

# Improving High Schools as a Strategy for Closing California's Achievement Gap

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## Overview

High schools play a critical role in preparing students for careers, college, and citizenship. Thus, disparities in educational outcomes from high school may contribute to long-term disparities in educational, economic, and social outcomes throughout adulthood. At the same time, reducing these disparities may play a critical role in reducing disparities in adult outcomes and improving the lives of the state's most disadvantaged

student populations. This paper examines the nature of the achievement gap in California high school outcomes. It then reviews the research literature on what features of high schools have been shown to contribute to the student achievement and then discusses alternative strategies the state could pursue to reduce the high school achievement gap.

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## Introduction

One of the most urgent educational challenges facing California and the United States is eliminating the large achievement differences among ethnic, linguistic, and socioeconomic groups of students [1,2,3,4]. Although this challenge has existed throughout the history of our country, it has taken on increased urgency in the current era of educational accountability. At the federal level, this urgency is perhaps best reflected in the landmark federal legislation, the *No Child Left Behind* (NCLB) Act, which requires annual testing of students and holds schools and districts accountable for demonstrating annual progress in improving the achievement of *all* students. In fact, one goal of NCLB includes:

...closing the achievement gap between high- and low-performing children, especially the achievement gaps between minority and nonminority students, and between disadvantaged children and their more advantaged peers [5, Title 1, Sec. 1001].

In California, the Superintendent of Public Instruction, Jack O'Connell, has made closing the achievement gap as the top priority in his second term in office.

Now, it's true that the achievement gap exists nationwide, but in nearly every other state, it is viewed as a problem affecting minorities of students. In California, the students representing the achievement gap are the *majority* of our

school population. In California, closing the gap is more critical than anywhere else in this nation and it is the way to help *all* students succeed. Closing the achievement gap will not only improve the lives and futures of our students, it will secure the future of our state [6, p. 4].

To address this priority, the Superintendent created a P-16 Council with a broad array of members to help develop a strategy for closing the achievement gap.<sup>a</sup> The committee issued its report with a series of recommendations in January 2008.

Existing research demonstrates that the achievement gap exists throughout the educational pipeline, from preschool to the postsecondary level [1,3]. Moreover, achievement differences tend to increase as students progress through school [1].

## California's High School Achievement Gap

Existing data show sizeable disparities in a number of achievement outcomes from California's high schools. One way to measure these disparities is by comparing the representation of student subgroups in schools with their representation in various outcome measures. Ideally, the two would be comparable. For example, if a subgroup represents 10 percent of the total population of students, then they should represent 10 percent of the students in the outcome category. If they are over-represented or under-represented, then it suggests there is an achievement gap.

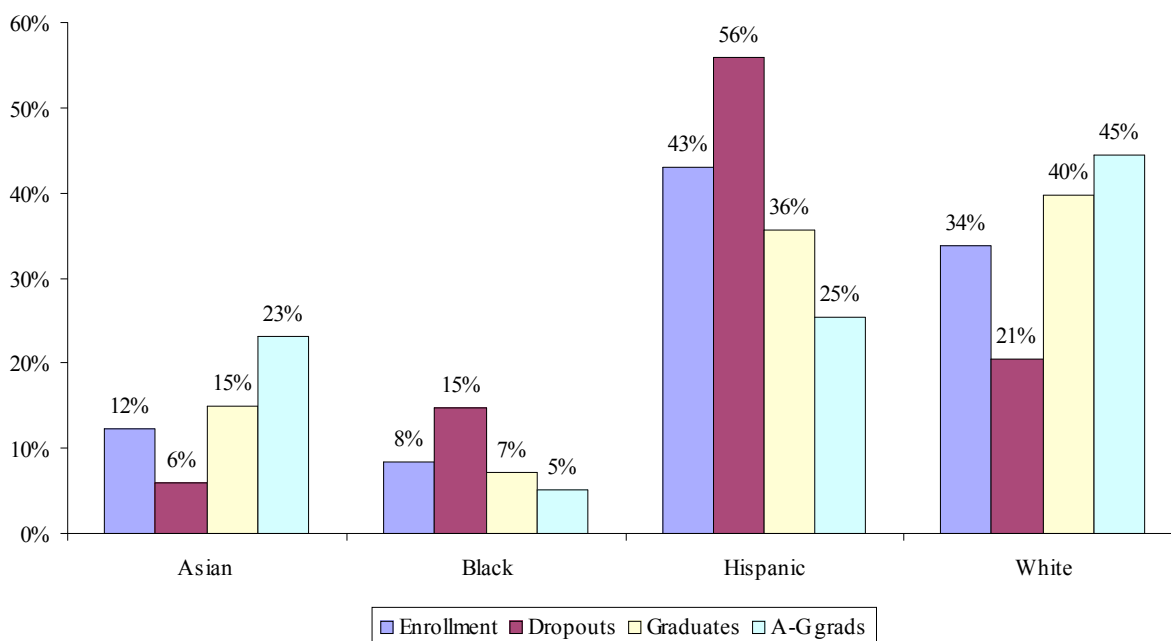
Figure 1 compares ethnic representation in high school enrollment (grades 9-12) in 2005-06 with three educational outcomes: dropouts, high school graduates, and high school graduates that met the (a)-(g) requirements for admission to CSU and UC. Asians represented 12 percent of all high school students in 2005-06, but only 6

This paper examines the achievement gap in California high schools. High schools play a critical role in preparing students for careers, college, and citizenship. Thus, disparities in educational outcomes from high school may contribute to long-term disparities in educational, economic, and social outcomes throughout adulthood. At the same time, reducing these disparities may be can play a critical role in reducing disparities in adult outcomes and improving the lives of the state's most disadvantaged student populations.

The remainder of this paper examines the nature of the achievement gap in California high school outcomes. It then reviews the research literature on what features of high schools have been shown to contribute to the student achievement.

percent of dropouts. Thus Asians were underrepresented in the dropout population. Conversely, Asians represented 15 percent of all high school graduates and 23 percent of all (a)-(g) high school graduates. In other words, there were twice as many Asians in the population of (a)-(g) graduates as in the population of all high school students. This indicates that Asians are doing better than other students. Similarly, whites were under-represented among dropouts (21%) relative to their representation in the population of all high school students (34%). On the other hand, whites were over-represented in the population of college graduates (40%) and even more over represented in the population of (a)-(g) high school graduates (45%).

