

POLICY Research Brief

EXAMINING KEY EDUCATION ISSUES

A Membership Benefit of NSBA National Affiliates

Class Size and Student Achievement

A review of the research

Reducing class size to increase student achievement is an approach that has been tried, debated, and analyzed for several decades. The premise seems logical: With fewer students to teach, teachers can coax better performance from each of them. But what does the research show?

Some researchers have not found a connection between smaller classes and higher student achievement, but most of the research shows that when class size reduction programs are well-designed and implemented in the primary grades, student achievement rises as class size drops.

Research Findings

Our research review revealed that despite the huge volume of work on the topic of class size, relatively little of it is based on sound research designs. And even in those cases, implementation of reduced class size programs can vary so widely that the research results are compromised.

Also, the research has not yet addressed questions related to teacher quality. In some reduced class size programs, less-experienced teachers, sometimes with fewer credentials, have been disproportionately assigned to smaller classes. The research also does not tell us whether gains in student achievement might be attributable to other changes implemented along with smaller classes, such as hiring more experienced teachers or strengthening professional development.

Nonetheless, we identified 19 studies that met our standards. Most of these addressed reduced class size programs in

kindergarten through grade three. Indeed, most programs in the past 20 years have targeted these early grades, in part because earlier research suggested that these are the optimal years for such programs, and in part because of the more recent and comprehensive evidence from Tennessee's influential Project STAR (Student/Teacher Achievement Ratio).

Statewide Programs

Project STAR—commissioned by the Tennessee Legislature in the mid-1980s—may be the most influential class reduction program in recent years. Project STAR found substantial evidence that reducing class size improved student academic achievement. The project:

- Was designed as a large-scale, longitudinal (four-year) study;
- Involved nearly 80 schools from 42 school districts;
- Included about 7,000 K-3 students from families ranging from very poor to very affluent;
- Required schools to commit to the four-year time frame as a condition of participation; and
- Required schools to agree to random assignment of teachers and students to small (13 to 17 students) or large (22 to 26 students) classes as a condition of participation. Class size was verified through site visits.

Project STAR's impact on academic achievement was measured using a scientifically valid research design.

A decade later, the Wisconsin State Department of Public Instruction initiated SAGE (Student Achievement Guarantee in Education), a program intended to increase student achievement by reducing K-3 class size to no more than one student per teacher. Phased in over five

years, beginning in 1996-97, SAGE targeted high-poverty schools and districts.

Also, in the summer of 1996, California initiated its Class Size Reduction (CSR) program. Phased in over four years, its purpose was to decrease the population of K-3 classrooms to no more than 20 students per teacher. Among the states initiating reduced class size programs, the dimensions of California's program are unequalled in terms of the numbers of students, teachers, and schools affected.

Gains in Student Achievement

The landmark 1978 study by Gene Glass and M. L. Smith strongly endorsed reduced class size as a reform likely to produce improvements in academic achievement. The researchers reviewed 80 research reports on the relationship between class size and achievement, obtaining more than 100 comparisons from "well-documented" studies of smaller

ABOUT THIS ISSUE

This issue was excerpted from a research review produced by the Center for Public Education, an initiative of the National School Boards Association, with support from the National School Boards Foundation. It is one in a series produced by the center that identifies, gathers, and analyzes the most useful and scientifically valid research findings on important education issues.

The full review, including notes, references, and methodology, can be found online at www.nsba.org/PublicEd. Click on Research.

POLICY Research EXAMINING KEY EDUCATION ISSUES Brief

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The National School Boards Association is the nationwide advocacy organization for public school governance. NSBA's mission is to foster excellence and equity in public elementary and secondary education in the United States through local school board leadership. Founded in 1940, NSBA is a not-for-profit federation of state associations of school boards across the United States and the school boards of the District of Columbia, Guam, Hawaii, and the U.S. Virgin Islands.

About the National Affiliate Program

The National Affiliate Program extends NSBA's services directly to local school districts. School districts are eligible to join provided they are members in good standing of their state school boards associations.

About the Advocacy and Issues Management Section

The Advocacy and Issues Management Section implements NSBA's Action/Advocacy Agenda and carries out NSBA's lobbying efforts at the national level. By lobbying the Congress, the White House, and federal agencies, the section helps increase federal funding for local school districts and reduces costly federal mandates; helps improve federal education programs by making legislative and regulatory changes local board members support; protects the governance role of school boards from congressional attack; and promotes the role of school boards as a key democratic institution in our country's education system.

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and larger classes using rigorous statistical analyses.

