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High-Stakes Accountability and Equity: Using Evidence From California's Public Schools Accountability Act to Address the Issues in *Williams v. State of California*

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In May 2000, a class action lawsuit on behalf of California's public school students, Williams v. State of California, *was filed in state court in an effort to make the state address inequities in its public schools. The central issue of the case was students' access to the "bare essentials" of public education: qualified teachers, current textbooks, and adequate and safe facilities. The author analyzes the relationship between school and district characteristics and the base year of the Academic Performance Index (API), the state's main measure of school performance, focusing on variables related to the main issues in the* Williams *case. The findings support the plaintiffs' arguments that the basic educational necessities targeted by the case should be the object of state policy in conjunction with accountability policies.*

KEYWORDS: accountability, equity, school-finance litigation.

On May 17, 2000, the 46th anniversary of the Supreme Court's decision in *Brown v. Board of Education* outlawing racial segregation in public schools, a class action lawsuit, *Williams v. State of California,* was filed on behalf of California's public school students in an effort to make the state address some of the inequities in its system of public education (Purdum, 2000; Rosenbaum et al., 2000a). Represented by a coalition of public interest law firms, civil rights organizations, and private law firms, the plaintiffs alleged that the state is legally responsible for ensuring that all children in the state

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have access to the "bare essentials required of a free and common school education"—qualified teachers, current textbooks, and adequate and safe facilities (Rosenbaum et al., 2000b, p. 6). The plaintiffs further argued that the disparities in access to educational resources that they documented were fundamentally unfair in the context of the high stakes accountability program that California initiated in 1999 with the Public Schools Accountability Act (PSAA) and subsequently expanded to include a high school exit exam (Rosenbaum et al., 2000b). As I will explain in more detail below, the *Williams* case can be viewed as an effort both to affirm the promise of equal educational opportunity that is at the heart of the *Brown* decision and to address the continuing reality of deep inequities in public education that have proved resistant to legislative and judicial action (e.g., Carey, 2003; Harris, 2004; Haycock, 1998, 2000; Powers, 2004).

Since the inception of the lawsuit, the state of California has expended considerable resources fighting the *Williams* case in court. After unsuccessfully attempting to have the case dismissed, then-governor Gray Davis counter-sued the 18 districts represented in the original lawsuit, arguing that the inequalities in educational conditions documented by the plaintiffs were a local rather than a state responsibility. The presiding judge ruled that the latter lawsuit should be postponed until a decision was reached on the original lawsuit (Cooper, 2001; Egelko, 2000). By May 2003, a *San Francisco Chronicle* newspaper story reported that the state had spent approximately $18 million fighting the case using the services of a private law firm (Asimov, 2003; Asimov & Williams, 2001). When Governor Arnold Schwarzenneger took office in 2003, the state's strategy shifted from fighting the lawsuit to settling it. In August 2004—more than 4 years after the original lawsuit was filed—Governor Schwarzenneger's administration settled the lawsuit, noting the merits in the plaintiffs' claims. The settlement includes almost $1 billion in funding for low-performing schools, to be directed toward providing students in those schools with highly qualified teachers, standards-aligned instructional materials, and safe and adequate facilities. In addition, the agreement also contains provisions for increased state oversight of the educational resources at issue in the case. Although the programs and policies generated by the settlement have yet to unfold, it nonetheless represents an important turning point in the struggle for educational equity in California.

Purpose of the Study

In this article, I use the data generated by the Public Schools Accountability Act (PSAA) to address the issues raised by the plaintiffs, their expert witnesses and the responses by the state's experts. More specifically, I analyze the relationship between the school resources identified in the *Williams* case—teachers, textbooks, and facilities—and the state's main measure of school performance. The cornerstone of the PSAA is the Academic Performance Index, or API, the summary score assigned to each school in the state, ranging from 200 to 1,000. The API is calculated from the results of the state-

mandated standardized tests administered to students in Grades 2–11 in the spring of each school year.

The point of the present analysis is not to critique standardized testing per se. At present, standardized tests and indicators of school performance are a firmly entrenched part of the political landscape that public schools must navigate as a result of both federal and state policies. In 1999, California and 26 other states either categorized or ranked their public schools by using standardized test results (Education Commission of the States, 2000). By the end of 2003, California had released 5 years of school rankings. Since the No Child Left Behind Act (NCLB) was passed in 2002, states have been required to develop standards, administer tests aligned with those standards, and expand implementation, such that by 2005–2006 every student in Grades 3–8 will be tested in reading and math. States, districts, and schools must also make adequate yearly progress toward reaching standards. Given this political context, the API data from California represent a crucial litmus test for this type of accountability policy. Even in the early stages of its accountability program, California exceeded the *testing* requirement in NCLB. Schools in California have been ranked in this manner for 5 years, and since the inception of the API, growth targets have been calculated for each school.[1]

Thus, although many researchers have made cogent critiques of the enterprise of standardized testing and the limits of what it can tell us about student learning (for examples, see Haney, 2000; Lucas, 2000; Valenzuela, 2000; see also Scheurich, Skrla, & Johnson, 2000, and a response, Valencia, Valenzuela, Sloan, & Foley, 2001), this measure of school performance has been institutionalized within state policy. However flawed it may be, the API has important political consequences for schools—consequences that cannot be ignored, particularly by students and teachers who learn and work in schools identified as "underperforming" on the basis of this measure (for a specific critique of the API, see Russell, 2002). My aim in this article is to show that a strong argument can be made for equity by marshaling the very data that dominate the political discourse about public education. Moreover, despite our qualms about measures of school performance, they are also a major component of the legal debates involved in the *Williams* case, about the efficacy of policies to increase equity in public schooling. As I discuss in more detail below, the plaintiffs argued that the state's system of accountability based on school rankings is fundamentally unfair, given the systematic inequalities that they documented in California's educational system. Likewise, the state's experts have used the API data and other indicators of school and student performance to argue that there is little empirical support that increased spending on the school resources identified in the case would increase student achievement (e.g., Hanushek, 2003; Hoxby, 2003; Raymond, 2003; Rossell, 2003; for a detailed critique of the Hanushek, Hoxby, and Rossell analyses, see Lucas, 2003; for a detailed critique of the Raymond analysis, see Powers, 2004).

There are three main categories of variable in the analysis: (a) variables related to students' socioeconomic backgrounds; (b) variables related to the main issues in the *Williams* case—teachers' credentials, experience, and

educational attainment; the school calendar as the best available proxy for adequate facilities; and district textbook expenditures; and (c) school and district-level control variables such as student–teacher ratio, school size, the size and locale of the school district, a measure of districts' instructional expenditures, and the districts' tax base per student. The first category comprises variables that can distort a straight ranking of schools, given the long and well-documented relationship between students' social backgrounds and academic achievement, and that are also largely beyond the individual school's control (Lipsitz, 1998). The latter category is likewise important to include in the analysis to ensure that the findings related to the *Williams* variables are robust, that is, that the observed effects are not systematically related to school and district characteristics. I contextualize this analysis in three ways. First, I provide an overview of equity-oriented school finance litigation in California. Next, I provide a brief overview of California's Public Schools Accountability Act. Third, I provide an overview of the relevant research related to the relationship between school resources and student achievement.

Contextualizing *Williams*: A Brief History of Equity-Oriented School Financing Litigation

Since the early 1970s, California has been at the forefront of equity-financing litigation as a result of the *Serrano* lawsuits and the judicial and legislative action they generated. The *Serrano* decisions were the outcome of one of the earliest class action lawsuits to challenge patterns of school financing in the state courts. Before the *Serrano* decisions, most of the funding available to a school district in California was a function of the district's property wealth and the locally determined tax rate. Although the state legislature set maximum tax rates, they were subject to voter overrides. As a result, most districts' tax rates were higher than the maximum allowed by state law (Elmore & McLaughlin, 1982). Although the state provided funds to offset the disparities in tax revenues per pupil, large variations across districts remained.

