachers directly, not their quality. For this reason, researchers have not produced a reliable answer to the adequacy question. There are several different approaches to addressing that question, however, which we discuss in turn.

The Successful Schools Approach

One approach to addressing the adequacy question is based on observing which schools achieve the desired outcome, measuring their resource levels, and assuming that all schools could meet the goal with the same set of resources. Ohio used a version of this approach to determine adequate school resources (Rose, 2001). The major problem with this approach is that it assumes a very simple production function and ignores the fact that other unobservable factors, such as teacher quality, may also play a role in the success of a school.

Suppose, for example, that there were two groups of three schools identical in every observable respect except the number of teachers. Schools in one group have 15 teachers, and schools in the other group have 16 teachers. However, let us also assume that within each of the two groups of schools, one school has above-average teachers, one has average teachers, and one has below-average teachers. Assume also that the relationship between resources and APIs is given by the second, more realistic production function. Under those assumptions, two of the schools with 16 teachers—the ones with average and above-average teachers—will achieve at least an 800, and one of the schools with 15 teachers—the one with above-average teachers—will achieve an 800 (Table 2.1).

Because teacher quality cannot be observed, the successful schools approach would conclude that 15 teachers are adequate because a school

Table 2.1

Example of Education Production Function When Teacher Quality Is Included

Teachers	Quality	API	Average API
15	–1	700	
15	0	750	750
15	+1	800	
16	–1	750	
16	0	800	800
16	+1	850	

with 15 teachers achieved 800. If all six schools had 15 teachers, however, only two would reach an API of 800. In the language of statistics, the successful schools approach is vulnerable to selection bias. The schools that score 800 are successful because they are disproportionately endowed with an unobserved factor—namely, teacher quality—that enhances student achievement. As a result, this approach underestimates the resources more representative schools need to achieve state standards. Although we have focused on teacher quality in our example, a multitude of other unobservable factors might also be related to student success.

Statistical Analyses

Another approach to estimating the relationship between resources and outcomes considers both successful and unsuccessful schools using a statistical technique called cross-section regression. This technique essentially averages the outcomes of schools with the same resources and uses those averages to estimate the link between resources and outcomes. In our example, this approach would average the API scores of the three schools with 15 teachers, average the scores of the three schools with 16 teachers, and then estimate the link between resources and average outcomes. On average, a school with 15 teachers achieves an API of 750, and a school with 16 teachers achieves an average API of 800. On average, therefore, an additional teacher is predicted to increase a school's API by 50 points.

This technique also estimates the deviations around the averages, making it possible to recognize the effects of unobserved factors. When combined with the average relationships, the deviations indicate that if schools have 15 teachers, one-third can be expected to achieve an 800 API. If schools have 16 teachers, two-thirds can be expected to reach that goal. Acknowledging unobserved factors is more than a statistical nicety, however. It also changes how we conceive of adequate school funding and public policies to ensure it. The successful schools approach led to absolute statements: Schools with certain resources can reach the state standards; schools with fewer resources cannot. Given the complexities of the educational process, absolute statements like these are

obviously false.[1] A school with meager programs but an outstanding principal, excellent teachers, and motivated students can accomplish almost anything, including an 800 API. However, such factors rarely coincide. In shaping public policies, therefore, it is useful and common to think in terms of likelihoods. A policy based on a few exceptional cases is unlikely to prove generally successful, and a policy that seeks to guarantee success in all schools is likely to be prohibitively expensive. Public policy must always trade off the cost of a plan against its likelihood of success.

Although cross-section regression helps us quantify such tradeoffs, it is not infallible. If an observed resource (the number of teachers) is correlated with factors that are unobservable to the researcher (teacher quality), this technique can lead to biased estimates. Let us consider our six schools again under this assumption. Suppose that the two schools with below-average teachers attempt to compensate by hiring 16 teachers, and the two schools with above-average teachers hire only 15 teachers. Although researchers cannot observe teacher quality, those in charge of hiring teachers do have a sense of their quality. Of the two schools with average teachers, one hires 15 teachers and the other hires 16. Among schools with 15 teachers, the two with above-average teachers have an API of 800, the one with average teachers has a score of 750, and their average score is 783. Among the schools with 16 teachers, the two with below-average teachers score 750, and the one with average teachers scores 800, yielding an average score of 767 (Table 2.2).

Because researchers can measure only the number of teachers and not their quality, statistical analyses would conclude, falsely, that an additional teacher reduces a school's API by 16 points! In the language of social science research, this false conclusion is due to an omitted variable bias.

For reasons of this sort, statistical research has yet to capture the key relationships between resources and student achievement. As data

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[1]Furthermore in California, where per-pupil funding levels are largely equalized across school districts, this type of argument is less helpful.

Table 2.2

Example of Education Production Function When Teachers and Quality Are Negatively Correlated

Teachers	Quality	API	Average API
15	+1	800	
15	+1	800	783
15	0	750	
16	0	800	
16	–1	750	767
16	–1	750	

improve, however, and more variables can be measured and included in the analyses, these problems will become less severe.[2]

One way to reduce omitted variable bias is to observe how changes in resources are related to changes in outcomes over time for a set of schools. This statistical technique is commonly referred to as panel analysis. Its underlying assumption is that a school's unobserved factors, such as teacher quality, do not change along with resource levels and student outcomes. Again, consider the six schools in Table 2.2 in which teacher quality is negatively correlated with teacher quantity. Suppose, however, that we observe these schools at two different points in time and that some schools have gone from 15 teachers to 16 teachers,

[2]Consider a related example of how unmeasured factors can bias estimates of the relationship between student outcomes and school inputs. For example, suppose that good teachers are scarce in District A but plentiful in District B. In an attempt to attract better teachers, District A offers higher salaries. The move is partially successful; District A improves its teaching staff, but on average, District B still has better teachers. A team of social scientists decides to study both school systems and concludes that District B is doing better than District A and at less expense. The researchers might conclude, falsely, that expenditures are negatively correlated with achievement. Because the researchers do not observe this scarcity, and because it is correlated with expenditures per pupil, researchers incorrectly attribute the differences between the two districts to expenditures rather than to teacher quality. In fact, Loeb and Page (2000) show that this particular bias may account for previous research results showing that teacher salaries are not correlated with student achievement. When Loeb and Page used better data and introduced a variable that measures the scarcity of quality teachers in a state, they found that students performed better in states that paid teachers more.

and some have gone from 16 to 15. Because of the education production function, the first group increased their API by 50 points and the second group decreased it by 50 points. If teacher quality remained constant, this variation over time would lead to the unbiased estimate that each additional teacher increases the API by 50 points.[3]

The main drawback to this approach is that unobserved factors do not necessarily remain constant over time. The classic example is California's Class Size Reduction program, which dramatically increased hiring and reduced class sizes in almost all California schools in grades K–3. As Jepsen and Rivkin (2002) point out, hiring so many teachers in such a short period undoubtedly affected teacher quality, making it difficult to distinguish this quality effect from the effect of lowering class sizes.

Although some insight can be gained from these types of statistical analyses, problems such as selection and omitted variables bias have clouded the results or led to unwarranted conclusions. Another reason this line of research has limited benefits for constructing a Quality Education Model is that it tends to focus on a small set of the overall resources needed to run a school effectively. Whereas the effect of class sizes on achievement is commonly studied, the effect of resources such as office staff or nurses is rarely explored. To construct a useful Quality Education Model, however, all resources must be on the table at the same time.

Experiments and the Professional Judgment Approach

There are two other ways to avoid the drawbacks of statistical analysis in estimating a production function for schools: experiments and professional judgments. The most famous example of a random experiment in education is the Tennessee class size experiment (Mosteller, 1995). Schools were asked to volunteer for a state program that dramatically reduced the size of some classes. Students and teachers within those schools were then randomly assigned to classes of different

[3] Hoxby (2002), for example, uses this approach to measure the effect of changes in class size on student achievement.

sizes. Because these assignments were random, teacher and student characteristics were unlikely to be correlated with class size. Researchers could then compare the performance of students in small classes and large classes without concern for an omitted variable bias. When they made this comparison, they found that students in small classes performed better on standardized tests, the best evidence we have that class size affects student performance. However, the experiment was limited to the primary grades and compared classes of about 25 students to classes of about 15 students. We therefore do not know whether the results hold for middle and high school students or for smaller changes in class sizes. Moreover, for all of their benefits, random experiments are rare in education. They are expensive, and most parents do not want their children assigned randomly to schools and classrooms to further a social science experiment.

The second alternative technique to estimate the education production function uses the professional judgment approach, in which school practitioners (such as superintendents, principals, and teachers) are surveyed about the connection between resources and outcomes. Although subject to the biases of the participants, this approach has several merits. It draws on the experience practitioners have amassed over the years, including their firsthand knowledge of resource allocation decisions and the learning challenges of students. This experience allows them to grasp complexities that may be obscured by abstracted data in statistical models.

One recent example of this approach was provided by a Maryland education consortium in 2001.[4] The consortium relied "on the judgment of experienced educators to establish the level of resources necessary to provide students with an adequate education." It convened 22 such educators over a three-day period, divided them into three teams, described a hypothetical school based on statewide average demographics, and asked them to devise an instructional program for a prototypical elementary, middle, and high school that would allow each school's students to reach the state's academic standards. Participants were given prices for each resource but not a budget constraint; instead,

[4]See Management Analysis and Planning, Inc (2001).

they were told to "spend every dime you need but not a dime more." Per-pupil expenditures from the three teams ranged from $7,461 to $9,313. (By way of comparison, Maryland's per-pupil expenditure in 1999–2000 was $7,346, and California's was $6,069.)

Maryland's professional judgment panels are informative, but the research design has three specific flaws. First, using teams of experts obscures differences of opinion about the link between resources and outcomes. Each team reported one answer, requiring a compromise among the different views of team members. For public policy, these differences of opinion are relevant because we ultimately need to know the likelihood that any one number is adequate. Second, the need to compromise in the absence of a budget constraint is likely to put upward pressure on spending. In such situations, it may be easy for participant A to grant team member B's "need" for instructional aides in exchange for the classroom computers participant A considers critical. Third, it is more informative to ask about the likelihood of success for different levels of resources than to ask what one level of resources is adequate. In fact, the considerable uncertainty about the link between resources and outcomes suggests that no single level of resources is adequate in all cases. In this sense, the Maryland panels were asked a question that does not have a logical answer.

Our Approach: Pseudo-Experiments with School Practitioners

Our approach capitalizes on the strengths of both random experiments and the professional judgment approach. Because random experiments are often difficult to arrange, economists and other social scientists have turned to pseudo-experiments to test their theories. Essentially, pseudo-experiments attempt to replicate a random experiment in a laboratory setting. In economics, such experiments typically involve participants buying or selling a good with considerably smaller stakes than would occur in a real market transaction. The smaller stakes raise the question of whether the results from these experiments can be taken seriously, but as Vernon Smith argues in his 2002 Nobel Prize lecture, pseudo-experiments have made important

contributions to economic research. Essentially, our approach is a pseudo-experiment using professional judgments of school practitioners.

Like the Maryland consortium, we convened experienced educators, described the characteristics of hypothetical schools, and elicited their judgments about the connection between a specific set of resources and achieving the state's academic standards. We told principals to assume that they had adequate facilities for the educational program they envisioned and that the quality of their personnel would be sufficient, thereby focusing attention on the resources of interest. We also represented the resource allocation problem using a spreadsheet, which listed the resources and their prices.

Unlike the consortium, we imposed a budget, asked principals to allocate resources to maximize the school's API, and then asked them to predict what that API would be. We had them work independently and complete the exercises for three budget levels and two hypothetical schools. Our analysis therefore focuses mainly on how allocations and predictions changed as the budget changed. As in the case of panel analysis, this research design allowed us to assume that the principals' choices and predictions reflected the perceived values of the resources and not the influences of unobservable factors.

The main disadvantage of our approach is that our results are based on API predictions, not real outcomes. Because real experiments seem a remote possibility in California, the alternatives seem to be nonexperimental observation, such as cross-section regression and panel analysis, and pseudo-experiments. In our view, each approach has its strengths and weaknesses; no one approach is clearly superior.

Conclusion

After reviewing previous efforts to capture the relationship between school resources and student outcomes, we designed a novel approach that capitalizes on the strengths of various methods. We avoided the successful schools' approach because it is vulnerable to various forms of statistical bias. We also avoided cross-section regression while crediting its basic intuition, which highlights likelihoods (rather than guarantees) of achieving specific standards with specific bundles of resources. Although random experiments reduce the statistical biases that afflict

both the successful schools approach and regression analyses, such experiments are expensive and difficult to arrange. Our approach responds directly to the inherent uncertainty about the link between resources and outcomes.

We combined the professional judgment approach with pseudo-experimentation of the sort economists and other social scientists have employed recently and successfully. Our budget workshops elicited professional judgments according to specific criteria. First, we chose to focus on principals, largely because they know the most about the standards, resources, and outcomes we have in mind. Second, we decided not to ask principals about individual resources in isolation; rather, we wanted to see how they combined resources to maximize achievement. Third, we wanted principals to combine those resources under a budget constraint. Only this constraint would distinguish desires from needs and reveal the relative value of each resource.

3. Preworkshop Interviews

With this basic research approach in mind, we visited 49 school sites during the 2002–2003 school year and interviewed the district superintendent, principal, and personnel director at each. These visits, which we will analyze more thoroughly in the third report, served three major purposes. First, they helped us understand the profound transformation that the emphasis on standards has created in California public schools. Second, they informed the design of the school resources spreadsheet we used in the budget workshops. In particular, they helped us identify the resources that mattered most to principals as they strived to balance academic performance goals with their everyday operational needs. Finally, they helped us understand the priorities and preferences the principals revealed in the workshops themselves. This chapter describes what we learned in those interviews.

Before arranging the site visits, we selected the schools for our study using a stratified random sample based primarily on geographical region and a combination of student test scores and socioeconomic status. (A description of the schools and the sampling procedure appears in Appendix A.) In addition to hailing from different parts of the state and serving different student populations, the principals we interviewed brought varying levels of experience to the budget workshops. Although the median experience level for the entire group was six years, two had just finished their first year and ten had more than ten years of experience. On average, our principals served at schools with slightly larger and more impoverished student bodies than is typical statewide. Although they had lower API scores relative to all California schools, they had higher scores relative to schools with similar demographic profiles.

The Emphasis on Standards

The strongest impression we took away from the site visits was a thoroughgoing emphasis on academic standards. The principals we spoke with understood that the public expects more from its schools, and several spoke disapprovingly of the atmosphere in public schools before the standards were adopted. Many characterized the new environment as one focused more on what students learn and less on how innovative or creative a teacher might be. Some principals expressed reservations about this new environment. One elementary principal told us that a science teacher she valued had left teaching because the teacher had found California science standards too broad and too shallow to be consistent with the narrow but intensive study that she found best for young students. Several other principals talked about the tension between covering the state standards and also allowing room for the creative lessons instructors had devised to inspire and motivate students.

Despite these understandable reservations, all the principals we interviewed were actively engaged in a range of activities to align their curricula with state standards. In many classrooms we visited, those standards were posted prominently. In one high school, students carried a portfolio listing the standards they were to master in each course. In many schools, teachers were encouraged to create lesson plans showing explicitly how their instruction related to state standards. In one elementary school, teachers were required to file a weekly lesson plan with the principal showing which standards they would cover and when. One middle school also required that teachers have their lesson plans visible on their desks for the principal to reference during classroom visits.

All the schools we visited were wrestling with the issue of allocating instructional time across the school year to cover the full breadth of California's standards. Those standards are detailed and extensive, and good planning is required to cover each in sufficient depth. Many schools we visited had established pacing schedules, specifying which subjects a teacher should cover in each week of the academic year. The result was a commonality across classrooms. One high school principal described the change in this way:

> When I walked classroom to classroom . . . I would see the same course being taught at different rates, with different calendars and different topics in every room I walked into. . . . Now when I walk classroom to classroom . . . kids [are] all getting the same kind of thing, classroom to classroom. Maybe off by a week, but it's all there.

In many schools, teachers were also working together to find a common level of instructional rigor. This challenging task often involved the comparison of student work from different classrooms. One elementary school principal found these comparisons particularly useful in encouraging her teachers to address state standards.

> First, I brought in samples from another school, because it's not threatening, and there's no finger-pointing. "Okay, you look at it. What grade levels, do you think, this would be now? Okay, now open your book. What standard did it really meet and what grade level?" Then they brought samples of their own work and did it by grade level again. . . . Real samples of student work. I wanted to see the lesson plan. I want to see what happened. So they brought those in, looked at them as a grade level with the standards books opened. Now, "You did this in fourth grade. You read your fourth grade standards, do they match? If they don't, why?" And it was a real eye-opener, because some of them said, "I've been doing this, but I just found it in third grade standards or, in some cases, I got it in second grade standards."

At the middle and high school levels, this search for a common level of rigor across classrooms had often led to common end-of-course exams. For example, the math teachers in a middle school might have produced the same final exam for all Algebra I classes. Typically, they would also share the grading of those exams, so that a teacher in one classroom would grade exams from a colleague's classroom. As a consequence, students were held to the same standards in all classrooms, and teachers could easily compare the work of their students with that of their colleague's students.

As schools have come to grips with the state's new standards, many have also come to realize that the standards may be too broad. This has led schools and districts to create so-called "power," "essential," or "focal" standards. The idea is to identify a small number of standards that are more important than others. In some cases, schools had identified these standards by paying close attention to the subjects on the state's standardized tests. They looked at the frequency with which items were being tested and then focused on the high-frequency items. As a

result, the state's tests have become a device for narrowing a set of standards that are arguably too broad. In other cases, schools and districts arrived at power standards by identifying elements that are essential preparation for subjects in subsequent grades or courses.