Black and Hispanic students, however, are over-represented among dropouts, but under-represented among high school graduates and (a)-(g) high school graduates.



*Figure 1: School enrollment, dropouts, graduates, and (a)-(g) graduates, by race/ethnicity, 2005-06*

For example, Blacks only represented 8 percent of all high school students in 2005-06, but 15 percent of all dropouts. Similarly, Hispanics represented 43 percent of all high school students, but 56 percent of all dropouts. On the other hand, Blacks only represented 5 percent of all (a)-(g) graduates and Hispanics only represented 25 percent of all (a)-(g) graduates.

Similar disparities are evident in test scores. As shown in Figure 2, Asians represented 10 percent of all students who took the California Standards Test (CST) in English Language Arts (ELA) as 11<sup>th</sup> graders in 2005, but 15 percent of all students who scored at or above the proficient level. Similarly, whites represented 37 percent of all test takers, but 51 percent of all students who scored proficient. On the other hand, Blacks represented 8 percent of all test takers, but only 5 percent of all proficient students. Hispanics represented 40 percent

of all test takers, but only 23 percent of all students who scored at the proficient level.

Disparities also exist for economically disadvantaged students, English learners (ELs), and students with disabilities. For example, ELs represented 16 percent of all high school students in 2005-06, but 33 percent of all high school dropouts.<sup>b</sup> Disparities appear to be even greater in terms of test score performance. For example, ELs represented 15 percent of all CST test takers in 2005, but only 2 percent of the students who scored proficient. Students with disabilities represented 9 percent of all test takers, but only 1 percent of students who scored proficient. And economically disadvantaged students represented 39 percent of all test takers, but only 21 percent of all proficient students.

It should be noted that disparities in 11<sup>th</sup> grade test scores mirror disparities in grade

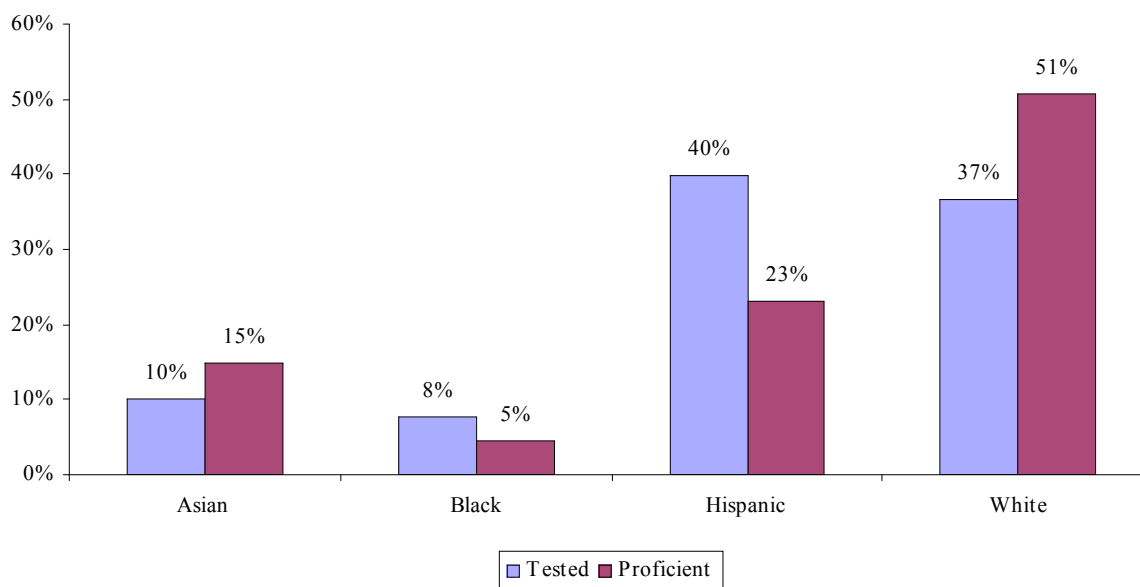


Figure 2: California Standards Test, English-Language Arts, grade 11 results by race/ethnicity, 2005

8 test score three years earlier. For example, ELs represented 20 percent of students who took the CST-ELA test as 8<sup>th</sup> grades in 2002, but only 2 percent of all students who scored at the proficient level. Similarly, economically disadvantaged students represented 43 percent of 8<sup>th</sup> grade test takers in 2002, but only 19 percent of all proficient students. These comparisons suggest that the large disparities that exist in high school test scores are similar to those in middle school, before students enrolled in high school. Thus, the achievement gap neither improved nor worsened in high school, illustrating not only the size of the high school achievement gap, but also how immutable it is to change.

Not only are there large disparities in educational outcomes among students, but also among high schools. Dropout rates, for example, vary widely among schools. In 2005-06, only 1 percent or 25 of the state's 2486 high schools accounted for 21 percent of the dropouts [7]. College eligibility and entrance rates also vary widely by school: only 3.8 percent of high school graduates from the lowest performing high schools (API Rank 1) attended the University of California in 2006, compared to 18.3 percent from the highest performing high schools (API Rank 10).<sup>c</sup>

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## Research on High Schools

A large body of research exists on high schools. Although the research is extensive, much of it is limited in its ability to provide a rigorous answer to the question: What are

the salient features of high schools that contribute to student success? The following discussion examines three basic types of research studies and their ability to

provide rigorous evidence on the effectiveness of high schools.

### **Case Studies**

One popular method for studying high schools is to conduct case studies of schools that have somehow been identified as effective. Sometimes schools are identified because they are simply using an innovative school reform model. One recent case study of five high schools based selection criteria on a mixture of school practices, multicultural pedagogy, and a broad array of student outcomes not limited to student test scores [8]). Case studies can provide rich and detailed descriptions of the origins, practices, and outcomes of schools. But they cannot, by themselves, determine which features of schools are critical to their success. In fact, they cannot determine whether the school is actually effective in producing good outcomes for students. The reason is that other factors could account for the schools' apparent success. For example, many successful schools, particularly charters and magnet schools, require students and parents to choose the school and perhaps fill out an application. They may also require some amount of parental involvement, such as volunteering in the school. In some cases, the school also selects the students based on criteria such as past performance or commitment to the school requirements. These so-called "selection" effects can result in a student body that is different than the student bodies of other schools. Thus, case studies are unable to determine whether the outcomes of the school are due to the characteristics of the school or the characteristics of the students.