The lawyers who filed the original *Serrano* lawsuit in 1968 on behalf of John Serrano, a social worker who had moved from East Los Angeles to the suburbs to better educate his sons, drew from an expansion of legal scholarship in the mid-1960s concerned with promoting equity in school financing. At the time, three main proposals were being staked out in what was an emerging literature: educational need, equality of outcomes, and fiscal neutrality (Elmore & McLaughlin, 1982). The educational need argument held that systems of school financing should be evaluated on the basis of how well they met the needs of individual children, which encompassed not only equal financing across districts but also additional funds for compensatory education if necessary. Advocates of the educational outcomes proposal argued that state financing systems should ensure not simply equal funding, but equal outcomes. Proponents of the fiscal neutrality, or the power-equalization proposal, contended that districts with the same tax rates should have the same amount of money to spend on education regardless of the

districts' overall wealth; the state's role is to equalize both resources and the tax burden among districts (Coons, Clune, & Sugarman, 1970).

In the early complaints filed in the *Serrano* case, the arguments described above were used by the plaintiffs' lawyers to provide the broadest possible theoretical and constitutional justifications for challenging the state's school financing system (Elmore & McLaughlin, 1982). However, an earlier lawsuit in federal court, *McInnis v. Shapiro,* was decided as the *Serrano* case was moving through the California state court system. In *McInnis,* the federal court rejected the educational need argument, a decision that was later affirmed by the U.S. Supreme Court in March 1969, with the consequence that the *McInnis* decision was now binding on federal and state courts (Elmore & McLaughlin, 1982). As a result, the *Serrano* lawyers decided to focus their own claim around the fiscal neutrality argument for school finance reform, a strategy that was ultimately successful.

Decided in 1971, *Serrano v. Priest*—known as *Serrano I*—was a preliminary decision that returned the original case that had been dismissed without a full hearing to the Los Angeles County Superior Court. However, the California Supreme Court's decision in *Serrano I* also set the parameters for the constitutional questions to be considered at the full trial (Elmore & McLaughlin, 1982). In *Serrano I,* the court noted that although not setting a direct precedent for the issues in *Serrano,* the decision in *Brown v. Board of Education* (1954) established the "fundamental importance of education" in American society because it highlighted the relationship between education and key social outcomes: citizenship, the inculcation of cultural values, and individuals' economic and social opportunities (*Serrano v. Priest,* 1971). Because education is a "fundamental interest," the court held that a higher level of judicial scrutiny was warranted, whereby the state was required to prove that the policy in question—the state's school financing system—served a compelling state interest. After an initial decision by the Los Angeles County Superior Court in 1974, the case went directly to the California Supreme Court; *Serrano II* was announced in December 1976. Between the California Supreme Court's two *Serrano* rulings, the U.S. Supreme Court ruled, in *San Antonio Independent School System v. Rodriguez* (1973), that education was not a "fundamental interest" because it was not a right guaranteed by the U.S. Constitution. However, in *Serrano II,* the California Supreme Court argued there were adequate grounds in the California state constitution to reaffirm its holding in *Serrano I* that education is a "fundamental interest" and subject to protection under the provisions that are "substantively equivalent" to the Equal Protection clause in the U.S. Constitution.

Between the two decisions, in Senate Bill (SB) 90, the California state legislature established the revenue-limit system of school financing whereby districts were limited to a specific level of per-pupil spending tied to their state and local revenues in 1972–1973, divided by their average daily attendance, or ADA (Elmore & McLaughlin, 1982; Goldfinger, 1999). In subsequent years, this figure would be adjusted for inflation so that high-wealth

districts received a lower inflation factor than low-wealth districts, with the goal of making revenue limits across districts more equal over time. However, the legislature maintained the provisions in the law that allowed districts to override the statutory limits by majority vote. Implementation of the new funding system proved problematic because of a combination of high inflation, a rapid rise in property values, and a decline in student enrollment (Elmore & McLaughlin, 1982). In *Serrano II,* the Los Angeles Superior Court ruled that the new financing system was unconstitutional because it would not close the spending gaps between districts quickly enough. The court returned the issue of school financing to the legislature, with the stipulation that the new system should reduce "wealth-related disparities" to less than $100 per student (Elmore & McLaughlin, 1982; Goldfinger, 1999). This component of the lower court's decision was upheld by the California Supreme Court 2 years later in *Serrano II.*

More than a year and a half later, Assembly Bill (AB) 65 was the compromise reached by the legislature and Governor Jerry Brown, who took office shortly after *Serrano II* was announced. Many of the basic outlines of the revenue limit system established in the earlier legislation remained in place. AB 65 also included provisions meant to increase the equity in financing across districts by setting minimum tax rates for high-wealth districts and "recapturing" the funds that exceed the districts' revenue limits and increasing state aid to poorer districts (Elmore & McLaughlin, 1982; Schrag, 1998). However, Proposition 13—a ballot measure passed by voters that froze property taxes at 1% of 1975 property values with minimal increases for inflation[2] and prevented state and local governments from passing new property taxes—neutralized AB 65 by reducing the funds available for schools and other government-provided services. As a result, districts were unable to raise the revenues needed to reach their AB 65 spending levels. Although the state legislature adopted measures to contain the effects of Proposition 13 by providing funds to districts on a sliding scale, so that a district's net budget cuts would range from 9% to 15% on the basis of their relative expenditures, Proposition 13 had the effect of "leveling down" high-wealth to low-wealth districts (Elmore & McLaughlin, 1982).

The legislative responses to Proposition 13 were challenged in the early 1980s in *Serrano III.* In that decision, the Superior Court adjusted the $100 band from *Serrano II* for inflation but also found that by 1982–1983 the state was in compliance with the *Serrano* mandate (Goldfinger, 1999). As a result, SB 813, a large-scale school reform bill passed in 1983, included a measure that phased out the differential inflation adjustments across districts and instead set them by the type of district (elementary, high, or unified). SB 813 also brought districts with below-average revenue limits to the statewide average in 1983–1984. Since SB 813, there were two periods when the state provided equalization aid, one in the late 1980s and one in the mid-1990s. In 1996–1997, the state provided three "rounds" of equalization aid whereby below-average districts were brought up to the state average, the state average was recalculated, additional equalization aid was provided, and the process was repeated (Goldfinger, 1999).

Starting in 1998–1999, the legislature changed the calculation of ADA so that it would no longer include excused absences; the legislature also recalculated the revenue limits so that districts would receive more funding per student to offset any decreases in funding that would result (EdSource, n.d.; Goldfinger, 1999). Goldfinger argued that because these adjustments were calculated on the basis of districts' 1996–1997 excused absence rates, depending on the extent to which districts' attendance patterns changed in subsequent years, the new formula had the effect of introducing new disparities among districts. As a result, "the tight grouping of base revenue limits that was achieved in the mid-1990s through successive rounds of equalization was blown up" (Goldfinger, 1999, ¶32). Although the legislature passed a new plan to equalize revenue limits in 2001–2002, this plan is currently unfunded (EdSource, 2003).[3]

Williams v. State of California is an effort to reframe the issue of school financing around the conditions of education rather than funding. The plaintiffs asked the court to "order the State to develop a system that prevents, detects, and cures unequal access to basic educational necessities" (Rosenbaum et al., 2002, p. 324). As noted above, the lawsuit focused on three specific conditions within schools and classrooms: the distribution of qualified teachers, the condition of facilities, and the quality and supply of textbooks. The plaintiffs' experts produced a range of papers documenting the inequalities in California schools in these three areas and their effects on educational outcomes (see the summary in Oakes, 2002a).