The schools in our sample were at various stages in aligning their curricula to state standards. In one case, a school in our sample previously designated as a California distinguished school had done poorly on the state's standardized exams. Unlike many schools in that situation, it volunteered for the state's process for underperforming schools (Immediate Intervention Underperforming Schools Program) and is now in the midst of a very thorough review of its instructional practices. Even where standards-based instruction was well established, however, schools constantly reevaluated and revised their pacing calendars and curricula. Most districts had districtwide tests to evaluate student achievement. Several elementary schools in our sample used a new assessment tool, StandardsMaster, developed by the company Renaissance Learning. StandardsMaster provides test items in reading, math, and language arts matched specifically to California's standards. Student test answers are scanned and then sent over the Internet to the company, which quickly returns an analysis of how well each student and class are learning specific standards. One high school in our sample created its own schoolwide assessments of state standards, which it administered to students every six weeks throughout the academic year. These assessments within the academic year provided opportunities for schools to identify weaknesses in their curriculum and to modify their pacing calendars. Because each cohort of students is different, curriculum plans and pacing calendars are always in flux. One district in our sample established a "data analysis day" in early September, when school administrators and teachers pore over results from the previous year's tests and begin planning adjustments in instruction in response to those results.

Building the School Resources Spreadsheet

The other major by-product of the site visits was a more precise sense of which school resources should be included in our school resources spreadsheet. For reasons of time and tractability, we could not

ask principals about every resource a school needs to function smoothly. We therefore used the interviews to narrow the range of resources we wished to focus on in the budget workshops themselves. We also learned more about the nature of these resources and why principals value them.

Professional Development

One of the resources principals mentioned most often was professional development, a category that includes cooperative activities among teachers to align a school's curricula to state standards and to adjust the pace of instruction in response to student test data. Finding the time for such activities was a challenge for every school in our sample. Many followed a practice called "banking minutes," by which they extended instruction for a few minutes on most days of the year to reduce instructional minutes on selected days. On these shortened days, schools held meetings among teachers and administrators. Some schools also brought in substitute teachers to take over instruction for regular teachers while they met.

Most principals expressed frustration with this process of squeezing common planning time into an already demanding academic week. As one principal said, "If you are doing it right, teaching is exhausting." Several principals expressed the desire to make this process of planning instruction and evaluating student work a more regular part of a teacher's work week. One middle school principal put it this way:

> Teachers need time to reflect. Teachers need time to plan. Expecting them to do it after 2:30, their duty day, is ludicrous. Expanding the school day and the school year, and paying them accordingly, and then building within the school day, staff development time, and time for reflection, and time for them to grow as persons, will not only increase student achievement but will also increase retaining teachers.

A related activity is training in pedagogy. All the principals we interviewed emphasized the importance of high-quality teachers. Although this issue came up time and time again in discussions of hiring, several schools also devoted considerable time and effort to improving the skills of their current teachers. The principals described those activities this way:

> Little things like make sure that you have a clear objective, the students know what the objective is, and it's stated in terms of a product. . . . They know that before they leave this class, there's going to be some project to prove that you've gotten the concept, in terms of making sure that every student is participating, actively participating in the classroom, and kids aren't falling between the cracks.

Several other schools employed academic coaches who worked with teachers, particularly new teachers, on effective teaching strategies. In one large inner-city elementary school we visited, almost half the teachers were in their first or second year. To assist those teachers, the school had two full-time coaches who spent their entire day in the classroom, observing teachers and helping them to improve. The principal of this school found these coaches to be essential to the school's outstanding performance, although she complained that the school acted as a training ground for other schools in the district. New teachers came to her school, received first-rate training, but then transferred to less-challenging assignments elsewhere in the district.

These staff development activities also involved observation of successful teachers. The school hired a substitute to fill in for a teacher, and the teacher was released for part of the day to observe an exemplary teacher. These observations were usually combined with follow-up sessions with an academic coach or the principal to reflect on what the teacher had observed and to discuss how successful strategies could be incorporated in the teacher's instruction.

For our budget simulations, we grouped common planning time and pedagogical training into the broad category of professional development. Professional development involves a teacher's time beyond regular classroom instruction. Either the teacher is absent from the classroom for a period of time and a substitute teacher fills in, or a teacher's work time is extended to accommodate these activities. In either case, the main cost of this activity is the time of teachers.

Class Size

To the parents of a student, the most obvious indicator of a school's resources is the number of other students in their child's classes. Small class sizes are also important for principals, and we discovered that some schools had developed ingenious solutions to lower the cost of achieving

small classes. One elementary school in our sample had fourth and fifth grade classes of 35 students. However, it had developed a large and well-equipped computer laboratory, which it used to lower class sizes for part of the day. For 90 minutes each day, half the students in each class were assigned to work in the computer laboratory on a math tutorial. The remaining 17 or 18 students stayed in their classroom and worked with their teacher on reading. When that period was over, the students in the lab returned to the classroom for their reading instruction, and the students who were in the classroom moved to the lab for their math tutorial. Even though the class had 35 students, each student received 90 minutes of reading instruction in a class of only 17 or 18 students. Another elementary school in our sample was experimenting with the concept of "flex" teachers, who are merely regular teachers with a different schedule. Flex teachers began work in the afternoon and took half of the students in a regular teacher's class. For the afternoon, therefore, students were in a class half the size of their morning class.

These and other examples led us to think of teacher resources from a broader perspective than just class size. Additional teachers allow a school to reduce its class sizes, but that school may not choose to reduce the sizes of all classes or to maintain the same class sizes throughout the day. As a consequence, in our budget workshops, principals chose the number of teachers, not the size of their classes, and were free to allocate those teachers in a variety of ways.

Instructional Time

Time on task is an essential ingredient to learning. Schools strive to make effective use of the time students spend in schools, but some principals believe that students need to spend more time in school. One elementary school principal in our sample used her Title I funds and other categorical money to pay teachers to teach 30 extra minutes each day. She had been doing this for many years, a result of her experiences as a beginning teacher. On her own and without compensation, she started her class 30 minutes earlier and kept her students 30 minutes longer than other classes. Over the course of the school year, her students received a total of 180 extra instructional hours. She found that her students performed significantly better on standardized tests

administered by the district. As she said, "I was at the beginning of my teaching career, so I could not have been all that wonderful and strong." She attributed her success as a teacher to her extended day. Later in her career, as she read research about the use of Title I money, she concluded that instructional aides, a common use of Title I funds, are ineffective. As a principal, she employed no instructional aides and used her Title I funds to extend the school day by 30 minutes.

At the high school level, the issue of instructional time is particularly acute. The framers of California standards deserve credit for describing a course of study that builds logically from year to year. Students are prepared for a challenging algebra course in eighth grade because they have been introduced to progressively more sophisticated algebraic concepts from third grade on. They are prepared for an ambitious senior year course in government and economics because they have learned basic concepts of political science and economics in lower grades. But suppose that preparation has not been as good as it was designed to be. Suppose students come from another state or country with a different curriculum, or suppose students can pass standardized tests at lower levels but have only a superficial knowledge of deeper concepts. Then they are not ready for the high-level courses outlined for our high schools, and high schools face a dilemma. A principal of a high school whose students are mainly recent immigrants from Mexico and other Latin American countries put it this way:

> What you're forcing teachers to do is race through the curriculum. They are racing through the curriculum, they are setting up pacing schedules, they are giving those assessments, but I question whether the students are learning.

A longer school year is a natural response to California's ambitious standards, an option we built into our budget workshop.

Full-Day Kindergarten

A constant theme among elementary school principals was the effect of the state's new standards on the nature of kindergarten. One principal expressed it this way:

> I do think it would be beneficial for students to have a full day of kindergarten . . . because of the standards, because we've moved all of the expectations down, at least one grade level, and possibly more. . . . Students

> used to have time to play in kindergarten. We no longer have time to play in kindergarten. . . . What we used to teach in first grade, they're learning to do now in kindergarten in a half day.

One elementary school in our sample offered a half-day kindergarten through the fall and a full-day kindergarten for the rest of the year. In the fall term, kindergarten teachers provided extra help in the afternoon for first-graders struggling with reading. We made full-day kindergarten another option in our school resources spreadsheet.

Extra Resources for Struggling Students

The new emphasis on standardized tests has focused attention on struggling students. For a school looking to improve its API scores, the best investment of instructional resources may be for students scoring at the basic level or below. Almost all schools we visited had instituted some form of after-school tutoring for struggling students. Staffing these tutoring programs was proving to be a challenge, however. Many schools started their programs by paying regular teachers to stay after school. This arrangement had the advantage that the tutors were familiar with the material students were covering in their classes. However, it made for a long day for teachers, and some principals reported that their teachers were showing signs of burn-out from long days in front of a classroom. Other schools have used noncredentialed teachers, sometimes college students, as tutors, but the efforts of these tutors were not always well-coordinated with the efforts of teachers during the regular school day.

Flex teachers appear to be a promising response to this problem. They reported in the afternoon and began their day by working in regular classrooms, perhaps sharing responsibility with a regular teacher or taking sole responsibility for half of the students of a regular teacher, thereby reducing class sizes for part of the day. They also participated with regular teachers in common planning activities. But, when the regular school day was done, flex teachers stayed on campus to provide after-school tutoring for struggling students. In some schools, academic coaches were also filling this role. They worked with teachers on pedagogy during part of the day and spent part of the day working in small groups with struggling students.

Several elementary schools have instituted reading recovery programs, an intensive program for first-graders with reading problems. A specially trained teacher worked one-on-one with each student in the program for 30 minutes a day. Under the program, such a teacher works with only four students at a time, so reading recovery teachers were often available for other assignments, such as academic coaches or tutors.

Because of the flexibility of their daily schedules, middle and high schools had more opportunities to make instruction for struggling students a regular part of the academic day. In many such schools, students with reading difficulties were required to enroll in special reading classes instead of the electives available to other students.

Summer school was also a way to provide extra help for struggling students. Schools on year-round schedules had the additional advantage of intersession instruction. In a typical year-round schedule, students have three vacations of approximately one month duration spaced throughout the year instead of one three-month summer vacation. One large urban district we visited had established a formal intersession program, staffed by its own regular teachers. Students attended this intersession program to catch up on material in the previous session before going on to the next regular session. Unlike summer school, in which students must wait until the end of the year to receive remedial help, the intersession program provides remedial help at three intervals throughout the year and thus may be more effective in keeping struggling students on pace.

Our budget workshop included decisions about the number of students in tutoring programs and summer school. The costs of those programs were determined by the hours of teacher time needed to staff them.

School Leadership

The new emphasis on academic standards has also changed the role of principals. They are expected to be "instructional leaders," not bureaucratic paper pushers. There is just as much paper to push, of course, so the duties of instructional leadership fall on top of the other responsibilities of a principal. Primarily, instructional leadership comes down to taking an active role in instruction, being a presence in the

classroom, encouraging teachers to improve instruction, and providing tangible representation of high academic standards. Many principals expressed frustration about not finding the time for these activities. A visit to a classroom can always be postponed, and there are always more urgent issues that need attention. One high school principal had overcome this conflict by thinking of classroom visits as dental appointments. First, she wrote down the time in her appointment book for visiting classrooms; then she scheduled other activities around those times.

The issue of leadership came up in many contexts in our interview. One notable example occurred in our interview with a highly regarded elementary school principal in Southern California with over 20 years of experience. His school serves students who are almost entirely low-income and Hispanic, and it has done quite well on the state's standardized test. It is still short of the 800 API goal, however, so we asked him if it would be possible for his school to achieve that goal. He responded as follows:

> It's possible if two things would happen. The first thing that has to happen is there needs to be enough resources that the principal can be freed up to spend more time devoted to being the instructional leader of the school. . . . We don't have the counselor, and we don't have the assistant principal, so we take two hours settling an argument between two kids on whose pencil is it. . . . So my number one answer is, we can make 800, if I could be allowed to spend more of my day on instructional leadership. And the second part to that is what we've already talked about, if we had more release time for staff development.

As his answer makes clear, the principal often responds to the day-to-day problems that no one else has time to deal with. We found this to be particularly true in elementary schools, which typically have few staff beyond teachers, attendance clerks, the school secretary, and the principal. When an adult authority is needed, the easiest response is for the principal to postpone a scheduled classroom visit. In many respects, adequate resources for school leadership come down to adequate staff in supporting areas.

Support Staff

The adequacy of support staff was intertwined with the issue of instructional leadership. If the support staff is inadequate, the principal may not have the time to visits classrooms, critique teaching, and lead other activities designed to enhance instruction.

In addition to uncovering this general issue, we also learned that most principals feel that they have too few counselors. Most elementary schools did not have any counselors or other personnel functioning in that capacity. At the few schools that did, principals felt fortunate to have that support. One district had instituted a districtwide "wellness" program to deal with the social development of its students and the difficulties they might encounter at home. As a result of this program, the elementary school we visited had a part-time wellness advisor who worked with troubled students individually and in small groups and supervised the playground during lunch hour. The principal identified that program as one of the keys to the school's considerable success: "If it happens in the playground, it's going to happen in the classroom, and that destroys learning. So if you keep the playgrounds calm and the kids are reasonably happy, it's going to flow."

The high schools we visited all had a counseling staff, but the ratios of students to counselors were quite high, often 400 or 500 to 1, so that counselors were mainly consumed with the tasks of approving student schedules and related paperwork. Counselors had little time for dealing with social or emotional problems or even simple college and career counseling. At one of our large suburban high schools with a student-counselor ratio of 500 to 1, students had to meet with a counselor once a year to discuss class schedules. Some students met more frequently with their counselor, but many did not. The principal found this arrangement inadequate and made it his goal to improve counseling services. He described the goal this way:

> We want to get to the point where . . . as a counselor, I'm sitting down with you, your family, your son, whoever goes to this school, and we're talking about that kid, and spending 45 minutes once or twice year, really talking about where that child is going. That's where we're not, but we've got to be.

At middle schools, counselors may be even more important because students are passing through an emotionally difficult stage. As one

middle school principal put it, "Any given adolescent is upset at least once during the week because they've been neglected by their peers or something. They're not studying, they're not getting anything done." Despite the apparent need for counselors, most middle schools we visited lacked them.

A closely related support staff position is school nurse. Most elementary and middle schools we visited did not have a school nurse; instead they were visited periodically by a district nurse, whose job it was to check student health records. In most schools, the clerical staff was trained in basic first aid and coped with playground scrapes and bruises. Anything more serious resulted in a 911 call. School staff also dispensed regular medicine prescribed by doctors and dealt with minor illnesses. Most principals thought it would be desirable to have a trained nurse on site but felt that they were getting by adequately with their current arrangements.

Although employment of school nurses may be in decline in California, employment of campus security officers seems to be on the rise. The large high schools we visited had a half-dozen or more officers to patrol school grounds and buildings during the day. In several of these schools, access to the school grounds was closely guarded. In addition, many large high schools had a full-time police officer on campus. Some middle schools also had security officers, but most elementary schools did not.

Large high schools typically had a significant clerical or secretarial staff. These staff members supported the activities of the principals, assistant principals, and counselors. In addition, all schools we visited devoted considerable clerical resources to the task of recording attendance. This task involves not only recording who is present each period but also determining reasons for absences. A large high school may have three or four clerks devoted full-time to attendance issues.

Parents as a Resource

Parents can be an important resource for a school. One elementary school principal with experience at many schools throughout the state attributed the success of her current school largely to the parents of her students. She described her teachers as merely average but regarded her

parents as extraordinary. It was not so much the help they provided during the school day but the support they provided after school by encouraging their children to do their homework, emphasizing the importance of doing well in school, and holding high expectations for their children. The principal characterized this support as part of the culture of the school, a neighborhood attitude that developed over the years and continued even as school staff and leadership changed.

We heard the same story from our highest-achieving elementary school, located in an affluent suburb of one of California's large cities. According to the principal of that school, there are more volunteers working on campus on any given day than there are paid staff members. She reported that on volunteer day, when parents and others sign up for volunteer assignments, her biggest problem was crowd control. Parents both volunteered and monitored quite closely what their children were learning in their classes. If parents believed their children's textbooks were out-of-date, or if teachers made inaccurate or misleading statements in class, the principal heard about it.

In schools like these, the support of parents is an important potential resource, but that resource requires some management. The school needs to coordinate volunteer activities, and the school's management must also listen to and respond to parents' concerns. Some schools have responded to this need by creating the position of community liaison to work with parents and others on volunteer activities. Those positions can be a small price to pay to take full advantage of a very valuable resource.

The position of community liaison can also be very valuable in low-income neighborhoods, but for a different reason. In the schools in our sample serving those neighborhoods, particularly neighborhoods with recent immigrants, principals spoke of the need to involve parents more in the activities of schools. Many of those parents had limited educations themselves and thus little understanding of what to expect from their schools and how to support their children in their studies. A community liaison can visit families in their homes and help to break down the barriers between families and their schools. Several schools had established "parent institutes" in which the parents were invited to attend weekly sessions at the school. The topics of these sessions ranged from

school organization and curriculum to strategies for effective parenting. The underlying idea was to make parents feel welcome at school and to make them an active participant in their children's education.

A few principals also spoke of the need to provide a quiet place for students to study in the afternoon and evening. In some communities, families were crowded together in small housing units, providing a poor atmosphere for evening homework. One high school in our study kept its library and computer lab open at night for its students, the main cost of which was the staff to supervise its facilities after hours.

Parental resources often play an important part in successful schools. Parents can be a potentially valuable resource in some schools, even if those schools must invest some of their own resources to take full advantage of that potential. In other schools, parents may not take an active interest in their children's education unless the school makes a substantial effort to involve them. Even then, parents may not have the education or inclination to help their children with homework or to encourage them to excel. In those communities, a school's resources may have to substitute for the parental resources that exist in other communities.

Conclusion

In designing a spreadsheet that provides a simplified description of an actual school, we realized that time constraints would not allow us to ask about every resource employed in schools. We therefore used the site-visit interviews to identify the resources that principals thought were especially important to student outcomes. Although they frequently mentioned the importance of a large teaching staff to ensure small classes, principals also emphasized the contributions of other staff, such as administrators, counselors, and nurses. In addition, they explained the benefits of increasing instructional time for students, either through schoolwide efforts or through programs targeting specific students. Finally, they described the critical role professional development plays in improving student performance. The next chapter provides details about how we integrated these resource considerations into our budget spreadsheet.

4. The Budget Workshops

Following the site visits, we invited the principals in our sample to participate in a series of budget simulation workshops conducted in San Francisco. In all, 45 were able to attend. The purpose of the workshops was to elicit their judgments about the optimal allocation of school resources and the connection between those allocations and student performance. Given the time constraints imposed by the budget workshop schedules, the exercises limited the number of resources considered and aggregated others into broader categories. In the case of teaching assignments, for example, a high school math teacher was placed in the same resource category as a high school English teacher, even though teaching math requires a different set of skills than teaching English. Through these aggregations, we created a spreadsheet that allowed principals to quantify the resources they wanted at each school and at each budget level.

