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Successful California Schools in the Context of Educational Adequacy

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The AIR research team takes sole responsibility for the entire substance and content of this report.

Executive Summary

This report presents the results from a seven-month study of successful schools in California performed by the American Institutes for Research (AIR). This study is part of a larger group of studies coordinated through Stanford University and funded by the Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, the James Irvine Foundation, and the Stuart Foundation.

The study explored some of the concepts underlying the "successful schools" approach to defining education adequacy and considered their implications for analyzing educational adequacy in California. The overall purpose of the paper is summarized in the following research questions:

- How has the successful schools approach been used to consider educational adequacy?
- What are the strengths and weaknesses of these alternative applications?
- How might successful schools be identified in the state?
- What resource differences are observed or reported by these schools?
- Can we predict academic performance by levels of resources and types of students enrolled?
- Is there any evidence that successful schools use their resources more efficiently?
- What other factors appear related to their success?
- What are the implications of these findings for defining education adequacy in California?

The successful schools approach seeks to determine the cost of the education needed to reach a specified level of educational outcomes by identifying districts achieving these outcomes and determining how much they are spending. This study sought to improve on this basic approach by selecting schools that have been consistently performing at a higher level than the one predicted by their demographics, rather than selecting successful schools that are above an absolute level of performance in a given year or over a given period of time. We analyzed these schools that were "beating the odds" (BTO) with regard to student achievement and compared them to low-performing (LP) schools—schools that had been performing at a lower level than predicted by their demographics. We also conducted telephone interviews with a total of 23 schools from both groups in an attempt to understand their resource allocation practices and to identify common themes in the factors principals deemed necessary for success.

A major premise underlying all approaches to education adequacy is that success is directly linked to the resources available. This study explored this assumption by looking for evidence to confirm or disprove the idea that resource quantities constitute the primary distinguishing factor between successful schools and all others. Thus, the first question was whether BTO schools have more resources than LP or other schools. The second question was whether BTO schools are using their resources in more efficient ways than other schools in the state. We did not intend to estimate an "adequate" level of spending for all schools in California based on these BTO schools, but instead shed some light on whether successful schools have more resources and/or

use their available resources in more efficient ways than other schools in California, and the extent to which the total amount or mix of resources or their unique use appears to explain their exceptional academic achievement levels.

One striking finding of our study is that only a small number of schools (103 schools) met all the requirements to be considered a beating-the-odds school. Beating-the-odds schools were those that were outperforming similar schools during a four-year period (three years in the case of high schools). The same was true for low-performing schools. We found considerable instability in their test score results: schools could outperform one year, and the next perform as expected or underperform. For example, 365 elementary schools were beating the odds during 2002 and 307 schools were beating the odds during 2003; however, only 61 elementary schools were beating the odds every year over the 2002-05 time period.

We focused our resource analyses predominantly on the allocation of personnel resources because these are so fundamental to the educational process and are such a large component of educational spending. We found some differences in staffing between BTO, LP, and other California schools, but these did not appear to be substantial. The most important difference appears to be the level of experience that administrators hold: elementary BTO administrators have more experience than their colleagues in other public schools. Fewer LP school administrators have advanced degrees, and they have less experience in education-related work. In addition, it is worthy of note that LP schools have less-qualified teachers (measured by education and experience level), and more staff focused on providing pupil support (e.g., counselors), which may be a reflection of the higher needs at these schools

Do BTO Schools Have More Resources than Other Schools in the State?

The results of a multivariate OLS regression model designed to explore how personnel resources in BTO and LP schools differed in comparison to other public schools provided no statistical evidence that BTO and LP schools have different quantities of certified and classified personnel when compared to other public schools. Also, BTO schools do not have smaller classes in grades 1 to 5 compared to other public schools (BTO schools do have two fewer students in their kindergarten classrooms). The education and experience levels of teachers do not differ in comparison to other public schools, but elementary BTO administrators are more experienced than their counterparts in other schools. Both the level of experience of teachers and the administrators' educational attainment in elementary LP schools are lower than in BTO schools and lower than the state average. Further, teacher education and experience is lower in LP middle and high schools than in other public schools.

BTO elementary schools have a higher proportion of staff in administrative positions and have a significantly lower percentage of teachers with tenure when compared with other public schools. LP schools have significantly lower percentages of teachers holding full credentials, but they have a higher proportion of staff in pupil support assignments when compared to other public schools.

Costing Out

We also costed out BTO and LP schools in order to compare their levels of spending to one another. We found that, on average, beating-the-odds schools appear to spend slightly less than

low-performing schools per student ($7,799 vs. $8,021; the statewide average is $7,523). For both BTO and LP schools, total per pupil spending is positively correlated with poverty—high-poverty schools tend to show higher per pupil spending. In addition, high-poverty BTO schools show higher per pupil spending than high-poverty LP schools, with the reverse true for low-poverty schools.

Can We Predict the Unusually High Performance of BTO Schools by their Level of Resources?

We used an academic production model in an attempt to relate resource allocation practices and student demographic characteristics to differences in student academic attainment. We found that available measures of resources and student characteristics did not appear statistically related to the unusually high academic performance of BTO schools. It is possible that the factors that make schools successful are unobservable characteristics, or are not captured by current statewide databases. For example, indicators associated with school leadership, teachers' planning time, and teacher and principal turnover are not uniformly available to conduct a comprehensive analysis for all schools in the state.

Are BTO Schools More Efficient?

We also addressed the issue of efficiency, asking whether there is room to reduce schools' level of spending without altering their student achievement level. To do so, we concentrated on the optimal ratio between teacher experience and education. We found that the actual levels of teacher education and teacher experience in BTO schools are closer to the optimum predicted by the model, or in other words, BTO schools appear to be operating at a more efficient level than LP schools in regard to their teacher characteristics. Our findings suggest that if BTO and LP schools were to move to the optimum level predicted from our model, they would gain in efficiency by reducing spending on teaching staff. It is important to keep in mind that in the case of LP schools this would result in a gain in efficiency, but not in an improvement of their academic performance level.

What Did We Find In Our Telephone Interviews?

Knowing that BTO schools do not appear to have more resources than other schools seems an important finding. Still, it begs the question of what does make a difference in BTO schools. Statewide data do not provide sufficient depth to provide much insight into one of the primary research questions for this study: What resource allocation patterns, instructional practices, programmatic leadership, or professional development opportunities are observed or reported by schools as being related to their academic success?

In an attempt to dig deeper into the factors that seem to have made a difference for BTO schools, we conducted telephone interviews with 18 BTO principals and five comparison schools' principals. From our interviews, it seems clear that at least among these schools there is not a single key to academic success. It is not even clear that there is a single combination of factors, or a single recipe. In many ways, the combination of factors said to be major contributors to the success of the BTO schools seemed unique to each school. On the other hand, some factors were mentioned frequently enough to emerge as themes. The major factors identified by the respondents were: 1) the existence of high-quality teachers and staff, 2) implementation of a standards-based curriculum, and 3) coherent instruction.

There is a close relationship between these three major factors. High-quality teachers are responsible for delivering the content of the curriculum to their students. They are held accountable for ensuring that students understand the main content areas that are covered in the curriculum. In turn, the curriculum is used to inform the instruction. Finally, the instruction is the way in which the curriculum is delivered to the students. These three components all contribute toward having high-performing students.

In addition, seven other factors were mentioned by the principals as contributing to school success by influencing the three major factors mentioned above. Teacher support and training, which refers to any professional development opportunities or support, increases the quality of teachers. Control over hiring ensures that new teachers have the training and skill set necessary to meet the expectations of the school. Effectiveness in removing teachers gives principals the ability to replace teachers that are consistently unable to meet expectations. Teacher collaboration time improves teacher quality by allowing them to discuss the curriculum, plan out their instructional strategies, and be aligned in their instructional practices and vision for the school. Assessment data informs instruction by allowing teachers to identify areas in which students are still struggling and areas which the students have mastered.

The three other components that were also mentioned are more directly linked to the students: interventions and/or student services, which can either be additional help to students that are struggling or services that are intended to improve achievement; parental involvement, which provides extra encouragement from home and informs parents about the education of their students; and high expectations for students, which encourage them to challenge themselves academically and feel confident in their ability to perform at a high level.

School and district leaders and external consultants, which have the potential to influence school performance, were also mentioned by our respondents. While only a few schools have hired an external consultant, every school has an identifiable leadership structure and some degree of collaboration with its district. The most common leadership structure is centered on a dominant principal, seen in 11 of the 18 BTO schools included in this study.

Furthermore, of the BTO schools interviewed by phone whose API scores were below 800 (14 schools), nine felt that an API of 800 was an obtainable goal for the year 2013. Of the administrators that saw 800 as obtainable, none saw more funding as necessary, but the majority stated that money would be helpful in achieving the goal. A few communicated satisfaction with their present level of funding. However, LP school administrators expressed frustration about lacking the funding to implement the programs that would allow their schools to reach the 2013 API goal.

What Can We Conclude?

In short, what we have found is that the answer to success across the BTO schools in this study is complex. It is not simply more resources or the application of a certain recipe in regard to resource allocation practices. However, what we found in this analysis is not new. Our findings are similar in many ways to those of other research that have investigated the differences between relatively successful and unsuccessful schools. And although the linkage between the existence of high-quality teachers and school success seems somewhat obvious, the findings

from this report suggest that such staff can be attracted to schools with high concentrations of students with special needs (e.g., students in poverty and English learners). To attract them we need to create an environment in which they believe they have a chance to be successful. Some resource considerations in relation to this may be stable leadership, district support, and discretion at the local level in regard to being able to attract and retain other high-quality teachers and to remove those who prove to be ineffective.

From an overall adequacy perspective, our findings seem to challenge the basic underlying premise that the primary element that is lacking in regard to realizing state outcome goals is directly related to the quantities (or even to the attributes) of educational resources. It may be that simply adding more resources will be unlikely to make a difference in regard to school performance. This would suggest a somewhat different conceptualization of the adequacy question than has been commonly employed.

Undoubtedly, there are certain minimum levels of resources that are imperative for school success. Beyond this, however, we may need to broaden this perspective to begin specifying adequate conditions for schools' success. To examine this further, we may need resource measures that, at least in California, we do not currently have. For example, we do not have measures of the stability of leadership and instructional staff at the school. We do not know the degree to which there is latitude for schools to select, retain, and remove teachers as needed to ensure a "quality" staff. We have insufficient measures to ensure district support for high needs schools—e.g., ensuring that they have at least equal resources in comparison to all schools in the district.

In summary, identifying and analyzing BTO schools has provided insight into our overall conceptualization of educational adequacy. The basic underlying premise for adequacy as it has been largely defined and applied is that we simply need a better understanding of the levels of resources needed to reach a specified educational outcome standard. The analyses in this report suggest that at least for the pool of schools realizing this level of success at a much greater rate than their counterparts, traditional resource measures do not seem to be what are making the difference.

This does not lead to the conclusion that resources do not matter. All of these schools do have resources at a certain specified level; none would likely say that they could continue to perform at this level with less, and most would probably argue for more. Perhaps existing adequacy frameworks would benefit from considering more broadly the mix of school-wide staff attributes, as well as counts of staff and non-personnel resources, needed in a school to be truly adequate for success. The state can further this agenda through more comprehensive data collection in regard to the broader sets of attributes and performance measures that are needed to better understand the full resource implications of schools' success.

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Chapter I. Introduction and Overview

Introduction

At the beginning of 2006, Stanford University contracted with the American Institutes for Research (AIR) for a seven-month study of successful schools in California. This study is part of "Getting Down to Facts," a research project of more than 20 studies designed to provide California's policy makers and other education stakeholders with information to assist in raising student achievement and repositioning California as an education leader. The group of studies is funded by the Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, the James Irvine Foundation, and the Stuart Foundation.

The "successful schools" approach is one of four dominant approaches that have been used to attempt to measure education adequacy. This approach has been used in a number of studies across the states. A listing and overview of these prior studies is contained in Chapter 2.

This study explores some of the concepts underlying the successful schools approach to defining education adequacy and considers their implications for the consideration of adequacy in California. The overall purpose of the paper is summarized in the following research questions:

- How has the successful schools approach been used to consider educational adequacy?
- What are the strengths and weaknesses of these alternative applications?
- How might successful schools be identified in the state?
- What resource differences are observed or reported by these schools?
- Is there any evidence that successful schools use their resources more efficiently?
- Can we predict academic performance by levels of resources and types of students enrolled?
- What other factors appear related to their success?
- What are the implications of these findings for defining education adequacy in California?

A simplified way to state the basic rationale underlying this approach is as follows: an effective way to determine the cost of the education needed to reach a specified level of educational outcomes is to identify schools (districts) achieving these desired outcomes and to determine how much they are spending. This approach is appealing in its apparent simplicity. However, a major concern in determining education adequacy in this manner is the criteria used to select these schools. For example, in California, a simple definition of the schools that might be considered successful under this approach is those scoring 800 on the state's Academic Performance Index (API). This is the target set by the State Board of Education for all schools under the state accountability system.

As shown in Exhibit 1.1, student characteristics in schools scoring at or above 800 API are very different from those scoring below this level. Given that their percentages of students in poverty

and English learners are less than one-third of those found in the average state school, the level of resources producing "success" in these schools will not necessarily be sufficient for all of the schools in the state.

Exhibit 1.1. All California Schools as Compared to Those at or Above 800 API

	School Level	N	% Free and Reduced Price Lunch	% English Learners	Enrollment
Schools at or above 800 API	Elementary	1,401	17.0	8.7	541
	Middle	210	11.4	4.9	885
	High	71	10.3	3.6	1,627
	Average	**1,682**	**16.0**	**8.0**	**630**
All schools	Elementary	5,582	53.6	27.5	562
	Middle	1,274	47.3	20.3	927
	High	1,159	35.6	14.9	1,540
	Average	**8,015**	**50.1**	**24.7**	**761**

For this reason, an important dimension that distinguishes how this methodology has been applied pertains to whether an attempt has been made to control for the characteristics of the students enrolled in these "successful" schools and/or districts. When controls are not used, "successful" schools could simply be those with the lowest percentages of students with special needs (e.g., those in poverty or who are English learners).

When this approach is used to produce an estimate of education adequacy to be applied to schools and districts with varying student populations, it is important to carefully consider the impact of student characteristics, as well as the assumption that it is possible to define adequate levels of spending simply from what is found in "successful schools." Accordingly, this report presents a more complex methodology for identifying successful schools, explores measures of their resources, and attempts to identify a broader mix of factors that may be leading to success.

The analysis presented in this report factors in student characteristics in the selection of successful schools. Rather than defining successful schools in an absolute sense as in the example above, this alternative approach focuses on "beating the odds" or BTO schools. This approach identifies schools that are producing substantially higher educational outcomes than expected given the demographic composition of their students. It arguably provides a better indication of which schools or districts are most effective in producing educational outcomes and it also produces a mix of schools that are much more representative of all of the schools in the state. This latter point is especially important if the purpose of the exercise is to derive resource standards that could be applied to schools statewide.

The BTO schools in this study are not selected on the basis of having the highest overall test scores in the state, but on the basis of substantially outperforming other schools statewide with like student populations. In addition, for comparison purposes, we used the same approach to also identify schools that are producing educational results that are much lower than expected given the students they enroll. We refer to these as low-performing (LP) schools.

A major premise underlying all approaches to education adequacy is that success is directly linked to the resources available to them. Under the successful schools approach, the premise is that the resources available to successful schools are the best indication of the resources needed by all schools to be successful. But what evidence is there that resource quantities constitute the primary distinguishing factor between successful schools and all others? Thus, the first question is whether BTO schools have more resources than LP or other schools. The second question is whether BTO schools are using their resources in more efficient ways than other schools in the state.

To further explore this premise, we compare the total quantity and mix of resources found in these two sets of schools and against all other schools statewide. In addition, we compare the resource allocation practices across all three sets of schools (i.e., BTO, LP, and all others). How do these schools compare in regard to the total resources available to them, and in regard to the kinds of resources they employ? We also attempt to relate resource allocation practices to differences in student academic achievement by analyzing whether observable differences in resource levels are statistically related to academic performance.

Of course, our ability to empirically measure these differences depends on the extent to which those aspects of BTO schools allowing them to outperform their peers are measurable and reflected in currently available data. For instance, if what distinguishes BTO from LP and all other schools is something other than measurable resource differences, to what extent is it possible to identify those factors? Do we observe different instructional, leadership, or professional development strategies in these schools?

In an attempt to address these questions, we interviewed a subset of BTO and LP schools in an attempt to understand their resource allocation practices in relation to other factors they believe affect their student outcomes. The number of schools interviewed disproportionately favors BTO schools (n=19), but we also interviewed four LP schools to gain some comparative perspective. The purpose of these interviews was to understand what the leaders of these BTO and LP schools believed had most affected their ability to produce the academic results realized by their schools over the past several years. In addition to understanding their perspective on the relative importance of resources in regard to the performance of their school, we also wanted to know exactly what they believed were the most important factors affecting their students' performance.

It is not the intent of this study to estimate an "adequate" level of spending for all schools in California based on these BTO schools, but rather to shed some light on whether successful schools use their available resources in more efficient ways than other schools in California, and the extent to which the total amount or mix of resources or their unique use appears to explain their exceptional academic achievement levels. If the analyses show, and the interviews corroborate, that observed differences in student performance are primarily the result of other factors, are there implications for the use of the successful schools approach in further adequacy deliberations and for the overall consideration of educational adequacy in California? For example, how do these finding relate to the long-standing adequacy debate of more resources versus a more efficient use of the resources already available?

In summary, a major focus of this study is to explore how the successful schools approach has been used to measure educational adequacy. This question is largely addressed in Chapter 2, which reviews and summarizes findings from prior successful schools studies. This chapter also discusses some of the strengths and weaknesses of these alternative applications.

Chapter 3 describes the data and methods used to address the subsequent research questions for this study. In summary, we used a mixed-method approach to examine school academic performance, resource allocation decisions, and other factors appearing to have led to school success. Statewide performance and demographic data were used as a basis for selecting beating-the-odds and low-performing schools, and school-level personnel profiles and district-level financial data were used to investigate schools' resource allocation practices. Qualitative data methods (telephone interviews) helped identify issues not captured through the quantitative approaches, and to uncover strategies and other factors that led to or hindered academic success in selected schools.

Chapter 4 presents methods for appropriately conceptualizing "successful schools" for the purposes of this study, and presents analyses of these schools. It presents analyses of whether resource differences are observed in these schools as compared to "low-performing" and other schools statewide. It also attempts to assess whether there is any evidence that successful schools use their resources in a more efficient way than other schools (i.e., the extent to which academic performance can be predicted by the levels of resources in these schools and the types of students they serve).

Chapter 5 presents the results of phone interviews with a subset of BTO and LP school principals in an attempt to assess the extent the resource findings from Chapter 4 are corroborated and to identify other factors said to be related to the educational outcomes produced by these schools. The final chapter of this report contains a discussion of possible implications for considering education adequacy in California.

Chapter II. Lessons Learned from Previous Research

Introduction

This chapter contains three sections reviewing prior research. The first section addresses the study's first two research questions regarding how the successful schools approach has been used to consider educational adequacy, and the strengths and weaknesses of these alternative applications.

The second section of this chapter is a literature review of studies that have analyzed elements of school effectiveness. In particular, we will concentrate on studies that have examined high-performing schools serving low-income and minority populations, and what we have learned from them regarding their instructional strategies and practices. This section provides the literature on which we based our theoretical framework of school effectiveness. This framework helped us develop the telephone interview protocols and suggested common characteristics and themes to look for across the schools we interviewed.

In the last section, we will summarize studies that have focused on resource allocation practices at the school and district level. This section includes a brief literature review on resource allocation research, as well as production functions in education. It provides a foundation for the theoretical model developed to analyze the resource allocation practices of public schools in California, as shown in Chapter 4.

Section I: Successful Schools Approach

The basic idea behind the successful schools or districts approach is to identify schools or districts that are meeting certain performance benchmarks, and then identify their expenditure levels. This approach has been used primarily by John Augenblick and John Myers, although other researchers have used it as well. Exhibit 2.1.1 provides a list of the states in which the successful schools/districts approach has been used.

Exhibit 2.1.1. Successful Schools/Districts Approach around the Nation

Mississippi	Augenblick, Van de Waters, and Myers (1993)
Ohio.	Augenblick (1997)
New Hampshire	Augenblick, Myers, and Silverstein (1997)
Illinois	Augenblick and Myers, Inc. (2001a)
Louisiana	Augenblick and Myers, Inc. (2001)
Maryland	Augenblick and Myers, Inc. (2001b)*
Kansas	Augenblick, Myers, Silverstein, and Barkis (2002)*
Missouri	Augenblick and Myers, Inc. (2003b)*
Tennessee	Augenblick (2003a)*
Colorado	Augenblick and Myers, Inc. (2003b)*
Vermont	National Conference of State Legislatures (2004)
New York	Standard and Poor's School Evaluation Service (2004)
Washington	Fermanich, Mangan, Odden, Picus, Gross & Rudo (2006)

* The successful schools/districts methodology was performed in conjunction with the professional judgment method.

Each study uses different criteria to determine which schools or districts are considered "successful." Augenblick and Myers tend to choose the criteria for each study by asking the state's department of education to supply the criteria, as defined in the current state legislation (e.g., Tennessee and Maryland) or by a group of legislators or education providers (e.g., the Legislative Education Planning Committee in the case of Kansas). Consequently, each study employs a separate methodology for identifying successful schools and districts. The major differences are the type of academic performance tests used as cut points to determine the percentage of students meeting a certain level of performance; the overarching idea remains the same. Exhibit 2.1.2 provides an example of a set of criteria that have been used to identify successful districts.

Exhibit 2.1.2. Example of Criteria Used to Determine Successful Districts

Standardized achievement test:

- Absolute criteria: Based on a single year of performance, districts are chosen if a certain percentage of students is above a certain proficiency level
- Relative criteria: Usually based on two years of performance (sometimes three); districts are chosen if they are on track to achieving the absolute criteria. In other words, if districts are meeting their growth targets
- Minimum participation rate in standardized test (e.g., 80 percent)

Filters:

- Maximum dropout rate (e.g., 2 percent)
- Minimum graduation rate (e.g., 85 percent)
- Other filters: maximum proportion of Title I schools in need of improvement, a certain attendance rate, and a minimum percentage of high-need students (e.g., English learners, special education students)

Spending efficiency criteria:

- Districts will not be considered if they appear to be inefficient in their spending levels—if the predicted spending level for a district is lower than the actual level.

Source: Augenblick and Meyers adequacy studies in Tennessee, Illinois, Colorado, and Kansas. Standards & Poor's School Evaluation Service, adequacy study for New York.

Most of the successful schools/districts studies have identified successful districts, rather than schools. In some cases, schools have been identified instead of districts due to the small number of districts in the state. This was the case in Maryland, which only has 24 districts. In this study, the research team asked the state to determine which schools should be made the center of analysis.

After the successful districts have been identified, it is then possible to estimate a base cost figure based on the districts considered successful. For the most part, this has been done in the following way:

1. **Examination of the basic expenditures and revenues** of identified districts. Basic expenditures exclude spending for capital purposes, transportation, special education, English learner programs, and programs and services for at-risk pupils, as well as any adjustments for district characteristics—such as size or regional cost differences.

2. **Calculate a base cost figure** using the basic expenditure figures of successful districts and, possibly, using a set of screening procedures to exclude some districts that, even though successful, might be considered to be unusual or inappropriate for some reason (based on demographic characteristics, for example).

Even though analysts have suggested that the adequate expenditure level should be equal to the weighted average of the expenditures of all of the districts meeting the performance benchmark (as Augenblick and Meyers recommend), in some of these studies the researchers have raised the possibility of using the average of only the bottom half of that sample, or even using the value of just the lowest-expenditure district in the sample. They describe this type of an adjustment as an "efficiency factor." The rationale given for this type of adjustment is that just because districts or

schools are able to reach a given education target, does not mean that they are efficient in doing so. As there is generally more than one district reaching a given target, some of these districts are spending more and some less. If they are all reaching the specified level of achievement, the reasoning is that those at the upper half of the spending spectrum must be less efficient in relation to those districts able to meet the target for less. Of course, this also drives down the value of the base adequate expenditure level and thus the state cost. An efficiency factor of this type was included in the successful schools studies conducted in New York, New Hampshire, Mississippi, and Maryland.

Strengths of the Approach

One appeal of this approach to defining education adequacy may be that the concept is easy to understand and appears logical. What could be a better source of information for the resources needed to produce a given set of educational results than the resources found in districts or schools already achieving them? In addition, this type of study is fairly straightforward to conduct, can be completed at a relatively low cost and within a short time span. The approach's major strengths, discussed by Chambers and Levin (2006), are that it appears to contain a direct link between education costs and desired outcomes and the fact that the successful schools approach does not require resource cost data.

A perceived strength from the perspective of those responsible for finding the funds for public education (i.e., those from the legislative and administrative branches of government) may be that it tends to produce lower estimates of the cost of educational adequacy (Baker, 2006). The philosophical underpinnings of this approach (i.e., that it may not be a matter of more money being needed but just the better use of existing money) also may have political appeal.

One successful schools report describes the approach as follows: "The successful school district approach is based on the simple premise that any district should be able to be as successful at meeting a set of objectives as those districts that actually meet those objectives provided that every district has the same level of funding that has been available to the successful districts and that differences in student characteristics have been taken into consideration….The strengths of the approach are that it is based on actual evidence that districts can be successful at a certain resource level and that the ways that resources are used can vary among successful districts; a weakness of the approach is that it makes no adjustments to the base cost to reflect uncontrollable cost pressures, since the characteristics of some districts might differ from those that have been successful." (Augenblick & Myers, 2003; Colorado).

Another report says this about the approach: "The successful schools approach considers all schools or districts in the state, identifies the ones that are meeting specified outcomes, and then treats the amount that those schools are spending as an adequate education funding level. The logic of this approach is simple and, with proper adjustments, proponents believe it is the best method for arriving at a cost of an adequate education." (National Conference of State Legislatures, 2004; Vermont).

Limitations of the Approach

Of course, proponents of all the approaches think theirs is the best. The major limitation of the successful schools is the "with proper adjustments" caveat mentioned above. This approach has no good way of dealing with one of the primary challenges of any adequacy analysis—how to adjust an overall adequacy estimate to meet the needs of varying percentages of special needs students. Harr et al. (in progress) include a more detailed analysis of how various BTO applications have dealt with special student populations, and note that these studies have often been conducted with other approaches to adequacy (e.g., professional judgment), which have provided adjustments to base successful schools adequacy estimates. The source of some of the recommendations in these combined-methods approaches also raise questions. For example, Baker (2006:21) notes that there are instances wherein "arbitrary recommendations for marginal cost adjustments are attached to successful schools estimates after the fact."

In short, the major shortcoming of this approach is the difficulty of attempting to define successful schools in ways that are overly simplistic and which largely ignore the substantial impact of student characteristics and special needs on the resources needed to reach specified levels of educational outcomes. As articulated by Hanushek (2005), most schools that are underprivileged have not achieved the standards that we use for these studies, and it is not possible to extrapolate what they should be spending to achieve those standards. For instance, if the schools under consideration have not yet achieved 95 percent proficiency (which is the standard for NCLB), it is not appropriate to extrapolate the cost of achieving 95 percent proficiency.