In their review of the history of school financing in California, plaintiffs' experts Norton Grubb and Laura Goe (2002) argued that whereas the *Serrano* case was an instance of the "old" approach to reforming school financing, which focused on "levels and patterns of spending," the *Williams* case is an instance of a "new" effort at reforming school financing, which focuses on "how dollars are actually used within classrooms and schools to produce desirable educational outcomes" (Grubb & Goe, 2002, p. 5). In this latter approach, the state is responsible for ensuring that resources are used appropriately. In contrast, until Governor Schwarzenneger took office, state officials argued not only that the state was addressing some of the issues raised by the case but also that school districts shared responsibility for addressing those concerns (Glater, 2003). Likewise, in reports prepared during Governor Davis's administration, the state's expert witnesses further argued that there was little empirical evidence to suggest that increased spending on the school resources identified in the case would increase student achievement and that, on the contrary, policies created to increase state oversight of those "inputs" would undermine local educational control, quite possibly at the expense of student achievement (e.g., Hanushek, 2003; Hoxby, 2003). One state expert analyzed a different subset of the API data used here to argue that the latter position was correct. However, that analysis suffered from a number of serious flaws in method (Raymond, 2003; see the critique of the analysis in Powers, 2004).

Overview of California's Public Schools Accountability Act of 1999

The PSAA Legislation and the *Williams* Case

In 1999, California began ranking its public schools on the basis of their scores on the API. That measure was constructed by using the results of the state-mandated standardized test administered to students in Grades 2–11 in the spring of each school year.[4] The API is the outcome of California's Public Schools Accountability Act of 1999 (SB X1), which authorized the Superintendent of Public Instruction and the State Board of Education to construct a metric to measure the performance of schools, comprised primarily of the results of the state tests. SB X1 also requires schools to meet a minimum growth target of 5% against a statewide target set by the Superintendent of Public Instruction and the State Board of Education (see the discussion of the API and the growth target in Russell, 2002). Until the budget crisis in California, schools that met their growth targets in the second and third years of the program were eligible for financial incentives;[5] schools that did not meet their growth targets were identified as under-performing and targeted for intervention.

In arguing that the state was responsible for educational equity, the plaintiffs focused on three main issues. First, they contended that the combination of the responsibilities conferred on the Superintendent of Public Instruction and the State Board of Education by the Public Schools Accountability Act; other features of the Education Code providing for the oversight and/or control of school districts' attendance and budgets by the Superintendent of Public Instruction, the State Board of Education, and other state agencies; and the overlapping responsibilities between these agencies implied that the state as a whole was responsible for addressing basic inequities in education (Rosenbaum et al., 2002). Second, they maintained that state policies on the key issues in the case—access to qualified teachers, up-to-date textbooks, and adequate and safe facilities—had been insufficient at best and at worse had exacerbated inequalities.[6] Finally, they claimed that the state was aware of the inequities in its educational system—much of the documentation for the lawsuit was drawn from state data and reports and newspaper articles. Given these three conditions, the plaintiffs further argued that by focusing exclusively on test scores, the accountability system generated in the wake of the PSAA was "indifferent to gross disparities in the opportunities and conditions for learning provided by the State's system of education to students in different schools and school districts" (Rosenbaum et al., 2002, p. 314).

In essence, the *Williams* case was an effort to broaden the definition of accountability embedded in the PSAA to include equitable access to productive learning environments, in contrast to the present system, in which accountability means little more than providing students with equal opportunities to be tested. One way to interpret the *Williams* case is that it was attempting to unmask what Varenne and McDermott (1998) identified as one

of the central cultural logics of American education—success/failure. More specifically, the notion that children and schools should be sorted into the categories of "success" and "failure" is deeply embedded in American culture. To make cultural sense of a student or school labeled as a "failure," we need "successful" students and schools to serve as an often unmarked reference point. "Legitimately identified success is made the ground against which failure stands out as 'the problem' " (Varenne & McDermott, 1998, p. 109). Standardized tests are one of the main instruments used for sorting students—and, by extension, schools—into the cultural categories of success and failure. Varenne and McDermott (1998) further argued that standardized tests also function as a set of cultural rituals that obscure the contextual factors that shape student performance. As formally scheduled and strictly timed events in which only materials and rules supplied by testing companies are used for the purpose of making *testing* conditions equal for all students, we might also understand standardized tests as a ceremony that directs attention away from the differences in resources and conditions across schools, differences that shape students' educational experiences from their first days of school until they pick up their pencils to fill in the bubbles on a standardized test.

The routine sorting and ranking of students and schools in California has intensified in recent years. Moreover, the consequences attached to the high-stakes tests administered annually to students are increasing; students in the class of 2006 are now required to pass a high school exit exam to receive their high school diplomas. By focusing attention on the conditions of learning, the plaintiffs in the *Williams* case argued that, given the extreme educational inequalities evident across the state's schools, these sorting practices deny the predominantly low-income and minority students attending underresourced schools the educational opportunities that are not only guaranteed by the California state constitution but also widely understood as the gateway to educational and occupational advancement. As middle school student and plaintiff Elly Rodrigues stated in her Declaration,

> I think it is unfair that we are told to go to school and learn and then we are given these old torn books to work with, an old building, and classrooms with rats and cockroaches. How can the school have these books and expect you to learn? I change my shoes when they get old and torn; shouldn't the school change my books also? How can they expect us to learn when we can't use the bathroom, or when we have to worry that there are mice, rats, or cockroaches everywhere. I don't think anyone should have to learn in these conditions. (2000, p. 2)

The API in Practice

The baseline year for the API was 1999. In the first years of the program, the API was constructed solely from the results of the state-mandated Stanford 9

assessment administered to all students in Grades 2–11 in California's public schools in the spring of each school year. Once the API score is calculated, schools are ranked on the basis of their API in two additional ways. First, all schools are ranked statewide solely by their API and then divided into deciles and assigned a number on that basis. Second, schools are ranked within cohorts of 100 schools that share similar characteristics on the basis of the following variables: pupil mobility, racial demographics, socioeconomic status (measured by percentage of students eligible for reduced-price or free lunch), teachers' credentials (percentage fully credentialed or emergency credentialed), percentage of English learners at the school, average class size by grade level, and type of school calendar (traditional versus year-round, multiple-track). This process forms the basis for an additional decile ranking, the Similar Schools Index (SSI). Thus there are three possible ways to compare schools: (a) the API score, which ranges from 200 to 1,000; (b) the score of 1 to 10 that a school is assigned on the basis of the raw API score; and (b) the score of 1 to 10 that a school is assigned on the basis of its performance in comparison to its cohort of similar schools. State documents describe the API as the main indicator of school performance and the SSI as an additional measure that provides "additional contextual information about a school's performance and progress" (Technical Design Group, 2000, p. 4). As a result, I use the raw API score as the measure of the dependent variable.

The base year API data are particularly important to analyze carefully because it was calculated on one of the earliest statewide administrations of the SAT 9 test. As a result, it is less subject to the test score gains that are associated with increased familiarity of the test as it is administered over time (Linn, 2000). The possibility of test score gains as a result of familiarity are a crucial consideration, given that the API is constructed by using a percentile rank metric such that in subsequent years, students in the highest-scoring schools will not raise school scores because they have "topped out" the index (Rogosa, 2001). As a result, the schools with the most room for improvement will experience the greatest increases in API scores over time.[7] Thus, 1999 represents a critical baseline for assessing the relationship between the API and the factors in the Williams case. In addition, the 1999 data are best for matching to the recently available Census 2000 data.

Empirical Background

The relationship between school resources and student achievement has been long debated; some of this research has been incorporated into the legal arguments for and against equity financing. One of the earliest—and most influential—studies to examine the relationships between student characteristics, school characteristics, and student achievement was the 1966 study conducted by James Coleman and his colleagues and reported in a document that has come to be known as the Coleman Report (Coleman et al., 1966). Among Coleman's most widely reported findings was that most

of the variation in student achievement occurred within schools rather than between schools; about 30% of the variation in student scores was related to differences across schools. Coleman also found that much of the between-schools variation in student achievement was attributable to student body characteristics, as opposed to various types of school resources. Similar results were obtained in a reanalysis of Coleman's data by Jencks and his colleagues (1972). To this day, researchers continue to debate the Coleman findings (see, e.g., Payne & Biddle, 1999; Turner, 2000), which suggested the intractability of the influence of social background on educational attainment. Thus Coleman's analysis has come to represent the opening salvo for a number of often intersecting debates about the relative influence of students' socioeconomic characteristics versus school resources on student achievement. In the sections that follow, I review some of the major areas of inquiry.