The Spreadsheet

The key survey instrument employed during the workshop was an electronic spreadsheet. Table 4.1 shows an abbreviated version of this spreadsheet. Each row provides details about one resource employed by a school. The first column lists the resource. The second defines the units in which each resource was measured, and the third column gives the price per unit. In the fourth column, principals entered the quantities of each resource they wished to purchase. The final column (not shown) then showed total expenditures on that resource. The sum of these expenditures was also displayed and could not exceed the budget.

Each resource listed on the spreadsheet is described below. As the previous chapter suggested, the list is not meant to be exhaustive. We focused attention on the resources required for the daily operation of

Table 4.1

School Resources Spreadsheet

Resource	Unit of Measure	Cost per Unit ($)	Quantity
Teachers			
Teachers—grades K–3[a]	FTE[b]	59,000	_____
Teachers—grades 4–5[a]	FTE	59,000	_____
Teachers—core[c]	FTE	59,000	_____
Teachers—noncore[c]	FTE	59,000	_____
Teachers—physical education[c]	FTE	59,000	_____
Administration			
Principals	FTE	100,000	_____
Assistant principals	FTE	90,000	_____
Clerical office staff	FTE	37,000	_____
Support staff			
Academic coaches	FTE	67,000	_____
Instructional aides	FTE	29,000	_____
Counselors	FTE	78,000	_____
Nurses	FTE	78,000	_____
Librarians	FTE	67,000	_____
Security officers	FTE	37,000	_____
Technology support staff	FTE	77,000	_____
Community liaisons	FTE	36,000	_____
Specialty teachers[a]	FTE	59,000	_____
Student programs			
Professional development	Hours/year/teacher	No. of teachers x hourly teacher wage	_____
Preschool[a]	Students	4,400	_____
Full-day kindergarten[a]	1 = yes 0 = no	No. of kindergarten teachers x annual teacher wage[d]	_____
After-school tutoring program	Teacher hours/week	1,649	_____
Longer school day	Hours/day	No. of teachers x hourly teacher wage x instructional days per year[e]	_____
Summer school	Students	401	_____
Longer school year	Days/year	No. of teachers x daily teacher wage	_____
Computers for instruction	Computers	300	_____
Other	$ thousands	1,000	_____

NOTE: For elementary schools, the number of teachers counts kindergarten teachers twice because we assume that they teach two sessions of students, each of which needs to stay for the additional hour.

[a]Option available only to elementary principals.

[b]Full-time equivalents.

[c]Option available only to middle and high school principals.

[d]Also includes the cost of professional development and a longer school year for the additional teachers.

[e]Instructional days include days added to the school year in the longer school year category.

regular education in schools. In particular, we told principals to assume that the hypothetical schools had adequate facilities, maintenance and operations budgets, transportation and special education services, instructional materials, and office supplies. We did not regard these simplifying assumptions as judgments about the relative importance of these resources and services. Special education, for example, was a significant concern for all principals, but they agreed that the program's manifold complexities could not be given their full due in this context. Despite these simplifying assumptions, the principals indicated that our list satisfactorily distilled most of the key core resources.

We measured all staff positions as full-time equivalents (FTEs) in which one FTE works five full days per week. When choosing staffing levels, we allowed principals to choose fractional units. For example, a staff member working one day per week was 0.2 FTE. We also asked principals to assume that substitute teachers would staff absences. The cost of the staff included salaries and benefits. Several data sources provided salary estimates for teachers, administrators, and staff. These ranged from comprehensive administrative data of salary schedules at the district level to a statewide wage survey of employers. Appendix A provides detail about the data sources for salaries. The costs were meant to reflect California averages in 1999–2000, but we rounded off annual salaries to the nearest $1,000.

Teachers

Teachers refer to credentialed full-time teachers with an average of 11 years of experience (about the state average experience level). Elementary school principals could select different numbers of teachers for grades K–3 and grades 4–6, thereby producing different average class sizes for those grade levels. Middle and high school principals could select different numbers of core, noncore, and physical education teachers, thereby producing different average class sizes for the different types of classes. We instructed the principals to treat the average class sizes within the different grade spans and class types as guidelines. That is, elementary principals could have an average class size of 20 in grades K–3 with some classes of 25 and some of 15. Ultimately, we were concerned with the number of teachers and not how they were deployed.

The cost of a teacher includes the funds required to staff their absences with substitutes and to cover the annual cost of supplying them with a computer.

Administrative Staff

Principals, vice principals, and clerical office staff are included in this category. The clerical office staff category includes attendance secretaries, regular secretaries, and other similar positions at the school site.

Support Staff

The support staff category includes those who support teachers, students, and administrators. Academic coaches include mentor teachers, curriculum development specialists, and testing and assessment specialists. These coaches focus on helping teachers as opposed to students; in fact, this category excludes staff, such as resource teachers, who help students. Counselors include those who help students with their course schedules, determine college plans, and coordinate school-to-work programs as well as those who help students with psychological, behavioral, and social issues. The technology support staff maintain the school's computer systems, install software, provide help to users, and so on. Community liaisons coordinate volunteers, promote community outreach, and work with parents, businesses, and public agencies. Specialty teachers in elementary schools include reading specialists as well as art and physical education teachers.

The optional programs varied in scope. Some programs helped teachers, others focused on small groups of students, and others helped all students in the school. For example, tutoring programs can help a small group of students, whereas extending the school day can help all students. Summer school helps a few, whereas a longer school year helps all. The costs associated with the programs were based on the salaries of the personnel required to run the programs and did not include any facilities or administrative costs.

Professional Development

This program is measured as the number of additional hours each teacher would receive for professional development during the year. These hours are in addition to the two days per year of professional development teachers are assumed to receive as part of their contract. The appropriate materials, facilities, and transportation would be available for the type of professional development desired.

Teachers could use professional development hours to take university courses, attend local district workshops, or meet as a group within their school. For example, if principals wanted each teacher to attend ten days of professional development courses per year, they entered 70 hours (ten days times seven hours per day). If they wanted teachers to have an additional hour per week of common planning time for each of the 36 weeks in the school year, they entered 36 in that cell. We also allowed for flexibility in choosing professional development hours. For example, if principals wanted only half the teachers to receive 70 additional hours of professional development, they entered 35 hours. By doing so, they effectively purchased 35 hours of professional development time for each teacher and then reallocated the hours across teachers. To explain how they would allocate those hours, they filled out a questionnaire.

The cost of increasing professional development by one hour per teacher is the total number of FTE teachers multiplied by the hourly teacher wage. As the number of teachers changes, the cost of this program changes. This relationship is built into the interactive spreadsheet.

Preschool

The preschool program we used is a full-day program in which each class has 20 students, one teacher, and one aide, on average. Principals were to enter the number of students they wanted to participate in such a program. The cost per 20 students is the annual cost of a teacher plus the annual cost of an aide. The per-pupil cost is that sum divided by 20.

Full-Day Kindergarten

This program would provide full-day kindergarten at the average K–3 class size to all kindergarten students. We assumed that to staff this program, the number of current kindergarten teachers would need to be doubled.[1] In addition to the salaries of these teachers, the full cost of the kindergarten program also included the cost of any professional development time and the cost of lengthening the school year for these teachers. So as not to double-count these additional costs, the costs of professional development and lengthening the school year did not include costs for the additional kindergarten teachers. This highlights the issue that when there is an interaction in costs, it is somewhat arbitrary where those costs are assigned.

After-School Tutoring Program

This after-school tutoring program is one in which credentialed teachers provide extra help to students in a small group setting. The program is measured as the number of additional teacher hours required per week to operate the program. Teacher hours per week are computed as:

$$\frac{\text{students served in program}}{\text{number of students per group}} \times \text{hours per week.}$$

For example, a program that serves 50 students in groups of five for three hours per week requires 30 teacher hours per week (50 divided by five times three). We embedded a calculator in the spreadsheet program so that the principals could determine the number of teacher hours required for various programs by simply entering the students served, the group size, and the weekly meeting hours. The principals could choose to have several different types of tutoring programs; the spreadsheet only

[1]Our exercises assumed that kindergarten teachers taught two sessions of kindergarten each day and that principals could use specialty teachers to provide additional support for their teaching staff. However, even in schools where kindergarten teachers teach only one session per day and support other teachers during the rest of day, adding full-day kindergarten would require doubling the kindergarten teaching staff to preserve the support that these teachers were otherwise providing during the rest of the day.

gathered the sum of the weekly teacher hours required for all the programs. We then asked them to fill out a questionnaire about how they allocated these hours. We assume that the weekly meetings take place during each of the 36 weeks in the school year; therefore, the annual cost of each weekly hour is the hourly teacher's wage times 36.

Longer School Day

This option increases the instructional school day for every student in the school. It is measured as the number of additional hours per day. We measure the cost of a longer school day as the cost of keeping every teacher for additional time each day. If principals chose to increase the number of school days per year, the cost of a longer school day accounted for the additional days per year.

Summer School

The summer school program consists of four weeks of full-day attendance with an average class size of 20 students. This program is measured as the number of students attending this summer school program. Teachers receive one week of time for preparation. Therefore, the cost per 20 students is 25 days worth of teacher time and the average cost per student is that amount divided by 20.

Longer School Year

This option increases the length of the school year in one-day increments for every student in the school. The additional cost is the daily cost of a teacher times the number of teachers. Whereas the cost of lengthening the school day takes into account any additional days in the school year, the cost of the longer year does not take into account any additional hours in the school day so as not to double-count hours.

Computers for Instruction

This figure refers to the total number of computers (those in regular classrooms and those in labs) used for instructional purposes at the school. We assume that the cost of each computer equipped with the appropriate software is $1,000. Furthermore, we assume that each

computer lasts for three years for an average annual cost of about $300 per computer.

Other

This category allows principals to allocate funds to a resource that did not fit one of the prespecified categories. This option was rarely used.

Workshop Protocols

We held six one-day workshops in San Francisco during June and July 2003 for the principals in our sample. Principals had the option of attending one of two sessions for their grade level (elementary, middle, or high school), and they were paid an honorarium for their participation. The workshop groups ranged in size from four to 12.

Each participant had a computer with an interactive version of our spreadsheet. We asked the principals to fill in quantities of each resource to maximize student achievement. To aid them, the spreadsheet program also displayed their budget allotment, a running tally of expenditures as they added resources, and a column that displayed how much more or less of each resource they could afford to buy without exceeding their budget. In addition, the program displayed class size averages based on the number of teachers they selected.

The resource allocations depended on the type of students the school was serving. We presented principals with two hypothetical schools—one whose student body had a lower socioeconomic status (SES) than the other. Although both were hypothetical schools, their characteristics reflected statewide averages. Specifically, the student characteristics in the low-SES school represented those in actual schools from the 25th through the 35th percentile of the California School Characteristic Index, an index of socioeconomic status. The student characteristics in the high-SES school reflected those in schools that are in the 65th through the 75th percentile of the index.

The descriptions also included logistical information about the length of the school day and year. The middle and high schools were given typical class schedules, which determined average class sizes in the spreadsheet program. Although our chief concern was the total number

of teachers hired, we provided average class sizes for the principals' information.

Elementary Schools

At the low-SES school, 75 percent of the students receive free or reduced-price lunch, 35 percent are English language learners, and 35 percent have parents who have attended some college. At the high-SES school, 30 percent of the students receive free or reduced-price lunch, 10 percent are English language learners, and 70 percent have parents who have attended some college.

Each school enrolls 600 students in kindergarten through fifth grade with 100 students in each grade.[2] Students at each school attend classes 180 days per year (these include state testing days). Instructional time depends on the grade level. Kindergarten classes have 3.3 hours of instructional time per day; grades 1 through 5 have five hours.

Teachers at each school are contracted to work 184 days per year. Two of these days are used for professional development, and two are used for parent conferences, preparation, and related activities. Teachers are contracted to work seven hours per day. This includes 2.5 hours of preparation time per week.

Middle Schools

At the low-SES school, 60 percent of the students receive free or reduced-price lunch, 30 percent are English language learners, and 40 percent have parents who have attended some college. On average, the elementary schools that feed the low-SES middle school have an API score of 635. The socioeconomically disadvantaged students have an average score of 610; other students score an average of 700.

At the high-SES middle school, 25 percent of the students receive free or reduced-price lunch, 10 percent are English language learners, and 70 percent have parents who have attended some college. On average, the elementary schools that feed this school have an API score of

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[2]Although some professional judgment approaches allow participants to choose their school size, we did not give principals that option. Rather, we chose typical California enrollment levels.

760. The socioeconomically disadvantaged students have an average score of 680; other students score an average of 790.

Each school enrolls a total of 1,000 students in grades 6 through 8. Students at each school attend classes 180 days per year (these include state testing days). On average, there are 5.5 hours of instructional time per day. We asked principals to assume that students have a traditional schedule of six classes per day: English, math, science, social science, physical education, and one elective.

Contracts for teachers are identical to those for elementary school teachers with one exception: Each workday includes one hour of preparation time. In other words, the school day runs for six periods, but teachers teach only five of those periods.

High Schools

At the low-SES school, 40 percent of the students receive free or reduced-price lunch, 20 percent are English language learners, and 50 percent have parents who have attended some college. On average, the middle schools that feed this low-SES school have an API score of 610. The socioeconomically disadvantaged students have an average score of 570; other students score an average of 690.

At the high-SES high school, 15 percent of students receive free or reduced-price lunch, 7 percent are English language learners, and 75 percent have parents who have attended some college. On average, the middle schools that feed the high-SES school have an API score of 725. The socioeconomically disadvantaged students have an average score of 630; other students score an average of 760.

Each school enrolls a total of 1,800 students in grades 9 through 12. Students at each school attend classes 180 days per year (these include state testing days). On average, there are six hours of instructional time per day. Again we assumed that students have a traditional schedule of six periods per day. Further, students must complete 24 courses to graduate: four years of English courses, three years of mathematics, two years of science, three years of social science, two years of physical education, and ten year-long electives. Teacher contracts are identical to those of middle school teachers.

Exercises

All principals completed a set of three exercises pertaining to each hypothetical school at their level. Only the budgets differed in each school's set of exercises. In the first exercise, the budget for all schools amounted to $3,500 per pupil. This per-pupil budget translated into $2.1 million in total for elementary schools, $3.5 million for the middle schools, and $6.3 million for the high schools. These budget levels are meant to approximate actual spending levels on our list of resources in 1999–2000.

We relied on figures from the California Department of Education's "The Average Costs of a California School, 1999–00" (CDE, 2002a) to determine these starting budgets. We wanted to ensure that principals could afford the typical staffing ratios reported in that report with our pricing structure. We also wanted to ensure that principals could afford the average computer-student ratio with our computer prices. We determined the starting budgets by plugging the appropriate numbers of staff and computers into our spreadsheet.

Per-pupil spending of $3,500 represents about 58 percent of the total $6,069 current expenditures per pupil in 1999–2000.[3] The remaining portion of funds is devoted to the items that we excluded from our exercise but are nonetheless essential in running a school.

In retrospect, we realized that we may have underfunded some programs, such as summer school and preschool, by not explicitly providing money for them in our initial budget. For example, some principals explained that other agencies, such as Head Start, are in charge of providing preschool in their schools. In this sense, our low budget may have presented more difficult circumstances than those to which principals are accustomed. To the extent that high schools are more expensive to operate than elementary schools, our low budget may have been relatively more challenging for high school principals.

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[3]This level of current expenditures comes from a survey of state education agencies by the National Center for Education Statistics. Current expenditures include all expenditures for ongoing operations such as salaries, benefits, textbooks, utilities, maintenance, and so on. Excluded are major capital expenditures, such as buildings, and the expenditures of school cafeterias and other enterprise activities financed through user fees.

The second budget for each school increased spending by 15 percent of the original. The third budget added another 15 percent of the original budget. Even this highest spending level did not match those of the highest spending states in the nation. In 1999–2000, California's total spending per pupil ranked 28th in the nation. An additional 15 percent would put California on par with spending in states such as Illinois, Minnesota, Oregon, and Indiana—states ranked between 16th and 19th in per-pupil spending. Another 15 percent would put California schools on par with states such as Michigan, Delaware, and Vermont—states ranked between 8th and 10th in per-pupil spending.

We also instructed principals to assume that both hypothetical schools had satisfactory personnel. In particular, we asked them to assume that salaries were adequate to attract and retain qualified personnel, that personnel had sufficient time to learn their roles and perform them satisfactorily, and that they as principals could define those roles. Finally, we instructed them to ignore the restrictions placed on them by the California Education Code and collective bargaining agreements. If they wanted to increase class size despite a union agreement to the contrary, they were free to do so. Because we are interested in a long-run steady state of the education system, we told principals to assume that these hypothetical schools would have their resource allocations for a sustained period of time.

Each principal completed six exercises. The first three, which involved the low-SES school, were the same except that the budget gradually increased. The second three exercises focused on the high-SES school and used the same three budget levels. At the end of each exercise, we asked principals to predict the API score of the school they just constructed.

Each principal approached these exercises with his or her own rationale. This rationale guided him or her to certain instructional programs, which in turn had resource implications. The spreadsheet captured the resource implications but could not easily translate the rationales the principals brought to them. To better understand these rationales, we asked principals to describe them in writing. We collected these write-ups and discussed the exercises as a group at the

end of the day. Some of these comments appear in the subsequent results chapters.

Conclusion

The spreadsheet was a survey instrument designed to elicit the opinions of principals about which combinations of school resources would maximize student achievement. Because the prices and the budgets were clear, principals faced real tradeoffs. By focusing on the school as a whole instead of each resource individually, the principals revealed the perceived value of each resource. The protocol was also designed to see how the resource combinations varied according to student characteristics and the size of the budget. Because the demographic profiles, prices, and budget constraints were realistic, we believed that the tradeoffs and API predictions would be similarly realistic. In addition to collecting each spreadsheet produced by the principals, we also solicited written and oral feedback on their allocation rationales.