Even with a more balanced approach to selecting successful schools that fully incorporates student characteristics (e.g., the BTO analysis presented in Chapter 4 of this report), it is unclear how the resource findings from these successful schools can be extrapolated to others. Even when the study does control for these types of school characteristics, the successful schools model does not allow marginal analyses of spending on special populations, such as English learners, students with disabilities, or at-risk students.

Another disadvantage, although considered a strength by some researchers, is the assumption that education costs and desired outcomes are directly linked. However, the factors that make the schools successful might be unobservable to the researcher, as in the case of good leadership or more effective teachers. Therefore, the success of the school should not be automatically attributed to the difference in what each school spends.

Section II: Selected Literature on Elements of School Effectiveness

The literature presented in this section was used as the basis for the theoretical framework of school effectiveness used to develop the interview protocols, as well as suggested common characteristics and themes to look for across the schools that were interviewed.

Since the emergence of the effective schools movement launched by Ron Edmonds more than two decades ago (Edmonds, 1982), the focal point for effective school researchers has been to identify schools successful in educating all students regardless of their socioeconomic status.

Once identified, the task remains to recognize the common characteristics among those effective schools. Collectively, the body of research on effective schools during this period highlights the following school characteristics as correlated with high performance:

1) Strong instructional leadership (Davis & Thomas, 1989; Edmonds, 1979; Purkey & Smith, 1983; Terry, 1996)

2) Frequent monitoring of student progress (Levine & Lezotte, 1990; Purkey & Smith, 1983; Newmann & Associates, 1996)

3) Shared goals and professional community (Davis & Thomas, 1989; Darling-Hammond, 1996)

4) Parental involvement (Fullan, 1991; Levine & Lezotte, 1990; Purkey & Smith, 1983)

5) Positive and academically focused school climate (Hoy and Hannum, 1997, Edmonds, 1979; Rosenholtz, 1985)

In the section that follows, we consider more-recent research on school effectiveness in order to provide a summary of the most current thinking regarding characteristics found in high performing schools that are educating high need populations.

Williams, T., Kirst, M., Haertel, E., et al. (2005) selected a large sample of 257 elementary schools serving largely low-income students, as measured by the School Characteristics Index (SCI)—schools fell between the 25th to 35th percentile band on the SCI in 2003-04. The sample included high-, medium-, and low-performing schools within that band, as measure by the API. Surveys designed to explore school qualities, policies, and practices were sent to 257 principals and 5,500 teachers in the state.

The survey included 350-400 items that were grouped into seven general domains. Answers of the different school types (i.e., high-, medium-, and low-performing schools) were compared using statistical methods. The study found that four specific domains were highly correlated with higher school API scores: 1) prioritizing student achievement; 2) implementing a coherent, standards-based instructional program; 3) using assessment data to improve student achievement and instruction; and 4) ensuring availability of instructional resources. The survey also included questions related to parental involvement, teacher collaboration and development, and the enforcement of high expectations for student behavior, but the correlations between those domains and API scores, although positive, were not statistically significant.

Parrish, T.B., Merickel, A., Pérez, M., Linquanti, R., Socías, M., Spain, A., et al. (2006) administered telephone interviews to school administrators of beating-the-odds schools with high concentrations of English learners, as well as district administrators of five high-performing districts. The sample included 66 schools that showed high levels of academic performance with English learners. A comprehensive list, including 24 different elements, was analyzed and grouped into eight different domains. The factors that were most cited among school administrators as contributing to their success were: 1) staff capacity to address EL needs; 2) a

schoolwide focus on English Language Development; 3) shared priorities and expectations in regard to educating ELs; and 4) systematic, ongoing assessment and data-driven decision-making. District administrators also discussed strategies to support EL academic achievement, such as sustained, on-site technical assistance and professional development; strategic resource allocations, and timely provision and careful use of data.

Springboard Schools is conducting the California Best Practices study (Oberman, Arbeit, Praglin, & Goldstein, 2005), a three-year study sponsored by the National Center for Educational Accountability (NCEA) that identifies successful high-poverty schools. Their ultimate goal is to investigate what these schools are doing right. During their first year (2004) the study focused on successful elementary schools; high schools were the focus of analysis in their second year (2005). In 2006 middle schools are being analyzed. In order to select high-performing sites for site visits, they looked at the California Standard Test (CST) student performance for three years, at enrollment in courses identified by the CDE as challenging courses, and at the percentage of students meeting the A-G subject requirement in the case of high schools. Comparison sites were selected among the schools in the "average" performance category as measured by the CST.

They found: 1) successful schools use a consistent curriculum and frequent diagnostic tests; 2) teachers and administrators in successful schools seek out and use strategies that have been proven to be effective; and 3) successful schools invest in improvement. Regarding the last finding, they found that these schools invest their resources differently: schools hire coaches to help teachers and administrators, schools provide teachers with opportunities to collaborate and coach each other, and school districts invest in data systems.

Using the Standards and Indicators for School Improvement (SISI), Kannapel & Clements (2005) conducted comprehensive site visits in eight high-performing, high-poverty schools in Kentucky. The results were compared with low-performing schools previously visited. The SISI categorizes school activities into nine standards; when site visit results were compared with those of low-performing schools, the eight study schools scored significantly higher on: 1) review and alignment of curriculum; 2) individual student assessment and instruction tailored to individual student needs; 3) caring, nurturing environment of high expectations for students, 4) ongoing professional development for staff that was connected to student achievement data; and 5) efficient use of resources and instructional time.

The Center for Public Education synthesized relevant studies published within the last seven years on high-performing and high-poverty school around the nation and found ten factors that are consistently identified as characteristics of these schools.[1] In their analysis those factors were separated into building blocks and five practices. The practices can be summarized as: 1) increased instructional time; 2) ongoing, diagnostic assessment; 3) parents as partners in learning; 4) professional development to improve student achievement; and 5) collaboration among teachers and staff.

[1] To prepare this synthesis, the Center for Public Education started with an initial list of 300 studies. Seventeen studies were selected on the basis of their relevancy and evaluation rigor.

These recent studies have found that successful schools share a common set of characteristics that are similar to those suggested by the body of effective schools literature that has been developed over the last two decades. The most-cited characteristics in these recent studies are:

1. A coherent and aligned curriculum
2. Systematic use of performance data
3. Efficient use of resources
4. Environment of high expectations for students

It is important to keep the limitations of these studies in mind, because they also pertain to our own findings for successful schools in Chapter 4. The practices identified by the research are associated with high academic performance, but a causal relationship cannot be assumed. These characteristics are not a list or "recipe" that will ensure high academic performance for schools, but rather should be considered part of a system in which particular strategies depend on others. In addition, the degree to which these practices are in place at a particular school is also a variable that should be considered. It is more common than not to find average or low-performing schools with these strategies in place; it is the way high-performing schools implement these strategies that seems to matter. The differences between the way average-performing and high-performing schools implement successful strategies are the *intensity*, the *coherence*, and the *focus* and willingness to stay focused over time (Oberman et al, 2005).

Section III: Selected Literature on Resource Allocation Practices

The literature on resource allocation in education is fairly limited. Not because it is seen as an uninteresting topic, but because researchers cannot agree on a more fundamental issue: the relevance of resources in determining student academic achievement. If the link between resources (or inputs) and education outcomes is not clear, it makes little sense to go one step further and ask for the optimum usage of resources such that academic achievement is maximized given a certain budgetary constraint. The research that studies this broader question of the impact of education inputs on outputs is referred to as education production function research. The literature in this area is extensive, and is not in agreement. Examples of the production function literature are found in Hanushek (1986), Burtless et al. (1996), Hanushek (1997), Krueger (1999), and Angrist and Lavy (2001). One of the most cited education production function studies is Eric Hanushek's (1997) meta-analysis that summarizes findings of 277 studies of the effects of the teacher-pupil ratio on academic achievement, and 163 studies of the effects of expenditure per pupils on the same outcome measure. The analysis found that 72 percent of the 277 studies show no statistically significant effect, while an additional 13 percent indicate a negative effect on achievement. The empirical evidence of the effect of expenditure per pupil is not very promising either. A total of 66 percent of the 163 studies don't show a statistically significant effect, while an additional 7 percent indicate a negative relationship with student academic achievement. Similar results were found for teacher test scores (as a proxy of teacher quality), administrative inputs, and facilities.

Of those studies that have tried to address the education resource allocation question, despite the well-known and valid concerns about education production function estimates, Lawton (1973)

focuses on the distribution of instructional resources in Detroit. He identifies three major factors as relevant in the production function of academic achievement: a) teacher experience, b) teacher academic training, and c) class size. The first two can be interpreted as a proxy for teacher quality, while class size is associated with the intensity at which a given teacher quality is applied to a group of students. His study indicates that instructional resources were not distributed evenly across schools in Detroit at the beginning of the 1970s. African-American students were taught, on average, by less experienced and less educated teachers than white students. Nevertheless, these African-American students had, on average, smaller class sizes than white students. His analysis shows that this last factor more than offset the teacher quality issue in the case of elementary schools, generating a positive correlation between percent of African-American students at the school and average instructional expenditure per student.

Another resource allocation analysis is the one performed by Margaret Simms (1977) in the 36 elementary schools in San Jose Unified School District. In this study, the main research question is how per pupil expenditure in teacher salaries varies by percentage of Spanish speaking students and total enrollment at the school. The findings suggest that teacher salary expenditures do not vary significantly with the percentage of Spanish speaking students, but that school enrollment is consistently correlated with this variable. Small schools have, on average, higher per pupil teacher salary expenditures than larger ones. The author links this relationship to class size, given that smaller schools also had smaller class sizes, which increased the per pupil expenditure figures. This study also analyzed the distribution of teaching experience and teacher education across schools with different percentages of minority students. The study found a negative correlation between the percentage of minority students and teacher experience and education. As the author states, "The pattern of teacher location was a combination of teacher preferences and district policy. Tenured teachers could request transfers out of "undesirable" schools into other ones. The pattern of transfer had been away from high-minority schools."

Another study by Hanushek, Rivkin, and Taylor (1996) uses a two stage estimation framework to analyze the impact of aggregation on schooling coefficients. It found that problems of omitted variables bias tend to increase along with the level of aggregation, causing analyses that use more aggregated data to overestimate systematically the influence of school expenditure related characteristics on student achievement. They add that these findings are consistent with the notion that increases in school expenditure used to reduce the teacher-pupil ratio and raise teacher salaries have had little systematic impact on student attainment, arguing that policies aimed at altering the incentive structure, and, thus, the ways in which resources are used appear much more likely to succeed than policies aimed simply at adding more resources to schools.

Another study focuses on resource allocation in five "high-performing" schools. The study by Karen Hawley Miles and Linda Darling-Hammond (1998) analyzes important resource allocation changes introduced in five schools that have shown a strong improvement in student achievement despite serving challenging student populations. The authors attribute these results to the following changes in resource allocation practices:

- Reduction of specialized programs. "Pull-out" programs are costly and segregate students. Resources used in these types of programs should be brought back into the regular classroom and benefit all students.

- More flexible student grouping. Students would benefit from multi-age grouping practices, in which they stay together for long periods of time. This promotes peer-to-peer learning.

- Structures that create more personalized environments. This may take the form of individual tutoring in reading or math, or teachers that serve as advisors to individual students or groups of students over long periods of time.

- Longer and varied blocks of instructional time. This policy is mainly targeted to high schools, in which students spend considerable amounts of time moving from one classroom to the next, for what the authors consider relatively small blocks of instructional time. The proposed solution would involve reducing the number of classes by increasing the length of blocks of instruction.

- More common planning time for staff. This allows teachers to learn from each other, sharing their instructional practices and fostering a collaborative working environment.

- Creative definition of staff roles. In order to reduce the amount of resources spent on administrative staff, and concentrate them on teachers, it is necessary that teachers extend their roles in schools. Teachers, for instance, may also act as advisors to a certain number of students each year, avoiding hiring guidance counselors or other administrative staff.

A study by Betts, Rueben and Danenberg (2000) analyzed the distribution of school resources (measured by CBEDS data from 1999), and how that distribution is related to student academic achievement in California. The authors concluded that schools with the highest needs had fewer teaching resources, as measured by teacher education, experience, and credentials, and the availability of advanced placement courses. The authors also found that the differences in socioeconomic backgrounds explained most of the achievement gap.

Chapter III. Data and Methodologies

Introduction

This chapter describes the data sources and research methodologies used in the study. The first section addresses the process of identifying beating-the-odds (BTO) and low-performing (LP) schools in California. In the second section we describe the data sources and methodologies that were used to: 1) analyze the level and the characteristics of resources used by BTO, LP and other public schools in their operations; 2) determine the level of per pupil spending in BTO and LP schools; 3) analyze what level of academic performance is predicted for BTO and LP schools by their level of resources and students served; and 4) examine the extent to which BTO and LP schools are efficient in their resource use. We conclude the chapter with a description of how schools were selected for the telephone interviews, the process for conducting the interviews, and the type of data that was collected.

The chapter's sections are organized as follows:

- **Section I: Identification of Beating-the-Odds and Low-Performing Schools.** This section summarizes the data sources as well as the methodology used for selecting BTO and low-performing schools. These schools are the subject of analysis in our exploration of resource allocation. In addition, a sample of these schools was chosen to conduct the telephone interviews—a procedure that is explained in Section III.

- **Section II: Methodologies for the Analysis of Resource Allocation**. This section presents the data sources that were used to conduct the resource allocation analyses in BTO, low-performing, and other public schools in California as well as all the methodologies used in our exploration and analyses of resource use in BTO, LP and other public schools.

- **Section III: Telephone Interviews.** This section describes the methodology for selecting the schools that were interviewed by telephone. It also presents the final sample of schools (with the corresponding BTO school names) as well as the type of data collected during those interviews.

Section I: Identification of Beating-the-Odds and Low-Performing Schools

Data Sources

Student and Demographic Characteristics

Several databases were combined to create a profile for all public elementary and secondary schools in California. The California Basic Educational Data System (CBEDS) provided information on schools' enrollment by grade and ethnicity, grade span, and school type (elementary, middle or high). These data were combined with variables from the Academic Performance Index (API), including the number of special education students, student mobility, graduation rates, class size, whether the school was a multi-track year-round school, parental education of the students, and the percentage of teachers that had regular or emergency credentials. Calworks provided the number of students that received or were eligible for free and reduced price meals, and the Language Census provided the number of English learners in each school, along with the primary language of each English learner. All of these variables were collected for each year from 2002 to 2005.

Outcome Measures

The main data source that was used to measure academic performance is the California Standardized Testing and Reporting (STAR) Program. This program started in October 1997 and all school districts were required to administer the tests to students in grades two through eleven. Today, the STAR program includes the results of a norm-referenced test (SAT-9 prior to 2002, and CAT/6 afterwards), and the California Standard Tests (CSTs).[2] Student-level test scores are not publicly available; therefore available grade-level test scores for each school were used to assess the performance of California schools from 2002 to 2005. These results are available at an aggregate level (i.e., for each grade 2 to 11) for all students in the school that are taking the test, as well as for subgroups when 10 or more students have valid test scores.[3] In addition to using the overall grade-level test scores, we included outcome measures for the following subgroups: English learners, students eligible for free and reduced price lunch, Hispanic students, and African-American students.

The primary outcome measure that was used to select beating-the-odds elementary and middle schools is the CST English language arts (ELA) and mathematics scale scores from 2002 to 2005. All elementary and middle school students take the same CST ELA and mathematics tests corresponding to their grade level. However, high school students take the math test corresponding to the math course they are enrolled in (for example, geometry or algebra). As a result, there is no consistent CST mathematics test that can be compared between all high schools. Given that limitation, we decided not to use the CST mathematics results in the selection of beating-the-odds high schools. Instead, we used the California High School Exit

[2] STAR also includes the California Alternate Performance Assessment (CAPA) and the Spanish Assessment of Basic Education (SABE/2). They are administered to students with significant cognitive disabilities and Spanish-speaking English learners who were enrolled in public schools in California less than 12 months, respectively.
[3] STAR available test scores can be downloaded from the following California Department of Education website: http://star.cde.ca.gov/.

Exam (CAHSEE)[4] tests in English language arts and mathematics from 2002 to 2005, in addition to the CST ELA results for high schools. All high school students are required to take the CAHSEE ELA and mathematics tests for the first time in tenth grade; therefore, we used the passing rates of tenth graders as the outcome indicator for high schools. Some criticize the use of the CAHSEE because it tests very basic skills, but we decided that it was most important to have a consistent comparison of the math achievement between schools.

There are several reasons underlying our decision to use the CSTs and CAHSEE instead of the Academic Performance Index (API) as the outcome measures. The first is that we wanted to be able to use an outcome measure for English learners at the school, and EL scores are not disaggregated in the years we were analyzing. Second, given that the API is a composite of different measures it encompasses more variability than one single test. In addition, the API does not remain consistent over time. That is, it is a moving target because the academic subjects included in the calculation of the API, as well as the weights that are applied to these subjects, change over time, which introduces variability or noise when used across years. However, it should be noted that the CST and CAHSEE results are major components of the API results.

Methodology for Selection

High-Performing Schools

Given the instability of test scores over time, the schools in this study were selected using several years of data. For elementary and middle schools, four years of test scores were used. For high schools, we used three years of data. As an indicator for academic achievement in our analysis, we used CST ELA and mathematics scale scores.[5] In order to generate a school-level average academic achievement indicator from the CST scale scores, we first standardized the average CST score of each grade using the corresponding statewide CST score distribution. This step is necessary because CST scores are not vertically equated, which makes scale scores non-comparable across grades. Standardized grade averages were then weighted by the relative enrollment in each grade to obtain a school-level average academic performance measure. This was done for all students, English learners (ELs), Hispanic students, African-American students, and students eligible for free and reduced price lunch (FRPL) from 2002 to 2005. OLS regressions were then used to identify beating-the-odds and low-performing schools.

[4] Beginning in 2005-06, students must pass the CAHSEE to earn a high school diploma. In addition, this test is used to calculate the Academic Performance Index (API) for state accountability purposes and Adequate Yearly Progress (AYP) to meet federal No Child Left Behind requirements.

[5] In the case of high schools, we used CAHSEE ELA and mathematics test results in addition to the CST ELA results.

Using each of the above as outcome variables, we estimated a panel regression for each year, and for each school type separately (elementary, middle, and high schools). The following is the regression that was estimated:

$$Y^{tp}_{iy} = \beta^{tp}_0 + \beta^{tp}_1 X^{tp}_{iy} + \varepsilon^{tp}_{iy} \quad (1)$$

where *Y* is the outcome variable in subject *t* (either ELA or mathematics) for student category *p* (all students, students that receive free or reduced price lunch, English learners, Hispanic students, or African-American students) for school *i* in year *y*. X is a vector of school characteristics that includes the percentage of students that receive free or reduced price lunch (FRPL), the percentage of ELs in the school, the percentage of ELs that speak Spanish, the percentage of students with disabilities, the percentage of parents that did not complete high school, the percentage of parents that have some college education, the percentage of parents that have a college degree, and the percentage of parents that have a graduate degree. For high schools, parental education was not included in the regressions due to missing values.

Once this model was estimated, the fitted value ($\hat{Y}_{tpiy}$) was calculated for each category of student *p* in school *i* for year *y* and the residual (ε_{tpiy}) was saved. Using the residuals, schools were then identified as beating the odds (BTO) schools in each of the five student categories, *p*, in each year *y*. Exhibit 3.1.1 lists the requirements a school must meet in order to be identified as BTO in each of the five student categories.

After charter and magnet schools were removed from the sample, there were 61 elementary, 7 middle, and 35 high schools identified as BTO schools in all five categories and in all four years.[6]

[6] There were no high schools that were beating the odds in all four years, so we limited the criteria to beating the odds in three years (2003 to 2005) for high schools only.

Exhibit 3.1.1. Criteria for Selecting Beating-the-Odds Schools

Elementary and Middle Schools

For **all** students:

- CST ELA and mathematics residual for all students is more than .75 standard deviations above the mean residual for students in all elementary or middle schools in California.

For subgroups: **FRPL, EL, Hispanic, and African-American** students:

- Residual CST ELA and mathematics for these subgroups of students is more than .75 of a standard deviation above the mean residual for these subgroups of students in all elementary or middle schools in California.
- Residual CST ELA and mathematics can be missing. The school may not have that subpopulation of students (or an insufficient number of students to be considered accountable for that subgroup), and still may be part of the pool of schools that are beating the odds.

High Schools

For **all** students:

- CST ELA residual and CAHSEE ELA and mathematics residuals percent passing rate is positive.

For subgroups: **FRPL, EL, Hispanic, and African-American** students:

- Residual CST ELA for all subgroups is positive and residual CAHSEE ELA and mathematics percent passing rate for all subgroups is positive.
- Residual CST ELA and residuals CAHSEE ELA and mathematics percent passing can be missing. The school may not have that subpopulation of students (or an insufficient number of students to be considered accountable for that subgroup), and still may be part of the pool of schools that are beating the odds.

Low-Performing Schools

Low-performing schools were then identified as schools that have a negative error term ($\varepsilon_{tpiy)}$ in all four years and all student categories (i.e., all students, ELs, Hispanic students, African-American students, and students that receive free or reduced price lunch). This means that these schools have been performing at a lower level than would be expected given the student population they serve. The total number of low-performing schools selected is 76 elementary schools, 32 middle schools, and 5 high schools.

Selected Schools

High-performing schools were selected if they were beating the odds every year during a four-year period (three years for high schools). The same was true for low-performing schools. The following exhibit shows the number of schools that were beating the odds each and every year from 2002 to 2005. As it shows, there is a lot of instability in the test score results. Schools could outperform one year, and the next perform as expected or underperform. For example, 365 elementary schools were beating the odds during 2002; from 2003 to 2005 about 280-300 elementary schools were also beating the odds. However, only 61 elementary schools were beating the odds every year during that time period. Similar numbers are seen for middle and high schools.

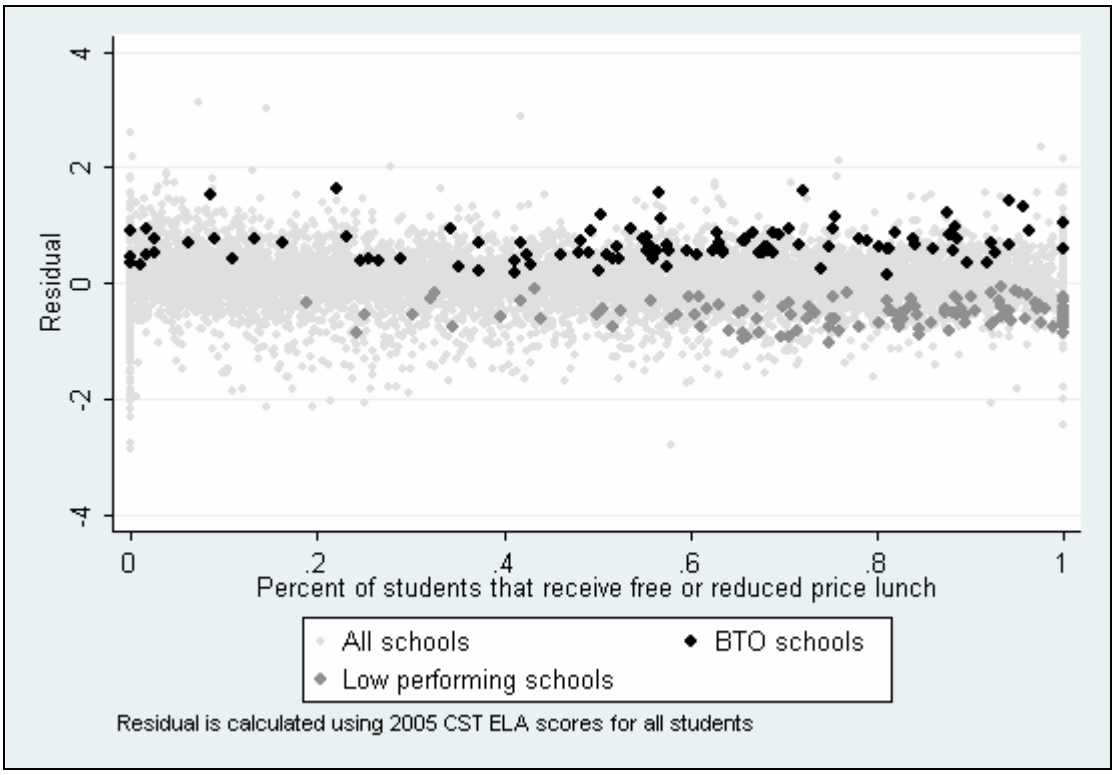
Exhibit 3.1.2. Number of BTO Schools Each Year, 2002-2005

	2002	2003	2004	2005	All years
Elementary	365	307	292	280	61
Middle	41	39	37	38	7
High Schools	N/A	82	150	190	35
Total	**406**	**428**	**479**	**508**	**103**

One of the striking results shown in this table is the fact that there aren't many beating-the-odds schools in the state. The fact that a total of only about 100 schools in California were actually performing higher than expected during this time period is a result that should be of concern. This study focuses on what BTO schools are doing that has allowed them to achieve this high level of performance. However, it is beyond the scope of this work to investigate why there are few schools in the state that have reached this high level of performance given the population they serve.

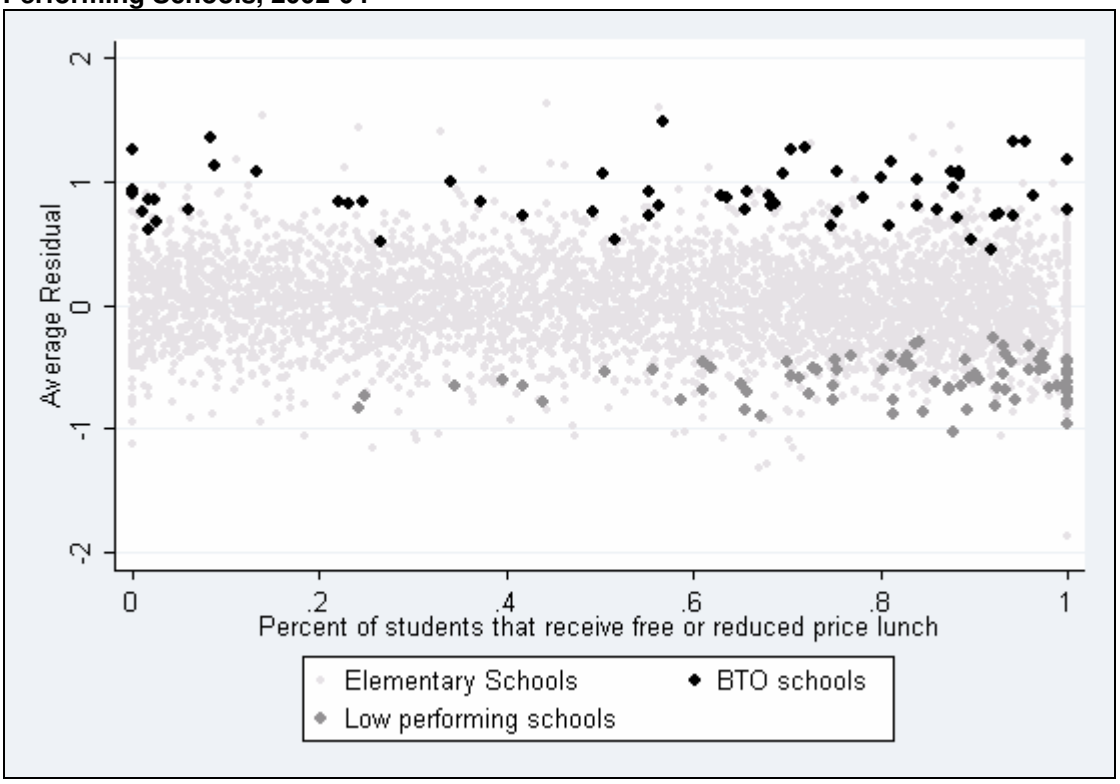
The following exhibit shows the distribution of 2005 CST ELA residuals for all schools, with BTO schools in black, low-performing schools in dark gray, and the remaining public schools in light gray. It shows that BTO schools do not seem to be outliers. Or in other words, there seem to be schools that are beating the odds but not highlighted as BTO schools. This is because this graph only presents the residuals of the CST for 2005. Some schools could be beating the odds this year (2005) but they not consistently outperforming their peers during the previous years.