Teacher Characteristics

Coleman's study is also relevant for its analysis of the effects of teachers on student achievement, which he argued accounted for more variation than other characteristics of the school after variables measuring the characteristics of the student body (Coleman et al., 1966). Much of the current debate about the effect of teacher characteristics on student achievement in the research literature tends to focus on secondary education, where subject-specific training is more important. For example, Ingersoll (1999) documented widespread out-of-field teaching at the secondary school level. Fetler (1999) found that once student background characteristics were controlled, teacher training and experience were the strongest predictors of high school math achievement.

Other researchers have examined the relationship between teacher certification and student achievement. For example, using data drawn from the NELS:88, Goldhaber and Brewer (2000) argued that there is a positive and statistically significant relationship between the mathematics achievement test scores of high school students whose teachers hold standard certification as compared with students whose teachers have private school or no certification. However, Goldhaber and Brewer also found no difference in math and science achievement between students whose teachers held emergency credentials rather than standard credentials. Darling-Hammond, Berry, and Thoreson (2001) questioned these findings on the basis of the small sample size of the emergency-credentialed teachers and the relative similarity in training between the emergency-credentialed teachers and the teachers with standard certification (see also the review in Darling-Hammond, 2000). A quasi-experimental study of Teach for America teachers in five districts in Arizona (Laczko-Kerr & Berliner, 2002), which matched Teach for America and other under-certified teachers with fully certified peers, found that, on average, students taught by fully certified teachers had gains equivalent to 2 months of an academic year, as compared with students taught by under-

certified teachers. Vandevoort, Amrein-Beardsley, and Berliner (2004) reported similar findings in a study comparing the performance gains of students taught by National Board Certified Teachers (NBCTs) and non–National Board Certified Teachers in 14 Arizona school districts. In this case, students taught by NCBTs had greater performance gains on average than students taught by non-NBCTs that were equivalent to an additional 1.2 months of schooling.

Finally, many researchers have highlighted the unequal distribution of qualified teachers across schools. For example, Betts, Rueben, and Danenberg (2000) found wide disparities across California schools in the distribution of fully credentialed teachers, more experienced teachers, and more educated teachers in California (see also Goe, 2002). These patterns in the distribution of teachers across schools were also related to school socioeconomic status. Schools with higher percentages of noncredentialed, less experienced, and less educated teachers (i.e., no higher than a bachelor's degree) also tended to have greater concentrations of low-income students. Lankford, Loeb, and Wyckoff (2002) found comparable patterns in New York schools. Ingersoll's (2002) analysis of national data yielded similar findings (reported in Ansell & McCabe, 2003; see also Education Trust, 2004; Haycock, 1998, 2000, for a synthesis of these and other studies).

School Spending

There have been robust debates about the relative effect of school spending on student achievement and other outcomes (see Burtless, 1996). For example, in an analysis of 1992 NAEP data, Wenglinsky (1997) found that district spending on instruction and administration resulted in increased student achievement through class size reduction. Elliott (1998) found that school expenditures (measured at the district level) had a significant effect on math and science achievement. In the case of math achievement, school spending was associated with teacher education and experience, which suggested that the effect of increased spending on math achievement worked indirectly through teacher education and experience. Card and Krueger (1996) argued that, in contrast to the highly contentious debates about the impact of school resources on student achievement, a growing number of studies found a relationship between school resources on educational attainment and earnings (e.g., Card & Krueger, 1992), although other studies re-port mixed findings on those measures (Betts, 2001). Finally, Card and Payne's (2002) analysis of the relationship between changes in state school funding policies, school district finances, and student outcomes suggests that the changes described above in California's school financing system are consistent with national trends. In states where school funding systems were found unconstitutional, states tended to modify their methods of school financing to make school funding more equitable through state aid. However, these trends toward equalization were offset by greater inequalities in local revenues across districts. Card and Payne also found some evidence that equalization policies

closed the gap in average SAT scores between students with the most educated and least educated parents.

Data and Methods

In this article, the school is the primary unit of analysis. The analyses presented here use a rich data set that comprises virtually the entire population of schools in the state of California with API scores in 1999, which excluded schools that had fewer than 100 students and nontraditional schools of various types. Of the 6,813 schools in the 1999 data set made available by the California Department of Education, 6,602 had full information on all variables and were included in the analysis.[8] The original API data were augmented with other California Department of Education data and two National Center for Education Statistics (NCES) data sets: the Common Core of Data (CCD) and Census 2000 data matched to school districts. In both cases, files were matched using the unique school codes assigned to each school and district. Thus the data set used in this analysis is unique for two reasons. First, if we consider the California schools that were issued an API score in 1999 to be a population, then approximately 97% of that population is represented here. Second, it links a measure of school performance with information on schools and districts, including census data. A few notes on variable construction follow. All independent variables are measured at the school level.

Academic Performance Index

As noted above, the dependent variable for all analyses is the state-constructed API index. This summary score for each school was constructed by weighting student scores in each content area of the SAT-9 test by their national percentile ranking (NPR), and then weighting each content area to create an overall score (California Department of Education Office of Policy and Evaluation, 2000). For the calculation of the API for elementary and middle schools, the content areas were weighted in the following manner: mathematics 40%, reading 30%, language 15%, and spelling 15%. For high schools the following content areas were each weighted 20%: reading, mathematics, language, science, and social science.

Student Background Variables

Percentage reduced-price or free lunch is measured by the percentage of students eligible for reduced-price or free lunch. *Mobility* is a state-constructed variable that provides a measure of the transiency of the student population within the district by indicating the percentage of test-taking students who first attended the school within the current school year. Students whose first year at a school was also their first year in that district were excluded from the API calculations. *Limited English proficient* denotes the percentage of students in a school who were reported as English learners. A variable mea-

suring school racial demographics was not included in the model because of collinearity.[9]

Variables Related to the Main Issues in the *Williams* Case

Teachers' credentials, experience, and education

In the *Williams* case, the plaintiffs focused their claims related to teacher quality around the issue of certification, because "professional certification is meant to represent the [state's] minimum standard for responsible practice" (Rosenbaum et al., 2002, p. 41). In addition to certification, I also include some of the secondary issues raised by the plaintiffs regarding teacher quality in the analysis: teacher experience and education. These variables were drawn from the California Basic Educational Data System (CBEDS) Professional Assignment Information Form. This data set contains records for 322,020 teachers across the state that were aggregated by school and matched to the API data by using the unique code for each school. *Fully credentialed* indicates the percentage of teachers who have completed a teacher preparation program and hold a preliminary, clear professional, or life credential. *Emergency credentialed* indicates the percentage of teachers that hold an emergency credential. Emergency credentials are granted to individuals who are not qualified for a credential or internship but meet minimum certification requirements: a passing score on the state's basic skills exam (CBEST); a bachelor's degree; and 10 semesters of college coursework in any four of the following areas—language studies, literature, history, social science, mathematics, science, humanities, art, physical education, and human development (Darling-Hammond, 2002). In addition, teachers working on emergency permits must submit a statement indicating their intent to complete the credentialing requirements.