5. Elementary School Results

California's elementary schools differ from middle and high schools in several important ways. Because of the state's Class Size Reduction (CSR) program, grades K–3 have significantly smaller classes than others. A larger portion of elementary schools already scores 800 or more on the state's Academic Performance Index, and the security requirements of elementary schools tend to be lower than those for middle and high schools in comparable neighborhoods. Yet, in some ways, elementary schools also have tougher challenges than middle and high schools. They tend to have a higher proportion of English learners, for example, and California families with young children have higher poverty rates than other households. Both patterns present high hurdles for the state's elementary schools as they strive to raise student achievement.

This chapter describes how the 16 elementary school principals in our budget workshops allocated resources when they were given prices and a budget. Their responses provide a picture of what a typical school would look like under three different budgets. We show which resources principals added as budgets grew and what they expected API scores to be with different budgets and different assumptions about the SES of the student body. Using their API predictions, we focus on the question of which additional resources principals think a low-SES school needs to achieve an API similar to that of a high-SES school.

The elementary school principals worked independently during the workshop, essentially creating 16 separate model schools with accompanying API predictions for each exercise. Table 5.1 shows the average allocations for the first exercise, which used the low budget for the low-SES school of 600 students.[1] To show the level of consensus in

[1]The total expenditures based on these averages do not exactly equal the actual amount budgeted because of the nonlinearities in the prices. However, the differences are small and do not affect our analysis.

Table 5.1

Resource Levels for a Low-SES Elementary School of 600 Students with a Low Budget of $3,500 per Pupil

Resource	Unit of Measure	Units		
		Average	Fourth Lowest	Fourth Highest
Teachers				
Teachers—grades K–3	FTE	16.3	14.0	18.0
Teachers—grades 4 and 5	FTE	7.3	7.0	8.0
Administration				
Principals	FTE	0.9	1.0	1.0
Assistant principals	FTE	0.3	0.0	0.5
Clerical office staff	FTE	2.3	2.0	3.0
Support staff				
Academic coaches	FTE	1.2	0.5	2.0
Instructional aides	FTE	1.8	0.0	3.0
Counselors	FTE	0.3	0.0	0.5
Nurses	FTE	0.4	0.0	1.0
Librarians	FTE	0.6	0.0	1.0
Security officers	FTE	0.1	0.0	0.0
Technology support staff	FTE	0.3	0.0	0.5
Community liaisons	FTE	0.4	0.0	0.5
Specialty teachers	FTE	0.7	0.0	1.0
Programs				
Professional development	Hours/year/teacher	33.2	11.0	50.0
Preschool	Students	12.8	0.0	40.0
Full-day kindergarten	1 = yes 0 = no	0.3	0.0	1.0
After-school tutoring	Teacher hours/week	23.3	6.0	30.0
Longer school day	Hours/day	0.0	0.0	0.0
Summer school	Students	39.9	0.0	95.0
Longer school year	Days/year	0.1	0.0	0.0
Computers for instruction	Computers	38.6	11.0	63.0
Other	$ thousands	0.4	0.0	0.0

their responses, the table also shows the fourth-lowest value and the fourth-highest value for each resource. One-quarter of the principals chose values less than or equal to the fourth-lowest value, and one-quarter chose values greater than or equal to the fourth-highest value; the remaining half chose allocations between or equal to these two values.

The low budget approximates California's average funding level for these resources in 1999–2000. According to CDE (2002a), a typical California school in that year with 600 students would have 26 teachers and a student-teacher ratio of 23 to 1. However, the principals in our

study selected slightly fewer teachers so as to include certain programs. With the low budget, the principals selected 23.6 teachers, yielding an overall student-teacher ratio of 25.5 to 1. This student-teacher ratio serves as a rough guide to actual class sizes. Average class size differs from the student-teacher ratio because specialty teachers can pull students out of regular classes during the day, thus reducing regular class sizes for part of the day.[2] On average, principals allocated 0.7 specialty teachers. Several described this position as a reading specialist. One principal explained, "Students would benefit from one-on-one or small group reading interventions."

The overall student-teacher ratio masks an interesting result: namely, that principals generally chose significantly smaller class sizes for grades K–3 than for grades 4 and 5, despite the fact that we removed the state's incentives for CSR in the lower grades. In this exercise, the class size for grades K–3 averaged 21.5 students compared to 27.4 for grades 4 and 5. Although CSR policies are often criticized for thwarting administrators who wish to allocate resources toward more urgent priorities, most principals in our experiment thought that small classes were worth maintaining in the early grades. One principal explicitly noted in the post-exercise discussion that children in the lower grades need more attention than others, and another principal said that she would structure her classes so that grades K and 1 were smaller than grades 2 and 3. Thus, the allocations seem to reflect the conviction that small class sizes in the early grades provide a solid foundation for later learning.

There was less consensus about the optimal K–3 class size. For example, four principals chose 16 K–3 teachers and another four principals chose 18 (Figure 5.1). Although one principal allocated 20 K–3 teachers, not all principals chose to maintain small class sizes. Four of the 16 principals chose 14 or fewer K–3 teachers, yielding a class size

[2]Also, in the case of grades K–3, the total number of students divided by the total number of teachers hides the fact that, under the exercise's assumptions, kindergarten teachers teach two sections of students each day. Thus, 100 kindergarten students require fewer teachers than 100 first grade students to maintain equivalent class sizes. This section of the report accounts for that relationship when reporting class sizes; however, it does not factor in the use of specialty teachers.

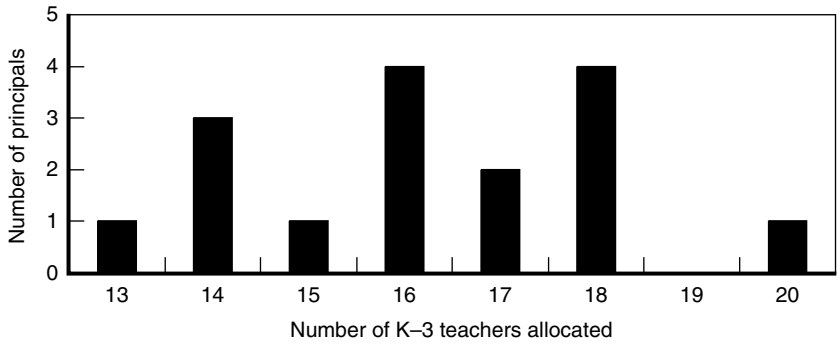

Figure 5.1—Number of Principals Selecting Different Quantities of K–3 Teachers

of at least 25 students in those grades. There was more agreement about fourth and fifth grade teachers. Nine principals chose seven of these teachers and four opted for eight.

The allocations also confirmed the integral role that nonteaching staff play at a school. Only two principals did not allocate one FTE for the position of principal.[3] As one explained, "I began with a principal doing two schools and the office staff severely constrained. I'm not sure that is doable, but it was the only way to maintain any kind of student services." The other principal allocated what most observers might consider a principal to the academic coaching position to highlight the importance of that aspect of a typical principal's job. With the low budget, principals chose an average of 0.3 FTE assistant principals and 2.3 clerical staff. One principal explained that her clerical staff would also serve "as liaison and tech support."

In this first exercise, principals chose an average of 1.2 academic coaches. One principal claimed, "The greatest level of staff development, based on my experiences, comes from coaches." Another noted the extra importance of coaches for new teachers. The principals also budgeted for an average of 1.8 instructional aides. One principal

[3]In Table 5.1, the average value may not fall within the fourth-highest and fourth-lowest values if most principals had the same answer and just one or two principals deviated from it.

described the aides' function as assisting "with primary language support." However, several principals noted that they felt the pinch of the low budget and used instructional aides to staff many of the other support positions. For example, one principal explained that he would assign an instructional aide to the library rather than hire a certificated librarian, and he would assign an aide/health technician to provide health services instead of a nurse. At the other extreme, five principals chose not to employ any instructional aides in the school, indicating in the subsequent discussion that other resources were more helpful to students.

Principals staffed the remaining support positions meagerly. For example, they allocated less than half an FTE for community liaison work, even though one principal described this role as necessary "for organizing parent education classes, home/school contacts, parent club coordinators, student attendance problems, finding agencies to assist needy families, etc." Another imagined the counselors handling some of these responsibilities; in particular, counselors would "direct parents to community and social service resources."

The principals' choices revealed the importance of several programs as well. On average, principals provided each teacher with 33 hours per year of professional development, yet there was a remarkable range of responses regarding this resource. One-quarter of the principals chose 11 or fewer hours, and one-quarter chose 50 or more hours. Principals allocated these hours in various ways. Some chose to provide day-long sessions at either the beginning or end of the year. Others chose to provide short weekly sessions. Still others chose a combination of these two approaches. In our discussions, one principal said he planned to reallocate his total professional development hours across teachers, directing them to only kindergarten and first grade teachers. Regardless of the approach, most professional development focused on reading and math curriculum.

Principals also supplied an average of about 23 hours of teacher time per week for tutoring. Although three principals did not provide any tutoring programs, those who did generally served 120 students in groups of 13 for about three hours per week. Summer school was provided for about 40 students, on average. However, one-quarter of the

principals offered summer school for at least 95 students. Almost no principal opted for a longer school day or year with the low budget, but four chose to offer full-day kindergarten, and four chose to offer preschool to 40 or more students.

Given the prominent role CSR plays in elementary schools, it is worth comparing the spending patterns of the four principals who chose larger K–3 classes with the remaining 12 teachers who preferred to maintain smaller K–3 classes (see Figure 5.2). The categories in this figure are nearly identical to the broad categories in Table 5.1. The difference is that spending on academic coaches and professional development has been removed from their respective categories of support staff and programs and combined into a new category called teacher training. Student programs thus include preschool, full-day kindergarten, tutoring, summer school, and a longer school day and year. The negligible spending in the "other" category was also included with student programs.

Principals who opted for larger K–3 class sizes by spending less on K–3 teachers directed a portion of their savings to administration—enough to employ a principal or assistant principal for an additional two days per week. Principals with fewer teachers also spent more to train their teachers. On average, these principals supplied each teacher with about 55 hours per year of professional development—about 29 hours more than did principals who retained small K–3 class sizes. Spending on student programs differed the most between these two groups of

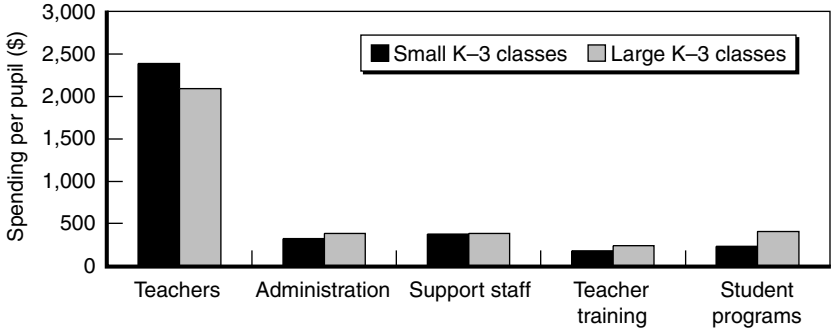

Figure 5.2—Spending Patterns Based on Class Size

principals. Principals with large K–3 class sizes provided preschool for 40 students, on average; those with small class sizes provided this program for an average of only four students. Principals with large K–3 class sizes also provided 12 more students with summer school and provided 42 more computers than principals with small K–3 class sizes. In dealing with student preparedness, then, most elementary school principals preferred smaller class sizes to more extensive preschool and summer school interventions.

As the budgets increased in subsequent exercises, the variation in the K–3 teacher-pupil ratio declined. Principals who started with larger K–3 class sizes added 1.9 teachers, and those who started with lower class sizes added only .7 teachers. With the high budget, average K–3 class sizes for these two groups were 22.4 and 19.7, respectively. Even with the high budget, however, principals varied more in their allocation of K–3 teachers than in their allocation of fourth and fifth grade teachers. With that budget, 11 principals agreed that eight teachers for fourth and fifth grade would be optimal.

As budgets grew for the low-SES school, principals added resources to all areas, but they added the largest share of their additional funds, over 40 percent, to student programs. When describing the rationale behind their allocations, one principal said, "Establishing strong early interventions and mentoring support over time is the key to success." Figure 5.3 documents the average spending patterns in the five broad categories as budgets grew by 30 percent, and Appendix Table B.1 shows the average resource allocations for each budget. Half the additional spending in the student programs category funded preschool and full-day kindergarten, reflecting the need to prepare students in their early years. With the high budget, preschool served an average of 21 more students, and six more principals chose to institute full-day kindergarten. In part, this allocation reflects the effect of academic content standards in kindergarten. One principal explained, "Full day kindergarten allows the teachers to introduce the academics and the basic skills needed for reading, writing, and math." Another added, "All day kindergarten would allow for the academic components to be met as well as the socialization skills." However, one principal warned that although

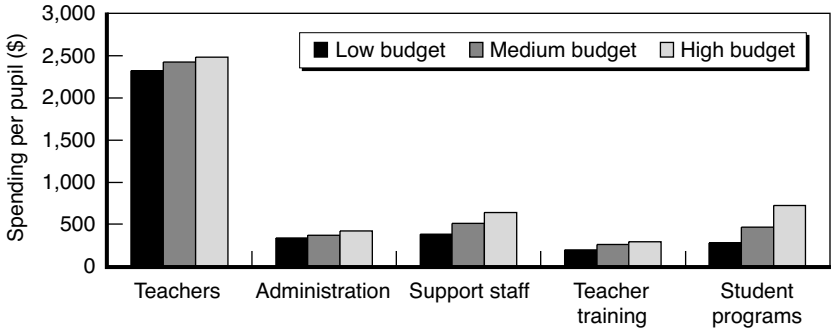

Figure 5.3—Allocation of Funds in Low-SES Elementary School as the Budget Grew

preschool has its merits, accountability and mandatory attendance do not occur until the student reaches age six.

With the high budget, principals also added another 19 hours of teacher tutoring time, 42 students to summer school, eight minutes to the school day, and 2.8 days to the school year. However, these averages dilute the extreme positions some principals took. One principal added 20 days to the school year with the medium budget, noting, "I focused on extending the school year as soon as resources were available." Principals also traded some programs for others as more funds became available. One principal reduced her tutoring program once she had the funds to add an extra hour to the day.

Not all principals were equally enthralled with the idea of extra student programs. As one principal remarked during the discussion, her goal was to construct a school where teachers "teach correctly and effectively the first time and no tutoring or summer school is necessary." Another recommended some nonmonetary changes that could help student achievement. For example, she suggested a plan to "modify the school year so a large gap doesn't occur in summer. Many summer school programs are elaborate day care systems."

Principals budgeted one-quarter of the additional funds for support staff, but they reserved a much smaller share of the additional funds for teachers. This pattern points to the notion of diminishing marginal productivity; ensuring small class sizes in the low budget makes nonteacher resources more important in the high budget. On average,

the additional expenditures directed to support staff funded three additional FTE, with instructional aides and specialty teachers constituting 1.7 FTE. In the area of teacher training, principals hired 0.6 FTE more academic coaches and provided 17 more hours of professional development for each teacher.

Principals used a very small amount of their additional funds to add administrative help, on average hiring 0.6 more FTE. A principal who added an assistant principal did so to help with grant writing. Another explained that adding an assistant who could manage discipline issues would allow the principal to spend more time observing teachers in the classroom. Another principal added a half-time secretary so that "parents can be called immediately if their child is absent or tardy."

Although this discussion has focused on spending patterns in the low-SES school as budgets rise, similar trends emerge at the high-SES school, where the largest shares went to student programs and support staff, respectively. The average resource allocations for the high-SES school with each budget are also shown in Table B.1.

Student Outcomes and API Predictions

Principals predicted that the different budgets would lead to very different outcomes (Figure 5.4). The average API prediction in the low-SES school ranged from 588 with the low budget to 750 with the high budget. Furthermore, the principals predicted that the same budget would lead to very different outcomes depending on the school's SES. With the low budget, principals predicted that the high-SES school would achieve a 708 API—some 120 points higher than the low-SES school with the same budget. With the high budget, they predicted that the high-SES school would achieve an 840 API—well above the state's goal of 800 and also 90 points higher than the API of the low-SES school with the same budget.

Although the average predicted API for the low-SES schools was still short of the state's goal with the high budget, almost half the principals believed that the low-SES school would achieve at least an 800 with that budget. In contrast, only one principal thought that the low-SES school

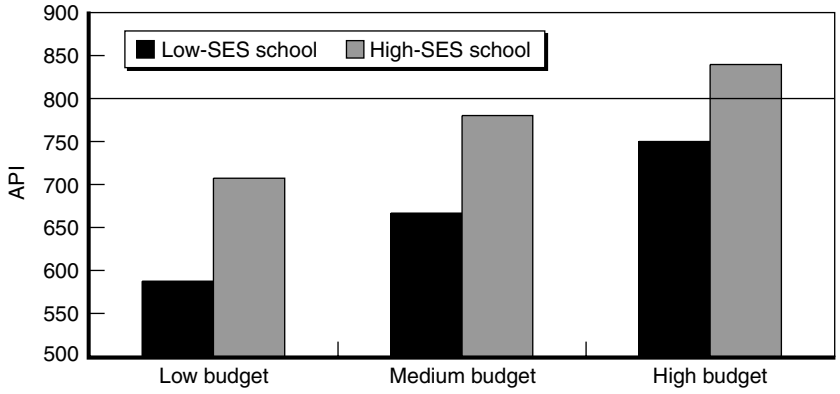

Figure 5.4—Average Predicted API for Elementary Schools by SES and Budget

could achieve the state's goal with the medium budget. Table 5.2 shows the number of principals predicting each API score for each of the exercises. There is no way to judge the accuracy of these predictions, and the principals were the first to admit that their estimates were informed guesses. In all three budget scenarios, however, API predictions in the low-SES school clustered around certain values. With the low budget,

Table 5.2

Number of Elementary School Principals Predicting Each API Range

	Low-SES School			High-SES School		
API	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550
300–499	2	–	–	–	–	–
500–549	2	1	–	1	–	–
550–599	2	1	–	–	–	–
600–649	5	1	1	2	–	–
650–699	3	7	1	5	1	–
700–749	1	4	5	–	5	1
750–799	–	–	2	3	2	2
800–849	–	–	6	4	3	5
850–899	1	–	–	1	4	3
900–1000	–	1	1	–	1	5
Average	588	666	750	708	780	840

eight out of the 16 principals predicted an API in the range of 600 to 699 for the low-SES school. With the middle budget, predictions concentrated in the range of 650 to 749. With the high budget, half of the predictions were between 750 and 849.