Exhibit 3.1.3. Distribution of Residuals across Poverty Level for BTO Schools and Low-Performing Schools



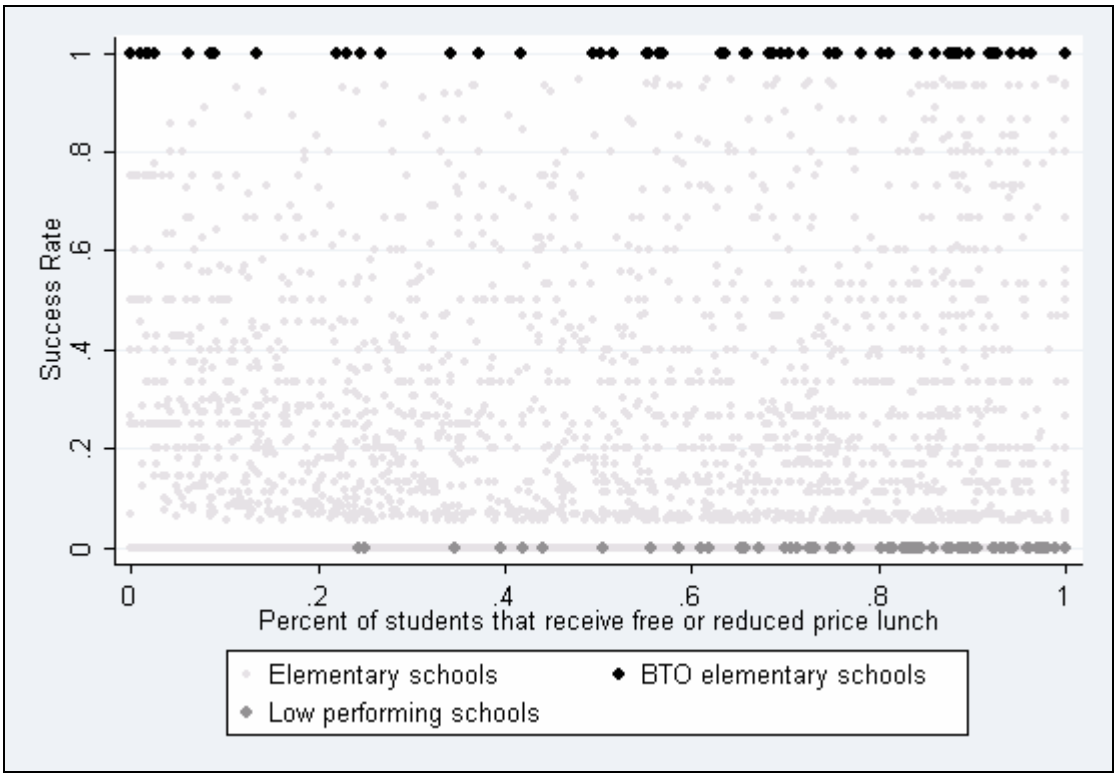
One way to more accurately graphically represent BTO schools is to graph the *average* residual during the four-year period rather than focusing on just one year and one subject. The following exhibit presents the average residual across all years and subjects for elementary schools. Even though this better represents BTO schools, there are still some schools that for a given poverty level have a higher average ELA residual than some BTO schools. One reason could be that those schools outperform in only three of the four years under analysis, but still have an average residual during the four-year period that is higher than some BTO schools.

Exhibit 3.1.4. Distribution of the Average Residual across Poverty Level for BTO Schools and Low-Performing Schools, 2002-04



We also constructed a *success rate* indicator to show BTO and LP schools more accurately. This success rate goes from 0 to 1, with 1 meaning that the school meets all the requirements to be considered a BTO school. Zero means that the school does not meet any of the requirements. For example, a school that met the requirements to be considered beating the odds during two years, but missed the requirements for the subpopulations during the other years would have a success rate close to 0.5. Exhibit 3.1.5 shows success rate distribution for elementary schools across poverty levels. As shown, BTO schools have a success rate of 1, and LP schools have a success rate of 0.

Exhibit 3.1.5. Success Rate Distribution across Poverty Level for BTO and Low-Performing Schools



One interesting result that can be observed in all of these graphs of BTO and LP schools is the fact that LP schools are clustered among high poverty levels. This result means that there aren't any low-poverty schools that consistently perform at a lower level than what is expected for them. Low-performing schools in California tend to be schools with high concentrations of poor students. Though we found high-performing schools across the entire spectrum of poverty levels, high-performing schools were more likely to be at the lower poverty levels. More about the demographic characteristics of BTO and LP schools will be presented in the following chapter.

Section II: Methodologies for the Analysis of Resource Allocation

In this section we describe the data and methodologies for each of the three major analyses that we conducted in exploring resource allocation in BTO, low-performing, and public schools in general:[7]

- **Section II-A** describes the process of building a statewide school-level personnel database that was used as a cornerstone for a comprehensive descriptive analysis of personnel resources in California schools.

- **Section II-B** describes the methodology and data used to determine the level of spending for BTO and LP schools.

- **Section II-C** develops a theoretical model for conceptualizing the problem of resource allocation when schools attempt to maximize student outcomes under budgetary constraints. This model is then used for measuring how resources and student characteristics predict the level of academic performance in BTO and LP schools. In addition, this model is used to analyze how *efficient* BTO and LP schools are in their use of teacher resources.

Although these methods are distinct, and approach resource allocation from different angles, they build off of the same data sources and are complementary. Exhibit 3.2.1 provides an overview of the extant data informing our study of resource allocation and highlights some of the key variables that are used.

[7] A similar theoretical framework and methodological approach was used for a study of charter schools conducted by AIR that is part of the "Getting Down to Facts" project.

Exhibit 3.2.1. Data Used for Analyses of Resource Allocations (CBEDS 2004-05)

CBEDS - 2004/05	
PAIF - Certificated Staff	
Position/Assignment/Course	
Administrators	FTEs in administrative positions (e.g., principals, vice principals, department chairs, program administration)
Teachers	FTEs in teaching positions (e.g., self contained classroom teachers, core subject teachers, instructional support specialists)
Pupil Support Staff	FTEs in pupil support positions (e.g., counselors, librarians)
Characteristics	
Education	Highest Educational level achieved (i.e., doctorate, master's, bachelor's, less than bachelor's)
Experience	Years of educational service in total and in district.
Teaching Credentials	FTEs designated as having full teaching credentials.
Status	FTEs designated as long term subs, probationary, tenured or other.
SIF - Classified Staff	
Position	
Paraprofessional	Number of full-time and part-time staff designated as teaching assistants, teacher aides, pupil service aides, and library aides.
Office/ Clerical	Number of full-time and part-time staff designated as providing clerical or administrative support.
Other	Number of full-time and part-time staff designated as managers, custodians, food service staff, bus drivers, noon duty supervisors, and staff below the level of assistant, deputy, or associate superintendent.
Characteristics	
None Available	
Public School Databases - School Level Indicators	
School Type	Types of public schools include Special Education School, County Community School, Youth Authority Facility, Opportunity School, Juvenile Court School, Other County-Wide Programs, Elementary School, Single Elementary School in District, Intermediate/Middle School, Alternative School, Junior High School, K-12 School, High School, Single High School in District, Continuation High School, Community Day School, State Special School, and Adult Education Center.
Charter	Identifies charter schools
Enrollment	Grade by grade enrollment
Grade Span	
SACS - 2004/05	
LEA Revenue and Expenditure Report	
District Level Expenditures	
Certified Salaries	
Non - Certified Salaries	
Employee Benefits	
Books and Supplies	
Services and Other Operating Expenses	
Capital Outlay	
STAR - 2004/05	
CST	
English Language Arts and Mathematics Scale Scores	All students in grades 2 – 11

Section II-A: School-Level Resource Database

In order to explore how personnel resources differ between BTO and low-performing schools, we built a comprehensive school-level personnel database, providing a profile of the quantities and characteristics of staff in California's public schools.

Data Sources and Methodologies

Using 2004-05 CBEDS data derived from the Personnel Assignment Information Form (PAIF),[8] we obtained information on certificated personnel in California. The PAIF files accounts for all certificated staff in the state, their major functions (assignments) in a given school or district, and the relative amount of time spent on a particular assignment. We aggregated this information to the school and district level across three broad personnel categories: administrators, teachers, and pupil support staff. These personnel categories are aligned with administrative employees, teachers, and pupil services employees as defined in Education Code 41401 and referenced in the *Administrative Manual for CBEDS Coordinators and School Principals, October 2005*.[9]

Although district-level employees are reported in PAIF, it is not possible to assess how district staffs are allocated across the schools within each district. We also captured more detailed assignment categories (nested within the administrator, teacher and pupil support categories) and aligned them with the subject code groupings in CBEDS. Quantities of personnel within each assignment category are reported in PAIF in terms of full time equivalents (FTEs). PAIF also provides information on personnel characteristics, such as gender, experience in education, highest degree level obtained, teaching status, and whether or not they are fully credentialed. In addition, PAIF contains information on the courses that schools offer, such as course enrollments and whether or not the course satisfies the University of California graduation requirement.

Using CBEDS School Information Form (SIF)[10] for 2004 – 05, we obtained information on the number of part-time and full-time classified staff at each school site.[11] As SIF data are not collected in a manner that allows FTE reporting, in our analyses we assume part time status as 0.5 FTE and full time status as 1 FTE. Information on experience and education is not available for classified staff. School level characteristics, such as school type, grade span, and enrollment were obtained from the Public Schools database.[12]

The Standardized Account Code Structure (SACS) and the Charter School Alternative Form Database of 2004-05 provide annual revenue and expenditure figures for all school districts in California, as well as for charter schools that reported their financial data independently from their districts. Expenditures are disaggregated into certified salaries, non-certified salaries, employee benefits, books and supplies, services and other operating expenses, capital outlay, and other outgo. Teachers' salaries are a subcategory within certified salaries.

[8] PAIF files downloaded from: http://www.cde.ca.gov/ds/ss/cb/filespaif.asp.
[9] Please refer to Appendix 1 for a more detailed description of the staff that are included in PAIF as well as a more detailed description of the specific personnel assignments that are included within each personnel category.
[10] SIF Sections A, D and E downloaded from: http://dq.cde.ca.gov/DataQuest/downloads/sifade.asp.
[11] A classified employee is an employee of a school district in a position not requiring certification. The numbers of classified staff do not include preschool, adult education, or Regional Occupation Program classified employees.
[12] Public Schools database downloaded from: http://www.cde.ca.gov/ds/si/ds/pubschls.asp.

As an indicator for academic achievement for all public schools in California, we used the same outcome measure that was used for the selection of beating-the-odds and low-performing schools: CST ELA and mathematics scores standardized across grades. However, for this analysis only the year 2004-05 was included.

Using all of these data sources, we constructed a comprehensive database that includes:

- Total certified and non-certified personnel at the school and district level
- Characteristics of the personnel (e.g., education level, number of years of experience, tenure status)
- Class sizes and caseload
- Total salaries for different personnel staff
- Expenditures for different categories (e.g., books and supplies, capital outlay, and other outgo)

Section II-B: Methodology for Costing Out BTO and LP Schools

This section describes the methodology and data used to cost out the total expenditure that BTO and low-performing schools incur in their operations.

Teacher and administrator wage equations play a crucial role in this exercise because spending on personnel salaries and benefits represents about 81 percent[13] of district expenditures. These equations are both defined as follows:

$$\overline{W} = \alpha_0 + \alpha_1 \overline{edu} + \alpha_2 \overline{\exp} + \alpha_3 \overline{\exp}^2 + \alpha_4 rwi + \varepsilon$$

where the dependent variable is an average teacher (or administrator) salary (that does not include benefits), which depends on educational attainment, a non-linear function of the teaching experience, and a relative wage index (RWI). This index is based on the average teacher salary (for a given level of education and experience) in 30 different California regions.[14] We then divided the average teacher salary of each region, by the Los Angeles Unified School District (LAUSD) average teacher salary (i.e., this region was used as the base, or in other words, the *rwi* is 1 for LAUSD).

We estimate this wage equation for teachers and administrators of all public schools in California using the comprehensive database described in the previous section. In particular, we use salary information and personnel characteristics such as educational level and experience.

Once the weighted least squares wage equations for teachers and administrators were estimated,[15] we combine the coefficients with the school-level average educational attainment

[13] Source: Ed-Data, Expenditures by Category (2004-05). http://www.ed-data.k12.ca.us.
[14] The average teacher salaries for the 30 regions were obtained from "Getting Down to Facts" research by Heather Rose.
[15] The number of teachers and administrators within districts was used as the weight.

and experience of teachers and administrators. Then, we multiply these school-level average wages by the total full time equivalents (FTEs) of teachers and administrators at the school to obtain the total spending in teacher and administrator salaries, respectively.

In order to complete the picture of personnel expenditures, it is also necessary to consider what schools spend on pupil support and non-certified personnel. Unfortunately, it was not possible to estimate reliable wage equations for these types of staff because of data constraints. So, we simply use state-level average salaries for these types of personnel ($53,529 and $51,730 for pupil support and non-certified staff, respectively). We then multiply these estimates by the total number (FTEs) of support staff (e.g., counselors, psychologist, librarians), and non-certified staff (e.g., paraprofessionals) in each school to obtain the total spending in pupil support and non-certified staff, respectively.

We then obtained the total spending on personnel salaries by summing up the expenditures on teachers, administrators, pupil support staff, and non-certified personnel wages. Benefit ratios were estimated dividing the total spending in salaries by the total spending in employee benefits in each district (using SACS). This district-level benefit ratio was then applied to the total expenditures on personnel salaries. These estimations produced what we call in this report *total personnel per-pupil spending* for each beating-the-odds and low-performing school.

Then, using SACS, we obtained at the district level: 1) per pupil central office administration spending (this includes board and superintendent spending, other general administration, and centralized data processing); 2) per pupil non-personnel spending (including textbooks and core curricula materials and supplies); 3) per pupil plant expenditures (plant maintenance and operations, facilities acquisitions and construction, facilities rents and leases); and 4) per pupil spending on other services (this includes travel and conferences, memberships, professional consulting services).

Finally, we added *total personnel per-pupil spending* to all district-level per-pupil spending (i.e., central office administration, non-personnel, plant expenditures, and other services) to estimate the *total per pupil spending* in California. The results of this methodology are presented in Chapter 4.

Section II-C: Resource Allocation as an Optimization Problem

In this section we describe the theoretical model that was used in our analysis of how much of the academic performance level in BTO and LP schools is explained by their level of resources and student characteristics. This model was also used in our study of how *efficient* BTO and LP schools are in their use of resources. We define a simplified model that attempts to simulate the general goal and constraints that schools face. The model is a simplification of the context in which public schools operate—it leaves out complex and relevant factors including teacher unions, long- term labor contracts, the role of the district, and parental involvement. Nevertheless, we see this as a relevant exercise that should help inform our discussion about the efficient use of available resources in a world of budgetary constraints.

The model is specified as follows. An educational institution that operates in a competitive environment has the following objective function:

$$Max\ L \equiv \overline{Y}\ enr \tag{1}$$

where $\overline{Y}$ is an outcome measure of average school-level student academic achievement. The variable *enr* represents the enrollment at the school. The production function equation is given by the following formula:

$$\overline{Y} = A\ \overline{edu}^{\alpha}\ \overline{\exp}^{\beta}\ (\frac{tea}{enr})^{\gamma}\ (\overline{pov})^{\delta}(\overline{els})^{\eta} \tag{2}$$

Where $\overline{edu}$ and $\overline{\exp}$ represent the average years of education and teaching experience of the teachers at the school, respectively, and *tea* indicates the total number of teachers working at the school. The terms $\overline{pov}$ and $\overline{els}$ represent the percent poverty and percent English learners at the school, respectively. $\alpha,\beta,\gamma,\delta,\eta$ and *A* are parameters. This academic production function states that average student achievement depends on teacher and student characteristics, as well as class size.

Replacing Equation 2 in Equation 1, we get the following objective function:

$$Max\ L \equiv A\ \ \overline{edu}^{\alpha}\ \overline{\exp}^{\beta}\ (\frac{tea}{enr})^{\gamma}\ \overline{pov}^{\delta}\ \overline{els}^{\eta}\ enr \tag{3}$$

The school faces several constraints in this optimization process. These constraints are given by the following equations:

$$Total\ Costs = C + H\ enr + \overline{W}\ tea \tag{4}$$

$$\overline{W} = \theta_0 + \theta_1 \overline{edu} + \theta_2 \overline{\exp} + \theta_3\, rwi + \varepsilon \tag{5}$$

Equation 4 defines the cost structure of the school. *C* represents fixed costs (e.g., facility costs). The school also faces variable costs that depend on student enrollment. *H* may be associated, for instance, with costs related to special education services that the school faces per student enrolled. Finally, we also need to consider labor costs. These are equal to the product of the average annual salary ($\overline{W}$) times the number of teachers working at the school (*tea*).

Equation 5 states that the average annual cost of labor depends on the characteristics of the teachers hired by the school. We expect θ_1 and θ_2 to be positive parameters. The term *rwi* represents a relative wage index that takes geographical as well as urban-rural wage differences into account.

The results and the analyses performed with this model are presented in Chapter 4.

Section III: Telephone Interviews

In addition to conducting a comprehensive analysis of resource allocations in beating-the-odds schools, low-performing schools, and statewide schools; we performed telephone interviews with administrators of a sample of these schools.

Selected Sample of Schools

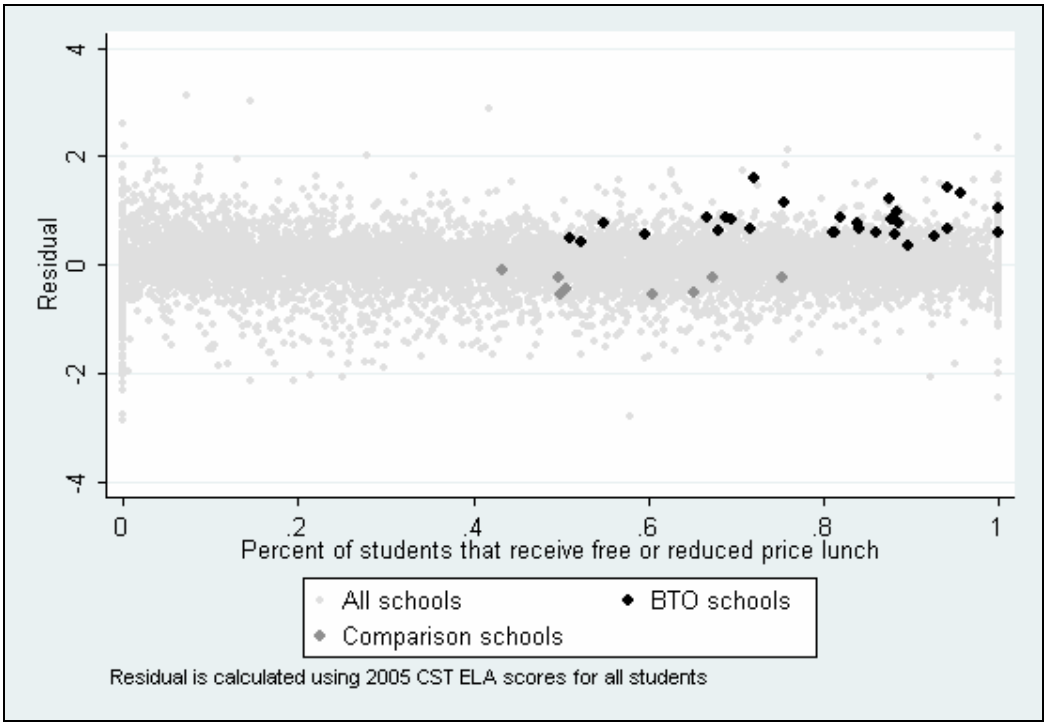
Given that we wanted to focus on high-need high-performing schools for the telephone interviews, it was necessary to narrow down the number of BTO schools to conduct the telephone interviews. From the original sample of 103 beating-the-odds schools; schools that did not meet the school-wide 2004-2005 API growth target or did not meet all 2005 AYP criteria were removed from the list (a total of 11 schools). Once these schools were removed, the final selection of schools was hand-picked by the research team. Variables that were considered when making the final selection were parental education, percentage of students receiving free or reduced price lunch, and racial diversity of the school. We also verified that schools were not selective with the student population they enroll (i.e., schools were not pre-testing or selecting students for enrollment, and in addition, students were not dismissed due to low academic performance). The primary goal was to select schools that are serving students with high needs (e.g., high percent poverty, high percent of English learners, low parental education). The final sample of BTO schools that were contacted for a telephone interview included 16 elementary schools, 3 middle schools, and 5 high schools.

In order to select "comparison" schools, or in other words, schools that have a similar mix of student characteristics compared to BTO but are performing at a lower level, a one-to-one matching technique was used for selection among the sample of low-performing schools.[16] Once matched schools were identified, the research team selected a small sample of 3 elementary, 2 middle, and 3 high schools for conducting telephone interviews. It is important to mention that the comparison schools were not selected from among the schools with the highest poverty levels because we did not want to select schools whose low performance level was mainly explained by their high-poverty status.

As a way of displaying the overall performance of the BTO and comparison schools, Exhibit 3.3.1 shows the distribution of 2005 CST ELA residuals for all schools. Notice that this exhibit displays only an overall school-level performance in a single year (2005), therefore those highlighted as BTO schools are not necessary those performing at the highest level in the graph. BTO schools, in order to be selected as such, needed to be performing above their expected level for the past four years. In addition, all subgroups in the school needed to be outperforming as well, not just the overall school. The following exhibit displays BTO schools in black, low-performing schools in dark gray, and the rest of public schools in light gray.

[16] The CST English language arts fitted values were used for matching low-performing with beating-the-odds schools.

Exhibit 3.3.1. Distribution of CST ELA Residuals, with Interviewed Schools Highlighted, 2005



School Names

The final sample of interviewed beating-the-odds schools, or schools that have been performing for the past four years at high levels given the student population they serve, is the following:[17]

- Monte Vista Street Elementary, Los Angeles Unified
- Fremont Primary, Calipatria Unified
- Azusa High, Azusa Unified
- Cahuenga Elementary, Los Angeles Unified
- Cantara Street Elementary, Los Angeles Unified
- Clifford Street Elementary, Los Angeles Unified
- Commonwealth Avenue Elementary, Los Angeles Unified
- Mayall Street Elementary, Los Angeles Unified
- Normont Elementary, Los Angeles Unified
- Leroy L. Doig Intermediate, Garden Grove Unified
- George R. Moscone Elementary, San Francisco Unified
- Dewey Elementary, San Diego Unified
- Olivewood, National Elementary
- Baldy View Elementary, Upland Unified
- Ramona High, Riverside High
- Garden Grove Elementary, Los Angeles Unified
- Orange High, Orange Unified
- North Salinas High, Salinas Union High

[17] Due to confidentiality agreements, the names of the "comparison" schools are not included.

Telephone Interview Process and Response Rate

Once BTO and comparison schools were selected, the research team solicited these schools to participate in telephone interviews. The first step was obtaining district permission to contact the school principals. All 16 districts agreed that we could contact the principals, although one district indicated that two of the BTO schools that we had selected were not suitable for our study. These two middle schools were dropped and not replaced. The next step was calling the principal to solicit participation and schedule the interviews. Five elementary schools refused to participate in the study (four BTO and one comparison school) and were replaced with similar schools. An additional eight schools were unresponsive to our phone calls and were not replaced due to time constraints. One BTO telephone interview was scheduled for early August, but in the end the principal could not participate, not allowing enough time for replacement. Exhibit 3.3.2 presents the total number of schools that were contacted for interviews, the number of interviews that were conducted, and the number of schools that were dropped from the study and not replaced.

Exhibit 3.3.2. Selected, Interviewed and Dropped Schools for Telephone Interviews

	Beating-the-Odds Schools			Comparison Schools			
	Elementary	**Middle**	**High**	**Elementary**	**Middle**	**High**	**Total**
Total selected schools	16	3	5	3	2	3	32
Total interviewed schools	13	1	4	3	2	0	23
Dropped without being replaced	3	2	1	0	0	3	8
Response rate	*87.5%*	*33.3%*	*80.0%*	*100.0%*	*100.0%*	*0.0%*	*75.0%*

Data Collected through Telephone Interviews

The one-hour telephone interviews included 25 questions that covered the following topics (the protocols used for the telephone interviews can be found in Appendix 2):

- Background information about the school and the principal
- School strategies for success (including probes—when relevant—about curriculum, instruction, professional development, teacher collaboration, use of data, district support, and parental involvement)
- Challenges to increasing academic achievement
- School leadership
- Funding
- Hiring and firing practices
- Additional staff
- Professional development
- District support
- Feasibility of reaching an API of 800

These same topics were covered for both BTO and comparison schools, although there were slight differences in the way in which the questions were phrased. For example, BTO schools were asked to describe the primary strategy implemented that has influenced their high results, while comparison schools were asked to describe the strategies implemented that have affected the performance of their school. Another variation in the interviews was that schools with an API below 800 were asked about the feasibility of reaching that goal and what kind of changes (including resources) would be required to get closer to an 800. Schools with an API above 800 were asked whether they had sufficient resources to continue at that level.

Chapter IV. Resource Allocation Analysis Results

Introduction

A major objective of this study is to determine if there are resource differences between groups of schools showing varying degrees of success in regard to student performance. In this chapter, we focus predominantly on the allocation of human resources, for three important reasons. First, personnel are the most necessary resource to provide educational services to all students in the traditional public school setting. Second, as mentioned in the previous chapter, districts spend approximately 81 percent of their total expenditures on personnel salaries and benefits. Third, statewide data are most readily available for personnel resource analyses.