### **Correlational Studies**

Another method for studying high schools is to use statistical models to test the relationship between student outcomes, such

as test scores and dropout rates, and an array of student and school characteristics. These studies are often based on national longitudinal studies conducted by the federal government involving large, national samples of students and schools, and a broad array of data based on student, parent, teacher, and administrator surveys, student test scores, and institutional data, such as student transcripts. And because the data are collected over a number of years, the studies can be used to examine changes in student outcomes over time. One of the most widely used studies is the National Educational Longitudinal Study of 1988 (NELS; p. 88), a study of 25,000 eighth graders in the spring of 1988 who were surveyed throughout their high school and college careers until 2000, when most of participants were 26 years of age. A large number of studies of high school effectiveness have been conducted using the NELS:88 data [9,10,11,12] .

The statistical models used in these studies are able to control for differences in observed student characteristics to help determine to what extent differences in student outcomes are attributed to differences in student characteristics or school characteristics. And because of the broad array of data in the datasets, the studies are able to determine which features of schools predict student outcomes after controlling for other factors. This can help determine the relative importance of various factors. And recent advances in statistical modeling techniques do allow these studies to estimate causal effects [13]. But not all correlational studies use these more sophisticated techniques, so not all studies can establish a strict causal connection between school characteristics and student outcomes. And despite the wide array of data collected in these studies, they may not be able to identify all of the factors related to student success. Nonetheless, these

studies do provide valuable evidence on the effectiveness of high schools.

### **Evaluation Studies**

The most rigorous evidence on the effectiveness of high schools comes from evaluation studies. Evaluation studies are used to study the effectiveness of a wide variety of interventions, from single interventions, such as small classes, to comprehensive school reform (CSR) models [14]. There are a variety of research designs for conducting evaluation studies and the rigor of the design dictates the ability of determining a causal connection between the intervention and student outcomes. The so-called “gold standard” in evaluation studies is the randomized experiment or more formally referred to as a *randomized controlled trial* (RCT), where students are randomly assigned to the intervention (experimental group) or the regular or non-reform program (control group). For single interventions, such as small classes, it is possible to randomly assign students to the treatment or control condition. One well-known example is the Tennessee class size reduction study, where students in grades kindergarten to grade 3 were randomly assigned to small (15 students per class) or regular (25 students per class) classes [15]. Because it is virtually impossible to randomly assign students to schools, an alternative design for evaluations of CSR models is to randomly assign reform models to schools. But this, too, is difficult. A recent review of the research evidence on the effectiveness of CSR models found only seven studies of three CSR models, or about 3 percent of all studies examined in the review, were based on randomized experiments [14, p. 163]. Another review of 197 studies of 18 secondary comprehensive school reform models found only 16 with rigorous evaluations [16]. A more common evaluation design is the quasi-experimental

design that is not based on random assignment, but instead uses statistical techniques to control for differences in the characteristics of students attending experimental and control schools. Several techniques can be used to estimate causal effects from quasi-experimental studies [13].

Results from rigorous evaluations can determine not only whether a particular intervention is effective, but the magnitude of the effect, known as the effect size (ES). Although there are no absolute standards for judging the magnitude of effect sizes, one prominent statistician argues that an ES of at least .2 should be considered a small effect (which corresponds to increasing the likelihood of graduating from 50 to 58 percent), an ES of at least .5 should be considered a medium effect (which corresponds to increasing the likelihood of graduating from 50 to 69 percent), and an ES of at least .8 should be considered a large effect (which corresponds to increasing the likelihood of graduating from 50 to 79 percent) [17, p. 25-26]. To illustrate, an evaluation of the Tennessee class size experiment found that students who were enrolled in small classes from kindergarten through third grade had high school graduation rates that were 11 percentage points higher than students who were enrolled in regular-sized classes, which is an effect size of about .25 [18]. The effects were even stronger for low-income students—those in small classes had graduation rates 18 percentage points higher, which is an effect size of .50. A review of 232 evaluation studies of the effects of 29 different CSR models on student test scores found an average effect size of .12, although interventions that had been implemented for 8 years or longer had an average effect size of .50.

Although evaluation studies are able to establish a causal connection between the intervention and student outcomes,

evaluation of whole-school or CSR models are not able to determine the specific causal mechanisms responsible for the outcome. CSR models typically involve a series of components, from structural features, such as creating small learning communities, to specific instructional components. Consequently, it is impossible from a whole-school evaluation to determine which components are critical to the models' effectiveness—some components may be critical and others not, but the evaluation is unable to make this determination unless it was implemented in such a way that the effectiveness of specific components could be determined.

Each method for studying the effectiveness of high schools has limitations. In general, it is most useful to draw on all three types of studies and look for confirming evidence from many studies to help determine which features of high schools are most critical in contributing to student success.

### ***Measures of High School Performance***

High school performance can be measured in different ways. Test scores are the most common measure of high school performance. California's state accountability system, the Academic Performance Index (API), is based completely on test scores. But other measures are also important, such as dropout rates, graduation rates, and college-ready graduation rates. One reason for using multiple indicators of school performance is

that some schools may perform better on one type of outcome than another. This may be especially true if the features critical to raising performance in one area are different than the features critical to raising performance in another area. For example, if teacher resources are more critical in raising test scores, but other resources, such as school counselors, are more critical in keeping students from dropping out, then schools may have to choose where to focus scarce resources. Some features of school performance may be effective in improving performance in all areas.

For example, one recent correlational study of 912 U.S. high schools found that schools that were effective in promoting student learning (growth in achievement) were not necessarily effective in reducing dropout and transfer rates [12]. Moreover, the study found the same features of schools had different effects on those outcomes: larger high schools had higher dropout rates, but also larger gains in student learning. Finally, the study found that measured school characteristics had a greater impact on dropout rates than on student learning, suggesting that schools have more potential impact on dropout rates than improvements in student achievement. A more recent correlational study of 63 public high schools in California confirmed these findings: two measures of high school performance—test scores and graduation rates—were not correlated; and schools had more potential to improve graduation rates than to raise test scores [19].