The state data designate some teachers as holding a full credential and an emergency credential. This group of teachers could include teachers who are credentialed in one field but teaching out of field, or teachers who are credentialed in another state and working on California state certification (Darling-Hammond, 2002). To correct the problem of overcounting these teachers by including them in both the *fully credentialed* and *emergency credentialed* variables described above, I created a third variable indicating the percentage of teachers at a school who held both types of credentials, *both full and emergency*. This strategy has the added advantage of allowing me to differentiate between emergency credentialed teachers and teachers who hold some form of certification but are not fully certified for their current position according to the state's standards. *Years teaching* denotes the average number of years that teachers have been instructing students.[10] Two additional variables provide indicators of teachers' highest level of education. *Greater than M.A.* indicates the percentage of teachers at the school with a master's degree or higher. *Less than M.A.* indicates the percentage of teachers at the school with less than a master's degree. Two of the three groups of variables (credentials and education) sum to 100% and are treated

as dummy variables. *Fully credentialed* and *Less than M.A.* are the omitted categories. Additional variables were used to indicate whether the teacher's credentialing, experience, or education information was missing. Once the original file containing teacher-level data was aggregated by school, if schools were missing data on more than 30% of their teachers on any of the variables described above, they were omitted from the analysis.[11]

School calendar as a proxy for facilities

To my knowledge, no state-level data sets exist that provide information about school facilities. However, one of the issues in the *Williams* case concerns the use of multiple-track school calendars to address overcrowding, a dimension of adequate facilities addressed in the lawsuit (Oakes, 2002b). Multiple-track calendars allow districts with increasing enrollments to serve more students in existing school facilities. On this type of schedule, students and faculty are divided into three to five groups. As one group of students and staff goes on vacation, another returns for instruction. The "Concept 6" calendar is a particular type of year-round, multiple-track calendar in which students have fewer instructional days than in other types of school calendar; the school day is lengthened so that students receive the same number of instructional minutes as the students in schools on traditional 9-month–3-month calendars. Whereas the other types of school calendars have 180 instructional days in the academic year, Concept 6 schools have 163 (Oakes, 2002b). The Concept 6 instructional calendar allows schools to enroll 50% more students than they would be able to handle at the facility if they were to follow the traditional calendar (California Department of Education, 2001). In contrast, the other year-round, multiple-track calendars allow schools to increase their enrollment by 33% as compared with the traditional calendar.[12] The advantage of including these variables in the model is that they provide an indirect test for the effect of facilities on school performance by examining how students are distributed in schools. To the extent that the year-round, multiple-track calendar and the Concept 6 calendar are designed to address overcrowding, these variables provide an indicator of insufficient facilities, although they do not address the condition of the facilities.

Indicator variables for the school calendar were created from the CBEDS School Information Form Sections G–K. *Traditional* indicates that the school follows a traditional academic calendar with an extended summer vacation. *Year-round, single-track* indicates that the school operates on a single-track, year-round calendar with more frequent and shorter vacation periods (usually three a year, ranging from 3 to 5 weeks in duration). The major change from the traditional calendar for the year-round, single-track calendar is the timing and duration of instructional and vacation periods; all of the staff and students are in school or in session at the same time (California Department of Education, 2000). The other two calendar variables denote the types of year-round, multiple-track calendars described above, *year-round, multiple-track* and *Concept 6.*

Powers

In 1998–1999, seven districts used the Concept 6 calendar. Of these, two districts had only one school following the Concept 6 calendar. The remaining five used the Concept 6 calendar extensively. Four of the five were small districts with fewer than 50 schools, more than half of which used the Concept 6 calendar. The remaining district was the Los Angeles Unified School District in which more than 25% of the schools followed the Concept 6 calendar. Because I also control for district characteristics, I include variables denoting the type of calendar the school uses in the analysis. *Traditional* is the omitted comparison category.

Textbook spending at the district level

Like the condition of school facilities, information about textbooks is relatively limited. I constructed the best available measure of the quality of textbooks using state fiscal data, which include information on district-level expenditures. *Per-pupil expenditures on textbooks* was constructed by taking the total dollars spent on textbooks by school districts in the 1998–1999 school year and dividing it by the number of students in the district. This variable provides an indirect measure of the adequacy of textbooks, to the extent that schools in districts that spend more money per student on textbooks are more likely to have both newer textbooks and an adequate supply of them for their students.

School-Level Control Variables

Student–teacher ratio was calculated by dividing the total enrollment in the school by the number of teachers at the site. This variable provides a measure of the number of certified staff per student at a school site; however it should not be misunderstood as a measure of class size. An additional variable controls for school size by taking the natural log of the total number of students enrolled. Using the natural log of school enrollment accounts for the effect of scale; adding an additional student in a smaller school has more impact than an additional student in a larger school (Lucas, 2003). I included the original enrollment variable in the descriptive statistics (Table 1) for purposes of comparison.

District-Level Control Variables

The last set of variables provides measures of district characteristics that were matched to each school. *Schools in district* indicates the total number of schools in the school district, which provides an indicator of district size. Another series of indicator variables provides information on the locale of the school district. *Central city* indicates that the school district is located in a central city of a consolidated metropolitan statistical area (CMSA) or metropolitan statistical area (MSA) where the city has a population greater than or equal to 250,000. *Mid-size city* indicates that the school district is located in a city of a CMSA or MSA that has a population lower than 250,000. *Urban fringe* indicates that the district is located in an area within a CMSA or MSA

Table 1
Descriptive Statistics for All Variables

Variable (N = 6,602)	Mean (*SD*)	
API score (1999)	630.47	(132.14)
Student background variables		
Percentage reduced-price or free lunch	49.37	(30.12)
Mobility	13.24	(12.91)
Limited English proficient	24.19	(22.17)
Variables related to Williams *case*		
Teacher training		
Fully credentialed	86.61	(12.28)
Emergency credentialed	8.71	(10.05)
Both full and emergency	1.95	(3.29)
Years teaching	13.17	(3.24)
Teachers' highest level of education		
Greater than M.A.	31.68	(14.59)
Less than M.A.	68.10	(14.67)
School calendar		
Traditional year	.78	(.41)
Year-round, single track	.06	(.23)
Year-round, multiple-track	.11	(.31)
Concept 6	.03	(.18)
Per-pupil expenditures on textbooks	45.59	(24.96)
School-level control variables		
Student–teacher ratio	19.23	(5.14)
Enrollment	823.89	(571.38)
Natural log of enrollment	6.54	(.56)
District-level control variables		
Schools in district	81.47	(176.27)
Locale of district		
Central city	.22	(.41)
Mid-size city	.15	(.36)
Urban fringe	.54	(.50)
Town	.03	(.17)
Rural	.07	(.25)
Instructional salaries per pupil	2699.80	(284.19)
Real estate taxes per student	2507.66	(2597.18)

of a large city or mid-sized city and defined as urban by the Census Bureau. *Town* indicates that the school district is in a locale with a population greater than or equal to 2,500 outside a CMSA or MSA. *Rural* denotes that the district is in an area defined as rural by the Census Bureau.

Like the variable on textbook expenditures, *Instructional salaries per pupil* is drawn from state fiscal data. To construct this variable, I added the total amount spent by the district on teachers' salaries, guidance, welfare and

attendance salaries, instructional aides' salaries, and services by instructional consultants and lecturers; I then divided this sum by the total number of students enrolled in the district. By including this variable in the model, I was able to control for variation in teachers' salaries across districts. A final variable provides a measure of the district context drawn from 2000 Census data, which have been mapped to school districts by the NCES.

Real estate taxes per student is the aggregate real estate taxes in the district (Census Item HCT021) divided by the total number of students in the district. This variable controls for the amount of funds potentially available for school spending in the district (Ferguson & Ladd, 1996). Although the revenue-limit funding system is meant to address some of the inequities in funding across districts, total revenue still varies widely across districts.[13] To calculate these variables and the textbook variable described above, I used enrollment rather than average daily attendance (ADA). Enrollment figures (which tend to be higher than ADA) not only were more reliable than the measure of ADA in the state fiscal data but also provided a sense of the absolute number of students that the schools were educationally and administratively responsible for. Table 1 provides descriptive statistics for all variables.

Table 2 provides a series of nested regression models for the variables, using standard multiple regression techniques; each subset of variables is added to the model incrementally. All of the models control for school type (Rogosa, 2002). Model 1 uses only the variables measuring students' socioeconomic background aggregated at the school level. Model 2 adds the *Williams* variables and the school- and district-level control variables. An *F*-test indicated that the addition of variables from Model 1 to Model 2 was statistically significant.

An argument can be made that there are important district effects that would require more complex data analysis techniques, such as centering the variables in the regression models or using hierarchical linear modeling to estimate district effects. However, California is a large and diverse state. Although the notion of public education in California might call to mind large urban school districts such as those in Los Angeles, San Diego, and Oakland, 79% of the schools were located in districts with 10 or fewer additional schools in the sample. Slightly more than one quarter of the schools were the only schools from their districts in the sample. Likewise, this sample includes 79% of the entire population of schools in California and 97% of all schools with 1999 API scores. As a result, the problem of inaccurate standard errors is not an issue here (Attewell, 2002). Including district characteristics, such as locale and expenditures, controls for possible district-level effects that might confound the effects of the variables of interest.