This chapter is divided into three main sections: First we present a descriptive analysis of the types of students that are served in schools with different levels of performance, we then consider how these schools are staffed and the extent to which the characteristics of their personnel differ (e.g., education and experience levels). We proceed by assessing resource differences with more care by controlling for important student demographics. Second, we estimate the level of total spending at these schools and compare those estimates with actual spending levels in the state. The third section goes one step further by analyzing how much of the academic achievement gap between high-performing schools and other public schools we are able to explain through differences in resources and the types of students they serve. We repeat this analysis to explain the academic achievement gap that exists between low-performing schools and other public schools. In addition, this section analyzes school efficiency by developing a framework that measures whether beating-the-odds (BTO) schools use their teacher resources more efficiently than low-performing (LP) schools.

It is also important to keep the limitations of these analyses in mind; given the nature of the variables available from extant statewide data, we are forced to approach resource allocation indirectly, using variables or combinations of variables as proxies for resource allocation practices. For instance, we cannot capture organizational features of schools that shape how resources are used, such as incentives or programs put in place to influence the dynamics between personnel and interactions with students, nor can we examine key structural features such as the scheduling, sequencing, and length of classes. And other important school characteristics pertaining to leadership, turnover and the kind and frequency of professional development teachers receive, for example, are not routinely documented in statewide databases. The lack of such data makes a comprehensive analysis of resource allocation more difficult.

This chapter is organized into three sections:

- **Section I: Results of the Descriptive Analysis of Personnel Resources in BTO and LP Schools**. This section presents the results of a descriptive analysis as well as statistical analyses that aim to describe differences in the distribution and characteristics of personnel

resources in beating-the-odds (BTO), low-performing (LP), and other public schools in California.

- **Section II: Results of Costing Out BTO and LP Schools**. This section presents the results of a costing-out exercise that estimates the total educational spending level of beating-the-odds and low-performing schools. These estimates are also compared with actual statewide per pupil spending.

- **Section III: Resource Allocation as an Optimization Problem**. This section presents the results of estimating a theoretical model that helps understand 1) how much of the achievement gap that exists between BTO and other public schools, as well as between LP and other public schools, is due to differences in their resources and student characteristics, and 2) how BTO and LP schools compare in efficiency in the allocation of their teacher resources.

Section I: Results of the Descriptive Analysis of Personnel Resources in BTO and LP Schools

As detailed in the methodological chapter (Chapter 3), using CBEDS as the primary data source, we built a comprehensive school-level personnel database to explore how personnel resources differ between beating-the-odds, low-performing schools, and other public schools in the state. The first part of this section presents a descriptive analysis of how personnel are allocated among these schools and which are the characteristics of their staff. In the second part we conduct the same analysis while controlling for demographic characteristics.

Describing Personnel and Resource Allocation with CBEDS Data

Describing personnel with CBEDS data allows us to consider whether or not BTO schools are staffed differently (in terms of the numbers and characteristics of their employees) in comparison to other public schools. Because our personnel database accounts for each employee in each school in California, addressing this question is straightforward. We defined a series of variables describing resource levels that capture information on the quantities of certified and classified staff and average levels of education and experience for teachers and administrators.

We also specified a series of variables describing resource ratios. Examples of these variables are teacher experience-to-education level, and pupil support staff-to-teachers. In some cases these variables were defined to broadly approximate dimensions of school organization, such as capacity to support teachers (pupil support-to-teachers) and support to principals (vice principals and clerks-to-principals). In other cases, the variables simply describe the distribution of staff across assignments (e.g., percentage of teachers assigned to core subjects versus electives), seniority, and credentialing status. We recognize that the interpretation of some of these ratios may not be straightforward; however they are presented to help understand the results of our efficiency analysis presented in Section III of this chapter.

In addition, given that elementary schools are structurally different from middle and high schools, and may have different needs and priorities, the analyses in this chapter are presented

separately for elementary schools, whereas middle and high schools are grouped together. For comparability, we exclude charter, alternative, continuation, special education, state special, juvenile hall, community day, and adult education schools. In our analyses, we make comparisons between three groups of schools: beating-the-odds schools, low-performing schools, and other traditional public schools in California (refer to Chapter 3 for a description of how BTO and low-performing schools were selected).

Exhibit 4.1.1 provides demographic characteristics and school sizes for BTO, LP, and other public schools in the state. Overall, the most striking thing to note is the relative similarity between BTO and all other schools in relation to the LP schools. Compared to the large category of all other schools, the LP schools have approximately 50 percent more students in poverty (77.2 percent versus 50.9 percent), about 60 percent more ELs (39.1 percent versus 25.4 percent), and a substantially higher percentage of minority students (about 50 percent higher). LP schools also are substantially larger than BTO schools across all grade levels.

Exhibit 4.1.1. Characteristics of School Groups

Beating-the-Odds (BTO) Schools

	Elementary (N = 60)		Middle (N = 7)		High (N = 34)		**Total** (N = 101)	
	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)
% Poverty	57.9	33.0	51.3	27.5	54.2	13.1	56.2	27.4
% ELs	33.7	23.9	23.0	26.2	22.5	8.7	29.2	20.8
% Hispanic	49.4	34.1	45.4	32.1	63.4	14.7	53.9	29.5
% African-American	5.3	7.9	3.8	5.0	12.4	13.0	7.6	10.3
Enrollment	552	264	663	224	2,656	774	1,268	1,109

Low-Performing (LP) Schools

	Elementary (N = 76)		Middle (N = 32)		High (N = 5)		**Total** (N = 113)	
	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)
% Poverty	81.0	18.7	71.0	21.5	60.2	9.1	77.2	20.0
% ELs	42.4	15.4	33.2	16.3	28.0	12.2	39.1	16.1
% Hispanic	54.8	18.3	54.5	24.5	54.1	22.7	54.7	20.2
% African-American	21.9	10.3	24.1	18.6	33.3	17.9	23.0	13.6
Enrollment	777	311	1,545	835	3,252	1,184	1,104	801

Other Public Schools

	Elementary (N = 5,200)		Middle (N = 1,178)		High (N = 934)		**Total** (N = 7,312)	
	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)	Average (%)	Standard Deviation (%)
% Poverty	54.0	30.4	49.3	27.5	35.7	24.5	50.9	29.9
% ELs	28.7	22.8	19.5	16.3	14.0	13.8	25.4	21.6
% Hispanic	44.6	30.2	43.0	28.1	36.2	25.9	43.3	29.5
% African-American	7.1	11.0	7.6	10.8	7.3	10.5	7.2	10.9
Enrollment	570	269	940	473	1,714	1,077	776	618

Exhibit 4.1.2 displays the number of BTO and LP schools in each poverty quartile; BTO schools are spread out fairly evenly across the quartiles, while the majority of LP schools are in the higher quartile of poverty.

Exhibit 4.1.2. School Counts by Statewide Poverty Quartile

	BTO Schools		LP Schools		Other Public Schools		Total
	(n)	(%)	(n)	(%)	(n)	(%)	
Quartile 1 (0 - 25% poverty)	16	16	3	3	1,863	25	1,882
Quartile 2 (25 - 53% poverty)	23	23	12	11	1,846	25	1,881
Quartile 3 (53 - 77% poverty)	37	37	34	30	1,811	25	1,882
Quartile 4 (77 - 100% poverty)	25	25	64	57	1,792	25	1,881
Total	**101**	100	**113**	**100**	**7,312**	**100**	**7,526**

Exhibits 4.1.3 (elementary schools) and 4.1.4 (middle/high schools) provide a personnel profile for the typical BTO, LP and other public schools. The accompanying discussion provides an overview of how certain resource levels and characteristics contrast between school groups. The regression analysis that follows this discussion considers detailed differences in these variables, while controlling by demographic characteristics across school groups.

BTO and LP School Staffing

Teachers

With regards to teacher staffing in elementary schools, BTO schools have a slightly higher ratio of teachers to pupils compared with other public schools (5.19 versus 5.15 respectively; variable #2) while LP schools have the lowest ratio (5.01). The trend is different for middle and high schools, where other public schools have the highest ratio (4.86), followed by LP schools (4.34), and BTO schools have the least number of teachers relative to student enrollment (4.11).

In addition, there are differences regarding the educational attainment of teachers in these three different school categories. In particular, there are slightly higher proportions of elementary teachers with a master's or doctorate degree in BTO and other schools (29.7 percent and 29.5 percent, respectively; variable #9) than in LP schools (20.2 percent). The same pattern is evident in middle and high schools: BTO and other schools have higher percentages of teachers with advanced degrees (35 percent and 33.7 percent respectively; variable #9) in comparison to LP schools (21.8 percent).

Probably the most notable difference between LP, BTO, and other public schools in regard to teachers is the lower level of professional experience that teachers at LP schools possess. In elementary schools, average teacher experience is almost two years lower than in other schools (approximately 11 versus 13 years, variable #10). This difference is even bigger at the middle and high school level, with a teacher experience of 10.1 years in LP schools versus 12.23 and 12.81 in BTO and other public schools, respectively.

Administrators

There are also variations in the characteristics of administrators in these three different school types. Among elementary schools, the administrator-to-student ratio is higher in BTO schools (0.34, variable #3) than in LP and other schools (0.27 and 0.28, respectively). Meanwhile, there are more administrators, per 100 students in other middle and high schools than in the corresponding BTO and LP schools (0.30 versus 0.26 and 0.28, respectively; variable #3).

Furthermore, a greater proportion of administrators in elementary BTO schools possess advanced degrees than their counterparts in LP and other schools (85.4 percent versus 71.9 percent and 84.8 percent, respectively; variable #12). They also have more years of experience in the same district compared to LP and other public schools (18.13 versus 12.87 and 13.85, respectively; variable #14). In middle and high schools, these differences between administrators in BTO, LP, and other schools are less pronounced.

Percentage of Staff in Teaching, Administrative, and Pupil Support Positions

The typical elementary BTO school has a slightly greater proportion of its employees in teaching positions (92.7 percent versus 91.6 percent; variable #21) and administration (6.0 percent versus 4.9 percent; variable #22), and a smaller proportion in pupil support roles (1.4 percent versus 3.5 percent; variable #23), relative to LP schools. In addition, LP schools show the highest percentage of staff in pupil support assignments (e.g., counselors, psychologist), when compared with BTO and other public schools (3.5 percent versus 1.4 and 2.3 percent, respectively). However, when we look at middle and high schools, these differences are virtually nonexistent (see variables #20, 21, & 22).

Exhibit 4.1.3. Elementary School Personnel Resource Profile

	Variable/ Resource Category	Var #	Variable Description	BTO Schools	LP Schools	Other Public Schools
Resource Levels	Staff per pupil	1	Certified staff per 100 pupils	5.60	5.50	5.59
		2	Teachers per 100 pupils	5.19	5.01	5.15
		3	Administrators per 100 pupils	0.34	0.27	0.28
		4	Pupil support staff per 100 pupils	0.08	0.21	0.15
		5	Classified staff per 100 pupils	2.87	2.08	2.86
		6	Paraprofessionals per 100 pupils	1.51	0.90	1.31
		7	Clerical office staff per 100 pupils	0.55	0.47	0.50
		8	Other classified staff per 100 pupils	0.82	0.71	1.06
	Education & experience	9	Teachers: average total years of education[(a)]	17.23	17.12	17.26
			Teachers: percent with bachelor's degree or less	70.3%	79.8%	70.5%
			Teachers: percent with master's or doctorate	29.7%	20.2%	29.5%
		10	Teachers: average total years of experience in education	12.84	11.00	12.96
		11	Teachers: average total years of experience in district	11.26	9.24	10.82
		12	Administrators: average total years of education[(a)]	18.24	17.89	18.34
			Administrators: percent with bachelor's degree or less	14.7%	27.5%	15.3%
			Administrators: percent with masters or doctorate	85.4%	71.9%	84.8%
		13	Administrators: average total years of experience in education	22.72	17.47	20.28
		14	Administrators: average total years of experience in district	18.13	12.87	13.85
Resource Ratios	Class sizes	15	Average class size: kindergarten self-contained classrooms	19.49	20.40	21.58
		16	Average class size: grades 1 - 3 self-contained classrooms	19.73	19.82	20.13
		17	Average class size: grades 4 - 5 self-contained classrooms	29.31	29.76	30.38
	Experience : education	18	Teachers: total years of experience per total years of education	0.74	0.64	0.75
		19	Administrators: total years of exp. per total years of education	1.25	0.97	1.10
		20	Pupil support staff: total years of exp. per total years of education	0.87	0.79	0.81
	Distribution of staff across major assignments	21	Share of total staff who are teachers	92.7%	91.6%	92.9%
		22	Share of total staff who are administrators	6.0%	4.9%	4.8%
		23	Share of total staff who are pupil support staff	1.4%	3.5%	2.3%
	Support capacity	24	Teachers per administrator	17.08	20.83	21.80
		25	Teachers per pupil support staff	19.90	28.52	29.49
		26	Administrators per pupil support staff	0.94	1.57	1.39
		27	Paraprofessionals per teacher	0.28	0.18	0.24
		28	Share of teaching staff providing mentoring support	0.3%	1.5%	1.1%
		29	Share of teaching staff providing instructional support	1.8%	2.7%	2.7%
		30	Administrators + clerical office staff per principal	3.62	4.75	3.11
	Teacher status & characteristics	31	Share of total teachers designated as probationary or temporary	15.4%	25.8%	20.0%
		32	Share of total teachers with tenure	52.0%	62.1%	71.0%
		33	Share of total teachers with full credentials	95.3%	93.3%	96.6%

Notes:
(a) As CBEDS only includes the discrete education attainment level of staff, we create a continuous education variable in the following way:

- Less than bachelor's degree: 12 years of education.
- Bachelor's degree: 16 years of education.
- Bachelor's degree plus 30 or more semester hours: 17 years of education.
- Master's degree: 18 years of education.
- Master's degree plus 30 or more semester hours: 19 years of education.
- Doctorate: 21 years of education.

Exhibit 4.1.4. Middle & High School Personnel Resource Profile

	Variable/ Resource Category	Var #	Variable Description	BTO Schools	LP Schools	Other Public Schools
Resource Levels	Staff per pupil	1	Certified staff per 100 pupils	4.63	4.88	5.41
		2	Teachers per 100 pupils	4.11	4.34	4.86
		3	Administrators per 100 pupils	0.26	0.28	0.30
		4	Pupil support staff per 100 pupils	0.27	0.27	0.25
		5	Classified staff per 100 pupils	2.14	2.37	2.27
		6	Paraprofessionals per 100 pupils	0.68	0.88	0.76
		7	Clerical office staff per 100 pupils	0.56	0.63	0.55
		8	Other classified staff per 100 pupils	0.89	0.86	0.96
	Education & experience	9	Teachers: average total years of education[(a)]	17.23	17.03	17.31
			Teachers: percent with bachelor's degree or less	65.0%	78.2%	66.3%
			Teachers: percent with master's or doctorate	35.0%	21.8%	33.7%
		10	Teachers: average total years of experience in education	12.23	10.10	12.81
		11	Teachers: average total years of experience in district	10.36	8.50	10.24
		12	Administrators: average total years of education[(a)]	18.33	18.00	18.21
			Administrators: percent with bachelor's degree or less	20.4%	27.4%	21.9%
			Administrators: percent with masters or doctorate	79.6%	72.6%	78.1%
		13	Administrators: average total years of experience in education	18.76	16.16	18.62
		14	Administrators: average total years of experience in district	14.12	14.68	12.54
Resource Ratios	Class sizes	18	Average case load: core subjects	153.75	143.77	142.31
		19	Average case load: electives	190.44	211.27	183.59
	Experience : education	20	Teachers: total years of experience per total years of education	0.71	0.59	0.74
		21	Administrators: total years of exp. per total years of education	0.85	0.82	0.88
		22	Pupil support staff: total years of exp. per total years of education	1.02	0.90	1.02
	Distribution of staff across major assignments	23	Share of total staff who are teachers	88.6%	88.8%	89.7%
		24	Share of total staff who are administrators	5.5%	5.7%	5.5%
		25	Share of total staff who are pupil support staff	5.9%	5.5%	4.8%
	Support capacity	26	Teachers per administrator	19.04	17.11	17.97
		27	Teachers per pupil support staff	15.89	18.01	20.89
		28	Administrators per pupil support staff	0.99	1.19	1.28
		29	Paraprofessionals per teacher	0.17	0.21	0.16
		30	Share of teaching staff providing mentoring support	1.3%	0.8%	1.6%
		31	Share of teaching staff providing instructional support	0.1%	0.2%	0.4%
		32	Administrators + clerical office staff per principal	15.95	13.00	9.25
	Instructional emphasis	34	Share of Total Teachers who teach core subjects[(b)]	57.8%	66.2%	59.6%
		35	Share of Total Teachers who teach elective subjects[(c)]	20.3%	14.1%	18.9%
		36	Elective Teachers per Core Teachers	0.36	0.22	0.33
	Teacher status & characteristics	37	Share of total teachers designated as probationary or temporary	20.0%	28.5%	27.0%
		38	Share of total teachers with tenure	53.5%	37.4%	65.7%
		39	Share of total teachers with full credentials	88.9%	78.3%	92.2%

Notes:
(a) As CBEDS only includes the discrete education attainment level of staff, we create a continuous education variable in the following way:

- Less than bachelor's degree: 12 years of education.
- Bachelor's degree: 16 years of education.
- Bachelor's degree plus 30 or more semester hours: 17 years of education.
- Master's degree: 18 years of education.
- Master's degree plus 30 or more semester hours: 19 years of education.
- Doctorate: 21 years of education.

(b) Core subjects include: Mathematics, English, History and Social Science.
(c) Elective subjects include: Humanities, Arts, Music, Physical Education, Computer Education and Foreign Language

Seniority Status

BTO elementary schools have lower percentages of teachers in tenure (52 percent versus 71 percent; variable #32) and in probationary status (15.4 percent versus 20 percent; variable #31) when compared with other public schools. Meanwhile, LP elementary schools have higher proportions of probationary instructors (25.8 percent) and tenured teachers (62.1 percent) relative to BTO schools. Similar patterns exist in middle and high schools: 65.7 percent of teachers in public schools hold tenure, compared with 53.5 percent in BTO schools and 37.4 percent in LP schools (variable #38); while 27 percent of the teachers in public schools are probationary, compared to 20 percent and 28.5 percent in BTO and LP schools, respectively (variable #37).

Teacher Credentials

There are no salient differences in the percentage of teachers with full credentials in elementary schools. In middle and high schools, on the other hand, other public schools have the highest share of fully credentialed teachers (92.2 percent; variable #39), followed by BTO schools (88.9 percent), and LP schools have the lowest proportion (78.3 percent).

Summary

In general, while we observed some differences in staffing between these three school categories, they do not appear to be substantial. The most important difference appears to be the level of experience that teachers and administrators hold: LP school teachers and administrators have less experience in education-related work. In addition, it is worthy of note that LP schools have more staff focused on providing pupil support (e.g., counselors), which may be a reflection of the higher needs of their students given their higher poverty level.

Statistical Analyses of Resource Allocations

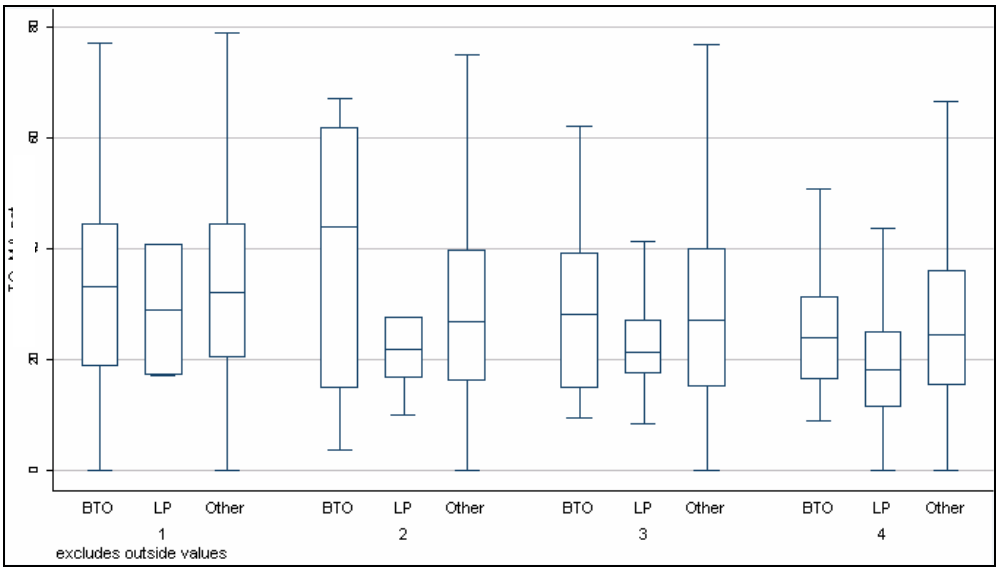
Although the resource allocation descriptions presented above provide a valuable summary of the levels and characteristics of personnel among BTO, LP, and other public schools, with a simple average it is difficult to disentangle these differences in personnel and the degree to which they are tied to differences in the student populations they serve. For example, as displayed in Exhibit 4.1.1, LP schools tend to be significantly larger, have a higher level of poverty and higher percentages of English learner and African-American students than BTO schools.

The previous section also showed that these schools differ in the characteristics of the teachers they employ. Exhibit 4.1.5 displays a box plot summarizing the distribution of the percentage of teachers holding master's or doctoral degrees (y-axis), broken out by poverty quartile. Even though BTO schools have, on average, a higher percentage of teachers with advanced degrees across all quartiles, the variation across school types in quartiles 1, 3, and 4 is much less than that seen in the overall results (Exhibit 4.1.3 and 4.1.4).

Differences across schools in the qualifications of teachers have been largely documented (Betts, Rueben and Danenberg, 2000). Low performing schools and schools with a high percentage of students with high-needs (e.g., poverty level, ELs) tend to have teachers with low education and experience level. One plausible explanation is that this difference results from some

organizational feature of high-performing schools (or low-performing schools), such as the ability of the school leadership or district to hire and retain highly qualified staff.

Exhibit 4.1.5. Box Plot for the Average Percentage of FTE Teachers Holding Master's or Doctoral Degrees, by School Group and Poverty Quartiles



Regression Results

To control for differences in student poverty between the three kinds of schools and to assess if the differences observed in the previous analysis are statistically significant, we used a multivariate OLS regression model to explore how personnel resources in BTO and LP schools differ in comparison to other public schools while controlling for student characteristics. This model does not imply a causal relationship between the dependent and independent variables. This model is designed to explore how personnel resources in BTO and LP schools differ in comparison to other public schools. The regression used is as follows:

$$Y_{is} = \beta_0 + \beta_1 BTO_{is} + \beta_2 LP_{is} + \beta_3 STU_{is} + \varepsilon_{is}$$

Where Y equals resource level or ratio *i* for school *s*,[18] *BTO* is a dummy variable indicating whether a school is a beating-the-odds school, *LP* is a dummy variable indicating whether a school is a low-performing school and *STU* is a matrix with student demographic variables that include percent poverty, percent ELs, percent Hispanic, and percent African American.

Exhibit 4.1.6 displays the regression results for elementary schools, and Exhibit 4.1.7 the results for middle and high schools combined. The models presented in these exhibits contain as control variables the percent poverty and percent ELs at each school.[19] Below we discuss in detail differences in resource levels and characteristics of staff in BTO, LP and other public schools that are observed in the regression results.

[18] As our dependent variables, we use the resource variables defined in Exhibit 4.1.3 and Exhibit 4.1.4 (teachers per 100 pupils, average years of education, and average years of experience, for example).

[19] Please refer to Appendix 3 for regression results including percent Hispanic and percent African American as additional control variables.

