

New Insights into School and Classroom Factors Affecting Student Achievement

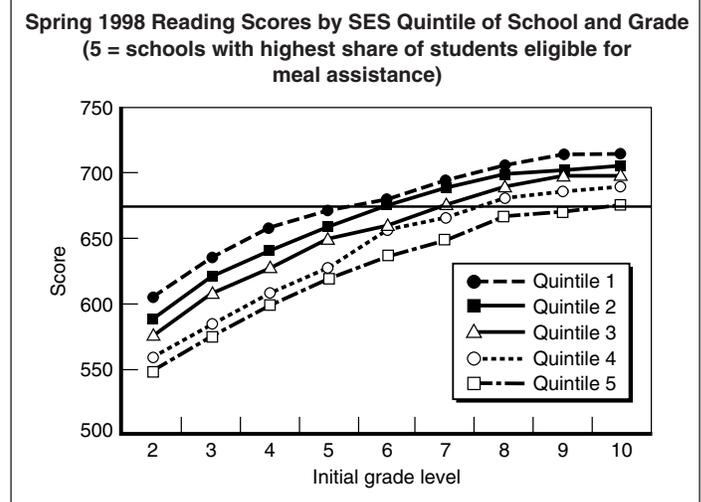
Surveys by the Public Policy Institute of California have consistently shown that Californians are concerned about the quality of K–12 public schools and that residents are aware of the wide disparities across schools in both student achievement and school resources. In a unique study conducted in collaboration with the San Diego Unified School District (SDUSD), the second-largest district in California, Julian Betts, Andrew Zau, and Lorien Rice compiled and analyzed a highly detailed, student-level database that enabled them to link factors influencing student achievement in ways that have not been possible with the state-level data generally used in such studies. In *Determinants of Student Achievement: New Evidence from San Diego*, the researchers examine resource inequalities across schools, explore trends in achievement, and, most important, provide detailed statistical estimates of the school and classroom factors that most influence student achievement.

Poverty and School Resources

The study defines school resources not as funding per pupil but rather in terms of class size and teacher training (including years of teaching experience, certifications and subject authorizations, highest academic degree, and field of study in college). The researchers divided students into five approximately equal size groups, determined by the percentage of students eligible for free or reduced-price meals in their schools. They found that in most cases, the lowest socioeconomic status (SES) schools received fewer resources. The largest inequalities across San Diego schools relate to teacher qualifications in elementary schools. In the most affluent group of schools (quintile 1), teachers have more than twice as many years of teaching experience as teachers in the most disadvantaged group of schools (quintile 5). They are also twice as likely to hold master's degrees and 10 percent more likely to hold full credentials. At the secondary level, relationships between SES and school resources were weaker and, in fact, students in low-SES schools on average had slightly smaller classes in middle and high school.

Test Scores as a Reflection of Achievement

To examine student achievement, the researchers focused on individual students' test scores on California's standardized state test, the Stanford 9, comparing students' achievement at a point in time as well as gains in achievement over time. The figure below shows initial mean reading scores in spring 1998 by SES quintile of schools (results for math are similar). The bottom and top lines show mean achievement for students in the most disadvantaged and least disadvantaged schools, respectively. As is evident in the figure, from very early in their educational experiences, students appear to exhibit large variations in achievement that are systematically linked to poverty: Students in the less affluent schools lag seriously behind. For example, the horizontal line in the figure illustrates that grade 5 reading achievement of students in the most affluent schools is not matched by students in the least affluent schools until they reach grade 10. Other research suggests that the achievement gaps depicted in this figure are



The most economically disadvantaged students exhibit lower scholastic achievement from the outset of their schooling and never catch up. As the horizontal line shows, the average reading achievement in grade 10 in the most disadvantaged schools is about the same as the reading level in grade 5 in the most affluent schools.

not unique to SDUSD or to California. The researchers also found that although the achievement gap narrowed significantly between 1998 and 2000, it nonetheless remained very large.

Factors Contributing to Gains in Achievement

The researchers estimated a series of models to explain gains in individual students' performance over time, using personal, school, classroom, and teacher characteristics. One result that appeared meaningful in almost every model had to do with the time a student spent at school rather than with school resources themselves. Specifically, the percentage of days a student was absent was a strong negative predictor of each student's gain in achievement in math and reading.

Perhaps the next most consistent finding across all the models was that an individual student made much more academic progress in a school year in which he or she was surrounded by peers in his or her *grade* who had high scores on the prior spring's test. A strong but less consistent finding was that the average initial test scores of a student's peers in his or her *classroom* also influenced his or her learning. Overall, the size of the *grade-level* peer effects is much larger in middle and high school than in elementary school. Conversely, *classroom* peer effects were more likely to be significant predictors of learning in elementary school than in middle and high school. One explanation could be that in middle and high school, students typically switch classrooms during the day, changing their peers from one class to the next.

These grade and class effects probably work through a number of channels, which can be categorized into the *direct effect* of a strong peer group (through interaction in the classroom and hallways) and *indirect effects* (such as the increased rigor that a teacher may introduce into a class that is particularly strong).

Among other factors, the researchers found that *class size* does influence reading achievement in the elementary grades, especially among English Learners, but they found no evidence that class size matters in middle and high schools. With regard to teacher qualifications, they found sporadic and varying effects between elementary, middle, and high schools, as well as between math and reading

achievement. In general, class size appears to matter more in lower grades than in upper grades, whereas teacher qualifications such as experience, level of education, and subject area knowledge appear to matter more in the upper grades.

Policy Implications

This study found that teacher education, credentials, experience, and subject authorization can make a difference, but the effects on student achievement are not as systematic as might be expected. This finding is important, given the grim new financial reality facing most school districts as a result of California's large budget deficits. Many policy-makers fear that the current budget situation will cause experienced teachers to leave the profession through early retirement, voluntary movement into other professions, and layoffs. In San Diego, for example, the district tackled its budget problem in early 2003 by offering early retirement incentives. These incentives led approximately one in ten teachers to opt for retirement. The possible loss of some of the state's most highly experienced teachers is a cause for genuine concern. However, the authors' analysis suggests that after one or two years, many relatively inexperienced teachers may be far more effective than some would believe. The surprising degree of success among many inexperienced teachers may result in part from statewide and district programs to mentor new teachers.

Policymakers should also be interested in a consistent finding of the study—that an individual student's rate of learning appears to be strongly and positively influenced by the initial achievement of students in his or her grade and, with somewhat lesser consistency, that of students in his or her classroom. Clearly, ability grouping within a school or across schools could affect a student's achievement in major ways.

Finally, the daunting achievement gaps between students do not appear to be created primarily by the schools as they now exist. These gaps—related to income and socioeconomic status more generally—emerge by the time young children reach school age. One implication is that policy-makers at the state and federal levels may want to examine the value of Head Start and similar preschool programs as a way to reduce the achievement gap of disadvantaged students before they begin their formal schooling.

This research brief summarizes a report by Julian R. Betts, Andrew C. Zau, and Lorien A. Rice, Determinants of Student Achievement: New Evidence from San Diego (2003, 172 pp., \$15.00, ISBN 1-58213-044-2). The report may be ordered by phone at (800) 232-5343 [U.S. mainland] or (415) 291-4400 [Canada, Hawaii, overseas]. A copy of the full text is also available on the Internet (www.ppic.org). The Public Policy Institute of California is a private, nonprofit organization dedicated to independent, objective, nonpartisan research on economic, social, and political issues affecting California.