Results and Interpretation

Before I discuss the results of the regression analysis directly relevant to the issues raised in the *Williams* case, a few points are worth emphasizing about the results of Model 1 shown in the first column of Table 2. The strong effect of the set of variables measuring the socioeconomic status of the student pop-

Table 2

Nested Regression Models Using 1999 Academic Performance Index as Dependent Variable

Variable	Model 1 Coefficient (*SE*)		Model 2 Coefficient (*SE*)	
Constant	841.01	(1.80)***	791.01	(16.16)***
Percentage reduced-price or free lunch	−3.35	(.04)***	−2.97	(.04)***
Mobility	−.23	(.03)***	−.15	(.06)**
Limited English proficient	−1.04	(.06)***	−.95	(.06)***
Variables related to Williams *case*				
Teacher training				
Fully credentialed ▲				
Emergency credentialed			−1.12	(.09)***
Both full and emergency credentialed			−1.44	(.22)***
Years teaching			.80	(.26)**
Teachers' highest level of education				
Greater than M.A.			.42	(.06)***
Less than M.A. ▲				
School calendar				
Traditional year ▲				
Year-round, single track				
Year-round, multiple-track			−10.64	(3.16)**
Year-round multiple-track			−15.32	(2.55)***
Concept 6			−34.46	(4.52)***
Per-pupil expenditures on textbooks			.11	(.003)***
School-level control variables				
Student–teacher ratio			−.69	(.15)***
Natural log of enrollment			−1.97	(1.88)
District-level control variables				
Schools in district			−.002	(.01)
Locale of district				
Central city ▲				
Mid-size city			−23.23	(2.97)***
Urban fringe			−18.72	(2.56)***
Town			−19.10	(4.87)***
Rural			−20.82	(3.85)***
Instructional salaries per pupil			.02	(.003)***
Real estate taxes per student			.004	(.000)***
R-square	.777***		.811***	

Note. ▲ = omitted category; controls for missing credentials were also included in the models.
** $p \leq .01$. *** $p \leq .001$.

ulation on school performance is particularly striking. The *R*-square in Model 1 indicates that 78% of the variance in school API index scores can be explained by three factors: the percentage of students eligible for reduced-price or free lunch, mobility, and the percentage of English learners. Also note-

worthy is the strength of the relationship between the independent variables and the dependent variables—all of the coefficients are statistically significant. As the percentage of students receiving reduced-price or free lunch, student mobility, and the percentage of English learners decreases, API scores rise.

Given the expansion of accountability policies across the country as a result of No Child Left Behind, these results—from a state whose testing policies in 1999 were more stringent than the 2001 federal legislation—might call for reflection on what we are holding schools accountable for. The results for Model 1 indicate that this measure of school performance is largely driven by the background characteristics of the student population. This is in part attributable to the unit of analysis. As White's (1982) classic meta-analysis of the relationship between socioeconomic status and academic achievement revealed, the magnitude of the correlation coefficient between these constructs is much higher for studies using aggregated units of analysis, such as schools and districts, than for studies using students as the unit of analysis. This implies that student demographics are important control variables that allow us to better assess the association between school and district factors and school performance, the focus of the analysis.

Thus it is not appropriate to infer from these results that schools have relatively little effect on student achievement. If we want to know the impact of schools on individual children, we would be better served by using Entwhistle, Alexander, and Olsen's (1997) approach. Their research team followed a sample of elementary school students in the Baltimore public schools longitudinally, beginning in the first grade, and, most important, assessed the students at the beginning and at the end of the school year. Thus they could distinguish between winter gain, which is largely attributable to schools, and summer gain, which is more strongly influenced by family background. Entwhistle, Alexander, and Olsen's (1997) findings suggest that although students came to schools with gaps related to socioeconomic status that persisted over the 5 years of the study, they made similar gains during the school year. However, the authors did not analyze the effects of the school characteristics considered here on student achievement.

Teacher Credentials, Experience, and Education

In Model 2 I add the variables related to the Williams case and the district and school-level control variables. The effect of teacher training and experience measured by the percentage of teachers holding an emergency credential and average years of experience, respectively, is large and statistically significant in the expected directions. As the percentage of teachers holding an emergency credential or both a regular credential and an emergency credential increases, API scores decrease. As the average years of teaching experience and the percentage of teachers holding a master's degree rise, API scores increase. The results are even more striking, albeit more nuanced, if the models are run separately by school type (see Appendix B; descriptive statistics are provided in Appendix A). The model for elementary schools fol-

lowed the same pattern as Model 2 of Table 2, which is not surprising because 71% of the full sample is composed of elementary schools. In middle schools, the coefficients for credentials and experience are significant and parallel the elementary school model, although the values for the individual coefficients are higher. Finally, in the high school model, the coefficients for the variables measuring teachers' credentials are much larger compared with the other elementary and middle schools, as is the coefficient for teachers' education. This would also explain the strong negative effect of the variable denoting the percentage of teachers with both full and emergency credentials, to the extent that it provides an indicator of the percentage of teachers teaching outside their subject area training. Taken as a whole, these results suggest the importance of specialized subject matter training at the higher grade levels and in particular for high school teachers. Notably, although not statistically significant, the coefficient for teacher experience is negative at the high school level. The teaching staff in the average high school, in comparison with teaching staff in elementary and middle schools, tends to be more experienced, which suggests that the effect of teacher experience may have a "ceiling." However, the effect of teachers' credentials and education remains consistent across the models.

Returning to the results shown in Table 2, the student–teacher ratio is also significant in the expected direction; as the student–teacher ratio increases, API scores decrease. It is important to bear in mind that this variable is not an indicator of class size but instead provides a measure of the credentialed staffing in relation to total school enrollment. However, it is also not unrelated to the issues in the *Williams* case. Even controlling for teachers' credentials, schools with greater proportions of certificated staff to students have higher API scores, these results underscore the importance of resources related to the quality of staffing (see also Betts, Rueben, & Danenberg, 2000; Haycock, 1998, 2000).

Finally, the coefficient for current expenditures per pupil on instruction is statistically significant in Model 2 and indicates that the more the school district spends per pupil on instructional salaries, the higher the school API. In interpreting this coefficient, it should be kept in mind that the mean of this variable is $2,670. The coefficient of 0.02 indicates that for every $100 increase in spending on instructional salaries at the district level, school API scores increase by 2 points. If we compare these results with the results from a regression model focusing on the variables related to teachers' characteristics (results shown in the first column of Appendix B), we see that that part of the effect of expenditures works through teacher quality. In districts that spend more money on instruction, schools tend to hire more fully credentialed teachers and more experienced teachers. We also see a decline in the coefficient for student–teacher ratio, in part because student–teacher ratio is also related to teacher salaries. Districts that spend more on instructional salaries could spend the funds not only on hiring more experienced teachers, but also on increasing the numbers of certificated staff at school sites, which would decrease student–teacher ratios.