Exhibit 4.1.6. OLS Regression Results – Elementary Schools

		Var. #		Beating-the-Odds Schools (BTO) (Coefficient) (A)	Low-Performing Schools (LP) (Coefficient) (B)	Percent Poverty (Coefficient) (C)	Percent English Learners (Coefficient) (D)	Constant (E)	Observations (F)	R-squared (G)
Resource Levels	Staff per pupil	1	Certified staff per pupil	0	-0.003	0.011***	-0.009***	0.053***	5,334	0.006
		2	Teachers per pupil	0.001	-0.003	0.01***	-0.012***	0.049***	5,334	0.020
		3	Administrators per pupil	0.001	0	0.001***	0	0.002***	5,334	0.008
		4	Pupil support staff per pupil	-0.001	0	-0.001	0.003***	0.001***	5,334	0.002
		5	Classified staff per pupil	0.001	-0.011	0.020***	-0.016**	0.022***	5,321	0.003
		6	Paraprofessionals per pupil	0.002	-0.005	0.008**	-0.005	0.01***	5,321	0.001
		7	Clerical office staff per pupil	0.001	-0.001	0.004***	-0.005***	0.004***	5,321	0.034
		8	Other classified staff per pupil	-0.002	-0.005	0.008***	-0.006*	0.008***	5,321	0.002
	Education & experience	9	Teachers: average total years of education	-0.013	-0.071	-0.269***	0.045	17.388***	5,335	0.034
		10	Teachers: average total years of experience in education	0.168	-1.277***	-0.436*	-4.101***	14.372***	5,335	0.079
		11	Teachers: average total years of experience in district	0.648	-1.278***	0.468**	-3.117***	11.46***	5,335	0.036
		12	Administrators: average total years of education	-0.097	-0.375***	-0.212***	-0.171**	18.509***	5,041	0.014
		13	Administrators: average total years of experience in education	2.616**	-1.912*	-1.732***	-3.434***	22.238***	5,041	0.021
		14	Administrators: average total years of experience in district	4.516***	-1.422	2.262***	-1.226	12.984***	5,041	0.007
Resource Ratios	Class sizes	15	Average class size: kindergarten self contained classrooms	-2.386***	-0.453	-3.98***	2.622***	22.957***	4,952	0.023
		16	Average class size: grades 1 - 3 self contained classrooms	-0.379	-0.006	-1.428***	0.604***	20.73***	5,018	0.026
		17	Average class size: grades 4 - 5 self contained classrooms	-0.816	0.349	-3.564***	-0.128	32.342***	4,837	0.007
	Experience : education	18	Teachers: total years of experience per total years of education	0.01	-0.072***	-0.013	-0.24***	0.826***	5,335	0.076
		19	Administrators: total years of exp. per total years of education	0.155**	-0.087	-0.078**	-0.183***	1.199***	5,041	0.019
		20	Pupil support staff: total years of exp. per total years of education	0.044	-0.017	0.078	-0.293***	0.854***	2,457	0.009
	Distribution of staff across major assignments	21	Share of total staff who are teachers	-0.001	-0.01*	-0.014***	0.005	0.935***	5,336	0.006
		22	Share of total staff who are administrators	0.01**	-0.004	0.02***	-0.004	0.039***	5,336	0.030
		23	Share of total staff who are pupil support staff	-0.009*	0.014***	-0.006**	-0.001	0.026***	5,336	0.005
	Support capacity	24	Teachers per administrator	-4.422***	0.315	-6.77***	3.993***	24.305***	5,041	0.034
		25	Teachers per pupil support staff	-9.75	1.933	-13.969***	11.024***	33.581***	2,457	0.010
		26	Administrators per pupil support staff	-0.415	0.185	-0.267*	0.8***	1.3***	2,457	0.008
		27	Paraprofessionals per teacher	0.055	-0.064**	0.12***	-0.18***	0.223***	5,321	0.012
		28	Share of teaching staff providing mentoring support	-0.009***	0	0.006***	0.018***	0.002***	5,335	0.048
		29	Share of teaching staff providing instructional support	-0.009	0	0.004	-0.004	0.026***	5,335	0.001
		30	Administrators + clerical office staff per principal	0.373	1.087***	1.017***	2.365***	1.844***	4,798	0.160
	Teacher status & characteristics	31	Share of total teachers designated as probationary or temporary	-0.046**	0.051**	0.028**	-0.002	0.185***	5,335	0.004
		32	Share of total teachers with tenure	-0.185***	-0.036	-0.155***	-0.082***	0.818***	5,335	0.062
		33	Share of total teachers with full credentials	-0.011	-0.02***	-0.036***	-0.025***	0.992***	5,335	0.065

* significant at 10%; ** significant at 5%; *** significant at 1%

Exhibit 4.1.7. OLS Regression Results – Middle & High Schools

		Var. #		Beating-the-Odds Schools (BTO) (Coefficient) (A)	Low-Performing Schools (LP) (Coefficient) (B)	Percent Poverty (Coefficient) (C)	Percent English Learners (Coefficient) (D)	Constant (E)	Observations (F)	R-squared (G)
Resource Levels	Staff per pupil	1	Certified staff per pupil	-0.007	-0.002	0.02***	-0.052***	0.054***	2,189	0.013
		2	Teachers per pupil	-0.007	-0.003	0.018***	-0.048***	0.049***	2,189	0.013
		3	Administrators per pupil	0	0	0.001**	-0.003***	0.003***	2,189	0.004
		4	Pupil support staff per pupil	0	0	0	-0.001	0.003***	2,189	0.001
		5	Classified staff per pupil	-0.002	0.000	0.022***	-0.032***	0.018***	2,170	0.031
		6	Paraprofessionals per pupil	-0.001	0.001	0.011***	-0.014***	0.005***	2,170	0.014
		7	Clerical office staff per pupil	0	0.001	0.003***	-0.005***	0.005***	2,170	0.017
		8	Other classified staff per pupil	-0.001	-0.001	0.009***	-0.012***	0.008***	2,170	0.033
	Education & experience	9	Teachers: average total years of education	-0.035	-0.176***	-0.482***	0.138**	17.498***	2,190	0.103
		10	Teachers: average total years of experience in education	-0.039	-1.807***	-1.618***	-3.146***	14.051***	2,190	0.072
		11	Teachers: average total years of experience in district	0.519	-1.244**	-0.771**	-1.883***	10.892***	2,190	0.027
		12	Administrators: average total years of education	0.119	-0.155	-0.162*	-0.05	18.284***	2,103	0.006
		13	Administrators: average total years of experience in education	0.541	-1.892*	-1.51*	-0.977	19.433***	2,103	0.009
		14	Administrators: average total years of experience in district	1.618	1.585	1.112	1.653	11.776***	2,103	0.009
Resource Ratios	Class sizes	15	Average class size: core subjects	12.123***	0.811	-12.658***	25.757***	143.387***	2,165	0.012
		16	Average class size: electives	5.678	18.919**	14.72**	31.45***	171.891***	2,144	0.031
	Experience : education	17	Teachers: total years of experience per total years of education	0	-0.098***	-0.073***	-0.191***	0.803***	2,190	0.065
		18	Administrators: total years of exp. per total years of education	0.02	-0.094	-0.067	-0.065	1.061***	2,103	0.007
		19	Pupil support staff: total years of exp. per total years of education	-0.021	-0.046	0.092*	-0.241**	0.88***	1,877	0.004
	Dist. of staff across major assignments	20	Share of total staff who are teachers	-0.011*	-0.009	0.001	-0.001	0.896***	2,190	0.002
		21	Share of total staff who are administrators	-0.002	0	0.012***	-0.01*	0.052***	2,190	0.008
		22	Share of total staff who are pupil support staff	0.013***	0.009*	-0.013***	0.01*	0.052***	2,190	0.011
	Support capacity	23	Teachers per administrator	1.564	-0.344	-4.191***	3.876*	19.101***	2,103	0.007
		24	Teachers per pupil support staff	-5.272*	-3.479	2.61	-0.92	19.949***	1,877	0.004
		25	Administrators per pupil support staff	-0.333*	-0.162	0.642***	-0.648**	1.117***	1,877	0.011
		26	Paraprofessionals per teacher	0.003	0.036*	0.091***	-0.043*	0.123***	2,170	0.036
		27	Share of teaching staff providing mentoring support	-0.006	-0.015***	0.011***	0.024***	0.007***	2,190	0.037
		28	Share of teaching staff providing instructional support	-0.004*	-0.004	0.008***	-0.003	0.001**	2,190	0.017
		29	Administrators + clerical office staff per principal	7.001***	3.504***	-5.362***	10.678***	9.714***	1,971	0.049
	Instructional emphasis	30	Share of total teachers who teach core subjects	-0.024	0.055***	-0.005	0.076***	0.586***	2,190	0.017
		31	Share of total teachers who teach elective subjects	0.028***	-0.02**	-0.101***	-0.008	0.234***	2,190	0.216
		32	Elective teachers per core teacher	0.052	-0.058	-0.179***	-0.051	0.418***	2,165	0.056
	Teacher status & characteristics	33	Share of total teachers designated as probationary or temporary	-0.076***	-0.012	0.055***	0.084**	0.232***	2,190	0.026
		34	Share of total teachers with tenure	-0.08**	-0.209***	-0.21***	-0.119***	0.768***	2,190	0.127
		35	Share of total teachers with full credentials	-0.014	-0.108***	-0.044***	-0.125***	0.962***	2,190	0.150

* significant at 10%; ** significant at 5%; *** significant at 1%

Staff size relative to enrollment: Do BTO schools have more personnel resources than other schools?

Across elementary, middle and high schools, the results from the regression model provide no statistical evidence indicating that BTO schools and low-performing schools have different quantities of certified and classified personnel when compared to other public schools.

Staff experience and education levels: Are teachers and administrators in BTO schools more experienced and more highly educated?

When controlling for student characteristics, the education and experience levels of teachers in BTO schools are no different than their counterparts in other public schools. However, differences in the level of experience and education displayed by administrators in elementary BTO schools still holds. As shown in Exhibit 4.1.6, administrators in elementary BTO schools show a statistically significant difference of 2.6 more years of experience as educators (Variable #13, Column A) and 4.5 more years of experience in the district (Variable #14, Column A) compared to administrators in other public elementary schools.

In contrast, both teachers and administrators in low-performing schools have levels of experience in education that are statistically significantly lower than the state average (Variables #10 and 13, Column B). Teachers in low-performing elementary schools are approximately one year less experienced in education and are one year newer to the district relative to teachers in other public schools.

As shown in Exhibit 4.1.7, across middle and high schools a similar pattern emerges: LP school teachers have lower educational attainment (Variable #9, Column B), are approximately two years less experienced as educators (Variable #10, Column B), and are one year newer to the district (Variable #11, Column B) relative to teachers in other public schools. Administrators in LP schools have two fewer years of experience in education as well (Variable #13, Column B).

Staff distribution: Do BTO schools distribute their staff differently across the major assignments (i.e., teaching, administrative and pupil support positions) relative to other schools?

As shown in Exhibit 4.1.6, in elementary schools, there are no significant differences in the proportion of total staff who are teachers between BTO, LP and other public schools (Variable #21, Column A and B). In the case of administrators, BTO schools have a higher proportion of staff in administrative positions compared to the rest of schools (Variable #22, Column D). In addition, LP schools have a higher proportion of staff in pupil support assignments (Variable #23, Column B) when compared to other public schools.

As shown in Exhibit 4.1.7, in the case of middle and high schools, the only significant difference that is observed is the higher percentage of staff in BTO schools providing pupil support services. LP middle and high schools resemble other public schools

Mutual support capacity: Do BTO schools have more capacity to support their teachers?

Yes. Regarding elementary schools, the most salient difference is in FTE teachers per administrator. BTO schools have 4.4 fewer teachers per administrator ((Variable #24, Column A) than other public schools, or in other words, more administrators per teacher. In addition, middle and high school BTO schools have more people support per teachers (Variable #24, Column A) relative to other public schools.

Principal support capacity: Do BTO schools have more capacity to support their principals?

Yes. Regarding the capacity of schools to support principals, at the middle and high school level, the results indicate that both BTO schools and LP schools have more administrators (e.g., vice principals) and clerical office staff per principal compared to other public schools (Variable #29, Columns A and B) .

Teachers' status: Do BTO schools have a lower percentage of teachers with tenure?

Yes. At the elementary school level, BTO schools have a significantly lower percentage of teachers with tenure (Variable #32, Column A) when compared with LP and other public schools. LP schools do not differ from other elementary schools on this measure. In the case of middle and high schools, BTO and LP schools have a lower percentage of tenured teachers ((Variable #34, Columns A and B).

Teacher credentials: Do BTO schools have a higher percentage of teachers with full credentials?

BTO elementary and middle or high schools are not statistically different from other public schools. In contrast, LP elementary, middle and high schools have significantly lower percent of teachers holding full credentials (Variable #33, Column B in Ex. 4.1.6 and Variable #35, Column B in Ex. 4.1.7, respectively).

Class sizes and case loads: Do BTO schools have smaller class sizes?

BTO schools do not have smaller classes in grades 1 to 5. However, BTO schools have two fewer students in their kindergarten classrooms (Variable #15, Column A) compared to other public schools. Among middle and high schools, BTO schools have higher case loads in core subject classes (Variable #15, Column A) compared with other public and LP schools.

Summary

The regression results provide no statistical evidence that BTO and LP schools have different quantities of certified and classified personnel when compared to other public schools. Also, BTO schools do not have smaller classes in grades 1 to 5 compared to other public schools (BTO do have two fewer students in their kindergarten classrooms; see Variable #15, Column A). The education and experience levels of teachers in BTO schools do not differ compared to other public schools, but the years of experience of elementary BTO administrators is higher (Variables #13 & 14, Column A) than their colleagues in other public schools. In contrast, both the level of experience of teachers and the administrators' educational attainment in elementary

LP schools are lower (Variables #10, 11 & 12, Column B) than the state average. Further, teacher education and experience is lower (Variables #9, 10 & 11, Column B) in low performing middle and high schools than in other public schools.

In elementary schools, BTO schools have a higher proportion of staff in administrative positions (Variable #22, Column A) compared to the rest of schools. In addition, LP schools have a higher proportion of staff in pupil support assignments (Variable #23, Column B) when compared to other public schools.

Also, BTO schools have a significantly lower percentage of teachers with tenure (Ex. 4.1.6, Variable #32, Column A; Ex. 4.1.7, Variable #34, Column A) when compared with other public schools. Last, LP elementary, middle and high schools have significantly lower percentages of teachers holding full credentials (Ex. 4.1.6, Variable #33, Column B; Ex. 4.1.7, Variable #35, Column B).

Section II: Results of Costing Out BTO and LP Schools

This section presents the results of costing out BTO and LP schools. As mentioned previously, our intent is not to estimate an "adequate" total education expenditure level for all schools in California based on these schools, but to analyze how BTO and LP schools contrast in their level of spending. These estimates are also compared with statewide averages of total per pupil spending.

As detailed in the methodological chapter (Chapter 3, Section II-B), at the center of our costing-out exercise lies a teacher and an administrator wage equation. The results of the estimations of these two equations are presented below (Exhibit 4.2.1).

Exhibit 4.2.1. Weighted Least Squares Regression Results for Teachers and Administrators

	Teacher Salary Equation	Administrator Salary Equation
Average education level[(a)]	5,027 **	6,250 **
Average experience level	3,742 **	613
Average experience squared	-115 **	-7
Wage Index [(b)]	27,512 **	61,321 **
Constant	3,283	12,581
Number of observations	1,027	979
R-squared	0.11	0.13

* significant at 5%; ** significant at 1%

(a) Average educational level is centered at 16 years. This means that the expected salary for a teacher in LAUSD with 16 years of education and 10 years of experience will be (5,027 * 0) + (3,742 * 10) – (115 * (10)^2) + (27,512 * 1) + 3,283

(b) The Wage Index is centered on LAUSD; it will take the value of 1 when the location is LAUSD.

The weighted least squares result for teacher wages shows that all regressors are statistically significant and have the expected sign. The average teacher salary increases with higher levels of teacher education and experience, and the marginal effect of experience decreases when teacher experience increases (reflected in the negative sign of experience squared). In the case of the salary equation for administrators, only the education level is statistically significant.

Exhibit 4.2.2 presents the results of the costing out methodology. It shows that, on average, when using this standardized approach to costing out education, beating-the-odds schools appear to spend slightly less than low-performing schools per student ($7,799 vs. $8,021). Also, in the case of BTO and LP schools, it shows total per pupil spending as positively correlated with poverty. In other words, high poverty schools tend to show higher per pupil spending. In addition, high poverty BTO schools show higher per pupil spending than high poverty LP schools, with the reverse showing when lower poverty schools are compared.

Exhibit 4.2.2. Total Weighted Per Pupil Spending; BTO and LP Schools (2004-05)

	Total per Pupil Spending	Total Personnel per Pupil Spending	Central Office per Pupil Spending	Plant per Pupil Spending	Other Services per Pupil Spending	Non-Personnel per Pupil Spending
Overall						
Beating the odds (n=103)	7,799	5,554	371	751	699	425
Low performing (n=113)	8,021	5,603	366	782	802	468
Below Median Poverty (0% - 71%)						
Beating the odds (n=72)	7,648	5,429	377	739	688	414
Low performing (n=37)	7,743	5,391	376	766	779	431
Above Median Poverty (< 71% - 100%)						
Beating the odds (n=31)	8,458	6,097	345	801	747	469
Low performing (n=76)	8,192	5,728	375	804	880	499

Source: California Department of Education, SACS and CBEDS data 2004-05.

Exhibit 4.2.3 shows total per pupil spending for the state of California. When compared with beating-the-odds and low-performing schools, total expenditures do not seem to differ noticeably. The statewide per pupil expenditure is $7,523; BTO school's level of spending is slightly higher than the state average (about $260 per pupil), and LP schools spend an average of about $500 per student more than the average school in the state.

Exhibit 4.2.3. Statewide Average Expenditures, 2004-05

Function	Average per ADA Expenditures All Districts
Instruction	4,687
Instruction related services	930
Pupil services	523
General administration	395
Plant services	729
Other	69
Total per pupil spending	**7,523**

Source: Ed-Data, Education Data Partnership. Statewide Financial Report, 2004-05.

Summary

We have seen in this analysis that standardized spending in BTO and LP schools differs slightly: BTO schools appear to spend $222 per student less annually than LP schools. Also, both sets of schools are shown to spend somewhat more than the average spending level in the state.

Section III: Resource Allocation as an Optimization Problem: Results

In this section, we attempt to relate resource allocation practices and student demographic characteristics to differences in student academic attainment. We learned from the previous sections that levels of resources and spending in BTO schools do not differ substantially from other public schools, and that teachers in BTO schools have higher levels of experience and education than teachers in LP schools.

In this section, we estimate the model presented in Chapter 3, Section II-C, and then present analyses of the extent to which observable differences in resource allocation practices as well as student characteristics among BTO, LP and the rest of public schools are able to explain their differences in average academic achievement. We conclude this section with an attempt to analyze how *efficient* BTO and LP schools are in their use of resources. In particular, we focus on the resources spent on teacher salaries.

The Academic Production Model

Using statewide data we estimate the following model (Equation (3) from Chapter 3):

$$Max\ L \equiv A\ \overline{edu}^{\alpha}\ \overline{\exp}^{\beta}\ \left(\frac{tea}{enr}\right)^{\gamma}\ \overline{pov}^{\delta}\ \overline{els}^{\eta}\ enr$$

The 2005 California Standards Test (CST) results for English language arts (ELA) and mathematics are used as a measure of academic outcome ($\overline{Y}$), as well as the *average residual* and *success rate* obtained when BTO and LP schools were selected. CBEDS and other extant statewide data are used to measure enrollment *(enr)*, and the number of teachers (FTEs) at each school *(tea)* and their educational attainment and teaching experience. With this information, we estimate the average years of teacher experience ($\overline{\exp}$) and education *(*$\overline{edu}$*)* for all teachers at each school, variables on the percentage of students eligible for free or reduced price lunch (a proxy for poverty) and the percentage of English learners are also included using other extant data sources.

Exhibit 4.3.1 shows the OLS results when the CST results for ELA and mathematics are used as a measure of academic outcome.[20] All regressors are statistically significant at 1 percent, and have the expected sign. Average school-level academic outcome increases with higher teacher education and higher teaching experience, as well as with increases in the ratio of teachers per

[20] In the case of mathematics, the regression has 6,467 observations, in the case of ELA, there are 7,395 observations. These differences are explained due to the lack of a consistent CST mathematic test for high schools.

students. In addition, with increases in the poverty level—as measured by the percentage of students eligible for free or reduced price lunch and/or who are English learners, the average school-level performance decreases. The R-squared values are very high for cross-sectional regressions, at 0.6 for CST mathematics and 0.7 for CST ELA.

Exhibit 4.3.1. OLS Regression of Average School-Level Academic Achievement

	Standardized CST Math	Standardized CST ELA
Ln (Average years of teaching experience)	0.260 (0.022)***	0.285 (0.018)***
Ln (Average years of teacher education)	1.287 (0.305)***	1.239 (0.232)***
Ln (teachers per student)	0.131 (0.047)***	0.346 (0.036)***
Ln (Percentage of students eligible for free or reduced price lunch)	-0.684 (0.010)***	-0.655 (0.008)***
Ln (Percentage of English learners)	-0.032 (0.008)***	-0.115 (0.007)***
Constant	-4.544 (0.852)***	-3.957 (0.649)***
Observations	6,467	7,395
R-squared	0.6213	0.7059

* Significant at 10%, ** significant at 5%, *** significant at 1% (p-values in parenthesis).

Exhibit 4.3.2 shows the OLS results when multiple years are used to measure academic outcome. This is the case when the *average residual* and *success rate* are used as a measured of academic performance.[21] These regressions include additional regressors as well. For example, the number of administrators and classified personnel per student is included. The average years of experience and education for administrators as well as the percentage of teachers in probationary and tenure status are incorporated in the regressions. The results show that in both regressions almost all regressors are statistically significant and have the expected sign. For example, the results for the average residual show that higher levels of personnel (e.g., teachers and administrators) are related with a higher average residual. The same is true for teacher and administrator education and experience level; higher the level of those variables higher the average residual.

When the success rate is used as a measure for academic outcome, the results are similar. One exception is the sign of the variable that measures the percentage of teachers with tenure status. Higher the percentage of teachers with tenure, lower the success rate measure. When the average residual is used as a measure of performance the reverse is observed. Another exception is the teacher pupil ratio variable. When the success rate is used as outcome measure, this variable is not statistically significant (the opposite is observed when the average residual is used as dependent variable).

[21] These measures were introduced in Section I of Chapter III. The *average residual* was calculated across years and subjects (i.e., ELA and math) from the regression results obtained when BTO and LP schools were selected. The *success rate* was calculated by measuring the number of requirements a school met every year to be considered BTO. For example, a school that met all the requirements during the four-year period has a success rate of 1 and is considered a BTO school. Schools that missed all the requirements have a success rate of zero and are considered LP schools.

In addition, it is important to observe that the R-squared values are much lower than when only a one year measure of academic performance is used (Exhibit 4.3.1). The R-squared is 0.395 for the average residual regression, and 0.138 for the success rate regression. This means that resources and student characteristics do not do a good job of explaining the performance of schools that are consistently beating the odds during a period of time longer than one year. It is possible that the factors that make schools successful are unobservable characteristics, or are not captured by current statewide databases. For example, indicators associated with school leadership, teachers' planning time, and teacher and principal turnover are not uniformly available to conduct a comprehensive analysis for all schools in the state.

Exhibit 4.3.2. Expanded OLS Regression of Average School-Level Academic Achievement

	Average Residual	Success Rate
Ln (Teachers per student)	0.873 (0.403)**	-0.016 (0.032)
Ln (Administrators per student)	1.484 (0.118)***	0.067 (0.009)***
Ln (Number of classified personnel)	0.857 (0.118)***	0.029 (0.009)***
Ln (Average years of experience – teachers)	1.665 (0.198)***	0.098 (0.016)***
Ln (Average years of experience – administrators)	-0.030 (0.080)	0.006 (0.006)
Ln (Average years of education – teachers)	6.070 (2.338)***	0.585 (0.186)***
Ln (Average years of education – administrators)	-2.723 (0.977)***	0.074 (0.078)
Ln (Percentage of teachers in probationary status)	0.784 (0.064)***	0.010 (0.005)**
Ln (Percentage of teachers with tenure)	0.329 (0.088)***	-0.039 (0.007)***
Ln (Percentage of students eligible for free or reduced price lunch)	-0.005 (0.064)	-0.009 (0.005)*
Ln (Percentage of English learners)	-0.415 (0.053)***	-0.025 (0.004)***
Ln (School size)	4.525 (0.092)***	0.153 (0.007)***
Constant	-26.139 (6.432)***	-2.54 (0.513)***
Observations	5,765	5,765
R-squared	0.395	0.138

* Significant at 10%, ** significant at 5%, *** significant at 1% (p-values in parentheses).

Academic Achievement and Resource Allocation

In Section I of this chapter we analyzed various resource measures of BTO, low-performing, and other public schools. The results did not show substantial differences between BTO, LP, and the rest of public schools. The schools have similar levels of personnel (i.e., FTEs of teachers, administrators, and pupil support), and BTO schools' teachers have similar experience and education levels to teachers in other public schools. In addition, differences in teacher pupil ratios are very small. However, it was shown that LP schools have teachers with less experience in education, and with lower levels of educational attainment compared to other public schools.

Furthermore, in the previous section we showed that there seems to be a relationship between some measures of resources and student characteristics and academic outcomes (Exhibit 4.3.1 and Exhibit 4.3.2). In this section we study the extent to which resource differences may explain differences in academic achievement among. Using the OLS regression coefficients displayed in Exhibit 4.3.1, we estimate how certain levels of resources and student characteristics explain differences in the academic performance level of BTO, LP, and other public schools. These exercises use only one year of academic outcome measure (standardized CST ELA and math results for 2005). This is estimated in the following way:

$$Effect\ on\ Achievement = [\ln(Avg.Input_{BTO}) - \ln(Avg.Input_{Other})] * OLS_{Coefficient}$$

where *Avg.Input* is measured by the average years of teacher education, teaching experience, and class size.

Exhibit 4.3.3 shows the average years of teacher education, teaching experience, and class size at BTO and other public schools (i.e., not including LP schools). These differences in average inputs can be used to generate an effect on achievement (or achievement gap) between these schools. This is contrasted with the actual gap in CST mathematics scores that exists between these two groups of schools.

Exhibit 4.3.3. Explained Difference in CST Mathematics Scores between BTO and Other Public Schools (2004-05)

		BTO Schools	**Other Public Schools** (Excluding LP Schools)	**Effect on Student Achievement CST Mathematics** (In Standard Deviations)
		1	**2**	**3**
A	Average Years of Teacher Education	17.2	17.3	-0.003
B	Average Years of Teaching Experience	12.6	12.9	-0.007
C	Average Class Size - Grades 4 – 5	29.3	30.4	0.005
D	Total Effect on Achievement due to Resources (A3 + B3 + C3)			-0.005
E	Poverty Level	0.6	0.5	-0.065
F	Percent English Learners	0.3	0.3	-0.004
G	Difference due to Demographics (E3 + F3)			-0.069
H	Total Predicted Difference (D3 + G3)			-0.073
				Observed Difference in Student Achievement
I	Average Standardized CST Math Score	1.05	0.04	1.01
J	Achievement Difference Explained by Resources (D3/I3)			0%
K	Achievement Difference Explained by Demographics (G3/I3)			0%

These results suggests that our ability to explain the difference in average mathematics achievement between BTO and the rest of public schools in California through differences in teaching experience, educational level, and class size is extremely limited (cell D3). For CST mathematics, the total estimated effect is 0.005 standard deviations in *favor* of other public schools. That is, the differences in resources between these two sets of schools actually predict a higher average test score for other public schools instead of BTO schools. When we also take

into consideration differences in student characteristics, the total estimated effect increases to 0.073 standard deviations (cell H3). This prediction is in sharp contrast with reality, given that BTO institutions actually outperform other public schools by more than a full standard deviation (cell I3). Given this disparity, the percentage of the academic difference or gap that exists between BTO and other public schools (i.e., 1.05 – 0.04 = 1.01) that is explained by differences in resources and by differences in the demographic characteristic of these two sets of schools is zero (cells J3 and K3).

Similar results were obtained when we used the CST English language arts as a measure of academic achievement. Differences in resources are able to explain a very small portion of the academic performance difference between BTO and other public schools. In addition, differences in student characteristics explain none of the higher academic level; in fact, the student characteristics of these schools predict a lower academic achievement level in these schools relative to the other public schools.
Next, we analyze how resources and student characteristics explain the low academic performance level of LP schools.

Exhibit 4.3.4 presents the same exercise for low-performing (LP) schools. Differences in resources account for a small portion, 5.1 percent (cell J3) of the 1.16 standard deviation (cell I3) difference in math achievement between students in LP and all other public schools. Student characteristics, however, explain a much larger proportion of the achievement gap in this case, at 25.8 percent (cell K3). When we combine what we are able to explain through differences in resources and student characteristics, our ability to explain the achievement gap between LP and other public schools increases to 30.9 (5.1 + 25.8) percent.

Exhibit 4.3.4. Explained Difference in CST Math Scores between LP and Other Public Schools (2004-05)

		LP Schools	**Other Public Schools** (Excluding BTO Schools)	**Effect on Student Achievement CST Math** (In Standard Deviations)
		1	**2**	**3**
A	Average Years of Teacher Education	17.09	17.27	-0.013
B	Average Years of Teaching Experience	10.71	12.92	-0.049
C	Average Class Size - Grades 4 – 5	29.76	30.43	0.003
D	Difference due to Resources (A3 + B3 + C3)			-0.059
E	Poverty	0.77	0.51	-0.285
F	Percent English Learners	0.39	0.25	-0.014
G	Difference due to Demographics (E3 + F3)			-0.299
H	Total Predicted Difference (D3 + G3)			-0.358
				Observed Difference in Student Achievement
I	Average Standardized CST Math Score	-1.12	0.04	-1.16
J	Achievement Difference Explained by Resources (D3/I3)			5.1%
K	Achievement Difference Explained by Demographics (G3/I3)			25.8%

When ELA results are used as a measure of academic outcome, similar results are obtained. About 6 percent of the academic difference between the two school types is explained by resources and about 30 percent is explained by the variations in student demographics. Thus, for these schools, at least some of the observed outcome disparity appears related to variables such as general teacher characteristics such as education and experience. For BTO schools, however, these variables appear virtually unrelated to these schools unusually high academic achievement levels. For these schools, our ability to predict their unusually high performance through this type of approach is very limited.