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## **Features of Effective High Schools**

This section reviews the research on features of effective high schools. To guide our discussion, it is useful to consider a conceptual model of the schooling process.

### ***A Conceptual Model of Schooling***

The most common conceptual model is based on an economic model of schooling [20,21], which focuses on two distinct aspects of schools; school *inputs* and school

*processes* (policies and practices). School inputs represent the features of schools typically provided from outside the school itself, usually the school district where the school is located. School inputs include the following: 1) the characteristics of the student body, such as their academic background and socioeconomic status; 2) structural features, such as type of school (public, Catholic, other-private) and size; and 3) school resources, such as teachers and textbooks. Many research studies have attempted to identify which school inputs are related to differences in school outputs [20,22,23] .

The second aspect of schools concerns the processes and practices that take place within them. They include such things as leadership and decision-making practices [24], instructional practices [25], and the overall academic and social climate of the school [26]. Many studies of school effectiveness have sought to understand what school practices affect student achievement and the extent to which these practices explain how and why school inputs make a difference. For example, studies have demonstrated that Catholic schools are more effective than public schools because of their strong academic climate and the strong social relationships or social capital among parents and school personnel [9,27] .

A large body of empirical research has demonstrated that a number of specific school characteristics within these two domains can explain differences in school performance, particularly as measured by test scores and dropout rates. Yet the research findings are far from consistent. In some cases the impact of school characteristics on the same outcome varies across studies. In other cases the impact of school characteristics varies across outcomes. Below we provide a brief summary of this research and highlight a few of the inconsistencies.

## **School Resources**

While it is obvious that resources are required to produce any desired educational outcome, there is considerable uncertainty and disagreement concerning the amount and types of resources that are necessary. Scholars have identified four types of resources that may impact student outcomes: 1) fiscal or monetary resources, 2) material resources, 3) human resources, and 4) social resources. Although these types are clearly related (e.g., fiscal resources can be used to purchase material and human resources), they remain conceptually distinct and have been distinguished in both the theoretical and empirical research literature.

### ***Fiscal Resources***

Researchers have long debated whether fiscal resources make a difference [20,28,29,30,31,32,33]. In a major review of 187 studies that examined the effects of instructional expenditures on student achievement, Hanushek [20] concludes: “There is no strong or systematic relationship between school expenditures and student performance.” Other reviewers conclude, however, that school resources can make a difference [34, p. 13]. Critics of the efficacy of fiscal resources point out that real expenditures per student have risen dramatically in the United States over the last few decades, while student achievement has changed very little [35]. According to these critiques, the problem is not a lack of resources, but how resources are used:

The fundamental problem is not a lack of resources but poor application of available resources. Indeed, there is a good case for holding overall spending constant in school reform. Not only is there considerable inefficiency in schools that, if eliminated, would release substantial funds for genuine improvements in the operation of



schools, but there also is a case for holding down funding increases to force schools to adopt a more disciplined approach to decisionmaking. Schools must evaluate their programs and make decisions with student performance in mind and with an awareness that trade-offs among different uses of resources are important [35, p. 30].

### ***Material Resources***

Fiscal resources can be used to purchase an array of material resources in order to produce educational outcomes, including facilities (buildings, science and computer labs, etc.), smaller schools and classes, instructional materials (textbooks, computers and software, Internet services, etc.), and personnel (teachers, support staff, and administrators). Economists attempt to determine what material resources contribute to educational outcomes by estimating educational production functions. By attempting to measure all of the resources used in the educational process and estimating the relationship between these resources and educational outcomes, these studies attempt to find which resources matter. Of course, educational production studies have a number of methodological limitations, including inadequate measures of all of factors that contribute to educational outcomes and that the estimated relationships between inputs and outputs are correlational, not causal. Despite the fact that more than 400 studies have been conducted, there is very little consistent evidence on which material resources affect student outcomes [20,31,32].

One of the most studied and controversial resources, and the one that represents the largest expenditure, is teachers. More than half of public school expenditures are spent directly on instruction [36, Table 156]. Yet while most scholars agree that teachers have a considerable influence on student

achievement, they disagree on what specific characteristics of teachers matter. Two types of teacher characteristics have been examined in the literature. The first has to do with teacher background characteristics, including degrees and coursework, credentials, and experience. These characteristics are typically used to make hiring decisions and determine teacher salaries, thus they can be considered to be material resources because schools have to spend more fiscal resources to hire teachers with more experience and advanced credentials. Although a large number of studies have examined the impact of teacher background characteristics on student achievement [25,37,38,39], many of these studies suffer from methodological limitations, including a lack of control for student background characteristics prior to entering the classroom. A recent review of the research, which focused only on 21 studies that controlled for students' prior achievement and socioeconomic status, found evidence that "students learn more from teachers with certain characteristics," particularly teachers from higher ranked colleges and higher test scores, but the evidence is inconclusive regarding the effects of degrees, coursework, and certification, except in the case of high school mathematics [38, p. 107]. This study suggests that the teacher background characteristics typically used to determine salaries have little systematic relationship to student achievement.

Two California studies provide mixed support for the role of school resources on student achievement. One recent California study found that several resource variables—the student-teacher ratio, the proportion of teachers with full credentials and teachers with bachelors' degrees in the subject area that they taught, and the mean teacher salary in the school—had no significant, independent effects on high

school graduation rates after controlling for student demographics [19]. Nonetheless, there is at least some evidence that some background characteristics affect student achievement in California. A large study of student achievement in California found that teacher experience, teacher credentials, and, in the case of math, subject-matter authorization, was positively associated with middle and school achievement in California [40, p. 190].

Teacher resources can also be used to reduce class size, which requires hiring more teachers. A recent review of research literature found that small classes generally improve student achievement, although the impact varies in a nonlinear fashion [41,42]. There is also little research on the effects of small classes in high school. A major study of student achievement in California found no effect of smaller classes on student achievement in high school [40].