Interestingly, changes in state policy in the wake of NCLB may eventually address one issue in the case: access to qualified teachers. NCLB requires that all teachers of core subject areas be "highly qualified" by the 2005–2006 school year. Teachers on emergency permits, waivers, or pre-intern certificates do not meet the criteria for "highly qualified." A June 2003 memo from the State Superintendent of Public Instruction directs districts, counties, and charter schools to focus their current hiring and recruitment efforts on teachers that meet the NCLB requirements (O'Connell, 2003). In December 2003, the California Commission on Teacher Credentialing (CCTC) announced a plan to phase out emergency credentials by July 1, 2006, although the CCTC also plans to develop an alternative certification of need for districts that have an unanticipated shortage of credentialed teachers.[14]

Recent newspaper accounts suggest that the change in federal regulations has indeed changed some districts' hiring practices (Hardy, 2002; Nelson, 2003). Similarly, a report by the CCTC suggests that increased state oversight beginning in 2001 has decreased the percentage of emergency-credentialed teachers in 22 districts that were audited because more than 20% of their teaching staffs were comprised of teachers who held emergency credentials for 4 years or more (California Commission on Teacher Credentialing, 2003a). Although the overall impact of these shifts might be relatively small, such developments support the plaintiffs' argument that increased state oversight can be an important factor in reducing inequities in educational conditions. To the extent that districts hire fewer emergency-credentialed teachers and that access to fully credentialed teachers therefore becomes more evenly distributed across schools, we can expect that the coefficient *emergency-credentialed* will decline in models using subsequent years' API data. More specifically, once the variation between schools on a variable is eliminated, it should no longer be a statistically significant predictor of school performance.[15]

School Calendar as a Proxy for Facilities

The negative and statistically significant coefficients for the school calendar variables in Model 2 indicate that schools with any of the three types of year-round calendars have lower API scores than schools with traditional calendars. There are two possible explanations for this result. The first is the obvious—schools with year-round calendars perform less well on this measure than schools with traditional year calendars. However, it is also possible that different dynamics are occurring across the different types of year-round calendars. As noted above, year-round, single-track calendars differ from the other two types of calendars because their primary rationale is educational—to better space instruction over the calendar year—rather than to address overcrowding. However, because of the month-long vacation periods at two points during the school year in the year-round, single-track calendar, if the SAT-9 tests were administered at approximately the same time for all schools, then the students attending year-round, single-track

schools could have taken the test earlier in their academic year than students attending schools following a traditional calendar.[16]

For year-round, multiple-track schools and Concept 6 schools, the effects of this variable are more difficult to interpret; however the coefficients for both year-round, multiple-track and Concept 6 calendars are also higher than those for the year-round, single-track calendars. Notable is the large negative coefficient for Concept 6 schools, which in Model 2 indicates that, with all other school and district factors statistically held constant, Concept 6 schools scored approximately 33 points lower than schools following a traditional calendar. Similarly, if the model is changed so that year-round, multiple-track is the omitted comparison category (not shown), the coefficients for *traditional* and *year-round, single-track* are positive, although the coefficient for *Concept 6* is negative.

This pattern could be a result of the relationship between the school calendar and the testing cycle described above coupled to overcrowding. We need to know more about how students are distributed across the track structure in year-round, multiple-track schools. For example, some scholars have documented extensive within-school segregation across tracks in schools following this calendar (Mitchell, 2002; Oakes, 2002b). Depending on when the testing period falls in relationship to their vacations, certain tracks may be placed at a disadvantage, either by receiving less instruction before the test than students in schools following the other calendars (or less instruction than other students in their own schools), or by having to take the test immediately after a vacation, or both. Finally, if we compare Models 1 and 2, we see that the effect of the student background variables in Model 1 decreases. This suggests that some of the effects of the background variables are attributable to their association with these school-level variables, where schools with greater proportions of poor and English Learner students are more likely to follow these calendars.

Although the school calendar variables address a component of the plaintiffs' arguments about school facilities, they are far from a comprehensive measure of the condition of school facilities. Indeed, the documents produced on behalf of the plaintiffs provide ample and disheartening examples of the overcrowded, unsanitary, and often unsafe conditions that many California students face in their quest for an education (see the overviews in Rosenbaum et al., 2000a, 2000b, 2002). If we care deeply about children and the still-elusive promise of equal educational opportunity outlined in *Brown v. Board of Education,* the evidence in the *Williams* case provides a compelling argument that we must expand our understanding of accountability to include the quality of life experienced by students—and their teachers—in schools. However, the findings presented here suggest that even when we use a limited measure, the effect of school facilities on school performance is not trivial.

District Spending on Instruction and Textbooks

The coefficient for instructional spending on textbooks per pupil is positive and statistically significant and indicates that, with all other factors held

equal, schools in districts that spend more money on textbooks scored higher on the API in 1999. As district spending on textbooks per pupil increases by $10, API scores increase by a little more than one point. Although this variable is a very imperfect measure of the textbooks available at a school, once again, the findings highlight the crucial role of the relationship between resources and school performance. These results also suggest that there might be a stronger relationship with more detailed measures of the sufficiency and quality of textbooks.[17]

Finally, the analyses presented here focus on the linear effects of these variables on school performance. However, as Lucas (2003) points out, there is also evidence that the relationship between school resources and school performance is nonlinear. That is, variables such as the percentage of teachers holding emergency credentials have a stronger influence on school performance above a certain threshold.

Conclusion

As an important marker in the broader struggle for equal educational opportunity, the 50-year anniversary of the *Brown v. Board of Education* decision provides an occasion for public reflection on the progress made in the past half-century. Yet, to be true to the legacy of *Brown,* we must also focus attention on those areas where the struggle is not yet over. As the discussion of equity-related litigation at the beginning of this article suggests, efforts to create more equitable learning environments in California public education have a long history and are still far from complete. The case of *Williams v. State of California* makes a relatively simple but powerful argument: If schools and students are to be judged on the basis of their test scores, they should be given equal access to the school-related resources commonly associated with academic success—qualified teachers, sufficient and up-to-date textbooks, and adequate, safe facilities. As Varenne and McDermott (1998) so eloquently remind us, rankings of students and schools are not simply the product of individual performances, but are also fundamentally shaped by the contexts and processes through which those performances occur. Thus the *Williams* case asks us to expand our *public* understanding of accountability beyond test scores, to include an equally pressing concern about how resources are distributed across schools. For example, newspapers routinely publish school test scores and rankings. Imagine if indicators of the resources available to schools to meet accountability standards, such as the percentage of fully credentialed teachers or the percentage of classrooms with adequate textbooks, were juxtaposed with school rankings.[18]

In this article I use the data generated from the state's accountability program to address the central issues in the *Williams* case. The results clearly indicate that the school resources that are the focal point of the case—teachers' qualifications, textbooks, and facilities—are systematically related to the state's main tool for measuring school performance. That is, schools with more qualified teachers and schools in districts that spend more money on

textbooks tend to have higher API scores net of other factors; schools following year-round, multiple-track calendars tend to have lower API scores than schools following a traditional calendar or a year-round, single-track calendar. Thus there are strong grounds for increasing equity, not only as a matter of fairness and justice but also because of the relationship between those factors and the state's desired educational outcome: increasing API scores. It could be argued that this type of analysis—like any production function analysis—oversimplifies the complex relationships between the variables in the model as well as other unmeasured factors. But what it accomplishes is to help us to identify some broad parameters for educational policymaking. A more equitable distribution of resources across schools should be viewed as the first crucial step in a broader process that would, ideally, include more fine-grained analyses of how to use resources most effectively. Accountability must encompass policies that promote equity. To do any less is to shortchange our students, our schools, and ultimately, ourselves.

Notes

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[1] Incorporating the results of the California Standards Tests (CST) into the API has been a more uneven process. Until spring 2003, the CST comprised test items aligned with the state standards, some of which were drawn from the SAT-9 question bank. Results from the CST were not used to calculate the API until the 2001 Base API.

[2] Tax rates were limited to 1% of this value until the house was sold, at which time the new owner would be assessed and taxed at the property's purchase price.

[3] In 2001 and 2002, Governor Davis signed two pieces of equalization legislation (AB 441 and AB 2781, respectively) but vetoed the funding for them, noting in both cases that he would set the funds allocated in each bill aside until an acceptable plan was passed by the legislature.

[4] For an overview of the changes in the API over time, see Powers (2004).

[5] In the first 2 years of the program, the California State Legislature allocated $100 million for a reward program that specifically targeted low-performing schools, defined as schools falling between 1 and 5 on the decile ranking. These funds were awarded to the certificated staff in schools showing the greatest gains from 1999 to 2000, the first and second years of the program. A second cohort of schools was identified for rewards in 2000–2001, until the erosion of the state budget surplus resulted in the discontinuation of the program.