Principals also said it was difficult to predict the API scores of schools that were unlike their own, yet their predictions were not correlated to the socioeconomic status of the school where they actually worked. Overall, the average API estimates for the hypothetical schools with the low budget was about 50 points lower than the actual API scores of schools that matched the demographics of each hypothetical school. On average, actual elementary schools matching the low-SES hypothetical school had an API of 635 and actual schools with the demographic characteristics of our high-SES hypothetical school had an average API of 760.

Student Characteristics and Resource Allocations

In addition to showing the perceived relationship between resources and test scores, the API predictions reveal how much more principals thought the low-SES school would need to achieve the same level of academic success as the high-SES school. For example, the low-SES school was predicted to achieve a 750 API with the high budget of $4,550 per pupil, whereas the high-SES school was expected to achieve a comparable API somewhere between the low and medium budget. This result suggests that principals thought the low-SES school would require something between $525 and $1,050 per pupil more to earn roughly the same API as the high-SES school.

To give a sense of the additional resources that a low-SES school would need to achieve nearly the same academic success as a high-SES school, Table 5.3 compares the average resource allocation in the low-SES, high-budget school to the allocation in the high-SES, medium-budget school. (To compare low-SES and high-SES allocations with the same budgets, see Appendix Table B.1.) The final column shows the difference between the two allocations: specifically, the number of additional resources required in the low-SES school for it to achieve nearly the same outcome as the high-SES school. With these additional

Table 5.3

Resources Needed for Elementary Schools to Achieve Similar API Scores (Approximately a 750 to 780 API)

Resource	Unit of Measure	Low-SES School, High Budget	High-SES School, Medium Budget	Additional Units in Low-SES School
Teachers				
Teachers—grades K–3	FTE	17.2	16.4	0.8
Teachers—grades 4 and 5	FTE	8.0	8.0	0.0
Administrators				
Principals	FTE	0.9	0.9	0.0
Assistant principals	FTE	0.7	0.4	0.3
Clerical office staff	FTE	2.5	2.4	0.1
Support staff				
Academic coaches	FTE	1.8	1.5	0.3
Instructional aides	FTE	2.7	1.5	1.2
Counselors	FTE	0.6	0.4	0.1
Nurses	FTE	0.5	0.4	0.2
Librarians	FTE	0.8	0.8	0.0
Security officers	FTE	0.1	0.1	0.0
Technology support staff	FTE	0.6	0.7	0.0
Community liaisons	FTE	0.7	0.4	0.3
Specialty teachers	FTE	1.5	1.8	–0.3
Programs				
Professional development	Hours/year/teacher	50.6	45.8	4.8
Preschool	Students	34.2	20.6	13.6
Full-day kindergarten	1 = yes 0 = no	0.6	0.3	0.3
After-school tutoring	Teacher hours/week	41.9	34.0	7.9
Longer school day	Hours/day	0.2	0.1	0.1
Summer school	Students	82.1	79.6	2.4
Longer school year	Days/year	2.8	0.6	2.2
Computers for instruction	Computers	66.8	70.0	–3.2
Other	$ thousands	1.7	1.5	0.2
Budget	Dollars/pupil	4,550	4,025	525

NOTE: Because of rounding, the additional units may be off by 0.1.

resources, the average API at the low-SES school is still lower than that at the high-SES school, but the distribution of predicted API scores at the two schools is actually somewhat similar. A negative value in the last column means that the low-SES school had less of that resource; in other words, the principals thought that those resources would not be as

beneficial in the low-SES school as they were in the high-SES school and that other resources took priority.

On average, the principals targeted certain areas over others when considering their allocations for the low-SES school. Among staffing categories, principals allocated an average of 0.8 K–3 additional teachers and 1.2 more aides to the low-SES school. They also provided the low-SES school with an added 1.5 days per week each from an assistant principal, an academic coach, and a community liaison. Relative to the high-SES school, principals provided the low-SES teachers with nearly five additional hours of professional development, offered preschool to 14 more students, devoted eight more hours of teacher time to tutoring programs, increased the school year by two days, and increased the school day by 7.5 minutes (which amounts to 4.5 additional days of annual instruction). Most of these increases were financed by the higher budget, but some additional funding came from reallocating certain resources. For example, the number of specialty teachers and computers in the low-SES school was lower than in the high-SES school.

Both in the workshop discussions and on the written questionnaires, principals described the rationales behind their allocations in the two types of schools. They maintained that the low-SES students arrive at school less prepared. As one principal described:

> There needs to be more learning opportunities [at the low-SES school], because students arrive less prepared and skilled; parents are less educated and needs are focused on survival for the family. . . . Students need to be offered more experiences due to lack of exposure and background knowledge. Lots of parent training/education is needed.

Another principal noted, "In the low-SES scenario, many students do not have a place at home to do homework, and it is almost essential that schools provide one." Some principals maintained that staff development is also more important in the low-SES school because English language learners have additional needs that teachers must learn to address. Although the workshop instructions stated that teachers at both schools had the same education levels, some principals expected teachers in the low-SES school to be less prepared and more in need of professional development.

In contrast, principals explained that students and families at high-SES schools place more importance on education, and the schools therefore make more use of specialty teachers, enrichment programs, and computer labs. Because the perceived need for after-school tutoring is less pressing at the high-SES school, tutoring programs focus on enrichment activities rather than on remediation. Fewer aides are needed because many parents help in the classrooms. One principal maintained that even without aides or volunteers, students in the high-SES school "seem to be able to work independently while the teachers work with individuals or small groups."

Once again, however, comparing the average allocations at the high- and low-SES schools hides interesting variation. For example, most principals thought that there was a greater need for community liaisons at the low-SES school because they could encourage interest in the school or even teach basic reading skills to parents. Yet some principals commented on the important role that community liaisons play in the high-SES schools, where they can recruit, manage, and coordinate parent volunteers. Likewise, some principals thought that administrative help was more important in the high-SES schools because parents were more involved in their student's academic life and more demanding of administrators' time. As one principal explained, an "additional assistant principal is needed because higher SES parents require more attention." As these examples illustrate, the level of resources needed to achieve similar outcomes and how these resources are deployed may vary dramatically depending on the student body of the school.

Conclusion

On average, elementary school principals preferred small class sizes, even with low budgets. However, they were willing to accept somewhat larger class sizes than exist today to pay for important student support programs. As budgets grew, principals increased expenditures in almost all resource areas, but they allocated the largest share of the additional funds to student support programs.

Not surprisingly, the principals also predicted that a low-SES school would need more resources than a high-SES school to achieve nearly the same outcomes. On an optimistic note, seven principals thought that a

low-SES school could achieve the state's goal of an 800 API with the high budget. At the same time, half thought that the high-SES school could attain an 800 API with the medium budget. Both budgets represent a higher level of funding than California schools received in 1999–2000.

6. Middle School Results

When it comes to budgets and resource allocations, middle schools differ considerably from elementary schools. The key difference, perhaps, is that most middle schools must accommodate a wider range of student needs than any single elementary school is likely to encounter. One principal described that sort of accommodation as follows:

> One of the realities of a middle school is that we receive students … often from a number of elementary feeder schools. Students come from different backgrounds with different skill levels, and the schools themselves have done a better or worse job of promoting strong student academic performance. For this reason, for the foreseeable future, middle schools will be remediating student skills, especially in reading, writing, and math, so that these students can take advantage of the increasingly discipline-based education program.

This approach to remediation guided the resource allocations of many of our 14 middle school principals, especially in the low-SES school. Again, they worked independently, essentially creating 14 separate model schools for each exercise. Like the previous chapter, this one describes how the principals allocated resources under different budget conditions and predicted student achievement. Table 6.1 summarizes the results of the low-budget, low-SES exercise by showing the average allocation of each resource.[1] It also shows the third-lowest and third-highest observation for the 14 middle school principals to give a sense of the smallest quarter of responses and the largest quarter of responses.

One significant difference between elementary and middle schools concerns the way teachers are distributed across the curriculum. For the low-budget, low-SES exercise, the middle school principals chose an average of nearly 40 teachers for their school of 1,000 students, or one

[1] As noted in the previous chapter, the total expenditures based on these averages do not exactly equal the actual amount budgeted because of the nonlinearities in the prices. However, the differences are small and do not affect our analysis.

Table 6.1

Resource Levels for a Low-SES Middle School of 1,000 Students with a Low Budget of $3,500 per Pupil

Resource	Unit of Measure	Units		
		Average	Third Lowest	Third Highest
Teachers				
Teachers—core classes	FTE	29.3	26.0	32.0
Teachers—noncore classes	FTE	6.0	5.0	7.0
Teachers—physical education	FTE	4.5	4.0	5.0
Administration				
Principals	FTE	1.0	1.0	1.0
Assistant principals	FTE	1.6	1.0	2.0
Clerical office staff	FTE	4.0	3.0	5.0
Support staff				
Academic coaches	FTE	1.2	0.5	2.0
Instructional aides	FTE	2.7	0.0	6.0
Counselors	FTE	1.7	1.0	2.0
Nurses	FTE	0.6	0.2	1.0
Librarians	FTE	1.0	1.0	1.0
Security officers	FTE	1.6	1.0	4.0
Technology support staff	FTE	0.8	0.5	1.0
Community liaisons	FTE	0.5	0.0	1.0
Programs				
Professional development	Hours/year/teacher	30.5	18.0	40.0
After-school tutoring	Teacher hours/week	46.0	20.0	62.5
Longer school day	Hours/day	0.0	0.0	0.0
Summer school	Students	164.0	0.0	300.0
Longer school year	Days/year	0.0	0.0	0.0
Computers for instruction	Computers	102.8	40.0	168.0
Other	$ thousands	0.2	0.0	0.0

teacher per 25 students. Because these teachers have one daily preparation period during which they are not teaching students, the average actual class size was higher, at about 30.2 students. The overall average class size, however, masks an important class size distinction between core and noncore classes. Middle school principals allocated teachers so that core classes (such as English, math, and history) were smaller than noncore classes (such as art, foreign language, and other electives) and much smaller than physical education classes. Core classes averaged 27.3 students per class, noncore classes averaged 33.3 students, and physical education classes averaged 44.9 students. Because most

elementary school pupils spend most of the day with one teacher, the distinction between core and noncore subjects has fewer staffing consequences in those schools. Interestingly, the average core class size was similar to what elementary school principals chose for their fourth and fifth grade classes with the same per-pupil budget.

The number of teachers (and therefore class sizes) that middle school principals chose varied greatly. Core classes ranged in size from 25 to 32 students and were fairly evenly distributed within that range. In their write-ups during the workshops, several principals stressed small class sizes. "Manageable class sizes are the highest priority in order to maintain a safe and orderly environment conducive to learning," maintained one principal. Another noted, "Teachers should know their students well," and a third principal emphasized "positive student-teacher relationships." Principals agreed much more about the optimal size of noncore classes, with half of the principals selecting exactly six noncore teachers leading to class sizes of about 33 students. Overall, the total number of teachers was quite evenly distributed from a low of 36 teachers to a high of 43 teachers.

Although teachers are the fundamental resource required to educate students, the principals' allocations reflected the need for nonteaching staff as well. Not surprisingly, all middle school principals chose to have one principal at their hypothetical school. They also chose an average of 1.6 assistant principals and a clerical staff consisting of four full-time employees. One principal itemized his four clerical positions as follows: receptionist, school secretary (primarily for the principal), clerk (primarily for the assistant principal), and attendance clerk. The allocations for the group included a range of support staff as well. One principal chose to have two academic counselors and a half-time psychologist. Another pointed out that nurses, the first contact regarding health issues for students and parents, were especially important in the low-SES school. Unlike their elementary school counterparts, the middle school principals cited security as a major concern. All but one principal chose at least one security officer, for an average of 1.6 FTE. In contrast, only one elementary school principal chose one FTE security officer, even in the high-budget scenario. On a per-pupil basis, middle school principals chose more administrators,

counselors, and security personnel than their elementary school counterparts.

Throughout the budget workshop, middle school principals also stressed the importance of professional development. On average, they provided 31 hours per teacher per year—just two fewer hours than elementary principals chose. Middle school principals were evenly split about how to allocate these hours. About half preferred to use professional development time in full-day increments. One principal noted, "The best professional development occurs during a full day, not added on to the end of an already busy and stressful normal teaching day." The other principals preferred to give teachers briefer but more frequent opportunities for professional development. Regardless of the approach, curriculum and academic standards formed the cornerstone of most professional development programs. One principal placed special emphasis on these programs in low-SES schools:

> Many underperforming students lack basic literacy/numeracy skills. Many times the teacher frustration level is high due to lack of training, low expectations, and lack of content knowledge. Delivering a standards-based instructional program for struggling learners is quite a challenge! The above areas can be addressed through a quality professional development plan that is of high quality, job-embedded, and ongoing.

The principals' allocations also revealed the importance of several student-based programs. Typically, principals provided tutoring for about 200 students in groups of 18 for three to four hours per week. Generally, they geared these programs to remediation. In addition, they provided summer school for an average of 164 students.

As the budgets increased, spending on teachers grew the most in absolute terms, followed by spending on support staff and then student programs. Figure 6.1 summarizes how money was spent in each of five broad resource categories as the budgets grew, and Appendix Table B.2 shows the average allocations for each budget. Again, "teacher training" includes spending on academic coaches and professional development. The remaining categories correspond to the broad categories in Table 6.1.

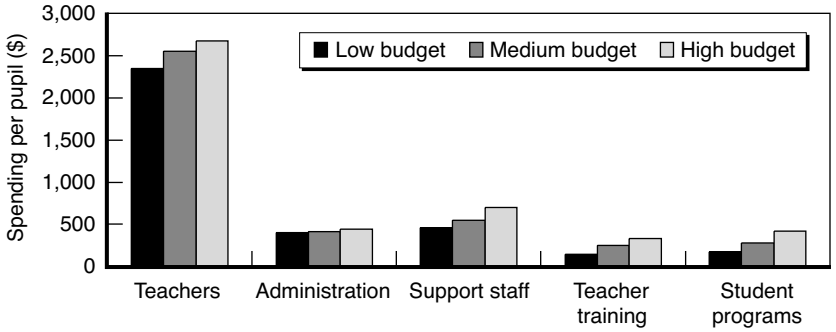

Figure 6.1—Allocation of Funds in Low-SES Middle School as the Budget Grew

Whereas elementary school principals ensured relatively smaller classes with their low budget and added new funds to student programs, middle school principals began with relatively large classes and devoted additional funds to reducing them. Again, this pattern helps illustrate the point that the marginal productivity of a resource depends on a school's original allocation. With the high budget, middle school principals added a total of 5.6 teachers, reducing their average core classes by about three students and their noncore class size by six students. One principal who deviated from the average trend explained that, because he viewed teachers as so important, he ensured a high number of teachers even in the low budget; as a result, he could focus on other areas as the budget increased. Nearly one-quarter of the additional funds in the high budget was spent on six additional support staff. On average, instructional aides accounted for over half these additional FTEs; counselors and community liaisons each accounted for nearly 15 percent of the new support staff.

Principals used another one-quarter of the additional funds in the high budget to broaden the scope of many student programs. On average, they more than doubled their spending on resources in this category. None chose an extended school day or school year in the low budget, but with the high budget, they lengthened the school day by 12 minutes. Over 180 days, the additional time totaled 37 hours, or about seven additional days of classes for students. In addition, principals lengthened the school year by three days. One principal said that he

added after-school tutoring *until* the budget permitted an extension of the school day and year, thus enabling him to reach students who might not otherwise make it to the tutoring program. With the high budgets, too, principals on average enlarged summer school programs to accommodate 115 more students and provided an additional 34 hours per week of teacher tutoring time. On average, the tutoring programs served about 100 more students; and several principals also reduced the size of the tutoring groups by about four students, explaining that with smaller group sizes "instructors would be able to use data to target the areas that individuals or groups were weak in and assist them in those targeted areas."

Principals more than doubled spending in the area of teacher training, even though that resource received slightly less than 20 percent of the additional funds. Principals added two academic coaches and provided another 19 hours of professional development for each teacher in the high-budget scenario. Principals generally allocated this time in much the same way they had allocated it in the low-budget scenario—either in full-day increments or in a set number of hours per week.

A very small share of the additional funds was allocated to administration, indicating the relatively fixed costs of that category. On average, principals added 0.9 administrative FTE in the high budget. One principal added an assistant principal to help with additional instruction and curriculum observation.

Although Figure 6.1 focuses on what happens in the low-SES school as budgets rise, the broad trends are apparent in the high-SES school. Table B.2 shows average resource levels for the three budget scenarios with the high-SES school.

Student Outcomes and API Predictions

Like their elementary school counterparts, middle school principals predicted that both hypothetical schools would achieve higher API scores with higher budgets. The average API prediction for the low-budget, low-SES middle school was about 668. Although it rose to 738 with the high budget, it still fell short of the state's goal of 800 (Figure 6.2). Middle school principals also predicted that the high-SES school would

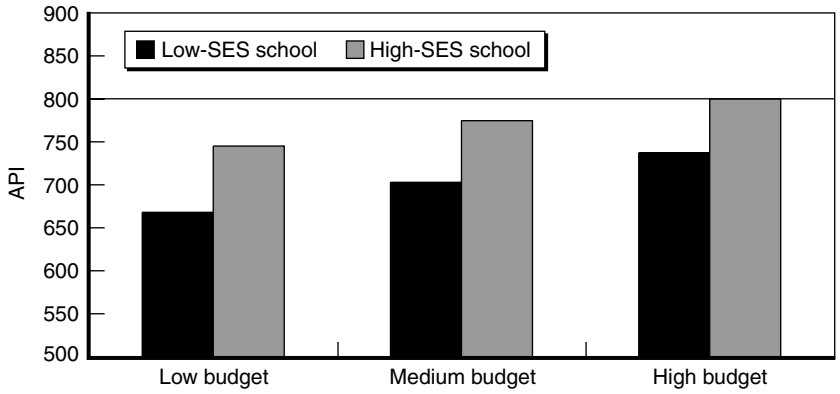

Figure 6.2—Average Predicted API for Middle Schools by SES and Budget

perform better than the low-SES school at each budget level—about 77 points better with the low budget and 63 points higher with the high budget. These API gaps based on SES, however, were not as wide for middle schools as they were for elementary schools.