Another material resource is school facilities. Fifteen percent of California high school students attend overcrowded schools [43, Table 5]. Overcrowded high schools are more likely to use year-round calendars to accommodate all their students. A recent study of California high schools found that the odds of graduating for students who attended year-round high schools were half of those who attended high schools on regular calendars, controlling for students' family and academic background of these students [19]. This finding is consistent with two recent studies of year-round schools in California that found differential resources and outcomes in multi-track, year-round schools [44,45]. These findings are at odds with a recent review of the national research literature which found that districts with modified calendars generally have higher performance than comparable districts on traditional calendars, although the same review found little effect at the secondary level [46].

### *Human Resources*

The existing research literature finds limited support for the impact of fiscal and material resources on student outcomes. Yet if there is widespread agreement that teachers and schools vary widely in their effectiveness, there must be other types of resources that distinguish between more effective and less effective teachers and schools. Cohen, Raudenbush, and Ball [47] argue that conventional school resources—such as teachers' formal qualifications, books, facilities, and time—only offer the capacity to improve teaching and learning, but to do so requires the teachers' *personal resources*, which they define as their will, skills, and knowledge:

The instructional effects of conventional resources depend on their usability, their use by the agents of instruction, and the environments in which they work. When added conventional resources appear to directly affect learning, it is because they are useable, because teachers and students know how to use them, and because environments enable or did not impede their use... If these ideas are correct, then when added resources lie outside the range of teachers' and students' knowledge, norms, and incentives, they will have no discernible effect [47, p. 132].

Similarly, Newman [48] argues that teachers need to have a range of commitments and competences to guide practice and improve student achievement. The concept of human resources is consistent with the economic concept of human capital, which includes cognitive and noncognitive (perseverance, motivation, and self-control) skills [49]. It is also consistent with the literature on policy implementation, which has found that “policy success depends on two broad factors: local capacity and will” [50, p. 172].

### ***Social Resources***

A final dimension of resources critical for effective teaching and learning are the resources embedded within schools that provide the institutional norms, incentives, and supports necessary for human resources to be realized or activated. A number of case studies have found that *social resources*, which represent the social relationships or ties among students, parents, teachers, and administrators, are a key component of effective and improving schools [51,52,53,54,55]. In their in-depth study of school reform, Chicago, Bryk and Schneider [53] argue that one particular social resource necessary for school improvement is *relational trust*, which represents the reciprocal, social exchanges among all the participants in the schooling enterprise that depend on respect, competence, personal regard for others, and integrity:

We view the need to develop relational trust as an essential complement both to governance efforts that focus on bringing new incentives to bear on improving practice and to instructional reforms that seek to deepen the technical capacities of school professionals. Absent more supportive social relations among all adults who share responsibility for student development and who remain mutually dependent on each other to achieve success, new policy initiatives are unlikely to produce desired outcomes. Similarly, new technical resources, no matter how sophisticated in design or well supported in implementation, are not likely to be used well, if at all [53, p. 144].

Hoy, Tarter, and Hoy [56] suggest that there are three social resources in schools—all of which reflect the collective views of teachers—that affect student achievement: an academic emphasis, collective efficacy, and trust in parents and students. Other

institutional characteristics and resources may be necessary to develop and sustain an adequate level of social resources in schools, including a small size, more participative organizational structures, effective leadership, and district support [48,57,55].

### ***Student Characteristics***

The social composition of students in a school, sometimes referred to as contextual effects, can influence student achievement above and beyond a student's individual social background [59]. Studies have found that the social composition of schools predicts school engagement, achievement, and dropout rates even after controlling for the effects of individual background characteristics of students [60,61,62]. One measure of school composition, the mean SES of the student body, has generally shown a positive and significant effect on student achievement [63,64,65]. However, its impact on dropout rates has been inconsistent, with some studies showing similar impacts [12,62,66,67], while other studies finding no significant impacts [60,68].

One California study found two measures of student composition—the percentage of students on free and reduced lunch and the percentage of English-learners—were associated with lower student achievement in grade 11 [40, p. 186]. Another California study found that students attending high schools with higher proportions of low-achieving students were less likely to graduate from high school [19].

### ***Structural Characteristics***

Structural characteristics also represent features of schools that are generally determined by forces outside of the school itself. These include the school's location, size, and type of control, such as whether the

school is a comprehensive high school, charter school, or alternative school.

One structural characteristic is school location. One California study found that the percentage of 11<sup>th</sup> grade students scoring above the 50<sup>th</sup> percentile was 5-6 percentage points higher reading and 4 percentage point higher for in math students attending suburban schools compared to students attending either rural or urban schools, net of other inputs such as teacher characteristics [40, p. 189].

There has been a great deal of recent interest in creating alternative structures to the comprehensive high school. California operated 1,425 such schools in 2005-06 [7]. One category consists of an array of alternative schools, which include magnet schools, continuation high schools, and alternative day schools run by county offices of education.. Some of these schools serve students who, for a variety of reasons, are not successful in the traditional comprehensive high school. Another category consists of charter schools, which were first established in California in 1993 as way to establish public schools that could operate exempt from most California State laws governing other public schools and districts.<sup>d</sup> In 2005-06, there were 271 charter high schools in California, enrolling 76,463 students, a dramatic increase from 2000-01 when there were 87 charter high schools serving 30,444 students [7]. Despite the growth of non-traditional high schools, particularly charters, both nationally and in California, there is no research evidence that these structures are more effective than traditional high schools after controlling for the characteristics of the students served [69,70]. One recent California study found that neither alternative schools nor charter schools had significantly higher high school graduation rates after controlling for the characteristics of students [19].

More recently, there has been considerable interest in another structural feature of schools, school size. While some correlational studies have found that large schools have significantly lower test scores and higher dropout rates than middle-sized or smaller schools [11,71], other studies have found no significant impact of school size overall (e.g., [61,72]) or a significant impact only on lower SES schools [62]. One recent study found that while dropout rates were higher in larger schools, students in larger schools also had higher achievement growth rates [12]. A recent California study found that high school size had no effects on student achievement [40]. Although correlational studies are mixed, evaluations of a number of comprehensive school reform models have found that they all are based on “small learning communities” of students and teachers [73].

### ***School Practices***

Despite all the attention and controversy surrounding the previous factors associated with school effectiveness, it is the area of school processes that many people believe holds the most promise for understanding and improving school performance. Although it may be costly and difficult to increase school inputs that improve student performance, it may be relatively easier to improve school practices—how they are organized and managed, the teaching practices they use, and the climate they create for student learning.