[6] There are programs targeted at teacher recruitment and retention in low-performing schools. However, "low performing" is defined as falling within the lower half of the API rankings. The plaintiffs argue that this definition is not narrow enough and that, as a result, the state's limited resources are less likely to reach the neediest schools. Legislation to create more targeted programs has in some instances been vetoed by Governor Davis. Likewise, the PSAA included the Immediate Intervention/Underperforming Schools Program (II/USP), which provides funds for an initial planning grant and $200 per student for 2 additional years. This program is also broadly targeted to schools in the bottom half of the API distribution that did not meet their growth targets. In the first year of the program, 3,144 schools were eligible for the program and about half applied. Because II/USP funds were awarded to only 430 schools per year, schools were chosen to participate in the program by lottery (Groves, 1999). Finally, the Class Size Reduction Program (CSR) had a negative impact on low-income schools and districts because it expanded the teaching pool

in California by close to 40%, which had the effect of increasing the concentration of in-experienced teachers in high poverty districts (Stecher, Bohrnstedt, Kirst, McRobbie, & Williams, 2001).

[7] The API is calculated by multiplying the number of students in each performance band on the content area tests by a weight assigned to the performance band and then weighting the content areas. Performance bands are the NPR rankings divided into a quintile scale. The weights are inversely related to the performance band; that is, the top performance band is assigned the smallest weight. If all students make approximately the same gains because of repeated exposure to the test, to the extent that gains for students in high API schools occur at the top of the NPR scale, they will have a lesser effect, or even no effect, on the school's API.

[8] According to my estimates, this sample contains about 85.4% of all schools eligible for a 1999 API score. On the basis of the data available from the California Department of Education, there were 8,334 schools operating during the 1998–1999 school year; of those, 820 had enrollments of fewer than 100 students, leaving by elimination 707 schools. Approximately 70% of the schools in this latter group were primary schools or kindergarten programs, alternative or continuation schools, court or youth authority schools, and special education programs run by counties. The full 1999 API data set comprises 82% of the full population of all California schools (traditional and nontraditional); the sample used here comprises 79%.

[9] Subtracting the tolerance statistic from 1 gives us the *R*-square from the regression of all the other independent variables on the independent variable of interest (R^2_j, where j = the variable of interest). Fox (1991) recommends taking the square root of R^2_j, noting that when this figure approaches .9, collinearity becomes a serious problem for the estimation of regression coefficients. In this case, when I created a variable for percentage of minority students, it was the most highly correlated with the other variables in the analysis with $R_j = .87$ (see Lewis-Beck, 1980, and the analysis in Powers, 2004).

[10] This variable counts the average total years of educational service in any school setting (public or private) but does not include substitute teacher or classified staff positions.

[11] In addition, a control variable indicating the percentage of teachers within a school whose credentials were not reported was included in all models; 95% of the schools had less than 11% of the teachers' credentialing information missing. In the case of the variables for experience and education, more than 95% of the schools included in the analysis had less than 4% of the teachers' information missing, and the mean was less than a percentage point.

[12] One hundred and twenty-one schools had no information on the type of school calendar used at the school. In preliminary analyses, a variable was included denoting that the information was missing. The coefficient was not statistically significant, and including this variable in the model did not have any substantive effect on the findings reported here.

[13] See the equity indicators in *Education Week*'s "Quality Counts" reports from 2001 to 2004, which suggest that California's school funding is becoming less equitable over time (available at *http://www.edweek.org*).

[14] The CCTC had initially voted in August to discontinue issuing emergency credentials in September 2003, but rescinded its decision in October at the request of school districts, educational organizations, and other stakeholders (California Commission on Teacher Credentialing, 2003b) and instead voted to implement a timeline consistent with the requirements of NCLB.

[15] See the analysis of the API for the San Diego Unified School District in Powers (2003).

[16] To better assess this, I compared a traditional calendar and a year-round, multiple-track calendar from the same district. The state sets a 2-month window for testing between March 15 and May 15 of each year (California Department of Education, 2000). By March 15, schools following a traditional calendar in this district have had 120 days of school and are in session during the entire testing window. In contrast, by March 15, the year-round, multiple-track schools have been in school for 115 days and are within days of beginning a month-long spring break; school resumes in April when less than a month of the testing window remains.

[17] One could imagine a survey of teachers at the end of the year that asks relatively simple questions: Did teachers have an adequate number of textbooks for their classes for

a majority of the school year? Were the majority of the textbooks in their classroom less than 5 years old? This information could then be aggregated at the school level (see also Russell, 2002).

[18] This is not to say that the information is unavailable. California state law requires that each school publish a detailed school accountability report card; the California Department of Education also provides great deal of information about schools to the public on its website. However, these sources of information are not as easily accessed as the school performance data published in local newspapers.

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Appendix A

Descriptive Statistics by School Type

Variable	Elementary schools (N = 4,701) Mean *(SD)*		Middle schools (N = 1,091) Mean *(SD)*		High schools (N = 810) Mean *(SD)*	
API	631.96	(137.03)	632.25	(126.44)	619.38	(108.64)
Percentage reduced price or free lunch	53.08	(30.66)	46.10	(27.24)	32.28	(23.54)
Mobility	14.32	(12.66)	12.48	(14.51)	7.94	(10.39)
Limited English proficient	27.06	(23.70)	19.47	(17.19)	13.84	(12.81)
Teacher training						
Fully credentialed	86.65	(12.92)	86.11	(11.42)	87.38	(9.26)
Emergency credentialed	8.92	(10.62)	8.46	(9.07)	7.82	(7.54)
Both full and emergency	1.79	(3.16)	2.53	(3.88)	2.14	(3.11)
Years teaching	12.67	(3.18)	13.91	(3.02)	15.11	(2.96)
Teachers' highest level of education						
Greater than M.A.	28.88	(13.82)	36.28	(13.88)	41.72	(13.90)
Less than M.A.	70.92	(13.89)	63.40	(13.93)	58.01	(13.97)
Student–teacher ratio	18.59	(2.15)	20.48	(2.55)	21.24	(13.11)
Enrollment	630.15	(255.44)	938.60	(442.96)	1807.30	(905.10)
Natural log of enrollment	6.37	(.41)	6.72	(.50)	7.32	(.67)

Appendix B

Regression Analysis Focusing on Teacher Variables by School Type

Variable	All schools (*N* = 6,602) Coefficient	*(SD)*	Elementary schools (*N* = 4,701) Coefficient	*(SD)*	Middle schools (*N* = 1,091) Coefficient	*(SD)*	High schools (*N* = 810) Coefficient	*(SD)*
Constant	865.23	(11.41)***	886.02	(16.06)***	790.49	(16.23)***	762.87	(25.53)***
Percentage reduced-price or free lunch	−3.18	(.04)***	−3.32	(.05)***	−2.96	(.09)***	−2.28	(.13)***
Mobility	−.16	(.06)**	−.14	(.07)	.04	(.12)	−.44	(.21)*
Limited English proficient	−.74	(.06)***	−.55	(.06)***	−1.49	(.15)***	−2.17	(.24)***
Teacher training								
Fully credentialed ▲								
Emergency credentialed	−1.26	(.09)***	−.96	(.10)***	−1.83	(.22)***	−3.51	(.33)***
Both full and emergency	−1.54	(.23)***	−1.05	(.28)***	−2.05	(.43)***	−3.66	(.69)***
Years teaching	1.27	(.26)***	1.25	(.31)***	1.78	(.61)**	−.38	(.89)
Teachers' highest level of education								
Greater than M.A.	.59	(.06)***	.57	(.07)***	.37	(.12)***	1.00	(.17)***
Less than M.A. ▲								
Student–teacher ratio	−1.06	(.15)***	−.14	(.43)	−1.36	(.72)***	−1.20	(.17)***
Natural log of enrollment	−6.09	(1.70)***	−12.41	(2.47)***	3.38	(3.73)	1.41	(3.83)
R-square		.797***		.812***		.819***		.694***

Note. The variables for school calendar are omitted because only 5% of the 810 high schools followed one of the three nontraditional calendars. To simplify the models, I include only the teacher credential variables and the school-level controls. ▲ = omitted category; controls for missing credentials were also included in the models.

* $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.