In the next chapter we present results gathered through telephone interviews for a sample of BTO and LP schools. These provide added insight in regard to factors that are not easily and uniformly measured. Before turning our attention to the results of our telephone interviews, however, the next section provides an analysis of efficiency of BTO and LP schools.

Addressing the Efficiency Question

A common criticism of exercises that try to link resources to student outcomes is that they generally do not address *efficiency*. As Hanushek (2005) states, "The existing analyses never consider the minimum cost, or efficient level of spending, needed to achieve the desired outcome." Above, we have provided estimates of average per pupil expenditure for BTO and LP schools in California. But what do they mean? Do they mean that any school with certain student demographics will reach the performance of BTO schools if their level of spending is similar to these schools? The evidence provided by LP schools suggests otherwise, that education spending is not sufficient or provides no guarantee of academic success. This finding may be at least partially explained by inefficient use of resources at these schools. In other words, is there room for improving student achievement without increasing expenditure? Or is there room to reduce expenditure maintaining student achievement intact? How much room for improvement do BTO and LP schools appear to have?

In this section we focus on this last question, and in particular we analyze whether BTO and LP schools appear to be efficient in regard to the resources spent on teacher salaries. In order to answer this question we have to consider both the implications of the estimated production function (Exhibit 4.3.1), as we did in the previous section, and the relative costs of the different inputs. Taking into account the relative marginal productivity of resources, as well as their relative costs, provides a basis for analyzing the efficiency of these schools.

The research question we try to answer here is whether there is any evidence that BTO schools use their teacher resources in a more *efficient* way than LP schools. In particular, we concentrate on the optimal ratio between teacher experience and education. It is worthy to note that this question is relevant to the extent that schools/districts have freedom to choose a preferred mix of teacher experience and teacher education.

The first order conditions of $\overline{\exp}$ and $\overline{edu}$ of the model detailed in Chapter 3, Section III-C, are the following:

$$\frac{\partial \ln(L)}{\partial \overline{\exp}} = \frac{\beta}{\overline{\exp}} - \lambda(\theta_2\ tear) = 0 \tag{6}$$

$$\frac{\partial \ln(L)}{\partial \overline{edu}} = \frac{\alpha}{\overline{edu}} - \lambda(\theta_1 tear) = 0 \tag{7}$$

Therefore, the optimal ratio of teacher experience to teacher education is equal to:

$$(\frac{\overline{\exp}}{\overline{edu}})^{Eq.} = \frac{\beta}{\alpha}\frac{\theta_1}{\theta_2} \quad (8)$$

It is important to state an important limitation of this model. This optimum level is a *partial* equilibrium and is not able to take general equilibrium effects into account. In other words, the model requires that each school represent only a small portion of the total pool of schools. This means that in our analysis only BTO and LP schools are analyzed. To understand this limitation, consider an analysis of the current and optimum usage of resources for all public schools in the state. If we learned that all of these schools were operating at a non-optimal point, how could all public schools in California hire more or less experienced teachers given that we know that the amount of teaching experience is relatively fixed within the state, at least in the short to medium term?

Now, in order to estimate how close BTO and LP schools are operating in regard to this optimum ratio of teacher education and teaching experience, we must estimate the wage equation presented in Chapter 3 (Equation 5).

As detailed in the methodological chapter, we used data from the Standardized Account Code Structure (SACS) and the Charter School Alternative Form Database of 2004-05 to estimate the wage equation. One challenge of this analysis is that it combines district- and school-level information. In order to estimate Equation (5) it is necessary to first divide each district's total expenditure on teacher salaries by the number of schools (including those charter schools using SACS) operating in each district. This gives us an estimate of teacher salary expenditure at the school level. The same procedure is used to get an estimated average of total number of years of teacher education and teaching experience for these schools.[22]

The wage equation that we estimate in this section is presented below. Note that we have centered the variable of years of education around 16 in order to get a constant that is easier to interpret.

$$\overline{W} = \theta_0 + \theta_1(\overline{edu} - 16) + \theta_2\overline{\exp} + \theta_3 rwi$$

Exhibit 4.3.5 shows the results of estimating the wage equation by weighted least squares. The weight is given by the number of schools operating in each district.[23] We have also included a relative wage index (*rwi*) in order to take geographic and urban-rural wage differences into account (the same that was used to costing out BTO and LP schools).

[22] Note that from CBEDS we can obtain actual (not average) figures of total number of years of teacher education and teaching experience for these schools. But given that the dependent variable—average expenditure in teacher salaries—does not vary within districts, this within-district variation of teacher education and teaching experience of schools reporting in SACS is not relevant for this wage regression.

[23] In the case of charter schools using the Alternative Form their weight is equal to one.

The weighted least squares results indicate that each additional year of average teacher education increases the average wage by about $3,574. In contrast, one additional year of average teaching experience increases the average wage by about $771.

Exhibit 4.3.5. Weighted Least Squares Regression of Average School-Level Teacher Wage

	School-Level Average Teacher Salary
Average years of teacher education[(a)]	3,574 (0.007)***
Average years of teaching experience	771 (0.000)***
Relative wage index	30,548 (0.000)***
Constant	21,489 (0.000)***
Observations	1,229
Population size	9,224
R-squared	0.10

(a) Average educational level is centered at 16 years.

Combining the empirical estimates of the production function and wage equation, and the theoretical optimum ratio of teacher education versus teaching experience, we can now address the efficiency issue.

Exhibit 4.3.6 presents the *isoquant* of BTO schools for CST math. This line shows how the average 2004-05 academic achievement of BTO schools in math could be maintained using different combinations of teaching experience and education. This isoquant is drawn using the average class size observed in grades 4 and 5, as well as the average level of poverty and percentage of English learners served by these schools. In addition, BTO schools have an average teacher experience of 12.59 years and an average education of 17.23 years.[24] This means that the ratio at which they are using these two resources is equal to 0.73 (12.59/17.23) units of teaching experience per unit of teacher education.

Equation (8) states that the optimum ratio is equal to:

$$\left(\frac{\exp}{edu}\right)^{Eq.} = \frac{\beta}{\alpha}\frac{\theta_1}{\theta_2} = \frac{0.26}{1.287} \times \frac{3{,}574}{771} = 0.94$$

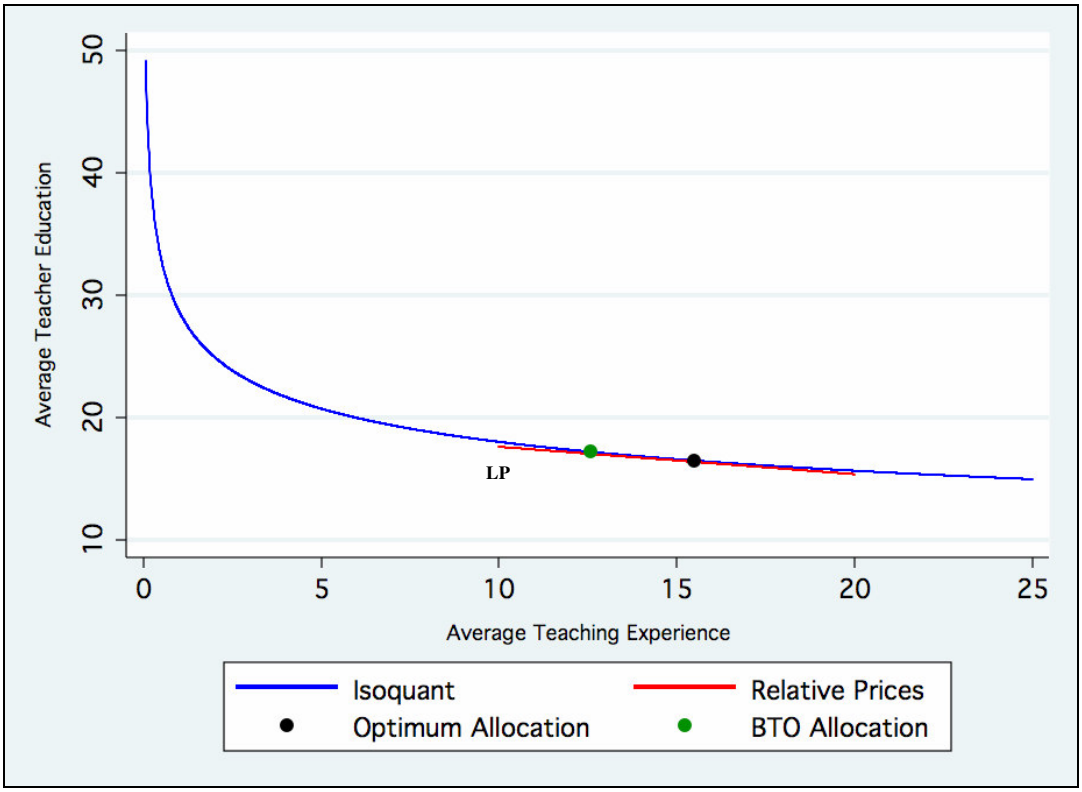
A ratio smaller than 1 means that even though each additional year of teacher education has a higher cost (i.e., has a larger effect on teacher wages) than an additional year of teaching experience, its greater impact on academic achievement more than offsets this differential cost. In other words, it is *optimal* to invest slightly more in education than experience.

Exhibit 4.3.6 presents the actual ratio for BTO schools, the optimum ratio, and where LP schools are in this mix of teaching experience and teacher education. As observed, BTO schools use a

[24] Overall averages for BTO and LP schools (i.e., for elementary, middle and high schools combined) are presented in Appendix 4.

lower ratio of years of teaching experience to years of teacher education than what would be optimum at the current relative prices. As shown, relative prices of these inputs are tangent to the isoquant at the point represented by 15.13 average years of teaching experience and 16.09 average years of teacher education. This mix of teacher education and experience is the one that minimizes the costs of these two inputs while maintaining exactly the same academic achievement level reached by the current usage of inputs (i.e., 12.59 and 17.23).

Exhibit 4.3.6. Isoquant of BTO Schools and Optimum Levels of Teacher Education and Teacher Experience.



We have observed that BTO and LP schools are not operating at the optimum level that is predicted by our model, however, BTO schools are much closer to the optimum when compared with LP schools. We can now analyze the impact on monetary resources if BTO and LP schools were to move to the optimum level.

Exhibit 4.3.7 shows the results of this exercise for BTO schools. At a marginal cost of $3,574 for each year of teacher education and $771 for each year of teaching experience (wage equation results), the current mix of these two resources has a monetary cost of $71,325 per FTE. If BTO schools used the optimum ratio of teaching experience to teacher education, they would face a monetary cost of $69,216 per FTE. The potential gain in efficiency is $2,108 per FTE.

Exhibit 4.3.7. Potential Efficiency Gains for BTO Schools

	Average Years of Teacher Education	Average Years of Teaching Experience	Monetary Cost of Inputs
BTO schools	17.23	12.59	$71,287
Optimum	16.09	15.13	$69,171
Potential efficiency gain per FTE			$2,116

Even though this amount may seem relatively low, it becomes more significant when we take into account the average number of teachers employed by these schools. The average number of FTE in teaching assignments in BTO schools is 54, which means that, on average, a BTO school can save $114,265 a year by hiring a teacher work force with slightly more experience and a slightly lower education level, while maintaining the same level of academic achievement.

Exhibit 4.3.8 shows the results of this same exercise for LP schools. It shows that the potential gains from moving to an optimum resource allocation are much larger for LP schools. In other words, these findings imply that LP schools are substantially less efficient than BTO schools. Their current mix of teacher education and teaching experience has a monetary cost of $69,337. If these schools were able to employ more experienced but less educated teachers, these findings suggest that they would be able to maintain their current average academic achievement while saving $10,264 per FTE. Since the average number of teachers per LP school is around 50, this would translate into an annual efficiency gain of $513,201 per school.

Exhibit 4.3.8. Potential Efficiency Gains for LP Schools

	Average Years of Teacher Education	Average Years of Teaching Experience	Monetary Cost of Inputs
LP schools	17.09	10.71	$69,337
Optimum	13.75	12.88	$59,073
Potential efficiency gain per FTE			$10,264

Summary

We have found that the actual levels of teacher education and teacher experience in BTO schools are closer to the optimum predicted by the model, or in other words, BTO schools appear to be operating at a more *efficient* level than LP schools in regard to their teacher characteristics. In addition, these findings suggest that if BTO and LP schools were to move to the optimum level predicted from the model, they could gain in efficiency that would translate in monetary savings. Also, LP schools show a much higher potential gain in efficiency if they were to move closer to the optimum ratio of teacher experience to teacher education. It is important to keep in mind that in the case of LP schools this would result in a gain in efficiency, but not in an improvement of their academic performance level.

Chapter V. Evidence from the Field

Introduction

This chapter focuses on the results of the telephone interviews conducted with BTO schools and comparison schools. In particular, it details what has enabled BTO schools to consistently produce substantially higher educational outcomes than other schools like them. The analyses presented in Chapter 4 suggest that the answer is not more resources. In the aggregate, the resources available to these schools appear similar to those of their lower-performing counterparts. Perhaps their mix of resources and how they use them is important to their success.

Knowing that BTO schools do not appear to have more resources than other schools seems an important finding. Still, it begs the question of what does make a difference in BTO schools. Statewide data do not provide sufficient depth to provide much insight into one of the primary research questions for this study: What resource allocation patterns, instructional practices, programmatic leadership, or professional development opportunities are observed or reported by schools as being related to their academic success?

In an attempt to dig deeper into the factors that seem to have made a difference for BTO schools, we conducted phone interviews with 18 BTO principals. As points of comparison, we also asked similar questions of principals from five "comparison" schools, or in other words, schools that were doing much worse than would be expected given the student populations they serve. As we heard certain factors stressed by BTO principals, it was interesting to note the extent to which we heard low-performing principals espouse similar strategies or factors for success.

Furthermore, it seems clear that at least among these schools, there is not a single key to academic success. It is not even clear that there is a single combination of factors, or a single recipe. In many ways, the combination of factors said to be major contributors to the success of the BTO schools seemed unique to each school. On the other hand, some factors were mentioned frequently enough to emerge as themes. Some of the factors cited by the BTO schools were also mentioned by the comparison schools interviewed. A comparison school's principal citing the same factor that a BTO principal cites does not mean the factor is not valid. The fact that both high- and low-performing principals acknowledge the importance of a certain element (e.g., control over teacher hiring and retention) may simply underline the importance of this component and the fact that perhaps only some principals have the ability to actually do it.

In short, what we have found is that the answer to success across the BTO schools included in this study is complex. It is not simply more resources or the application of a certain recipe in regard to resource allocation practices. Although we did not find the answer to school success through these interviews, we were able to discern a constellation of factors cited as leading to success among the BTO schools. What we found in this analysis is not new. Our findings are similar in many ways to those of other research into the differences between relatively successful and unsuccessful schools serving comparable student populations.

Findings from the School Interviews

As detailed in Chapter 2, research on effective practices has found that successful schools share a common set of characteristics. This chapter builds on existing research that has examined the effects of some of these components on student learning (Purkey and Smith, 1983; Levine and Lezotte, 1990; O'Day, Goertz, and Floden, 1995; Newmann and Wehlage, 1995; Mohrman and Lawler, 1996; Williams, Kirst, & Haertel, 2005; Oberman et al., 2005; Parrish, Merickel, Pérez, Linquanti, Socías, Spain et al., 2006). We end this section by exploring the challenges that schools faced in their efforts to improve their students' education, as well as their perceptions in regard to the need for additional funding to achieve California's academic goals.

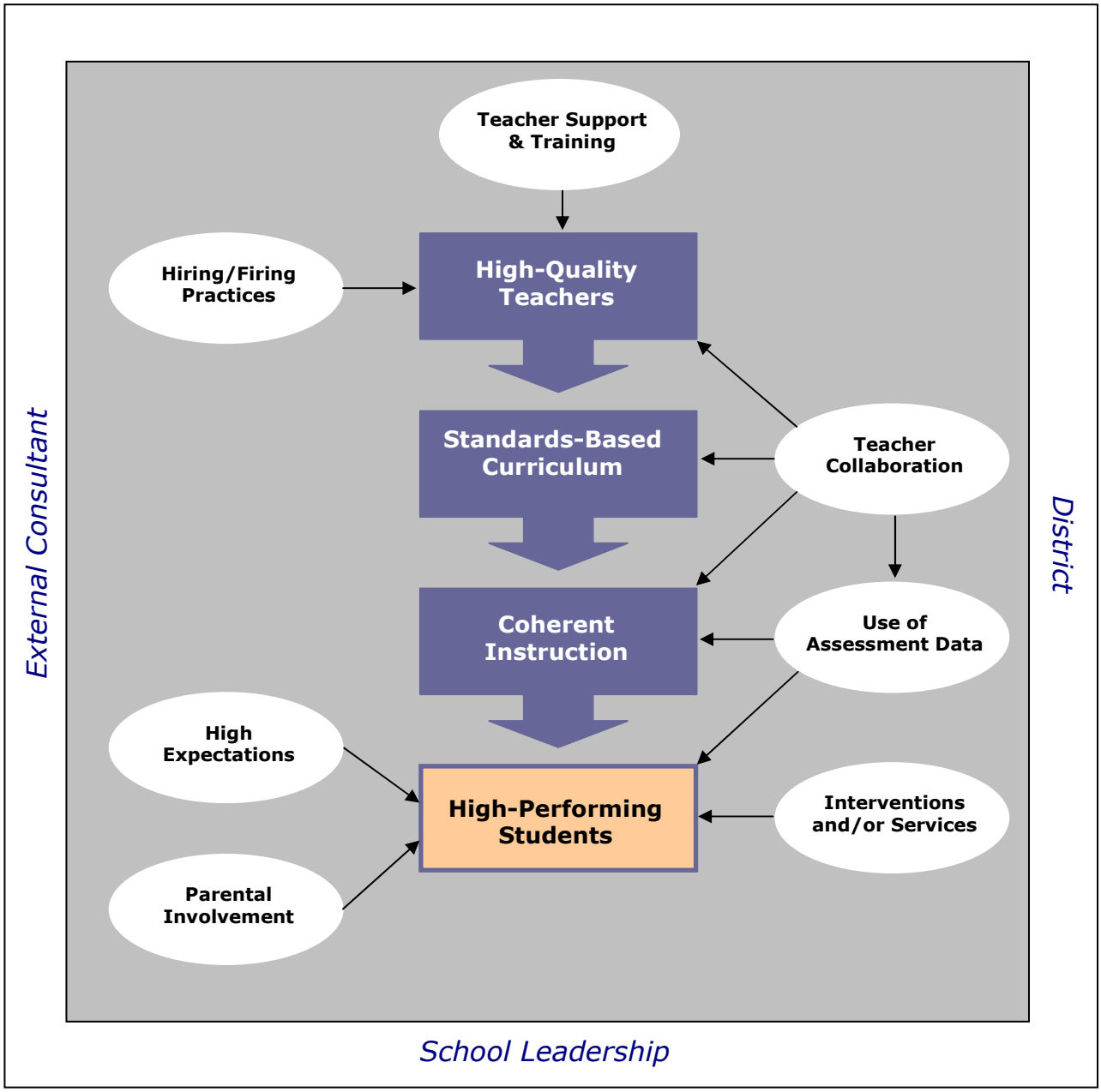
A theoretical framework of the strategies for school success from the school interviews is shown below. The framework also depicts how these components relate to each other. Because we wanted to provide these schools with as much latitude as possible to discuss factors contributing to their unusually high test scores, questions were asked in an open-ended manner. Given this, we gathered the information that the principals chose to tell us, instead of a complete list of all the components inherent to their success. Just because a principal failed to mention an element, we cannot conclude that this element was not important at the school. At the same time, the open-ended structure of this approach allowed them to focus on what they felt was most important. After presenting the theoretical framework, we discuss each component of the framework through concrete examples of how schools implement them, and discuss factors influencing their implementation.

Theoretical Framework

Cohen and Ball (1999) described the complexities of school capacity, mentioning that capacity is "a function of the interaction among [teachers, students, and educational materials]" and not a function of merely one factor such as teachers' skill or curriculum. In order to understand instructional capacity, it is important to view the organization and environment in which these factors exist.

Exhibit 5.1 displays a theoretical framework that helps us understand the relationship between ten different factors that contribute to educational success, as well as the role school and district leaders and external consultants have in influencing school performance. This framework was developed from the strategies for success that were described by the principals of 18 BTO schools, using interviews from principals at 5 low-performing schools as points of comparison.

Exhibit 5.1 Theoretical Framework



As shown in the theoretical framework diagram, the major factors identified by the respondents for this study were:

1) Existence of high-quality teachers and staff;
2) Implementation of a standards-based curriculum; and/or
3) Coherent instruction.

The existence of high-quality teachers and staff in the schools is the result of many confounding factors. For example, the support that teachers receive and the control over who is teaching at the schools seem to be critical features that would lead to high-quality teachers. Nine of the principals from the BTO schools indicated that high-quality teachers were the driving force behind the school's success, often placing emphasis on providing their teachers with the training and support needed to be successful. Most of these schools reported that they had a high or moderate degree of control over the hiring of teachers, and all of them indicated that they are highly effective in removing teachers and staff that are not meeting expectations.

Implementation of a particular curriculum and/or instructional technique was the primary driving force cited by four of the principals from the BTO schools, and cited among most of the interviewed schools as a contributing factor for success. These schools tended to focus on effective implementation of their curriculum with curriculum guides, data-driven decisions regarding instruction, and programs and/or interventions that complemented the core curriculum. Most of these schools also mentioned high-quality teachers as an important component of their strategy.

Coherent instruction was cited by five of the BTO school's principals as the most important driving force for success. However, most of the successful schools cited coherent instruction as part of their overall plan for academic accomplishment. Some of these schools place emphasis in having a pacing plan that helps teachers know what they should be teaching. Other principals mentioned that teacher collaboration as well as the implementation of a particular curriculum has helped to strength the instructional coherence at their school.

An important contribution of the theoretical framework is its representation of how all the components relate to one another and ultimately contribute to high academic achievement. In the following sections we will elaborate on the different components of the theoretical framework through specific examples that were mentioned by the principals. We will first provide examples and a detailed description of the three major factors for success: 1) high-quality teachers, 2) standards-based curriculum, and 3) coherent instruction. We will then describe the critical roles that the other components of the framework (the white ovals in the exhibit) played in ensuring the school's success. We will also provide a description of the roles played by the district, school leadership, and external consultants at these schools. The chapter finishes with a presentation of the challenges these schools face and a discussion of whether more resources are needed to reach an API score of 800 by 2013.

Major Factors for Success

There is a close relationship between the three major factors: high-quality teachers, the curriculum, and instruction. High-quality teachers are responsible for delivering the content of the curriculum to their classroom. They are held accountable for ensuring that the students understand the main content areas that are covered in the curriculum. In turn, the curriculum is used to inform the instruction. Finally, the instruction is the way in which the curriculum is delivered to the students. These three components all contribute toward high student performance.

High-Quality Teachers

When asked about the primary strategy for their school's success, nine high-performing principals indicated that having high-quality teachers was the driving force behind their school's success. The other nine BTO schools' principals also emphasized the importance of teacher quality to their school's success. There are many different dimensions in which one can measure the quality of teachers, each of which will be discussed in more detail below.

Experience, Qualifications, and Education of Staff

For the most part, interviewed principals did not emphasize the experience or education of their staff. However, the principal of Pheasant Elementary School[25] did mentioned that she tries to hire new teachers that are trained at a program run through the nearby university because the program has produced high-quality teachers in the past. Other interviewed schools appeared to benefit when well-trained teachers remained at the school for long periods of time. Puffin, Crow and Swan Elementary Schools all indicated that the longevity of their staff (both teachers and instructional coaches) was critical to their school's success.

Dedicated and Collegial Teachers with High Morale

The principal of Cardinal Elementary praised her teachers by saying, "I have teachers with heart. They go above and beyond the teaching. They make the school a priority and have a vision of the future." There are many ways in which teachers were said to demonstrate their dedication to the school and to the students. For example, teachers at Dove Elementary put in extra time outside of school to working on and developing their lessons. On their own initiative, teachers at Kingfisher Elementary sought out new instructional strategies via college courses, books and the internet in order to train themselves to be better teachers. As another example, the principal of Hawk Elementary said, "Our teachers are very committed and very passionate about these kids. We learn what is going on in the family and don't just look at the child as a student that is here for a few hours; we look at the whole child. If the teacher finds that something is going on at home, they are on top of it."

High Expectations of Teachers

A number of the interviewed principals said they encourage the dedication and effectiveness of their teaching staff by having high expectations for them and making sure that these expectations are known. One principal said she shows the teaching candidate a list of expectations at the beginning of the interview and does not continue the interview if the candidate does not agree to meet all those expectations. The principal of Egret high remarks, "Teachers have to believe and

[25] All of the school names in this chapter have been changed.

breathe the school's expectations. At Hawk Elementary, the expectations for new teachers are set by the veteran teachers, who make it a point to enforce those expectations." According to the principal, "If a teacher is not committed, the other teachers would do something about it. They would run that teacher out of the building!"

Strong Leaders among Teaching Staff

Some of the principals said they have teachers who take on strong leadership roles. "I want [the teachers] to make decisions on things that directly affect them. I just facilitate." The most common way in which schools allow teachers to participate in the decision-making process is through a leadership team. At Toucan Middle School, a BTO school, the leadership team goes to the district once a month and brings what it learns back to the staff. At Owl Middle School, a comparison school, the leadership team works with the school site council to make formal decisions regarding the school. In all of these cases, the leadership team is intended to cultivate leaders among the teaching staff who will participate in the decision-making processes of the school.

Standards-Based Curriculum

Since the state's adoption of academic content standards in 1998, schools have increased their focus on implementing a standards-based curriculum. In 2002, the state transitioned to a standards-based assessment system, creating even more incentives for schools to align their curriculum to the standards.

Every school that mentioned the specific curriculum they use reported using either the Houghton Mifflin or Open Court curriculum, which are both based on the California state standards. Often the district will choose which curriculum the schools will use, or give the schools a choice between two different curricula. Several principals mentioned that they are happy to use either of these curricula because they focus on the same standards they are held accountable for during testing. Only one principal expressed mixed feelings: "I welcome the standards and they've done a great deal to help us work at a higher level. They've also hindered me because the district wants everybody to work at the grade level, so teachers are hesitant to work above grade level." Below we will provide more details regarding how the specific curriculum interacts with other factors to ensure high performance at the school.

Coherent Instruction

Instructional approaches among these BTO schools appeared to differ in terms of how much time teachers spent on each subject, the extent to which teachers focused on the standards, and how teachers addressed the different needs of the students in the classroom. Below we discuss these different dimensions of classroom instruction.

Instruction Tied to Goals, Standards and Curricula

An important component of instructional coherence is having a schoolwide vision or set of common goals related to instruction (O'Day & Bitter, 2003). The most common schoolwide vision with respect to instruction that was reported during the interviews was a focus on the California state standards. Williams, Kirst, & Haertel (2005) found that the existence of coherent, standards-based instruction was a distinguishing characteristic between high and low-performing elementary schools in California. An example of a school that has a schoolwide

focus on standards based instruction is Dove Elementary, a BTO school, whose principal commented, "The teachers are taught that the standards are their bible, and they must teach their students the standards because that's what they are going to be tested on and that's what they are accountable for."