A number of school policies and practices have been shown to affect school performance. Some studies have found that school organizational practices, such as decision-making practices (including teacher and parental involvement in decision-making), impact student achievement in middle and high schools (e.g., [10,65,74,75]). Other studies have found that teachers’ expectations and efficacy as well as their

instructional practices impact student learning in high school [12,65,76]. Still other studies found that an array of indicators related to the social and academic climate of schools—such as the number of advanced academic courses taken by

students, the amount of homework done by students, and teachers' interest in students—impact a number of school performance indicators, including student achievement, engagement, and dropout [9].

## What Features of High Schools Can Address the Achievement Gap?

Research has found that a wide array of factors predict high school outcomes. But this information is not sufficient to reduce the achievement differences among schools. To reduce achievement gap, it is also necessary to find the answers to two additional questions: 1) what is the relative importance of these factors? and 2) what is the relative distribution of these factors among California high schools?

The need to answer to the first question is straightforward. It is clearly useful to know which factors are relatively more important in influencing school performance so that effort can be made on improving those factors that have the most influence. Of course some factors may be easier and less expensive to change than others. It may be easier to improve school resources, for example, than to change the social composition of schools. Yet because many of these factors are related to each other, it may not be easy to change one factor independently of the other. For example, both school resources and some school practices are highly correlated with student composition, as we show below. To the extent that such characteristics are “triggered” by the social make up of the students served—that is, educators and school officials consistently respond to high concentrations of poor, minority students with lower expectations and a less challenging curriculum—then attempts to alter those characteristics absent changes in student composition may be difficult at best.

The need to answer the second question may be less straightforward. To alter achievement differences among schools, it is not only necessary to know the relative importance of factors that influence school performance, but also the relative distribution of those factors among the schools. For example, even if teacher resources have a powerful impact on school performance, they may have little impact on the achievement differences among schools if they are distributed fairly evenly among schools. Similarly, even if some factors are distributed unevenly among schools, those factors may contribute little to achievement differences if they are a relatively weak impact on school performance. Sociologist James Coleman [77] made this observation more than forty years ago:

...equality of output is not so much determined by equality of the resource inputs, but by the power of these resources to bring about achievement [77, p. 223].

In the largest and most widely known study of school effectiveness, Coleman examined three types of school inputs—the characteristics of the student body, the characteristics of the teachers, and the facilities and curriculum of the schools [63]. The study found that the distribution of these inputs among schools was in reverse order of their importance in affecting student achievement: the input that mattered most—the characteristics of the student body—was the least equitably distributed among schools in the U.S., whereas the input that

mattered least—the facilities and curriculum—was the most equitably distributed, while the distribution and impact of teachers were in between.

### ***A California Example***

One recent California study provides a useful example and recent replication of Coleman’s analysis [40]. The study first examined the distribution of several school inputs and practices—students, school and class size, teacher preparation, and high school curriculum—among high schools in California. The student then analyzed the extent to which changes in the distribution of these factors would produce changes in high school student achievement in 11<sup>th</sup> grade in 1998.<sup>e</sup>

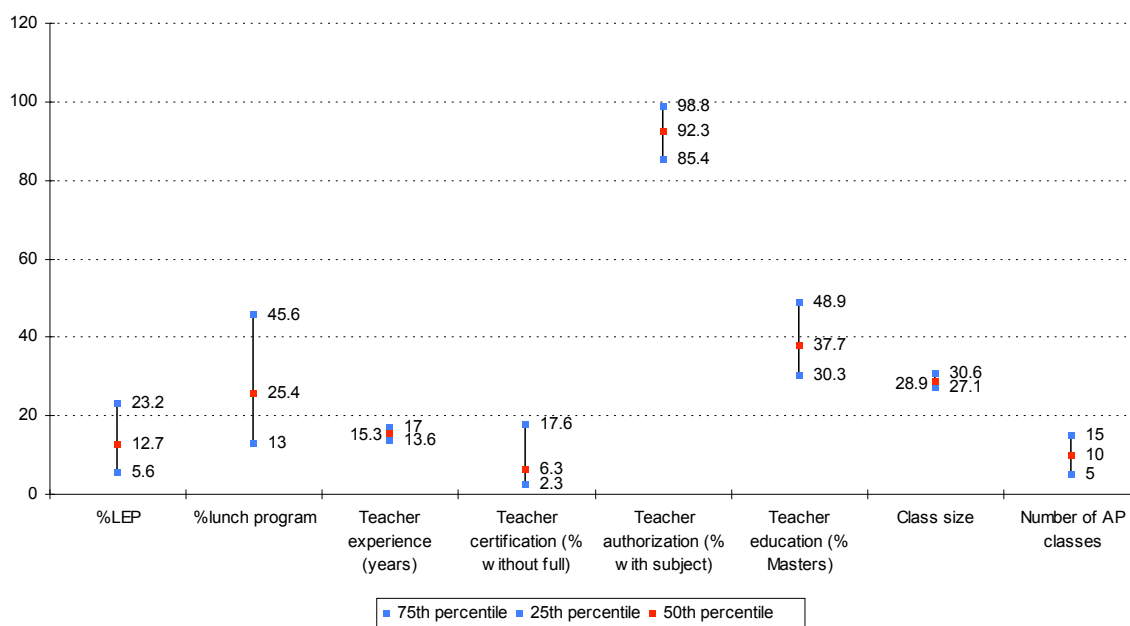
Figure 3 shows the distribution of several inputs and practices. The three points on each bar represent shows in the bottom quarter (25<sup>th</sup> percentile), middle (50<sup>th</sup> percentile), and top quarter (75<sup>th</sup> percentile) of the distribution of regular high schools in California. For example, the data show that the “average” high school has an enrollment of 12.7 percent EL students, but schools in the bottom quarter of the distribution enroll 5.6 percent EL students and schools in the top quarter of the distribution enroll 23.2 percent EL students. Schools also vary widely in the percentage of students who participate in the school lunch program—from 13 percent in the bottom quarter to almost 50 percent in the top quarter. Schools vary less widely with respect to teacher resources. Teacher experience, for example, ranges from 13.6 years in the bottom quarter of high schools to 17 years in the top quarter of high schools. There is more variability in the percentage of teachers without full certification—ranging from 2.3 percent to 17.6 percent. There is little variation in class size, but substantial variation in the number of AP classes—a school at the bottom

quarter offers five classes, on average, while a school in the top quarter offers 15 classes.