The range of API predictions was fairly narrow and more pessimistic than that of elementary school principals (Table 6.2). Only three of the 14 middle school principals predicted that the low-SES school could achieve an 800 API or higher with the high budget. Even so, their average prediction with the low budget tended to be higher than the

Table 6.2

Number of Middle School Principals Predicting Each API Range

	Low-SES School			High-SES School		
API	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550
600–649	3	1	–	–	–	–
650–699	7	3	1	–	–	–
700–749	4	8	9	6	2	1
750–799	–	2	1	8	9	5
800–849	–	–	2	–	2	6
850–899	–	–	1	–	1	1
900–1000	–	–	–	–	–	1
Average	668	703	738	745	775	800

actual API scores of schools with comparable demographics. The average prediction for the low-SES school was about 60 points higher than the average for actual schools with those demographics. For the high-SES schools, API predictions were only about 20 points higher than actual scores for similar schools. These differences are not entirely surprising given that our principals worked at schools that did relatively well within their demographic categories. Also, the exercise assumed more flexibility in resource allocation and more stability in staffing than the real world permits. In this sense, the higher API predictions may represent the benefits of flexibility and stability.

Student Characteristics and Resource Allocations

These results again permit an indirect estimate of the additional resources a low-SES school might need to achieve the same outcome as a high-SES school. By way of example, consider the low-SES school with the high budget. According to Figure 6.2, the average predicted API of 738 is quite similar to the 745 API predicted for the high-SES school with the low budget. In monetary terms, then, it would cost an additional $1,050 per pupil (the difference between the low and high budgets) for the two schools to have similar API scores close to 750. To give a sense of how the additional funds would be spent in the low-SES school, Table 6.3 compares the average resource allocation in the low-SES, high-budget school and that in the high-SES, low-budget school. (To compare low-SES and high-SES allocations with the same budgets, see Appendix Table B.2.) The final column shows the difference between the two allocations: specifically, the number of additional resources required for the low-SES school to achieve an outcome similar to that in the high-SES school.

As the table indicates, principals tended to add resources to the low-SES school in almost every category. On average, they used the additional funds in the low-SES school to hire more than five additional teachers, mostly core class teachers. Nonetheless, their allocations also suggest that noncore classes and physical education classes should have more teachers in the low-SES school. In the low-SES school, principals allocated one additional administrative FTE, with most of that time coming from clerical office staff. In the area of support staff, principals

Table 6.3

Resources Needed for Middle Schools to Achieve Similar API Scores (Approximately a 750 API)

Resource	Unit of Measure	Low-SES School, High Budget	High-SES School, High Budget	Additional Units in Low-SES School
Teachers				
Teachers—core classes	FTE	32.7	29.2	3.5
Teachers—noncore classes	FTE	7.4	6.3	1.1
Teachers—physical education	FTE	5.3	4.5	0.7
Administration				
Principals	FTE	1.0	1.0	0.0
Assistant principals	FTE	1.9	1.6	0.3
Clerical office staff	FTE	4.7	4.0	0.7
Support staff				
Academic coaches	FTE	3.4	1.3	2.1
Instructional aides	FTE	6.2	2.6	3.6
Counselors	FTE	2.5	1.8	0.7
Nurses	FTE	0.7	0.6	0.2
Librarians	FTE	1.1	1.0	0.1
Security officers	FTE	2.1	1.2	0.9
Technology support staff	FTE	1.0	0.8	0.2
Community liaisons	FTE	1.3	0.5	0.8
Programs				
Professional development	Hours/year/teacher	49.0	30.7	18.3
After-school tutoring	Teacher hours/week	80.3	34.8	45.5
Longer school day	Hours/day	0.2	0.0	0.2
Summer school	Students	279.1	167.3	111.8
Longer school year	Days/year	3.2	0.0	3.2
Computers for instruction	Computers	159.9	108.0	51.8
Other	$ thousands	1.9	0.6	1.4
Budget	Dollars/pupil	4,550	3,500	1,050

NOTE: Because of rounding, the additional units may be off by 0.1.

allocated over eight additional FTEs. Specifically, they added two more academic coaches, over three instructional aides, and nearly one additional counselor, security officer, and community liaison. One principal explained that there were "fewer security [personnel] needed for a more academically motivated student population."

On average, principals intensified all support programs in the low-SES school with the additional funds. They provided 18 more hours of

professional development to teachers and 46 more hours of teacher tutoring time for students. The allocations also reflect the importance principals placed on teaching time as evidenced by a 0.2-hour longer school day and the three-day longer school year. In addition, principals provided over 100 more students with summer school in the low-SES school. Their rationale was very similar to that of the elementary school principals; in particular, they maintained that the low-SES students would need more intervention and remediation. As one principal put it, "The high-SES school will have 100 or more *fewer* students requiring additional academic support."

Conclusion

Relative to elementary schools with the same level of per-pupil funding, middle school principals chose higher average class sizes. As their budgets increased, they tended to increase spending across all resource areas, but they used one-third of the additional funds to hire more teachers, thereby reducing class sizes. On average, they reduced their noncore class sizes by more than their core class sizes, in part because their noncore classes were larger to begin with.

The school's SES affected the principals' API predictions for a given budget level; specifically, principals believed that a low-SES school would require more resources to achieve an academic outcome similar to that of a high-SES school. To reach an API of 750, the principals predicted that the low-SES school would require 30 percent more funding than the high-SES school. Given that none of the budgets led to a predicted API average of 800 in the low-SES school, it is not clear how much more funding they thought would be required to meet the state's API goal.

7. High School Results

High schools differ considerably from schools at other levels. On average, they are almost twice as large as middle schools, and the high school exit exam has focused new attention on academic performance. These and other differences provided the backdrop for the high school budget workshops, which drew 15 principals from schools around the state. Like the previous two chapters, this one describes which resources principals added as their budgets grew and how their API estimates corresponded to budget levels, allocations, and student characteristics. We also asked the high school principals to predict the graduation rates for the various schools they created during the exercises.

The average allocations for the low-budget, low-SES high school are shown in Table 7.1.[1] Again, it includes the fourth-lowest and fourth-highest observations to give a sense of the variation in responses. Seven principals allocated resources between or equal to these values. With this low budget, principals chose 70.2 teachers for their school of 1,800 students, yielding an overall ratio of 25.6 students per teacher. Because teachers have one preparation period per day, the average class size at this budget level is 30.8, slightly higher than that of middle schools.

Like their middle school counterparts, the high school principals thought that smaller classes were more important in the core classes than in the noncore classes. One principal explicitly confirmed this pattern: "Noncore usually run larger because of the nature of courses, such as choir, band, art, etc." Using our assumptions about the number and type of classes that students take (see Chapter 4 for details), principals allocated teachers in a way to accommodate core classes of 26.6 students, noncore classes of 34.7 students, and physical education classes of 48.4

[1] As noted in the previous chapters, total expenditures based on these averages do not exactly equal the actual amount budgeted because of the nonlinearities in the prices. However, the differences are small and do not affect our analysis.

Table 7.1

Resource Levels for a Low-SES High School of 1,800 Students with a Low Budget of $3,500 per Pupil

Resource	Unit of Measure	Units		
		Average	Fourth Lowest	Fourth Highest
Teachers				
Teachers—core classes	FTE	40.6	38.0	43.0
Teachers—noncore classes	FTE	26.0	24.1	28.0
Teachers—physical education	FTE	3.7	3.3	4.0
Administration				
Principals	FTE	1.0	1.0	1.0
Assistant principals	FTE	2.9	2.0	3.0
Clerical office staff	FTE	8.7	6.0	10.0
Support staff				
Academic coaches	FTE	1.8	1.0	2.5
Instructional aides	FTE	4.4	2.0	6.0
Counselors	FTE	4.3	4.0	5.0
Nurses	FTE	0.5	0.0	1.0
Librarians	FTE	1.0	1.0	1.0
Security officers	FTE	2.8	1.5	4.0
Technology support staff	FTE	1.4	1.0	1.6
Community liaisons	FTE	1.3	1.0	2.0
Programs				
Professional development	Hours/year/teacher	39.5	17.7	60.0
After-school tutoring	Teacher hours/week	85.6	24.0	120.0
Longer school day	Hours/day	0.1	0.0	0.0
Summer school	Students	330.5	100.0	500.0
Longer school year	Days/year	0.0	0.0	0.0
Computers for instruction	Computers	309.9	175.0	400.0
Other	$ thousands	2.7	0.0	0.0

students. Relative to middle schools, these core classes were slightly smaller, but the noncore and physical education classes were larger. Once again, principals were not in complete agreement about the optimal number of teachers. Allocations ranged from 36 to 46 teachers for core classes, with a fairly even distribution within that range. Noncore teacher allocations ranged from 20 to 30. Generally, principals who chose larger-than-average core class sizes chose smaller-than-average noncore class sizes. Furthermore, one principal added that he would structure his core classes so that those serving English language learners were smaller than those serving students proficient in English.

Nonteaching staffing at the low-budget level also followed fairly clear patterns with some variation. The low-budget school depicted in Table 7.1 had an average of one principal, three assistant principals, and 8.7 clerical staff. Although every participant allocated exactly one principal, the allocation of assistants varied. One principal who chose four assistant principals explained, "Administration is key to orchestrate the development, implementation, and sustenance of the student support programs. To that end, I started with a healthy administrative staff and increased it as funding grew." On average, principals also allocated more than 17 support staff, of whom 4.4 were instructional aides. The purpose of these aides, one principal noted, was to "get in the classroom and provide one-on-one support to struggling students." With a staff of 4.3 counselors, each counselor was responsible for about 418 students. Like their middle school counterparts, high school principals regarded security officers as a necessity; on average, they allocated 2.8 full-time officers to the low-SES school. The staffing ratio implied by this allocation was similar to that in the low-budget middle school.

High school principals also emphasized professional development, supplying nearly 40 hours per teacher per year in the low budget—about eight hours more per teacher than the allocation chosen by the elementary and middle school principals. Like the other principals, the high school principals were split over how to allocate these hours. About half preferred to have teachers meet in full-day increments, whereas the other half preferred to dole out hours on a weekly basis. Several principals noted that they would allocate more professional development time to teachers in the core subject areas than to those in noncore subjects.

The principals stressed student-based programs as well. Their average budget allowed for 350 students in the tutoring programs; generally, these students met in groups of 16 for about four hours per week. These tutoring programs were typically a mixture of homework clubs and remediation programs devoted to reading and English skills. Summer school was funded for an average of 331 students.

As the budget increased for the low-SES school, high school principals allocated the additional funds in much the same way middle school principals did. Spending on teachers grew the most, followed by

almost identical increases in spending on support staff and spending on student programs. Appendix Table B.3 shows the average resource allocations for all three budgets, and Figure 7.1 summarizes the spending patterns in five broad categories as the budgets grew. Once again, the spending categories are comparable to the broad categories in Table 7.1 except that teacher training includes spending on academic coaches and professional development.

Like their middle school counterparts, principals used the largest share of their additional funds to add more teachers—10.2 more than in the low-budget scenario. One principal noted that these small classes "allow for more individual student-teacher contact" and another added that they would reduce disciplinary issues. However, several principals believed that professional development was more important than small class sizes. One principal remarked, "I increased staff development because *how* effective a teacher is has more to do with increasing achievement than does class size." Another principal added, "Professional development is a key component in building a strong staff. I didn't need *more* teachers, I needed people who are better prepared and qualified!" Yet another noted the importance of smaller class sizes but maintained that teachers need to motivate young people and must therefore be talented. In a follow-up message to the budget workshop coordinators, one principal expanded on this point:

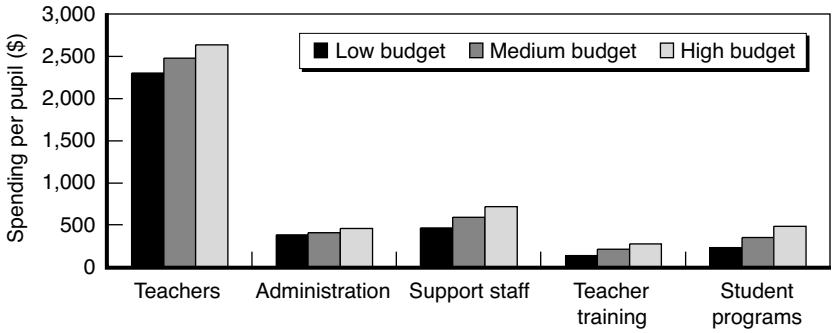

Figure 7.1—Allocation of Funds in Low-SES High School as the Budget Grew

> I have become more and more convinced that lowering class size is NOT the real answer to improved performance. If there is any message that I, as a workshop participant, would like to send to a commission or to the legislature or to the Governor, it is that we need to put significant resources behind changing the way teachers go about doing their work and allow for some curricular flexibility rather than just giving teachers fewer students. Obviously, we should be reasonable about lowering the oppressive student loads that are carried by some teachers, and I tried to reflect that thought in my exercise decisions. However, I kept returning to the thought that there must be a balance between making a teacher's work easier and helping make a teacher's work better.

With this argument in mind, perhaps, principals added an average of 27.3 hours of professional development per teacher as their budgets increased. High school principals placed much more emphasis on professional development than did elementary or middle school principals, who added only 18 hours on average.

Teacher quality and preparedness also emerged as priorities in other programs. One principal explained, "After-school tutoring is important, but not an emphasis. I believe reasonable class size with spectacular instruction is more powerful." One principal said she was reluctant to extend the school day or academic year if instruction was merely more of the same. Another explained that she chose not to fund a longer day or year because "effectively using the time we have now is the key." One principal also stressed making more effective use of the current resources.

> A longer day and longer year are not the solution. We need to do more in less time. Let's not bore students by making them attend longer days or more days. Less may be more in this case. Summer school shouldn't be necessary if we are doing our jobs during the regular school year.

Despite these sentiments, high school principals, like their middle school counterparts, more than doubled their spending on student programs as their budgets increased. They extended the school day by an average of 11 minutes with the high budget, thereby adding about one additional week of class time to the school year, and added 2.5 days to the official school year. One principal pointed out that these additional days should come at the beginning of the school year to "allow more instruction prior to state-mandated assessments." On average, principals enlarged summer school programs to accommodate 312 more students, and they provided an additional 43 hours per week of teacher tutoring time. As a result, the

tutoring program was expanded to serve about 200 more students than were served in the low-budget program. About one-third of the principals also reduced the size of the tutoring groups by an average of six students; however, the weekly hours of meeting remained relatively stable.

Principals used one-quarter of the additional funds in the high budget to add nearly ten support staff. Instructional aides, counselors, and community liaisons accounted for three-quarters of these additional FTEs. Several principals described the critical role that liaisons play in a low-SES school. One maintained:

> Especially in lower-SES schools, ongoing support and communication with parents is crucial. This communication needs to be in the language used by the parents. In many cases, the liaison is more approachable for parents.

Another principal added:

> There is a need for more parental contacts in a low-SES school. Many parents won't sign their children up for free lunch; they are not aware of problems at school (due to lack of phones, permanent address, etc.).

Administrative staffing also received a small amount of the additional funds. On average, principals added 0.8 FTE assistant principal. The function of this assistant principal was, as one principal explained, "to improve overall supervision and increase administrative presence in the classroom." More administrative involvement in the classroom reinforces the priority of improving teacher quality. Another principal noted that an additional assistant principal could focus on intervening with struggling students more effectively. Yet another added an attendance clerk, believing that higher attendance rates would translate into higher academic performance. As budgets grew, the overall patterns in Figure 7.1 were similar regardless of the school's SES (see Table B.3 for the average allocations in the high-SES school).

In addition to making changes in staffing, teacher training, and student programs, principals mentioned structural changes that could be made with minimal costs. For example, one principal believed that "single-track, year-round schedule and block daily scheduling would be a cost-effective and more efficient way to keep the momentum going with frequent breaks and tutoring and collegial work built into the school

day." Despite our instructions to purchase any necessary professional development time, some principals said they would simply rearrange their schedules to accommodate an hourly meeting per week for teachers.

Student Outcomes, API Predictions, and Graduation Rates

Like their counterparts, high school principals predicted that budget increases would lead to better academic outcomes and that, for the same budget, outcomes would be better for the high-SES school than for the low-SES school (Figure 7.2). For the low-budget, low-SES school, the average API prediction was 665. With the high budget, the average prediction rose nearly 100 points to 761. Although that average is still short of the state goal, nearly half the principals predicted that the low-SES school would indeed achieve an 800 API (Table 7.2). For the high-SES school, about one-third predicted that the high-SES school would attain an 800 API with only the medium budget. These results indicate that they believed that the low-SES school would need $525 per pupil more than the high-SES school to achieve a similar outcome.

With the low budget, the predicted API score for the low-SES school exceeded the average of actual ones for schools with similar demographics by 75 points; similarly, the high-SES predictions exceeded

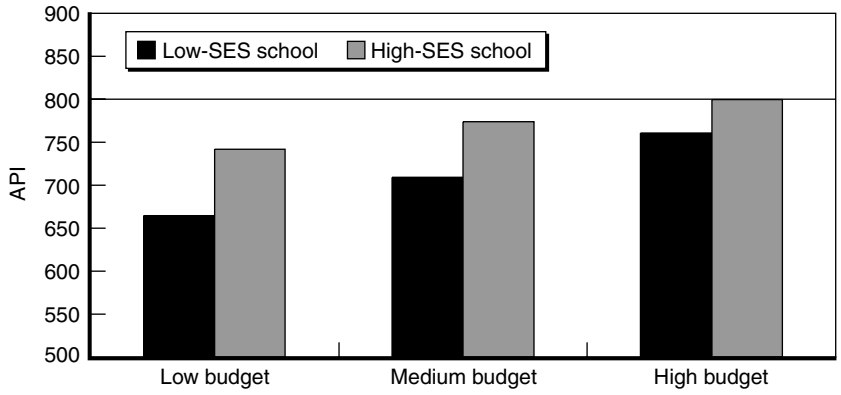

Figure 7.2—Average Predicted API for High Schools by SES and Budget

Table 7.2

Number of High School Principals Predicting Each API Range

	Low-SES School			High-SES School		
API	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550
550–599	1	–	–	–	–	–
600–649	4	2	2	–	–	–
650–699	4	1	–	1	1	1
700–749	5	9	3	6	1	1
750–799	–	2	3	7	7	4
800–849	1	1	6	–	4	7
850–899	–	–	1	1	1	1
900–1000	–	–	–	–	–	1
Average	665	710	761	742	774	800

actual API scores by about 55 points. The workshop's structure may have led principals to overestimate API scores, and there may have been a natural tendency to believe that API scores would reach the goal of 800 under the highest budget. The gap could also be due to the greater resource flexibility and staff stability assumed in the budget exercises than actually exists in California high schools.