Consistency within Grade

One method of ensuring consistency between same-grade classrooms is by having a pacing plan that helps the teachers know what they should be teaching on any given day. The principal of Pheasant Elementary, a BTO school, commented, "Every teacher follows a pacing plan so that everyone is on the same page. This way nobody goofs off. Before it was 'la la' land, but now instruction is much more structured." The principals of several other schools agreed that having all the teachers on the same page helps ensure that teachers cover all the standards during the school year.

Freedom for Teachers to Try New Ideas within the System

There are some schools that do not insist on having all the teachers deliver the same instruction in each grade-level classroom but still achieve good results. The principal of Sparrow Elementary, a BTO elementary school, allows his teams a lot of flexibility to deliver the instruction in the way they see most appropriate, as long as they deliver high results. The principal explained, "When I say I give the teachers a lot of freedom, I mean that I am not a policeman. I don't go in and get on their case about what they are doing. I am more concerned about the effectiveness of what they are doing. I don't require lesson plans from my teachers, for example." Similarly, the principal of Hawk Elementary says that she gives the teachers the freedom to teach how they want, as long as they cover the state standards.

Differentiating Instruction Based on Student Performance

One challenge to school success mentioned by several principals was the diverse needs of the students in the school and the ability of the teachers to meet those needs. An underlying implication of this challenge is that teachers need to be able to differentiate instruction based on the needs of their students. The principal of Raven Elementary School commented that the school's teachers spent a lot of time looking at assessment data so that they could differentiate the instruction based on what the students knew. According to him, "differentiation of instruction is the only key." Furthermore, the principal of Toucan Middle School (a BTO school) mentioned that differentiating the instruction was the next direction they wanted to take their school in order to try to reach an API of 800.

Other Factors for Success

As shown in the theoretical framework diagram, at the top is *teacher support and training*, which refers to any professional development opportunities or support that increase teacher capacity. Another component that is critical to ensuring high-quality teachers is the *hiring and firing practices* of the school. Control over hiring ensures that the new teachers have the training and skill set necessary to meet the expectations of the school. Effectiveness in removing teachers gives principals the ability to replace teachers that are consistently unable to meet expectations. The combination of hiring well-trained new teachers and removing ineffective teachers contributes to a high-quality teaching staff. Finally, *teacher collaboration* time is used to

improve the quality of teachers by allowing them to discuss the curriculum, plan out their instructional strategies, and be aligned in their instructional practices and vision for the school. Teacher collaboration time also serves as a forum for teachers to look at assessment data together. *Assessment data* is used to inform instruction because it allows teachers to identify areas in which students are still struggling and areas which the students have mastered. The data can also be used to identify which students need additional help or to group students in their classes.

The three other components of the framework are all related directly to the students. *Interventions and/or student services* can either be additional help to students that are struggling or services that are intended to improve achievement. *Parental involvement* includes students receiving extra encouragement from home and parents being informed about the education of their students. Finally, *high expectations* mean that students are encouraged to challenge themselves academically and feel confident in their ability to perform at a high level.

Teacher Support and Training

Of the complex factors contributing to the individual and organizational aspects of instructional capacity, Cohen and Ball (1999) suggest that opportunities for professional and organizational learning are among the most crucial. In these interviews, several forms of professional development were emphasized, ranging from conferences and workshops to the use of instructional coaches and principal and peer classroom observations.

Training for Teachers that Is Linked to the Standards, Curriculum, Instructional Strategies, and Data Use

Almost all of the BTO schools mentioned providing training for teachers on a wide range of topics, including the California state standards, a specific curriculum package, effective instructional strategies, using assessment data for instruction, and other non-instructional issues. These types of training opportunities have been linked with academic success in several studies (Oberman et al., 2005; Bitter, Pérez, Parrish, González, Socías, Salzfass, et al., 2005); however, a study by Williams, Kirst, & Haertel (2005) found that the provision of professional development opportunities, although positively correlated with academic success, was not statistically significant.

Specific examples of professional development opportunities that were mentioned by BTO schools were training in Guided Language Acquisition Development (GLAD) to learn strategies for vocabulary development and grammar for ELs, sending teachers to the AVID (Advancement Via Individual Determination) institute to learn how to implement the AVID program in their school, training in Ruby Paine's work on understanding poverty, quantum learning (which looks at how students learn), and training in instructional strategies for the Open Court curriculum. Furthermore, many schools received state funds through Assembly Bill 466 to provide training in reading and math to teachers, paraprofessionals, and instructional aides.[26]

These professional development opportunities can be provided either in house, through the district, or through an external organization. Schools such as Crow Elementary determine the

[26] The text of Assembly Bill 466 can be found at http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_0451-0500/ab_466_bill_20011011_chaptered.html

type of professional development that the teachers would benefit from through a professional development team. This team meets once a week and consists of the literacy and math coaches, bilingual advisor, principal, assistant principal, and SB 65 coordinator. This principal emphasized the importance of offering professional development opportunities that "really make sense and the teachers will buy into. [It is also extremely important that] teachers have the chance to use it, not just as a one time shot, but really having a lot of consistency and continuously going back to it over the year."

Instructional Coaches

Instructional coaches were said to help teachers in a myriad of ways, such as teaching them instructional strategies for the classroom and how to use assessment data, taking over a teacher's classroom so that the teacher can observe other classrooms, and giving demonstration lessons for the teachers. The most common type of instructional coaches that were mentioned by schools are literacy and math coaches, although one school mentioned have a science coach as well. These coaches are often provided by the district and have been observed in high-performing schools in several research studies (Oberman et al., 2005).

The instructional coaches can also play important leadership roles in the school. The principal of Crow Elementary School remarked, "I have to attribute part of the [school's] success to the leadership of the coaches, who have been here for four years. That has been great for consistency."

Classroom Visits

One strategy observed in high achieving high schools by Oberman et al. (2005) was that the principal would visit the classrooms on a regular basis to monitor the progress of the students and increase accountability of the teachers. This practice was also mentioned by four of the interviewed principals. They mentioned many reasons for visiting the classrooms, including assuring that the students were engaged, supporting the teachers, identifying which students were having trouble, and monitoring whether the common curriculum was being implemented correctly. The principal of Albatross High School emphasized the importance of classroom visits for accountability by saying, "When I became principal, I told teachers that they were going to be visited, so they better get used to it. I want our superintendent in our school. I want teachers from the school that is half a block away to come to our school and see us as a model for what a successful school should look like. Congressmen, senators, I encourage everybody to come by and walk through our school. It makes teachers more accountable when they know that somebody is going to come visit them."

Peer Coaching and Mentoring

Peer coaching and mentoring allow teachers to learn from each other in either an informal or formal setting. Principals mentioned several different ways in which they organized peer coaching and mentoring. Crow Elementary School pairs struggling teachers with teachers that are effective in the areas that are troublesome for the struggling teacher. Other schools target new teachers for peer coaching and mentoring. For example, Dove Elementary uses the Beginning Teacher Support (BTS) system, in which each new teacher is assigned to an experienced teacher, with whom they meet periodically throughout the year. They have criteria that they have to meet, and they do write-ups of how they are progressing on these criteria. The principal of Raven

Elementary commented, "Knowing there is someone out there who the new teacher can turn to in a moment of need is very important. Nobody feels isolated."

Peer Observations

Peer observations are an opportunity for teachers to observe the teaching practices of their colleagues in other classrooms. Some schools have peer observations on an "as needed" basis; for example, only struggling teachers may be asked to observe another teacher, or peer observations may only take place when they are introducing a new strategy. Other schools have regularly scheduled peer observations, such as Toucan Middle School, which has three days in which teachers have the opportunity to see what other teachers are doing in their classrooms. Another example is Albatross High School, which has a group of four or five teachers observe classrooms twice a year and are asked to observe something specific in each classroom (such as the environment of the classroom or instructional strategy). Furthermore, peer observations at Albatross High School are inter-disciplinary exercises in which teachers are expected to visit classrooms outside of their subject area. The principal of Albatross High school supports the system, saying, "We are trying to develop a system where teachers have more accountability to their peers, rather than a principal versus teacher type of thing."

Conferences and Workshops

Conferences and workshops are intended to provide teachers with a forum to come together and learn about issues relevant to the field of education. One principal mentioned sending teachers to conferences and writing workshops; however, the teachers must attend these on their own time. An alternative to sending the teachers to external conferences and workshops is to have staff presentations that are organized in a conference-like setting. Kingfisher Elementary, a BTO school, dedicates two days to having teachers with expertise in different areas present to their peers. The principal of Kingfisher Elementary remarks, "We bring in very few outside experts for professional development. Instead we use our own expertise."

Hiring and Firing Practices

Control over Hiring Staff

Schools with high degrees of control over the hiring process typically brought candidates to the school to be interviewed by the principal, the department chair, and a student. After these interviews, the principal would decide who to hire. Schools with less control over hiring included one that was able to choose its teachers at the beginning of the summer, but was forced to hire whoever the district had available based on credentials and seniority if an opening arose at the end of summer. Pelican Middle School, a comparison school, is told it they must hire by the district at any time of the year. One BTO school's principal said they face a similar challenge: "[Not having a choice in who I hire] affects my ability to change the culture of the school. So I feel that my hands are tied."

Effectiveness in Removing Teachers

The firing practices of a school are complicated by the restrictions on removing teachers. Given that very few schools have complete control over firing teachers, principals said they tended to focus on removing teachers that were clearly not meeting school expectations. The most common way these principals said they were able to remove teachers was by encouraging them to leave by themselves. The principal of Egret high, a BTO school, said, "We have certain

expectations for teachers that are not negotiable. If a teacher is not getting there, I do everything I can to make that teacher miserable. My rule is that if I would not put my child in that class, I would not put your child in that class. Parents entrust me to provide a good education." On the other end of the spectrum are schools that are not effective in firing because they have been unable to, or have made little attempt to, remove ineffective teachers. The principal at Falcon Elementary, a comparison school, said that at his school, "Bad teachers don't move on. I hope they leave." When another comparison school's principal was asked if there was high turnover in the teaching staff, she responded, "There's no turnover, and that is part of the problem!"

Most of the interviewed principals said that their first response is to try and help their struggling teachers to improve. The principals of Toucan Middle and Swan Elementary Schools mentioned having a peer assistance and review (PAR) program, which puts together a team of representatives from the district, the union and the school to come up with a plan for struggling teachers. "Our goal is not necessarily to remove the teacher, although we'll do that if it is necessary. The goal is to help the teacher get better."

Exhibit 5.2 categorizes the interviewed schools based on descriptions of their hiring and firing practices. All but three of the BTO schools' principals said they have a high or fairly high degree of control over hiring and firing. While two of the comparison schools also said they had a high or fairly high control over hiring or removing teachers, the other three comparison sites said they had a lower degree of control.

Exhibit 5.2. Hiring And Firing Practices In BTO And Comparison Schools

Degree of Control over Hiring	BTO Schools		Comparison Schools	
	Count	%	Count	%
High	4	22%	1	20%
Fairly high	11	61%	1	20%
Medium	3	17%	1	20%
Low	0	0%	1	20%
None	0	0%	1	20%
Total	18	100%	5	100%

Teacher Collaboration

Regularly Scheduled Collaboration Time

Almost every interviewed principal mentioned that they have collaboration time for teachers. These findings are consistent with Williams, Kirst, & Haertel (2005), who did not find that encouraging teacher collaboration was a distinguishing characteristic between schools with high and low student achievement.

Although nearly every school had regularly scheduled collaboration time, the variation was in how they spent the time. Some of the commonly mentioned activities were looking at assessment data, coming up with instructional strategies, designing lesson plans, identifying students that may need additional help, and receiving professional development. Often the instructional coaches attended the teacher meetings to help lead the discussion or provide professional development.

Use of Assessment Data

California public schools have engaged in numerous federal, state, district, and school-mandated assessments to monitor student progress. Data from these tests can be invaluable to schools by assessing the needs of students and pointing to areas for improvement (Neumann, 1996; Kannapel and Clements, 2005). Williams, Kirst, & Haertel (2005) found using assessment data to improve student achievement and instruction to be positively correlated with high performance. For some schools, the data drives their entire strategy for success. For example, the principal of Flamingo high (a BTO school) proudly said, "I'm known as the data principal. I look at the data. I know my data. And I act on my data. We tear the data apart."

Use of Several Assessment Measures

There are numerous different assessments that can be used by schools. Some schools use the assessments associated with Open Court and Houghton-Mifflin, which can be administered on a six-week or quarterly basis. In addition, some schools created their own assessments that aligned with state standards or used district-developed benchmark assessments. State assessments, including standardized tests such as the CST, CAT/6, CELDT, and APRENDA, were also mentioned as commonly used assessments. High schools also have the California High School Exit Exam (CAHSEE) when students are in the tenth grade, which can also be used to evaluate how students are performing. Most schools used a combination of these assessments to inform their instruction. For example, Albatross high, a BTO school, used a combination of the CST, CAHSEE, ABC (assessment of basic content standards) tests and other common assessments given throughout the year.

Tests Aligned With the Curricula and Standards

Almost all of the interviewed schools mentioned using the CST and/or CAT/6, which are standardized tests that are aligned with the California state standards. The next most commonly mentioned assessments were the tests that accompany the Open Court and Houghton-Mifflin, which are also completely aligned with these curricula. Schools that have their own school benchmarks also seem to make an effort to align the tests with the standards. Falcon Elementary, Toucan Middle and Jaeger High School all commented that the school benchmarks were based on the content areas and were designed to evaluate whether students were learning the California state standards.

Data Used to Monitor Student Performance, Inform Instruction, and Monitor Practice of Teachers

The use of assessment data to monitor student performance was reported in several different ways. The principal of Kingfisher Elementary, a BTO school, reported using the CST and demographic data to create a comprehensive picture of each student. According to him, "It's important to have the ability to collect and analyze data for each and ever child by name, so that we know exactly (in a prescriptive sense) what instruction each student needs." In addition, more frequently administered tests, such as the Open Court or Houghton-Mifflin tests or district benchmarks, were used to monitor student performance on a more regular basis. For example, Dove Elementary and Swan Elementary (both BTO schools) both mentioned that their teachers reviewed the assessment data every week during their teacher collaboration meetings to identify the areas in which students were struggling and excelling. At Toucan Middle School, a BTO school, the teachers and students reviewed the school benchmark results together. The principal

remarked, “It is really interesting to see the ownership of achievement passed from our teachers onto the students.”

In addition to monitoring the performance of the students, some schools use assessment data to inform instruction. Teachers at Swift Elementary School, a BTO school, used the results of the Open Court assessment, which is administered approximately every six weeks, to plan for the next unit of the curriculum and identify areas from the last unit that they needed to review. Data also reveal which instructional strategies are working better than others. For example, some principals reported asking teachers whose students had performed well on the assessments to share with the other teachers what they had been doing in the classroom.

Another common use of assessment data is to evaluate and monitor the effectiveness of teachers. “Using the data has given teachers the opportunity to look at something objective and take responsibility for both the success and the problems.” After identifying teachers who need help, the principal will work with them to understand why their students are performing at such a low level and what they can do to improve. However, there was clearly hesitancy on the part of some principals to single out teachers who had poor test score data. The principal of Falcon Elementary, a comparison school, says that the teachers would start screaming if he started singling out particular teachers, so instead he gave tips for improvement to all the teachers during the grade-level meetings, instead of identifying teachers having problems. The principal of Egret high described his attitude towards this issue by saying, “The data tells us how we are doing, where we are successful, where we are failing. It generates the opportunity to compare classrooms and promote teacher conversations. Data are not threatening. We don’t use data to beat up the teachers. We use data to improve.”

Assessment Data Frequently Reviewed

Schools vary in the frequency of the assessments they administer and how often they review them. Many schools mentioned assessing the students through school benchmarks or the curriculum tests approximately every four to six weeks. More frequent assessments were reported at schools such as Dove Elementary (a BTO school), which administered a mini-assessment for their students every week, with the teachers meeting on Wednesdays to review those results. An even more extreme case is Egret high (a BTO school), which assessed its students through tests and quizzes on a daily basis. On the other end of the spectrum is Owl Middle School (a comparison school), who only mentioned using the CST for assessment data, which is administered once a year.

Teachers Teaching the Same Course Giving the Same Tests

A study of best practices in high achieving high schools (Oberman et al., 2005) described advantages of having all the teachers of the same grade level of subject administer the same tests. Most of the principals interviewed in this study gave the impression that the assessments they used were uniformly administered in their school. For example, all schools that mentioned using the state standardized tests (such as the CST, CAT/6, APRENDA, and CELDT) or the assessments associated with the curriculum (such as Open Court of Houghton-Mifflin) administered these tests to all the classrooms. As a result, they were able to compare the performance of each classroom and student over time. Other schools, such as Toucan Middle and

Dove Elementary (both BTO schools), had developed school benchmarks or mini-assessments that were also administered in every classroom on a regular basis.

Consultant or Coach Helps Teachers Interpret Data

One common function of the instructional coaches is to help teachers understand how to use assessment data. Schools such as Swift Elementary and Parrot Elementary (both BTO schools) dedicate some time during teacher collaboration meetings to having the instructional coaches provide guidance to the teachers about what to focus on when looking at the data, and how to improve their instruction based on what they observe in the data. Instead of instructional coaches, Albatross high hired an outside consultant to teach teachers how to use the data the understand student achievement. According to the principal, this has really helped the teachers use the data to improve instruction and achievement.

Use of a User-Friendly Data Monitoring System

Data monitoring systems were observed in high-achieving high schools by Oberman et al. (2005) and were also mentioned by several of the principals interviewed for this study. Two schools mentioned using Edusoft, which allows them to break down their benchmark tests. In addition to Edusoft, Kingfisher Elementary also uses the Data Warehouse, which is provided by the county's department of education. These programs allow the teachers to bring together multiple sources of data. Toucan Middle, a BTO school, uses a different program called the Data Director, which was provided by the district and seems to perform a function similar to Edusoft. The last data monitoring program that was mentioned was Pulleyman, which is used by Albatross High to break down data for the teachers.

Intervention and/or Student Services

The Oberman et al. study of best practices (2005) found that successful schools focus on timely interventions for students that are struggling and need additional academic help. The following are short descriptions of different types of interventions and student services described by some of the principals for this study.

Tutoring Programs

The most commonly mentioned interventions are tutoring programs held outside of regular school hours. These programs can be taught by teachers at the school or by instructional aides who provide extra help to those students having difficulty understanding the material that is taught during the day. Pelican Middle School offers their tutoring program during lunchtime. They hire certified teachers (called clinicians) to come in and offer interventions during lunchtime for struggling students.

Similar to the after school tutoring programs are Saturday intervention classes, which were mentioned by two BTO schools. According to the principal of Swift Elementary, "Saturday intervention is more successful than after school because the teachers and the kids are really tired after school. If they are not performing during school, they are not going to do well after school."

Another option for tutoring programs outside of the regular school day is summer school or inter-session classes for schools on the year-round schedule. Pheasant Elementary has inter-

session intervention for struggling students, especially ELs. These classes are for 20 days and are four hours per day.

Targeted Educational Programs

Some BTO schools have implemented targeted educational programs such as AVID, GATE, Reading Recovery, Read 180 and Read Across America. Half of the high-performing high schools we interviewed had implemented AVID in their schools, which is a program that focuses on preparing students for college. The principal of Albatross high said, "We went to a week-long AVID seminar and decided to give the strategies to everybody." In addition to AVID, Albatross high also has a schoolwide writing program that occurs in every classroom in the school for two days of the year.

Reading Recovery, Read 180 and Read Across America are programs that focus on improving students' reading abilities. Puffin Elementary, a BTO school, has implemented Reading Recovery for the past 12 years. Swift Elementary, a BTO school, participates in Read Across America, which is a reading awareness program that encourages students to celebrate reading on a particular day of any given year.

Counseling or Other Student Services

Many students have issues outside of school that interfere with their ability to succeed academically. Accordingly, Swift Elementary School has four counselors that come to the school twice a week. The principal commented, "I believe in counseling because these kids come to school with so many issues. That's why they are not successful." Most schools have the counselors come in a few times per week, although it was mentioned by a few schools that having a part-time counselor was not sufficient. There are other programs as well that are designed to improve student behavior. Crow Elementary uses the "Motivation and Maintenance Dropout Prevention Program," which has a coordinator that calls the parents (and offers assistance if appropriate) if a student is not at school. Egret High uses "Capturing Children's Hearts," which is a toolbox for students to become self managing. The principal reported noticing a decrease in discipline problems and an increase in student achievement since implementing this program.

Parental Involvement

There has been extensive research dedicated to the effects of parental involvement in schools (Fullan, 1991; Levine & Lezotte, 1990; Purkey & Smith, 1983). The lack of parental involvement was a commonly mentioned challenge for schools, but research by Williams, Kirst, & Haertel (2005) did not find that involving and supporting parents was correlated with high student achievement. Nonetheless, some interviewed principals felt that parental involvement was key to the success of their students. The principal of Swift Elementary commented, "The kids that have parents who support school are the ones that are going to do well."

Existence of Activities to Engage Parents and Families

Most schools hold events, such as parent-teacher conferences, open house, parent night and back-to-school night. These events give parents an opportunity to discuss the progress of their children with their teachers and other school staff. In addition, Toucan Middle School has a college night, where the students present their college plans to their parents.

Some schools go a step further by having regularly scheduled meetings with parents. Pheasant Elementary has a weekly workshop for parents whose children are struggling where they discuss how the parents can help their child at home. Similarly, Sparrow Elementary has a morning meeting with all parents every two weeks in which the teachers (and a translator) tell them what they need to do for the students to be successful. According to the principal, "Parents want to do the right thing, so if you train them while their kids are in kindergarten, then they come back in later years. They want to renew the dream. They like the vision of their child in a cap and gown. My advice to other principals is to meet with parents when their children are young."

Parents can also get involved with the school through booster clubs, the school site council, and volunteer opportunities. A core group of parents at Dove Elementary helps with the photocopying at the school and running the school bank. Furthermore, they are starting a program called "P for 3" where every parent is expected to commit three hours to the school each year.

Swift Elementary and Hawk Elementary both mentioned having a center where parents can take classes and get information on how to get involved with their child's education. For example, the parent center at Swift has ESL classes two days a week and computer classes two days a week that are taught by teachers from the nearby high school. The parent center at Hawk offers counseling services for the parents.

Good Communication between Parents and School

One challenge to having good communication between a school and its parents is that many parents are not English speakers. Albatross high, a BTO school, addressed this problem by hiring Vietnamese and Spanish-speaking community liaisons. These liaisons come to parent night and explain to the parents about the school, standardized testing, and ways in which they can help their students. Since they hired the community liaisons, participation in these parent nights has grown appreciably. Another example of improved communication is Jaeger High, where they purchased a system on the internet called NTI that sends phone messages in both English and Spanish to all parents about testing, half days at school, and other relevant information. Finally, the previously mentioned Motivation and Maintenance Dropout Program at Crow Elementary has a coordinator contact the parents of children who are absent; the coordinator is available to work with those parents to solve any serious problems. All of these methods are intended to break down the communication barriers between the school and parents.

High Expectations of Students

"High expectations" has been a mantra of the school reform movement since the late 1980s. Williams, Kirst, & Haertel (2005) found a positive correlation between setting clear, high, and measurable expectations for student achievement and high performance. However, they found no correlation between high expectations for student behavior and high performance. In this study, the following examples of school expectations were described.

School Sets High and Measurable Expectations for Student Achievement

What constitutes high expectations is a matter of debate. The principal of Sparrow Elementary commented, "The fallacy with the word 'high expectations' is that nobody believes that they have low expectations, but it's just because they have never seen a high expectation. How can

teachers know what a high expectation is until they've seen a teacher that is doing better than them [sic]." The principals of two schools, Flamingo High and Toucan Middle School, said they express their high expectations for students by encouraging them to take challenging classes. At Flamingo High, the principal designs the class schedule of all the students in order to take higher-level math. Before he did this, the principal said that the students were not selecting any advanced classes. The principal of Toucan Middle School remarks, "We provide rigorous courses, and we believe that students can achieve at that level. All our seventh graders are in algebra, and we really believe that the students are capable of meeting that rigor and our test scores show that they are."

Other schools express their expectations of students through verbal encouragement. The principal of Pheasant Elementary School believed that high expectations are the main reason why her school was outperforming all the other schools in the district. She explained, "Every morning, I have an assembly where I repeat the same things over and over. For example, I shout out, 'What's our API score?' and they all say, '800 or more!' Before the students take a test, I come to the class to talk to them and motivate them. Expectations are even more important than the curriculum or the materials used." A similar strategy was reported by the principal of Sparrow Elementary, another BTO school, who shouts during the morning assemblies, "Which school has the smartest kids? Which school has the best teachers?" and the students shout, "Sparrow!" This type of verbal encouragement was touted as very effective for these two schools.

Policies for Student Behavior

Dove Elementary has a formalized procedure for their expectations for student behavior through their "Eagle Expectations." These are in the student handbook and are also shared with the parents. To make sure that all students know and understand the Eagle Expectations, the principal and assistant principal go to all the classrooms to talk about them. They also go over the expectations with the new students at the beginning of the year.

Another strategy is to focus on expectations for school attendance. For example, Crow Elementary's Motivation and Maintenance Dropout Program calls parents every time their child is not at school. Pheasant Elementary has an incentive system where students can earn "pheasant dollars" for each day they come to school. With these dollars, the students can buy things from the school store.

School Climate or Culture

Some principals mentioned their emphasis on making the school a fun and exciting place for the students to be. The principal of Swift Elementary School commented, "We're always finding fun things for the kids to do. These days the academics are so difficult and they are tested all the time. So we're trying to keep it fun and exciting for them." Her school offers music, orchestra, student council, an art class, and an after-school program. They also have a career day and a big party for the students that is given by a community organization. Similarly, the principal of a comparison school placed the same importance on making the school a fun place. She said, "We need to spice things up and become a little more entertaining. School is boring for kids—at home, they are on their computers and playing video games." As a result, the principal of this school is trying to use more technology to get students more excited about learning.

School, District, and External Leadership

School and district leaders and external consultants all have the potential to influence school performance. While only a few schools have hired an external consultant, every school has an identifiable leadership structure and a relationship with the district that ranges from minimal interaction to close and collaborative. The next three sections briefly describe these three sources of leadership as described by the study respondents.

School Leadership

Leadership has long been considered one of the most important contributors to effective schools (Davis & Thomas, 1989; Purkey & Smith, 1983; Terry, 1996, Muijs, Harris, Chapman, Stoll, and Russ, 2004). Effective leadership can be critical for school improvement efforts, particularly because their contribution to the school cannot be measured or re-created the way one could with the other components of the framework.