What would happen if the distribution of these inputs and practices were more equal? Again, the answer depends on the relative impact of these factors on student achievement. So the second part of the study estimated how much student achievement would change if schools at the bottom of the distribution looked like schools at the top of the distribution. More specifically, the authors estimated the change in the percentage of students scoring above the 50<sup>th</sup> percentile on standardized achievement tests in reading and math associated with a change in the level of school inputs and practices from the 25<sup>th</sup> to the 75<sup>th</sup> percentile. The results are shown in Figure 4.

The results show that the biggest change in student achievement was associated with a change in the percentage of students participating in the school lunch program. A change from a low-SES to a high-SES school would increase the percentage of students scoring above the 50<sup>th</sup> percentile by more than 12 percentage points. The next biggest change in student achievement was associated with changing school location from an urban setting to a suburban setting (5.9 percentage points. Of course, schools have no control over their location and little control over the demographic characteristics of their students.

What can be altered are the teacher resources. The estimates suggest that for math, the biggest impact would be increasing teacher experience, which would raise student achievement by 3.1 percentage points. The estimates suggest that for reading, the biggest impact would be to increase the percentage of teachers with full certification. It is interesting to note that the estimates suggest increasing school size would increase student achievement,



Source: Betts, et al., 2000.

*Figure 3: Distribution of selected high school inputs and curriculum*

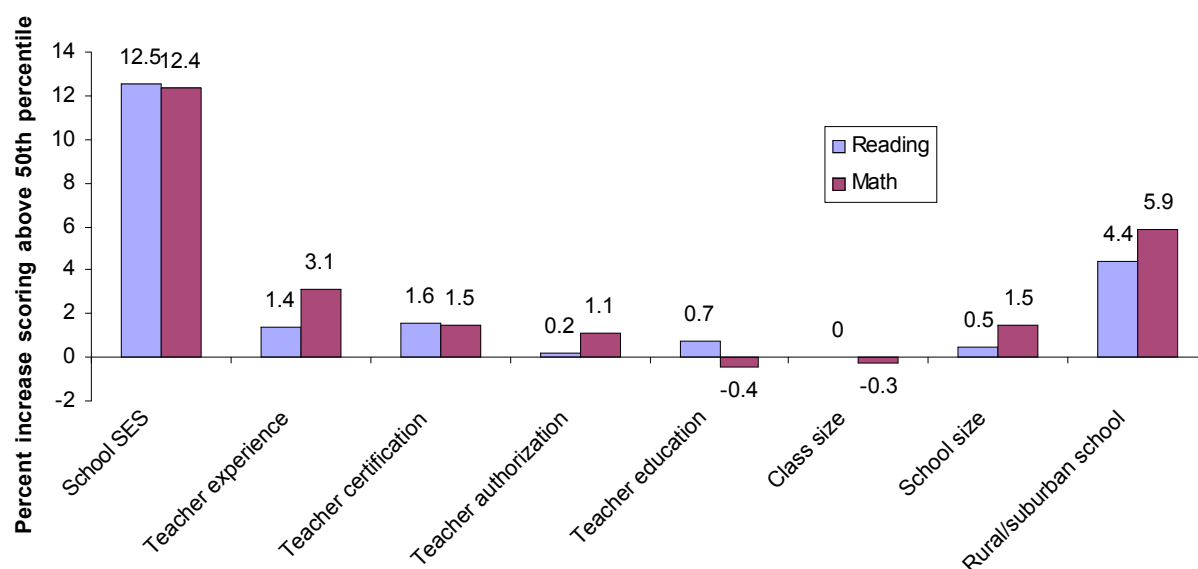
especially for math. This could reflect the fact that, as the study found, there were more college preparatory courses in larger schools than smaller schools, and those differences were larger than the differences below low-SES and high-SES schools [40, p. 135].

In summary, this study found results similar to Coleman's study conducted more than 30 years earlier: the factor that had the largest impact on student achievement—the SES of the student body—was the most unequally distributed feature of the high schools in California and the factor that had the least impact was class size, with teacher resources in between.

It should be pointed out that this study only examined differences between schools at the

25<sup>th</sup> and 75<sup>th</sup> percentiles. The data show much larger differences between schools at the 5<sup>th</sup> percentile—the roughly 45 high schools at the bottom of the distribution—and the schools at the 95<sup>th</sup> percentile—the top 45 high schools.

In addition, other features of school performance may also be unequally distributed. For example, a recent study of learning conditions in California high schools found that schools with high concentrations of underrepresented minorities (Blacks, Hispanics, and Native Americans) were almost three times more likely to be overcrowded as schools with low concentrations of such students [78].



SOURCE: Betts, et al., 2000.

Figure 4: Achievement impact of altering high school inputs

## Challenges and Limitations

This paper examined a host of factors that influence high school performance. Identifying those factors is an important first step in developing a strategy for reducing the high school achievement gap. Yet some of the most powerful factors may be beyond the ability of policy to readily address. In particular, the most powerful factor influencing high school performance appears to be the SES of the student body. This was the conclusion reached by sociologist James Coleman in his landmark study of school effectiveness more than 40 years earlier. It is also consistent with more recent studies, both nationally and in California.

Yet other factors may be more readily addressed by public policy. In particular, the efforts should focus on providing more experienced and fully certified teachers in the most disadvantaged high schools. In the

case of math, providing more teachers with authorization to teach math would also improve student outcomes in those schools.

Beyond altering school inputs, research also suggests that changing school practices could also improve student outcomes. Rigorous evaluations of comprehensive high school reform models suggest a number of features of effective high schools [79]:

- A personalized learning environment for both students and teachers;
- Rigorous and relevant instruction;
- Supports for such students that address both with social and academic needs;
- Connections to the real world to better engage students.

One strategy the state could pursue would be to implement proven comprehensive school



reform models in California's lowest performing high schools. Such high schools have high concentrations of racial and ethnic minorities and ELs [78]. So targeting those high schools would help reduce the achievement gap. Yet such a strategy would require at least some additional resources as well as the support of school districts and the state, which presents an additional challenge [80,81].