As noted above, the focus on graduation rates distinguishes high schools from elementary and middle schools. Principals predicted that the low-SES school would have a lower graduation rate at each budget level. Figure 7.3 shows the average predicted graduation rate for each of the schools with each of the budgets. With the medium budget, principals predicted that 93 percent of the students from the low-SES school and 96 percent of students from the high-SES school would graduate. At the highest budget level, the low-SES school graduation rate was estimated to be 96 percent, matching the high-SES school at the medium budget. This calculation suggests that, as with the API score, the low-SES school. requires more resources—about $525 per pupil more—to achieve the same graduation rate as the high-SES school. This is the same spending difference principals predicted would be required for the APIs of the two schools to be similar.

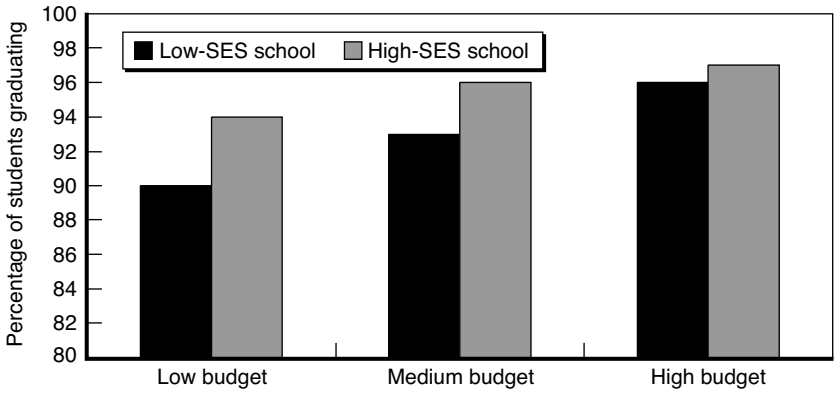

Figure 7.3—Average Predicted Graduation Rate for High Schools by SES and Budget

Student Characteristics and Resource Allocations

To examine which additional resources principals thought would be especially effective in equalizing student achievement and graduation rates across the types of schools, we compared the low-SES, high-budget scenario to the high-SES, medium-budget scenario. The first two numerical columns of Table 7.3 show the average allocations for the low-SES school and the high-SES school, respectively. (Appendix Table B.3 shows allocations for the low-SES and high-SES schools with the same budgets.) The third column shows the additional resources allocated in the low-SES school.

The most striking staffing difference is that the low-SES school had nearly six more teachers, most of them core teachers, and 3.5 additional FTE instructional aides to achieve the same outcomes as the high-SES school. One principal explained the importance of lower class sizes in the low-SES school: "I felt that class size was not as relevant [in the high-SES school] since academic gaps did not appear to be as significant." This rationale also explains the increased focus on student support programs in the low-SES school. Principals provided nearly 40 more hours of tutoring time and 140 more summer school slots. Although principals did not always change the level of other student

Table 7.3

Resources Needed for High Schools to Achieve Similar API Scores (Approximately a 770 API)

Resource	Unit of Measure	Low-SES School, High Budget	High-SES School, Medium Budget	Additional Units in Low SES School
Teachers				
Teachers—core classes	FTE	47.1	42.2	4.9
Teachers—noncore classes	FTE	28.9	28.2	0.7
Teachers—physical education	FTE	4.4	4.3	0.2
Administration				
Principals	FTE	1.1	1.0	0.1
Assistant principals	FTE	3.7	3.3	0.3
Clerical office staff	FTE	10.4	9.4	1.0
Support staff				
Academic coaches	FTE	3.6	3.0	0.6
Instructional aides	FTE	8.9	5.3	3.5
Counselors	FTE	6.0	5.7	0.3
Nurses	FTE	0.7	0.7	0.0
Librarians	FTE	1.4	1.3	0.1
Security officers	FTE	3.5	3.2	0.4
Technology support staff	FTE	2.4	2.0	0.4
Community liaisons	FTE	2.4	1.5	0.9
Programs				
Professional development	Hours/year/teacher	66.8	63.2	3.7
After-school tutoring	Teacher hours/week	128.6	91.2	37.4
Longer school day	Hours/day	0.3	0.1	0.1
Summer school	Students	642.5	504.3	138.2
Longer school year	Days/year	2.5	1.8	0.7
Computers for instruction	Computers	523.5	461.1	62.5
Other	$ thousands	3.6	2.7	0.9
Budget	Dollars/pupil	4,550	4,025	525

NOTE: Because of rounding, the additional units may be off by 0.1.

programs depending on the school, they explained that the focus of such programs would change. For example, longer school days at the high-SES school would be used to provide time for students to fulfill college prerequisites and take advanced placement courses, but that time would be used for remediation at the low-SES school.

Conclusion

At the low-SES, low-budget school, high school principals preferred that core classes be smaller than noncore classes. As budgets increased, principals used the additional funds in much the same way as the middle school principals. Although they increased spending in all resource areas, they used the largest portion of the funding to hire more teachers and reduce class sizes. At the same time, many stressed the critical importance of improving the quality of the teaching force. High school principals allocated about eight more hours per teacher to professional development under the low budget than did their elementary and middle school counterparts. As the budget grew, they also added nine more hours per teacher than did elementary and middle school principals.

Unlike their middle school counterparts, almost half the high school principals thought that the low-SES school could attain an 800 API with the high budget. Furthermore, their predictions indicate that the low-SES school would need $525 more per pupil, allocated optimally, to achieve an academic outcome similar to that of the high-SES school.

8. Conclusion

This report presents a new approach to thinking about adequate funding for California schools. By attaching prices to school inputs and then asking principals to make tradeoffs under realistic budget scenarios, this approach offers a useful way to distinguish needs from desires. It also blends allocation strategies with estimates of student achievement for various budget levels and for schools with different student body characteristics. The results therefore link resources, prices, budget decisions, demographics, and student performance estimates in a novel and instructive way.

It may seem obvious that school funding systems should reflect prices, budgets, student needs, and academic performance goals, but this has not been California's practice in recent years. In response to a series of court decisions and state ballot initiatives, the current school finance system allocates revenue according to formulas based on past budgets and a complicated array of categorical programs. Since the passage of Proposition 98, for example, California has sought to maintain per-pupil spending at its 1986–1987 level with adjustments for growth in real per-capita income. Although easy to summarize, Proposition 98 includes many details that are devilishly difficult to understand, much less implement. A series of contingencies, most of them added to adjust to difficult economic times, makes its budget provisions more flexible but virtually incomprehensible as well. A ballot initiative that appeared to be a simplification and a guarantee of adequate school funding has proven to be neither. Furthermore, Proposition 98 has encouraged legislators to satisfy its complicated mandates rather than focus on more fundamental questions, including what budget levels and resource combinations are most likely to help students meet the state's academic standards.[1]

[1]For more on Proposition 98, see Rose et al. (2003).

In the absence of reliable production functions for education, policymakers must rely on judgments to answer such questions. Although a great deal of research and experience can inform these judgments, in the final analysis the basic question—What do we want our schools to look like?—is a political one, and for various historical and institutional reasons, the state has chosen to address it now. Chief among those reasons, perhaps, is the fact that the state government is now responsible for both school funding (through the legislature) and setting performance goals (through the State Board of Education).[2] To many policymakers and observers, it follows that the state should provide the resources students need to achieve those goals. Recent legislative activity, including the Master Plan and the passage of AB 2217, indicates that state policymakers are prepared to investigate this approach.

The Quality Education Commission

To help close the loop between standards, funding, and performance, Governor Davis signed AB 2217 into law in September 2002. That law calls for the formation of a Quality Education Commission and charges it with developing a Quality Education Model.[3] According to the bill, the Quality Education Model should be a list of school resources, along with their corresponding costs, that would enable the "vast majority" of pupils to meet the state's academic standards. The language of AB 2217 makes it clear that the Quality Education Commission may produce a series of models, or prototypes, rather than a single, inflexible one; the bill notes, for example, that the commission should produce *at least* one prototype each for elementary schools, middle schools, and high schools. It also directs the commission to consider school and demographic characteristics when constructing these models. By doing so, the bill suggests that different types of schools may require different resource levels and therefore different

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[2]For a history of California's school finance system, see Sonstelie et al. (1999). Rose et al. (2003) discusses the split between the legislature's funding role and the State Board of Education's role in setting academic standards.

[3]The idea for a Quality Education Model for California arose from PPIC research undertaken for the Joint Committee to Develop a Master Plan for Education. See Sonstelie (2001).

funding levels. The bill also specifies that the commission's work is not meant to replace the current school funding system but to "enable the legislature to make more informed annual budgetary decisions."

The commission will consist of 13 members: seven appointed by the governor (and approved by the state senate), two appointed by the Senate Rules Committee, two by the speaker of the assembly, and two by the Superintendent of Public Instruction. The law also requires that the commission submit its prototypes, along with its findings and recommendations, to the governor and legislature within one year of its first meeting. Although the formation of the commission was delayed by the gubernatorial recall in 2003, it is expected to begin its work this year.

Although our study was not meant to develop the prototypes required by AB 2217, the commission may find our research approach, school budget spreadsheet, and protocols helpful. AB 2217 stipulates that "parents, classroom teachers, other educators, governing board members of school districts, and the public be involved in the design and implementation of the Quality Education Model." The spreadsheets we developed provide an efficient and inexpensive way of collecting and distilling the views of these and other stakeholders. Although we value the expertise of the principals in our study, we do not believe that they monopolize wisdom on these important issues. In fact, we believe that there is much to be gained from many more people completing the spreadsheet, including superintendents, education professors, businesspeople, legislators, and the governor along with the stakeholders explicitly listed in the bill. If the commission chooses to ask groups to complete the exercise, they might include EdSource, the California Teachers Association, the Education Trust, the Bay Area School Reform Collaborative, and other organizations known for their educational expertise and interests. This method would permit the commission to consult these stakeholders while minimizing any biases they may have regarding overall resource levels.

Both the protocols and the spreadsheet can be adapted in various ways to serve the commission's purposes. For example, budget levels can be added to produce more fine-grained information, and other factors in the education process—special education, transportation, and so on—can be added to the spreadsheet to flesh out the prototypes. In

addition to being adaptable, the spreadsheet can be distributed, completed, and returned to the commission electronically. Equipped with the packets we prepared for the workshop, our participants noted that they could have completed these exercises without extra instruction or preparation. In short, the commissioners can use, modify, and expand this approach depending on their preferred strategy for completing their work.

The commission may find our results helpful as well. The responses we gathered summarize the judgments of a representative sample of California principals, portray what various schools might look like under different budgets, and indicate which resources are most useful in improving student achievement. Even with the low budget, for example, elementary school principals hired teachers to maintain small class sizes. Middle school principals began with larger class sizes (to accommodate relatively more administrative, counseling, and security personnel) and then progressively reduced them as budgets grew. High school principals followed a similar trajectory, but they placed more emphasis on improving teacher quality. These and other patterns reveal the relative efficacy of specific resources at different types of schools.

Another important though unsurprising result is that principals thought that more spending was required for most schools to reach the state's relatively high academic standards. They also thought that the cost of reaching these standards would vary according to the socioeconomic status of the school's student body. Although many observers and stakeholders share both of these views, the principals' experience and heightened awareness of the state's academic standards make us more inclined to credit their conclusions. To scale the spending increases they thought were necessary to reach those standards, recall that the low budget in our exercises approximated California's actual spending levels on the relevant resources in 1999–2000. The subsequent budgets increase that original one by 15 percent and 30 percent, respectively. If California were to increase total per-pupil spending by 15 percent at the low-SES schools, including 15 percent of spending we left off the table, expenditures would match those in Illinois, Minnesota, Oregon, and Indiana—states ranked between 16th and 19th in per-pupil spending. Adding another 15 percent would yield funding levels

comparable to Michigan, Delaware, and Vermont—states ranked between 8th and 10th in per-pupil spending. Such budgets, in short, represent significant increases but are not unprecedented.

The principals' responses also indicate that thoughtful allocations, not just overall funding increases, would be critical for reaching the state's academic standards. An important aspect of our budget workshop was its assumption that principals could shift resources in virtually any way they saw fit. Our principals reminded us, however, that a large percentage of their funding in the real world is tied to individual program requirements. To the extent that these requirements constrain principals from reallocating resources to improve student achievement, we question the rationale for those requirements. If the state wishes to hold principals responsible for achievement at their schools, it seems reasonable to permit them to maximize that achievement by reallocating resources more freely. If, on the other hand, the constraints are lifted, and these principals continue to allocate resources as they did before, this outcome suggests that the constraints have outlived their purpose and only burden the principal with excess paperwork.

Our results do not point to specific bundles of resources that would ensure specific performance levels at any sort of school or budget level. Even in a highly controlled budget simulation for identical hypothetical schools, our principals differed somewhat in their optimal allocations and API predictions. This lack of consensus makes the adoption of a universal, all-purpose prototype seem unwarranted. It also makes the commission's job all the more important, for it shifts the terms of the discussion toward ranges and likelihoods and away from prescriptions or formulas that can be applied confidently throughout the state. It should also be noted, however, that the variation we observed was not so large as to preclude meaningful analysis of the average responses. Indeed, we came to view those averages in the same way we might view model homes in a new housing development—as tangible and whole representations of what certain funding levels might buy, not inflexible prototypes requiring slavish imitation. The models are useful insofar as they provide a funding benchmark for the legislature, even when resource allocations at actual schools vary significantly. In this sense, the models can be compared to the Consumer Price Index, which guides

cost-of-living decisions without assuming that every U.S. household will buy every item included in the index.

Seen this way, the averages and variations we observed can guide the commission as it seeks to provide the legislature with funding benchmarks. Consider, for example, the responses of our elementary school principals (Table 8.1). Thirty-one percent thought that the high-SES school could achieve an 800 API with a budget of $3,500 per student for the relevant resources. Fifty percent thought that the same school could achieve at least an 800 API with a budget of $4,025 per pupil. Finally, 81 percent thought that the highest budget of $4,550 would produce an API of at least 800. After reviewing the results, our sights shifted from the question, "How much will it cost for all schools to reach an API of 800?" to some slightly different ones: How much are Californians willing to spend to increase the probability of a school reaching an API of 800? Is it worth $525 per pupil in the high-SES school to raise the perceived likelihood of an 800 API from 31 percent to 50 percent? Is it worth doing so if 50 percent of principals think a 750 could be achieved without that extra spending? Is it worth spending $1,050 per pupil in the low-SES school to raise the predicted likelihood of an 800 from 6 percent to 44 percent? Such questions more accurately reflect the uncertainty inherent in such predictions, but they also lend themselves more readily to the political deliberation we spoke of above. No one knows what would happen to overall student performance if

Table 8.1

Predicted Likelihood of API Scores by SES and Budget: Elementary Schools

	Low-SES School			High-SES School		
API	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550	Low Budget $3,500	Medium Budget $4,025	High Budget $4,550
800 or higher	6%	7%	44%	31%	50%	81%
750 or higher	6	7	56	50	63	94
700 or higher	13	33	88	50	94	100
650 or higher	31	80	94	81	100	100

NOTES: Percentages are based on the distribution in Table 5.2. Even if 100 percent of principals predict a certain API, there is still no guarantee it will be obtained.

California spent 30 percent more on education next year; the outcomes would depend on a range of factors, including how and where the spending translated into specific resources. Our approach, however, shows policymakers what schools might look like under various budget scenarios as well as the range and likelihood of performance improvements resulting from increases in resource provision. This information could prove helpful to policymakers as they consider the value of K–12 education relative to the state's other commitments.

With these considerations in mind, the commission might wish to provide the legislature with model schools at several budget levels. For each model, it could also include the likelihood that such a school would achieve an API of 800, 750, 700, or 650, which roughly reflects the national median based on the 1999 API.[4] When presented with these estimates, legislators may decide that the cost of achieving an 800 API for all schools is too high, but the benchmarks resulting from the commission's work will enable a more informed discussion of that issue. That work will also refocus attention on the school as the primary unit in education. What does a typical school need to be successful? Answers may differ, but the question is the right one, and it is currently obscured by a school finance system that imperfectly reflects the needs, costs, and challenges of real schools.

One final consideration for the commission concerns the emphasis our principals placed on high-quality teaching and teachers. In general, principals were keenly aware that funding must be converted into useful resources, especially teachers, before it can improve student achievement. For this reason, high school principals in particular were concerned about attracting more-qualified people to the profession. Ultimately, highly qualified teachers may cost more than their less-qualified colleagues, but the principals believed that recruiting and developing these teachers is more likely to increase student performance than increasing budgets for schools as they now stand. In our workshops, we assumed that teachers were both experienced and qualified, but the participating principals never let us forget that this simplifying

[4]Rose et al. (2003, p. 12).

assumption masked an important component of a quality education in the real world—namely, a highly qualified and motivated teaching staff. Our next report will explore this critical issue in more detail.

Appendix A

Data and Methods

The School Sample

We used a stratified random sampling procedure to select the schools in our sample. Our goal was to ensure that we had a mix of California schools that represented the state in terms of geographic region, socioeconomic status, and student achievement. We also wanted to include roughly equal numbers of elementary, middle, and high schools. Because our broader study included a study of school districts, we required that each trio of elementary, middle, and high schools come from either one unified district or a combination of an elementary and high school district. We divided the state into six regions and oversampled from smaller ones to ensure that we had participants from each region of the state. We also oversampled low-SES schools (and high-API schools among them) because those schools are furthest away from the state's API goal, and we wanted to study what they were doing to close the gap. In total, we selected equal numbers of the three types of schools. Our sampling procedure weighted schools and districts by their enrollment and excluded schools with fewer than 200 students. Our next report will provide more technical details about the sampling procedure.