Leadership Structure

The most common leadership structure is centered on a dominant principal, seen in 11 of the 18 BTO schools included in this study. As stated by the principal of Sparrow Elementary, "There has to be somebody on the campus with that passion and drive; somebody who has a belief in the kids." The principals took on leadership roles in various ways. Some of them played a critical role in establishing the expectations of the students by developing a student behavior handbook (as done at Dove Elementary) or deciding the class schedule for every student (as at Flamingo high). Another role of strong principals is to set the expectations for staff members, providing them with the guidance, support and training they need to be successful, and effectively dealing with those not meeting expectations. Finally, principals who play a strong leadership role often have a large say in the curriculum and instruction that is delivered in the school. The principal of Swan Elementary School dedicated a lot of time to finding supplementary materials for her ELs when the school switched from dual immersion to English Only. Similarly, the first thing the principal of Sparrow Elementary did when he arrived to the school was visit every classroom and determine what kind of textbook and materials they should be using.

Beyond a single dominant leader, Elmore (2000) suggests that "the guidance and direction of instructional improvement" (Elmore 2000) requires the distribution of leadership among staff. Elmore suggests that as leadership becomes more distributed, the quality of leadership will evolve by enhancing the skills and knowledge of staff, creating a common culture of expectations, fostering productive relationships, and "holding individuals accountable for their contributions to the collective result." Four of the high-performing principals indicated this type of shared leadership between the staff and the principal. The principal of Pelican Middle School commented, "I believe in shared leadership. I think a lot can happen if a teacher buys into what they do. And it is much easier if the new idea came from a teacher."

At the other end of the school leadership spectrum are schools where the teachers are the primary leaders, with support from the principal, as reported in two BTO schools. The principal of Hawk Elementary School remarked, "I am not the 'principal'; I am just there to help and support the teachers. I facilitate their ability to teach." At Hawk Elementary, the teachers have taken it upon themselves to set their expectations and to force out any teacher that is not meeting them. Each teacher is free to teach the curriculum in any way they like, as long as they are teaching the

standards. The teachers also have taken it upon themselves to organize their own one-on-one after school tutoring program for struggling students. The principal of Parrot Elementary School takes on similar responsibilities in their school. It is noteworthy that both of these schools have fairly new principals, which may be one reason why teachers have stepped into primary leadership roles.

In contrast, the principal of one comparison school reported an unclear leadership structure. He remarked being a bit overwhelmed with the responsibilities that he is expected to take on in the school. He says, "I don't have an MBA. I don't have a degree in psychology to deal with my problematic teachers and students. I don't know about seismic retrofitting. Yet these are things I'm supposed to be an expert on." The teachers at this school also do not appear to be stepping into leadership roles. They appear to be isolated in their classrooms and are reluctant to participate in teacher collaboration or professional development. According to the principal, the primary challenge the school faces is building the instructional capacity and collegiality of the teachers.

Professional Development for the School Leader

Many districts provide extensive training for the principal and other school leaders. The most commonly mentioned training for principals is provided through Assembly bill 75, which mandates that all administrators receive training from the district that covers topics such as "curricular and instructional leadership, improving the abilities of new administrators to assess the performance of teachers, and providing a foundation for the proper implementation and examination of all pupil assessments."[27] The principal of Toucan Middle School, a BTO school, referred to this training at the district as "new principals' academy," where they cover topics such as finance, curriculum, maintenance, and facilities. Some districts have meetings for all the principals to discuss their schools' strategies and learn from other principals' successes and failures.

District

In a review of recent research literature on the role of the district in school-level reform efforts, Hightower, Marsh, Talbert, & Wechsler (2000) found that districts can play a "potentially critical role in improving teaching and learning." Districts that act as change agents tend to mobilize critical resources (human, social and physical), thus having a "better chance of enacting and sustaining state and local reform goals and policies." The principals of the interviewed BTO schools revealed a broad spectrum of levels of district involvement in the management, goals, and strategy of the schools. In the following sections, we will discuss examples of how districts were involved in establishing goals for the school and providing assistance to the schools for accomplishing those goals. We will also give examples of schools in which the district does not play an active role in the school's operations.

District Establishes District-Wide Goals for the School

Two schools mentioned that their district has explicit district-wide goals for all their schools. For example, Owl Middle School (a comparison school) has two district-wide goals. One is that 100 percent of their high school students graduate and the second is that at least 26 percent of the

[27] The text of Assembly Bill 75 can be found at http://www.leginfo.ca.gov/pub/01-02/bill/asm/ab_0051-0100/ab_75_bill_20010103_introduced.html

students score at the proficiency level on the state standardized tests. The principal of Owl Middle School has tried to align the school goals with these two district-wide goals, but feels that at times the district is too demanding and unrealistic about meeting the district goals. He comments, "Sometimes we are put under the microscope by the district and sometimes they give us negative feedback. We have such a diverse population and have students with difficult circumstances at home. Sometimes the district forgets that."

Toucan Middle School also has two district-wide goals: the first is that students are proficient on the CST after five years and the second is that ELs are redesignated after four years. The principal of Toucan Middle School has a more positive outlook on the district-wide goals than the principal of Owl Middle School. She says, "The district and the school are on the same page about doing the right thing for our kids."

District Plays an Active Role in Achieving School Goals

The most common way that districts assist schools in achieving their goals is by providing professional development for school staff. Nine schools reported receiving some form of professional development from the district, and most expressed a favorable opinion of the training they had received. Examples of professional development organized by the district are principal training through Assembly Bill 75, additional opportunities for school leaders to come together to exchange ideas and information, writing programs for teachers, GATE training, and specific subject area courses offered to teachers on the weekends, after school, or during the summer.

Besides professional development, the district can get involved by providing the school with programs to analyze the data with, curriculum guides, pacing maps, textbooks, and technical support. The district also provides the financial support necessary for the school to meet its goals. The principal of Jaeger high said that, "If I can't run a program given the money [I have], the district pretty much says, 'Okay, we'll help you out on it.' They've always worked out a way to fund our programs, even if I have to pay it back later."

District Does Not Play an Active Role in School's Operations

The principals of five of the BTO schools indicated that their district did not play an active role in the school's operations. Three of those schools seemed to be satisfied with that arrangement. The principal of Sparrow Elementary School commented, "The district helps me because they leave me alone and let me do my thing." Swift Elementary and Flamingo High also expressed appreciation that the district did not get very involved in the school's operations, which allowed them the freedom to try new strategies. Some schools with high district involvement, such as Raven Elementary, indicated that they would prefer for the district to play a less active role in the school.

On the other end of the spectrum are two BTO schools that would like more district support. The principal of Albatross high even said that his school had been neglected by the district because they did not believe that the school could improve when they were low performing and did not support many of the programs that they wanted to implement.

External Consultants

A few principals mentioned hiring external consultants. Toucan Middle hired an independent company to develop an audit of the school that focused on instruction and data. The company developed the school benchmarks and also helped teachers improve their instructional techniques. Dove Elementary is another BTO school that hired external consultants to show the teachers how to analyze test data and provide guidance to teachers that are struggling.

Challenges

Each principal interviewed for this study was asked to identify the biggest challenges they faced in increasing the academic performance of their school. These challenges were collapsed into five categories, shown in Exhibit 5.3. The exhibit shows frequencies for the greatest single challenge mentioned by the principal at each school.

Exhibit 5.3. Frequency Rating of Each Category as the Most Challenging Issue*

	Rated as Most Challenging Factor by BTO Principals (frequency)	Rated as Most Challenging Factor in Comparison Schools (frequency)
Characteristics/needs of student population	8	3
Administration/structure	0	0
Teaching	4	1
Finances/resources	2	1
Parental involvement	2	0

* Two beating-the-odds schools did not identify an important challenge to their success.

Perhaps the major finding from this table is the similarity in the general distribution of responses between principals from BTO and comparison schools included in this study. A majority of schools in both groups enroll relatively high percentages of challenging students, so it is perhaps not surprising that both groups of schools cited the high needs of their students as a major obstacle to their success. It is also interesting that only a few respondents from both groups saw finances as their major concern.

Funding Required to Reach an API of 800

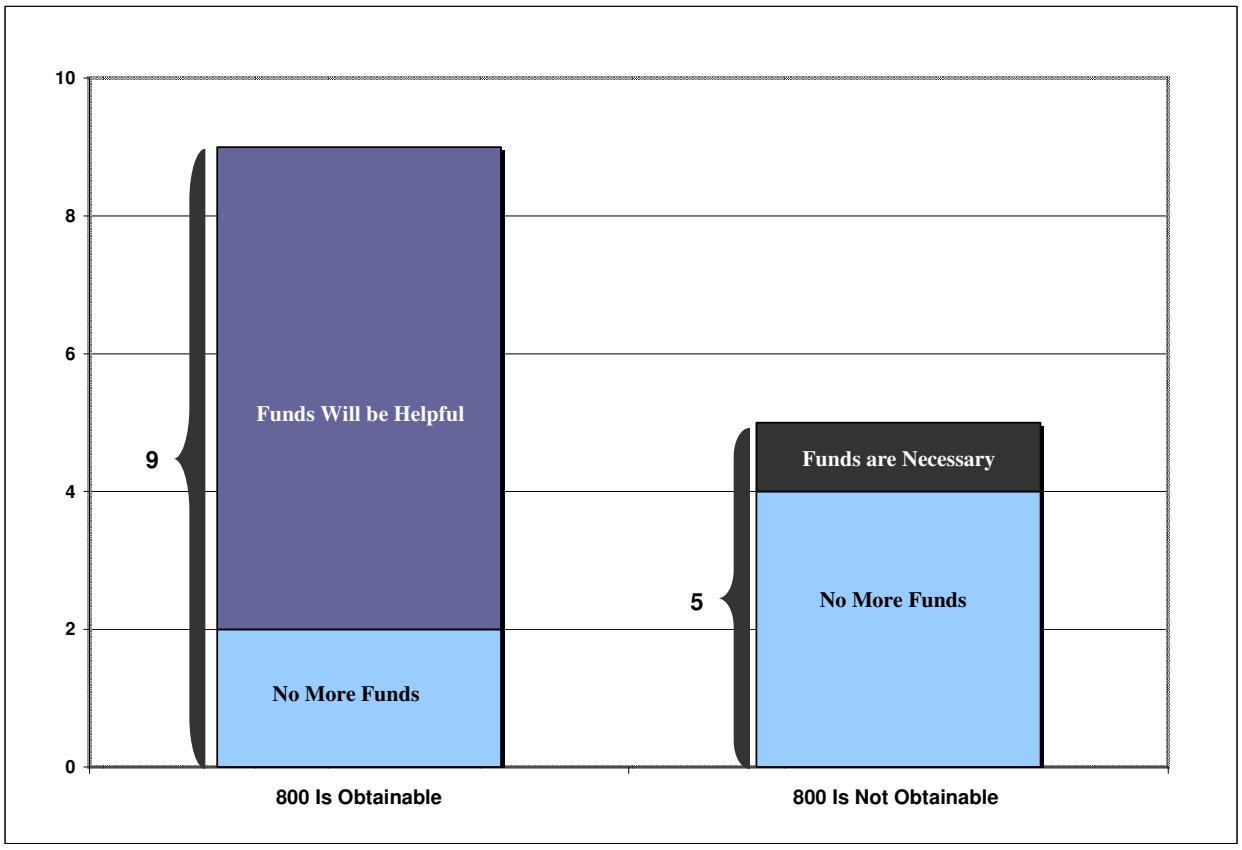
The administrators from the schools we interviewed gave mixed responses regarding whether they need increased finances to reach or maintain an API of 800. For those schools that were at an API greater than 800 (4 schools), half of them said that they had adequate resources to remain at the targeted goal. For instance, the principal from Mockingbird Elementary School articulated, "I think we do have the resources, I think if anything it is just a matter of getting the training and convincing the staff that they need to continue to work hard, that is more of a leadership thing, the district just throwing money in there will not make a difference."

Meanwhile, the other half expressed frustration due to lack of funding. Puffin Elementary School's principal lamented, "We should not have to write grants to maintain programs….It is absurd that I am struggling for resources for things like mental health counselors. We are

working on a shoe-string budget….We can't fully implement what we want—we have to have more resources." For Hawk Elementary School, the $60,000 cut from their Title 1 funds resulted in the elimination of their after-school program. Two years ago, their annual fiscal budget was $100,000 more than their current allocation. Their principal remarked that they used to have the level of resources necessary to sustain an API score of 800, but that now the cuts are going to affect their performance.

A somewhat different trend is seen with BTO schools whose API scores are below 800 (14 schools). Of these schools, nine felt that an API of 800 was an obtainable goal for the year 2013; the other five felt that the goal of 800 was not obtainable. Of the administrators that saw 800 as obtainable, none saw more funding as necessary, but the majority stated that money would be helpful in achieving the goal. A few expressed satisfaction with their present level of funding. For instance, while the Swift Elementary School's administrator would like to have more money to have more intervention programs, the principal from Pheasant emphasized that their concerns do not directly relate to funding: "Funding is not so necessary. We have intervention programs for at-risk students—we do that for 80 hours….There is also the inter-session programs. However, we are not getting support from parents." Both principals from Cardinal and Parrot Elementary Schools admit that increased funding is beneficial because it can help provide additional support programs. Dove Elementary School is one of the few that are content with the funding they receive; its principal noted that their Title I funds are sufficient to achieve the school's goals.

Exhibit 5.4. Attitudes toward Attainability of 800 API Score and Necessity of Additional Funding



Among the five BTO schools that were below 800 and whose administrators stated that reaching an API of 800 in 2013 was unlikely, only one administrator identified an increase in funding as crucial for the changes they envisioned for their school. The principal for the lone exception, Jaeger High School, wanted more intervention programs and reading classes for the school's students and this would entail a higher financial allocation. For the rest of the schools, while some acknowledged that money is helpful, none felt that more funding was unnecessary. For example, Raven Elementary School's principal asserted, "I wouldn't say no to the money, but I don't need more money for those changes [strategies for writing improvement and incorporation of structured computer use]." Meanwhile, Toucan Middle School's administrator maintained, "Honestly, I don't think that additional funding is necessary. We are fortunate to have the funding we have and we spend it wisely….The level of funding we have right now is appropriate."

Regarding the comparison schools, all principals mentioned that 800 was an obtainable goal. In addition, they all also affirmed that having more resources would facilitate the changes they would like to implement and two administrators explicitly stated a need for greater funds. For instance, the principals from Falcon and Blackbird Elementary Schools both admitted that an increase in budget allocations would translate into more supplemental instruction materials and support programs. Moreover, when asked whether they needed more funds to achieve the changes they envisioned, Hummingbird Elementary School's administrator responded, "Last year, I would have said no, but my funds have shrunk this year because the state has cut back on the LEP and EIASCE funds….I would need another $200K for people. We need to hire staff to work with the kids who need extra support. That is about 5 or 10 percent of our current budget."

In sum, while only a few school administrators explicitly stated their need for additional funds, the majority acknowledged that most changes would be better implemented with increased finances.

Chapter VI. Summary of Results

This report has analyzed successful California schools in the context of educational adequacy. It has covered a range of topics, including how the "successful schools" approach to considering education adequacy has been used in prior studies across the states (and an assessment of its strengths and weaknesses); whether successful schools could be identified for California, and if yes, what we might learn from them; and the implications of these findings for the overall concept of adequacy. The successful schools approach is one of four predominant methods for considering and attempting to measure education adequacy. A simplified summary of its possible primary advantage over other approaches seems to be the argument that the most effective way to determine the cost of education needed to reach a specified level of educational outcomes is to identify schools (districts) achieving these desired outcomes and to determine how much they are spending.

This line of reasoning is compellingly straightforward, but at the same time overly simplistic. A number of concerns associated with this approach to determining adequacy are described in Chapter 2. One serious concern is the dilemma of exactly how successful schools will be selected. On the one hand, we can select schools already achieving the state's specified outcome goals (e.g., a score of 800 measured by the Academic Performance Index, or API). This seems to meet the criterion of selecting schools that have actually achieved specified goals as the basis for costing out what is required to do this. However, these schools have the substantial disadvantage of generally being very unrepresentative of the rest of the schools in the state in regard to their percentages of special populations of students such as those in poverty or who are English learners (ELs).

Another option is to follow the selection methods employed in this study by defining successful schools as those "beating the odds" in the sense that they are consistently performing at a much higher level than expected given the composition of students they serve. This has the advantage of resulting in a pool of successful schools (termed "beating the odds" given the approach to their selection) that is more representative of the state in regard to the mix of students served. However, the disadvantage here is that only a small number of schools seem to be outperforming their counterparts over the time period under analysis. In addition, it is not guaranteed that these schools will also be meeting an absolute state-specified outcome goal. For example, an API of 800 can be considered a desirable goal for California schools. Yet of the 103 BTO schools selected for this study, only 41 were at or above the state school accountability target of 800.

Thus, although these schools are arguably excellent models of resource allocation in that they are performing at a much higher level than their similar counterparts, they do not necessarily reveal what is needed to meet the state's specified outcome standard, which is the primary objective of an adequacy determination. Furthermore, only a small number of schools are consistently performing at a higher level than what is expected for them.

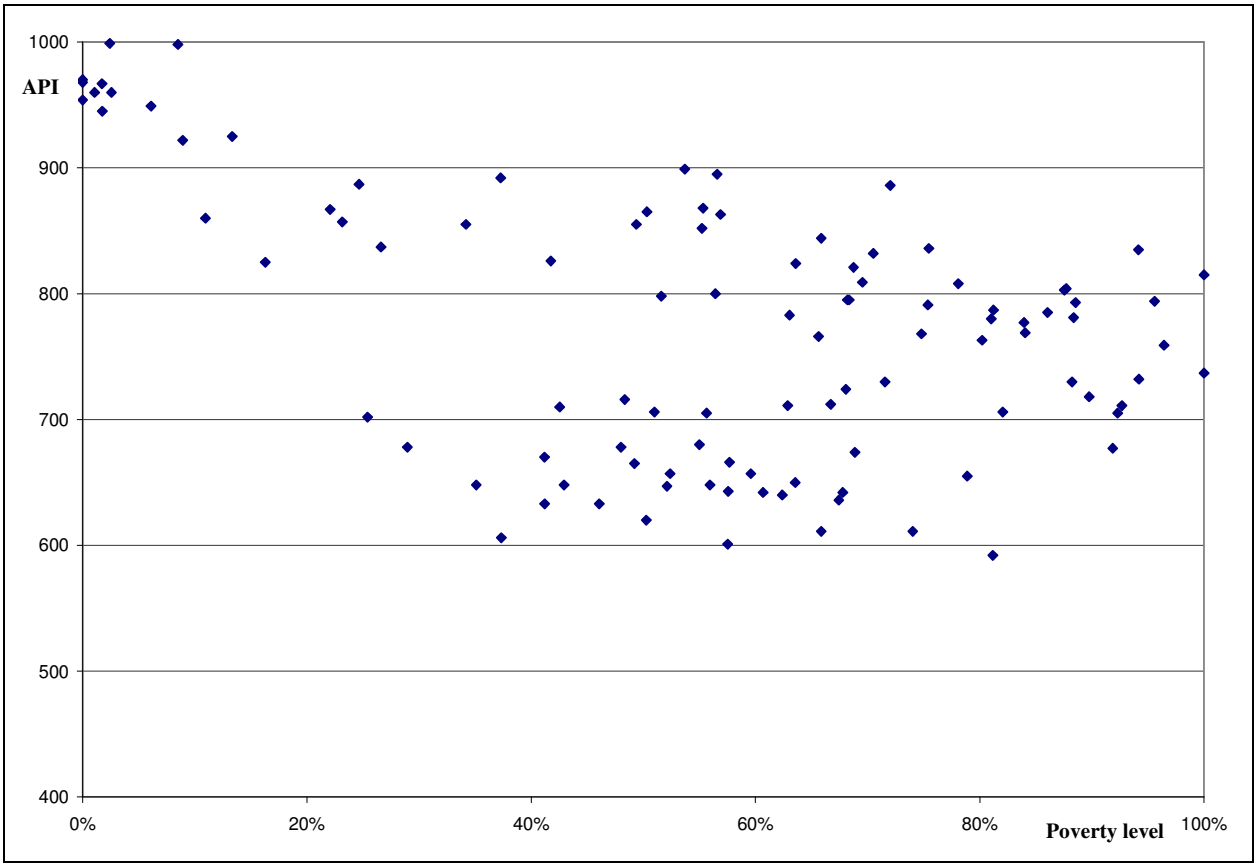
This does not mean that there is nothing to be learned from the identification and analysis of successful schools. As discussed in Chapter 1, however, the definition of these schools should

not be simply those already meeting the state standard. Due to the very atypical demographics of these schools, as shown in Exhibit 1.1, fairly little can be learned from these schools that would be generalizable to the average school in the state.

Therefore, we used a BTO approach to successful school selection, as described in Chapter 3. This chapter addresses the third research question for this study: how successful schools might be identified in the state. However, for the reasons cited above we have not identified these schools for the purpose of attempting to define adequacy. Just because these schools are successful does not mean that the resource patterns observed at these schools can be extrapolated to other schools with the assumption that this is the mix of resources that will also lead them to success.

Rather, we see several advantages to identifying and further examining these schools. Although these BTO schools are not necessarily all meeting the specified state outcome standard, and although there are only about 100 schools in the state, they all consistently perform at very high levels in relation to like schools, and also perform well in an absolute sense in relation to all schools. As shown in Exhibit 6.1, a number of the BTO schools are at or above the state school achievement target of 800 API and at the same time have a high poverty level.

Exhibit 6.1. Distribution of API and Percentage of Students in Poverty for All 103 BTO Schools



While identifying and analyzing schools with a broad mix of student characteristics that have been consistently outperforming similar schools may not be well suited to directly answering the

adequacy question, it does provide a basis for further considering the extent to which it is indeed variations in the quantities and characteristics of the resources employed (as we currently measure them) that really make a difference in regard to school success. Perhaps it is not resources at all, or if it is resources perhaps it is due to characteristics related to those resources that do not lend themselves to measurement.

Chapter 4 addresses these questions. What resource differences are observed at BTO schools? Is there evidence that BTO schools use their resources more efficiently? Can we predict academic performance by levels of resources and types of students enrolled? In summary, we found fairly few and relatively small resource differences between BTO, low performing (LP), and other schools in the state. Furthermore, the level of resources and student characteristics do not explain the high performance level observed in BTO schools. BTO schools do appear to have a more efficient mix of personnel resources in terms of estimated optimal levels of teacher education and experience, but as mentioned, this analysis is really only instructive in the sense that these schools have discretion to choose the education and experience levels of their staff.

In fact, no school (or district, for that matter) has complete control over this mix of teacher attributes, but some schools may have much more control than others in regard to how much latitude they have in hiring and firing teachers. This may be an important variable in better understanding and being able to statistically explain varying levels of school success. Another may be the number of years a principal has been at a given school, or measures of teacher turnover at a school, and perhaps teacher attendance. These are possible measures of school stability and climate that may be as important or as, or even more important than, the resource quantities and attributes we currently measure.

Given that they are producing much higher educational outcomes than their counterpart schools with apparently comparable levels of resources, the BTO schools identified in this study are arguably among the most efficient in the state. As the current state and federal accountability movement appears to be a clear call to arms to improve student achievement, it would seem imperative to identify schools such as those included in this study to further investigate the factors related to their success.

This was the focus of the phone interviews for this study and the resulting analyses, which is summarized in Chapter 5. If the primary differences in the BTO schools are not resource related, or at least not related to resource measures currently being collected by the state, what differences in these schools do appear associated with their unusual success? Chapter 5 showed that a number of factors appear to be important contributors to school success. In addition, it argued that school success is much less of a clear recipe that results from a clearly specified mix of ingredients than a confluence of factors that under the right conditions can produce striking results.

At the same time, it may be a mistake to conclude that school success is so idiosyncratic that there are no common elements or things that can be measured and perhaps replicated. Chapter 5 summarizes some of these common themes and ties them to what we know about school success from the literature. The major factors identified by the BTO respondents for this study were: 1) existence of high-quality teachers and staff; 2) implementation of a standards-based curriculum;

and/or 3) coherent instruction. Although these overarching themes are instructive, they are perhaps less directive than we would like in terms of providing guidance in regard to what policy makers might do to replicate the results of these schools statewide. The complexity of what makes a school unusually successful, and the possible difficulties of replicating these results, is perhaps best summarized by one of the respondents in this study:

> *You're looking for the recipe for how to get a school to be successful but I think running a school is an art form. You can give a recipe for making a film but it would not make it the best film in town. You can follow the whole recipe but you miss that other ingredient, which is the artistic part of it.* – BTO school principal

At the same time, although the linkage between the existence of high-quality teachers and staff cited above and school success seems somewhat obvious, the findings from this report suggest that such staff can be attracted to schools with high percentages of students with special needs (e.g., students in poverty and with limited English). A major variable associated with attracting teachers to these schools may be the creation of an environment in which they believe they have a chance to be successful. Some resource considerations related to this may be stable leadership, district support, and discretion at the local level in regard to being able to attract and retain other high-quality teachers and staff and to remove those who prove to be ineffective.

From an overall adequacy perspective, these findings seem to challenge the basic underlying premise that the primary element that is lacking in regard to realizing state outcome goals is directly related to the quantities (or even the attributes) of educational resources. Simply adding more resources may not be likely to make a difference in regard to school performance. This would suggest a somewhat different conceptualization of the adequacy question than has been commonly employed.

While it still may be that resources considered broadly are what make the primary difference in schools, it seems we need to broaden our conceptualization and measures of these resources beyond quantities. Undoubtedly there are certain minimum levels of resources that are imperative to school success. Beyond this, however, we may need to broaden this perspective to begin specifying adequate conditions for schools' success. To examine this further, we may need resource measures that, at least in California, we do not currently have. For example, we do not have measures of the stability of leadership and instructional staff at the school (e.g., number of years at the school). We do not know the degree to which is there latitude for schools to select, retain, and remove teachers as needed to ensure a "quality" staff. We have insufficient measures ensuring district support for high needs schools—e.g., ensuring that they have at least equal resources in comparison to all schools in the district, and a higher degree of selectivity in regard to the attributes of these teachers than schools with lower percentages of at-risk students. We also lack measures such as teacher and administrator absenteeism that might provide an indication of the overall atmosphere and day-to-day stability at the school.

In summary, although the successful schools approach to defining education adequacy seems deficient in many fundamental ways, identifying and analyzing BTO schools may provide insights into our overall conceptualization of educational adequacy. Its basic underlying premise as it has been largely defined and applied is that we simply need a better understanding of the

levels of resources needed to reach a specified educational outcome standard. The analyses in this report suggest that, at least for the pool of schools realizing this level of success at a much greater rate than their counterparts, traditional resource measures do not seem to be what are making the difference.

This does not lead to the conclusion that resources do not matter. All of these schools do have resources at a certain specified level; none would likely say that they could continue to perform as well with less, and most would probably argue for more. In addition, one of the primary factors that they attribute to their success is clearly resource based: "a high quality staff." The differences between the staff at these schools and other schools, or even those schools included in this study because they are performing much worse than expected, are not captured well by the types of measures currently collected by the state. Perhaps existing adequacy frameworks would benefit from considering more broadly the mix of school-wide staff attributes, as well as counts of staff and non-personnel resources, needed in a school to be truly adequate for success. The state can further this agenda by more comprehensive data collection in regard to the broader sets of attributes and performance measures that are needed to better understand the full resource implications of schools' success.

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