Finally, there are limitations to how much high schools can address the achievement gap. There are already large disparities in achievement long before students enter high school. In fact, there are already large disparities in achievement when students first enter kindergarten [82]. To address the achievement will require a concerted effort to not only to reduce disparities in resources and opportunities within all levels of the educational system, but also to reduce disparities in family and community

resources [3]. This is an immense challenge, one recognized by James Coleman more than 40 years ago:

In some part, the difficulties and complexity of any solution derived from the premise that our society is committed to overcoming, not merely inequalities in the distribution of educational *resources* (classroom teachers, libraries, etc.), but inequalities in the opportunity for educational *achievement*. This is a task far more ambitious than has even been attempted by any society: — not just to offer, in a passive way, equal access to educational resources, but to provide an educational environment that will free a child's potentialities for learning from the inequalities imposed upon him by the accident of birth into one or another home and social environment [83, p. 20-21].

## Developing a Statewide Strategy for Reducing California's Achievement Gap

How can research on effective high schools be used to reduce California's high school achievement gap? Four strategies could be pursued:

### **Redistribute School Resources**

One strategy would be to redistribute school inputs. To pursue this strategy not only requires information on which school inputs affect student achievement, but also their relative impact. One recent California study examined the distribution of several school inputs and practices—students, school and class size, teacher preparation, and high school curriculum—among high schools in California, and the extent to which changes in the distribution of these factors would produce changes in on high school student achievement in 11<sup>th</sup> grade in 1998 [40]. The

study found that the factor that had the largest impact on student achievement—the socioeconomic status of the student body—was the most unequally distributed feature of the high schools in California, and the factor that had the least impact was class size, with teacher resources in between. One way to pursue this strategy would be to redistribute students among schools, through a policy of racial or socioeconomic integration, without necessarily attempting to either improve the average student achievement across schools or the size of the achievement gap within schools.

### **Undertake Comprehensive School Reform**

Another strategy would be to undertake comprehensive school reform in California's

lowest performing high schools. Rigorous evaluations of comprehensive high school reform models suggest a number of features of effective high schools [79]:

- A personalized learning environment for both students and teachers
- Rigorous and relevant instruction
- Supports for such students that address both with social and academic needs
- Connections to the real world to better engage students

Low performing high schools have high concentrations of racial and ethnic minorities and English learners. So targeting those high schools would help reduce the achievement gap statewide without necessarily reducing the size of the achievement gap within schools.

### ***Adopt Proven Programs Targeting Disadvantaged Students***

Instead of adopting school-wide programs to raise the achievement of all students, an alternative strategy is to adopt proven programs and target them to the most disadvantaged students within selected schools. For example, English learners (ELs) represent a large proportion of low performing students, so allocating resources or adopting programs targeting those students would raise the achievement of those students and help to close the achievement gap with non-EL students.

### ***Combine Comprehensive School Reform and Targeted Programs***

A final strategy would be to adopt comprehensive school reform models together with targeted resources and proven strategies for disadvantaged students. If such a strategy were adopted in low performing schools with high concentrations of disadvantaged students, it could help improve the achievement of all students and help close the achievement gap.

## **Adopting a Course of Action**

The relative effectiveness of these alternative strategies for reducing the size of the high school achievement gap in California depends upon three factors:

- The average student achievement across California high schools
- The size of the achievement gap within California high schools
- The distribution of students across California high schools

A simple simulation suggests that the fourth strategy mentioned above is likely to have

the biggest impact on reducing the achievement gap in California. But a more detailed analysis is necessary to provide a more precise estimate of the impact of these strategies. Beyond these technical considerations, it is also important to consider the institutional capacity and political feasibility of pursuing these various strategies. For example, there may be much less political support for policies designed to promote student integration than policies to target additional resources and programs on low performing high schools.

## Policy Recommendations

This analysis leads to a number of policy recommendations:

### ***Conduct a Detailed Analysis of the Achievement Gap in California High Schools.***

To better address the high school achievement gap in California requires better information on the size and nature of the achievement gap statewide. While the state collects information on the average student achievement across all California high schools and the size of the achievement gap within all California high schools, it would also be useful to know how much of the achievement gap statewide is related to both of these factors (i.e., how much can be attributed to between-school versus within-school differences in students' achievement). Such information would help determine the relative effectiveness of the various strategies for reducing the achievement gap.

### ***Collect and Synthesize Research Evidence on Effective High School Reform Models***

To reduce the achievement gap will require adopting proven reform models and strategies. A number of private and public agencies have conducted evaluations of effective programs and reviewed the quality and nature of this research evidence. The state should collect and synthesize this

research evidence so that it provides a guide to adopting reforms in selected, low performing high schools. The state should also consider synthesizing this information into a set of *high school reform standards* based on research from comprehensive school reform models with proven effectiveness in raising high school achievement, along with implementation timetables and benchmarks that can serve as blueprints for low performing schools [84].

### ***Undertake Trial High School Reform Models in “Lighthouse” School Districts***

The state should recruit “lighthouse” school districts that have multiple low performing high schools to implement these high school reform standards [84]. The state would help recruit qualified external providers to work with the school districts. The district and the provider would develop a plan to implement the reforms based on the standards and implementation timetables. In exchange, the districts would be granted 1) waivers to use specified categorical state funds to support their reform efforts, and 2) temporary waivers from existing accountability sanctions during the initial implementation of the reforms. The state would evaluate the implementation and impacts of the reforms and, to the extent they were successful, they could be adopted in other districts.

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## Notes

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<sup>a</sup> See: <http://www.cde.ca.gov/eo/in/pc/>

<sup>b</sup> Data obtained from Dataquest. Retrieved February 17, 2008, from: <http://data1.cde.ca.gov/dataquest/>

<sup>c</sup> Data obtained from the California Postsecondary Committee. Retrieved February 25, 2008, from: [http://www.cpec.ca.gov/OnLineData/CACGR\\_API.asp?Year=2006](http://www.cpec.ca.gov/OnLineData/CACGR_API.asp?Year=2006)

<sup>d</sup> See: <http://www.cde.ca.gov/re/di/or/division.asp?id=csd>

<sup>e</sup> For a discussion of the limitations of this study, see: Betts, et al., pp. 173-174.