We originally sampled 90 schools; 49 are represented in our broader study, and 45 principals participated in the school budget simulation workshops. Two of the principals, a retiree and his successor, represented the same school. Sixteen principals were from elementary schools, 14 were from middle schools, and 15 were from high schools. Generally, principals who did not participate were at low-SES schools with relatively low test scores. We achieved a broad cross-section of schools. Table A.1 describes the geographic characteristics of the 44 schools from which our principals came and compares those characteristics with the characteristics of all California schools with valid

Table A.1

Geographic Characteristics of 44 Sample Schools

	Sample	Statewide
Geographic location (%)		
Northern California Butte, Colusa, Del Norte, Glenn, Humboldt, Lake, Lassen, Mendocino, Modoc, Nevada, Plumas, Shasta, Sierra, Siskiyou, Sutter, Tehama, Trinity, and Yuba Counties	11	7
Bay Area Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties	18	19
Central Coast Monterey, San Benito, San Luis Obispo, Santa Barbara, Santa Cruz, and Ventura Counties	5	7
Central Valley Alpine, Amador, Calaveras, El Dorado, Fresno, Inyo, Kern, Kings, Madera, Mariposa, Merced, Mono, Placer, Sacramento, San Joaquin, Stanislaus, Tulare, Tuolumne, and Yolo Counties	20	21
Los Angeles region Los Angeles, Orange, Riverside, and San Bernardino Counties	20	38
San Diego/Imperial region Imperial and San Diego Counties	25	8
Type of city (%)		
Midsize to large city	34	33
Urban fringes	57	53
Town or rural	9	14

SOURCE: California Basic Educational Data System (CBEDS) List of California Public School Districts and Schools, available at http://www.cde.ca.gov/. Only schools with valid 2002 API data were included in the statewide statistics.

APIs. Because we undersampled from the Los Angeles area, we have a smaller share of schools from that region than is representative statewide. The table also shows the percentage of sample schools from different types of cities. About one-third of the principals were from midsize to large cities, over half were from the urban fringes of a city, and about 9

percent were from towns or rural areas. These definitions of city type are based on U.S. Census Bureau classifications.[1]

Table A.2 shows more specific characteristics of the 44 schools represented by the workshop participants. For example, half the elementary schools in our sample had an enrollment of 695 or fewer students, slightly larger than the median of schools statewide. Middle schools in our sample enrolled just over 1,000 students, and half the high schools enrolled at least 1,893 students. At half the elementary schools in our study, more than 79 percent of the students received free or reduced-price lunch—a common proxy for low socioeconomic status.

Table A.2

Characteristics of 44 Sample Schools in 2000–2001: Median Values

	Elementary Schools	Middle Schools	High Schools
School enrollment (students)			
Sample	695	1,045	1,893
Statewide	567	891	1,706
Percentage of students on subsidized lunch program			
Sample	79	66	36
Statewide	54	44	26
Academic Performance Index			
Sample	675	608	590
Statewide	700	666	638
Similar Schools Rank			
Sample	8	7	6
Statewide	6	6	6

NOTES: Enrollment data came from CBEDS Enrollment by Grade and School files. Data on the other variables came from the 2002 API Base Data File. Both are available at the California Department of Education's website http://cde.ca.gov/. Only schools with valid 2002 API data were included in the statewide statisitics. However, if API or similar schools ranking data were missing for our sample of schools, they were replaced with 2001 data.

[1]A midsize to large city is a central city of a Consolidated Metropolitan Statistical Area (CMSA) or Metropolitan Statistical Area (MSA). An urban fringe of a city is any incorporated place, Census Designated Place (CDP), or nonplace territory within a CMSA or MSA of a large or midsize city and defined as urban by the Census Bureau. A town is an incorporated place or CDP with a population greater than or equal to 2,500 and located outside a CMSA or MSA. Rural areas are any incorporated place, CDP, or nonplace territory designated as rural by the Census Bureau.

As is typical statewide, a much smaller share of the high school students in our sample participated in this lunch program. Because of our sample design strategy, the schools in our sample served a more impoverished student body than is typical statewide.

Given the strong correlation between poverty and test scores, it is not surprising that the sample schools also scored slightly lower on the state's API than did schools statewide. Half the elementary schools in our study had an API of 675 or lower in 2002. The median middle school scored lower at 608, and the median high school in our sample scored even lower at 590. On average, however, the schools in our sample were doing better than schools with similar characteristics. California ranks schools by comparing their API score to 100 other schools with similar demographic characteristics. A rank of ten indicates that a school has a higher API than 90 percent of its similar schools, a rank of nine indicates that the school's API is higher than 80 percent of its similar schools, and so on. The median elementary school in our sample received an eight on the similar schools ranking. The comparable figures for the median middle school and high school were seven and six, respectively.

Data Sources for Personnel Salaries

Teachers

Every year, California school districts report their certificated salary schedules to the California Department of Education on a J-90 form. We used those schedules to determine what a teacher with 11 years of experience would make in California. We added 25 percent more to account for benefits and an additional $1,100 to cover absences and the annualized cost of a computer, bringing the total annual cost per teacher to $59,000. To compute a daily wage for teachers, we divided the annual cost by 184, the number of days per year teachers are contracted to work. To arrive at an hourly wage rate, we divided the daily rate by seven, the number of hours teachers are contracted to work each day. The hourly rate is therefore $45.80.

Administrative Staff

The J-90 data include principal salaries. In 1999–2000, the average principal salary in school districts with more than 2,000 students was $79,677. Assuming benefits of 25 percent, the cost of a principal rounds to $100,000. We assumed that assistant principals made 90 percent of what principals made, or $90,000.

To estimate the salaries of clerical office staff, we used the 2001 Occupational Employment Survey (OES), a statewide wage survey of employers conducted by the U.S. Bureau of Labor Statistics during 1999, 2000, and 2001. Secretaries in California made an average of $29,650 per year. Additional benefits of 25 percent yield an average cost of $37,000. We checked these estimates against salary schedules of several school districts and are confident that they are reasonable.

Support Staff

The estimates of salaries of academic coaches, librarians, instructional aides, counselors, and nurses came from CDE (2002a). CDE reports that the average school spent $168,000 on the salaries and benefits of 2.5 instructional support staff, such as curriculum specialists, librarians, and library aides, yielding an annual cost of $67,000 per FTE in this staffing category. CDE also reports that the average school spent $210,000 on the salaries and benefits of 7.3 instructional aides, for a cost of $29,000 per FTE. Finally, it reports that the average school spent $125,000 on the salaries and benefits of 1.6 pupil support staff, such as counselors and nurses, yielding an annual cost of $78,000 per FTE.

We used the 2001 Occupational Employment Survey to estimate salaries of security officers and technology support staff. California security guards earned an average annual salary of $20,290. Police officers in the 10th percentile of salaries, most likely new and inexperienced, earned $38,180 annually. We assumed that the security needs of a school could be met by a combination of security guards and the least-expensive police officers. Averaging the salaries of those two security categories and adding 25 percent for benefits yields $37,000 per year. Network and computer systems administrators earned an average annual salary of $61,600. Assuming a benefits rate of 25 percent yields an annual cost of $77,000 per technology support FTE.

To determine the cost of community liaisons, we reviewed the classified salary schedule of several school districts in California. After these reviews, we chose an annual salary of $29,000, or $36,000 including benefits.

Appendix B

Additional Results

Table B.1

Average Resource Levels for Elementary Schools of 600 Students

Resource	Unit of Measure	Low-SES School			High-SES School		
Teachers							
Teachers—grades K–3	FTE	16.3	16.8	17.2	15.8	16.4	16.8
Teachers—grades 4 and 5	FTE	7.3	7.8	8.0	7.4	8.0	8.1
Administration							
Principals	FTE	0.9	0.9	0.9	0.9	0.9	0.9
Assistant principals	FTE	0.3	0.4	0.7	0.3	0.4	0.8
Clerical office staff	FTE	2.3	2.4	2.5	2.3	2.4	2.5
Support staff							
Academic coaches	FTE	1.2	1.5	1.8	1.2	1.5	1.8
Instructional aides	FTE	1.8	2.2	2.7	1.4	1.5	2.0
Counselors	FTE	0.3	0.5	0.6	0.3	0.4	0.5
Nurses	FTE	0.4	0.4	0.5	0.3	0.4	0.5
Librarians	FTE	0.6	0.7	0.8	0.8	0.8	0.8
Security officers	FTE	0.1	0.1	0.1	0.1	0.1	0.0
Technology support staff	FTE	0.3	0.5	0.6	0.5	0.7	0.9
Community liaisons	FTE	0.4	0.6	0.7	0.3	0.4	0.5
Specialty teachers	FTE	0.7	1.0	1.5	1.0	1.8	2.6
Programs							
Professional development	Hours/year/teacher	33.2	48.9	50.6	34.7	45.8	48.8
Preschool	Students	12.8	20.6	34.2	9.3	20.6	32.8
Full-day kindergarten	1 = yes 0 = no	0.3	0.3	0.6	0.3	0.3	0.5
After-school tutoring	Teacher hours/week	23.3	34.8	41.9	23.2	34.0	35.1
Longer school day	Hours/day	0.0	0.1	0.2	0.0	0.1	0.2
Summer school	Students	39.9	79.2	82.1	57.0	79.6	87.7
Longer school year	Days/year	0.1	1.5	2.8	0.3	0.6	1.6
Computers for instruction	Computers	38.6	50.6	66.8	50.8	70.0	86.3
Other	$ thousands	0.4	0.4	1.7	0.4	1.5	2.2
Budget	Dollars/pupil	3,500	4,025	4,550	3,500	4,025	4,550

Table B.2

Average Resource Levels for Middle Schools of 1,000 Students

Resource	Unit of Measure	Low-SES School			High-SES School		
Teachers							
Teachers—core classes	FTE	29.3	31.5	32.7	29.2	31.1	33.1
Teachers—noncore classes	FTE	6.0	6.8	7.4	6.3	7.3	7.8
Teachers—physical education	FTE	4.5	4.9	5.3	4.5	5.1	5.3
Administration							
Principals	FTE	1.0	1.0	1.0	1.0	1.0	1.0
Assistant principals	FTE	1.6	1.7	1.9	1.6	1.8	1.9
Clerical office staff	FTE	4.0	4.4	4.7	4.0	4.4	4.7
Support staff							
Academic coaches	FTE	1.2	2.4	3.4	1.3	2.3	3.2
Instructional aides	FTE	2.7	3.9	6.2	2.6	3.6	5.5
Counselors	FTE	1.7	2.0	2.5	1.8	2.0	2.3
Nurses	FTE	0.6	0.6	0.7	0.6	0.6	0.7
Librarians	FTE	1.0	1.0	1.1	1.0	1.0	1.1
Security officers	FTE	1.6	1.8	2.1	1.2	1.5	1.7
Technology support staff	FTE	0.8	0.9	1.0	0.8	0.9	1.2
Community liaisons	FTE	0.5	0.9	1.3	0.5	1.0	1.2
Programs							
Professional development	Hours/year/teacher	30.5	41.3	49.0	30.7	41.4	48.4
After-school tutoring	Teacher hours/week	46.0	64.6	80.3	34.8	53.9	70.4
Longer school day	Hours/day	0.0	0.1	0.2	0.0	0.1	0.3
Summer school	Students	164.0	230.8	279.1	167.3	210.9	237.6
Longer school year	Days/year	0.0	1.1	3.2	0.0	1.6	2.0
Computers for instruction	Computers	102.8	121.8	159.9	108.0	139.3	210.4
Other	$ thousands	0.2	1.9	1.9	0.6	2.4	3.2
Budget	Dollars/pupil	3,500	4,025	4,550	3,500	4,025	4,500

Table B.3

Average Resource Levels for High Schools of 1,800 Students

Resource	Unit of Measure	Low-SES School			High-SES School		
Teachers							
Teachers—core classes	FTE	40.6	43.5	47.1	38.9	42.2	45.7
Teachers—noncore classes	FTE	26.0	27.8	28.9	26.7	28.2	29.5
Teachers—physical education	FTE	3.7	4.2	4.4	3.8	4.3	4.5
Administration							
Principals	FTE	1.0	1.0	1.1	1.0	1.0	1.0
Assistant principals	FTE	2.9	3.2	3.7	2.9	3.3	3.7
Clerical office staff	FTE	8.7	9.3	10.4	8.6	9.4	10.6
Support staff							
Academic coaches	FTE	1.8	2.8	3.6	2.0	3.0	4.0
Instructional aides	FTE	4.4	6.9	8.9	3.9	5.3	6.7
Counselors	FTE	4.3	5.3	6.0	4.5	5.7	6.2
Nurses	FTE	0.5	0.6	0.7	0.5	0.7	0.8
Librarians	FTE	1.0	1.2	1.4	1.0	1.3	1.6
Security officers	FTE	2.8	3.1	3.5	2.6	3.2	3.4
Technology support staff	FTE	1.4	1.8	2.4	1.5	2.0	2.7
Community liaisons	FTE	1.3	1.8	2.4	1.1	1.5	2.3
Programs							
Professional development	Hours/year/teacher	39.5	54.1	66.8	42.7	63.2	76.4
After-school tutoring	Teacher hours/week	85.6	107.8	128.6	59.7	91.2	102.5
Longer school day	Hours per day	0.1	0.1	0.3	0.1	0.1	0.3
Summer school	Students	330.5	558.8	642.5	385.1	504.3	664.5
Longer school year	Days per year	0.0	1.4	2.5	1.1	1.8	2.7
Computers for instruction	Computers	309.9	384.8	523.5	314.3	461.1	564.9
Other	$ thousands	2.7	2.7	3.6	4.0	2.7	12.1
Budget	Dollars/pupil	3,500	4,025	4,550	3,500	4,025	4,500

Bibliography

Betts, Julian R., Kim S. Rueben, and Anne Danenberg, *Equal Resources, Equal Outcomes? The Distribution of School Resources and Student Achievement in California,* Public Policy Institute of California, San Francisco, California, 2000.

California Department of Education, "The Average Costs of a California School, 1999–00," *Fact Book 2002: Handbook of Education Information*, Sacramento, California, 2002a.

California Department of Education, *2002 Academic Performance Index Base Report*, Sacramento, California, 2002b.

Hanushek, Eric A., "The Economics of Schooling: Production and Efficiency in Public Schools," *Journal of Economic Literature,* Vol. 24, No. 3, September 1986, pp. 1141–1177.

Hoxby, Caroline M., "The Effects of Class Size on Student Achievement: New Evidence from Population Variation," *The Quarterly Journal of Economics*, Vol. 115, No. 4, November 2002, pp. 1239–1285.

Jepsen, Christopher, and Steven Rivkin, *Class Size Reduction, Teacher Quality, and Academic Achievement in California Public Elementary Schools*, Public Policy Institute of California, San Francisco, California, 2002.

Loeb, Susanna, and Marianne E. Page, "Examining the Link Between Teacher Wages and Student Outcomes: The Importance of Alternative Labor Market Opportunity and Non-Pecuniary Variation," *The Review of Economics and Statistics*, Vol. 82, No. 3, August 2000, pp. 393–408.

Management Analysis and Planning, Inc., "A Professional Judgment Approach To Determining Adequate Education Funding in

Maryland," submitted to the New Maryland Education Coalition, June 5, 2001.

Mosteller, Frederick, "The Tennessee Study of Class Size in the Early School Grades," *The Future of Children*, Vol. 5, No. 2, 1995, pp. 113–127.

Ouchi, William G., with Lydia G. Segal, *Making Schools Work: A Revolutionary Plan to Get Your Children the Education They Need*, Simon and Schuster, New York, 2003.

Rogosa, David, "Interpretive Notes for the Academic Performance Index," Stanford University, November 20, 2000, available at http://www.cde.ca.gov/psaa/api/fallapi/apnotes.pdf.

Rose, Heather, "The Concept of Adequacy and School Finance," in Jon Sonstelie and Peter Richardson (eds.), *School Finance and California's Master Plan for Education,* Public Policy Institute of California, San Francisco, California, 2001.

Rose, Heather, Jon Sonstelie, Ray Reinhard, and Sharmaine Heng, *High Expectations, Modest Means: The Challenge Facing California's Public Schools*, Public Policy Institute of California, San Francisco, California, 2003.

Smith, Vernon, "Constructivist and Ecological Rationality In Economics," Nobel Prize Lecture, December 8, 2002, available at http://www.nobel.se/economics/laureates/2002/smith-lecture.pdf.

Sonstelie, Jon, "Toward Cost and Quality Models for California's Public Schools," in Jon Sonstelie and Peter Richardson (eds.), *School Finance and California's Master Plan for Education,* Public Policy Institute of California, San Francisco, California, 2001.

Sonstelie, Jon, Eric Brunner, and Kenneth Ardon, *For Better or For Worse? School Finance Reform in California*, Public Policy Institute of California, San Francisco, California, 1999.

About the Authors

HEATHER ROSE

Heather Rose is a research fellow at the Public Policy Institute of California. A specialist in the economics of education, she has published articles and reports on school finance and the relationship between curriculum and subsequent earnings. Her current projects include studies of college affirmative action policies, the determinants of teacher salaries, and the relationship between curriculum and test score gaps by race and ethnicity. She holds a B.A. in economics from the University of California, Berkeley, and an M.A. and Ph.D. in economics from the University of California, San Diego.

JON SONSTELIE

Jon Sonstelie is a professor of economics at the University of California, Santa Barbara, and a senior fellow at the Public Policy Institute of California. His research interests include several areas in public finance and urban economics, including the effect of public school quality on private school enrollment, the incidence of the property tax, the demand for public school spending, the economics of rationing by waiting, and the effect of transportation innovations on residential locations. He was previously a research fellow at Resources for the Future. He holds a B.A. from Washington State University and a Ph.D. from Northwestern University.

PETER RICHARDSON

Peter Richardson is a communications analyst at the Public Policy Institute of California. Before joining PPIC in 1999, he was an associate professor of English at the University of North Texas and an editor at Harper & Row, Publishers. He holds a B.A. in economics from the University of California, Santa Barbara, and a Ph.D. in English from the University of California, Berkeley.

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