Their meta-analysis showed that:

- As class size decreases, achievement increases; and
- Benefits begin to emerge as class size falls below 20 students.

The most influential contemporary evidence that smaller classes lead to improved achievement is Tennessee's Project STAR. Because this program set up randomly selected control and experimental groups of students, researchers could compare students who had four years of small class participation to students who had none. This meant that researchers could more reliably evaluate the impact of the class size reform. Project STAR found:

- Students in smaller classes did better than those in larger classes throughout the K-3 grades;

- Minority and inner-city children gained the most from smaller classes; and
- The more years spent in reduced classes, the longer lasting the benefits.

Evaluation of Wisconsin's SAGE found similar evidence to support the policy of reducing class size in the early grades. In 1999, Alex Molnar and others found that participation in any one of the four types of SAGE classrooms was a predictor for student achievement. Controlling for pretest scores, family income, school attendance, and race/ethnicity, they found that:

- Students in grades one through three in SAGE classrooms scored significantly higher on the Comprehensive Test of Basic Skills in reading, language arts, mathematics, and in total scores, than students in traditional classrooms;
- Although first-grade SAGE students had lower pretest scores than students in larger classrooms, the SAGE students had

FINDINGS FROM THE FIELD

After more than 20 years of research, class size continues to be at the forefront of the educational and political agenda for schools, school districts, and school boards. Since the late 1970s, research has indicated that smaller classes (15 to 18 students) are associated with increased student achievement in specific situations—particularly in the primary grades and particularly when students participate in small classes for more than one year.

Following is a snapshot of the significant findings from the research; references are available online at www.nsba.org/PublicEd. Click on Research.

- **Smaller classes in grades K-3 improve student achievement in reading and math.** Students in smaller classes performed better than students in larger classes on reading and mathematics achievement tests.

- **A class size of 15-18 is the upper limit for capturing benefits in the early grades.** Classes with no more than 15-18 students have been found to be the threshold class size for increasing student achievement in the early grades.

- **Young students benefit more when reduced class size programs span grades K-3.** The achievement of students in small classes outpaces that of students in larger classes by a widening margin for each additional

year spent in small classes.

- **The benefits of small classes in the primary grades are lasting.**

The academic gains students in small classes experience in the primary grades continue or are maintained more than five years later.

- **Small classes in the primary grades can help close the achievement gap.** Minority students often experience even greater gains than white students when placed in small classes in the primary school years. Minority students tend to have lower achievement scores than white students before entering small classes and make larger achievement gains by the end of the year.

- **More instructional options for teachers might explain the benefits of small classes.** Teachers may teach differently or certain instructional strategies may work better in small classes. For example, more work done in small groups might be possible.

- **Teachers with small classes give more individual attention to students.** High school math teachers with small classes were found to engage with individual students and small groups more frequently than teachers with larger classes, possibly because they spend less time on classroom management than teachers in larger classes.

significantly higher post-test scores, indicating that SAGE students made greater gains than those in larger classes—and subsequent analyses showed they maintained these gains through second and third grades; and

- Gains for African-American students were even greater than those for white students.

Douglas Mitchell and Ross Mitchell assessed the impact of California's CSR program after two years of implementation. They analyzed test data from the Stanford Achievement Tests ninth edition reading, language, and mathematics subtests as well as more than 30 variables related to student demographics, schools, classrooms, and teachers from more than 80 schools across eight school districts in Southern California.

In the Mitchell and Mitchell study, many demographic variables—such as gender, student poverty, ethnicity, and language spoken at home—were related to lower student gains. Nonetheless, when controlling for these variables, students in reduced size classes made small, positive gains in student achievement.

But, the researchers acknowledged, other factors could have contributed to these gains. Major changes in California's public education system took place in tandem with the first phase of the CSR program, including new requirements for teacher preparation, revisions to bilingual education, new curriculum frameworks and materials, new statewide tests, and a new performance accountability system—none of which were taken into account by this study and any of which could have contributed to the achievement gains.

Gains Over Time

Barbara Nye and her colleagues explored the relationship between the number of years students participated in Project STAR small classes and their level of achievement. After one year, the students in smaller classes had significantly higher achievement scores on the Stanford Achievement Test reading and mathematics subtests than students in larger classes. The gap in scores widened after two years, indicating that the effects of small classes are cumulative.

These researchers also conducted a follow-up study of Project STAR students, which showed that the positive effects of small classes were maintained over time. They compared the math achievement of ninth-grade students who had been in small classes for at least one year during

grades K-3 with that of ninth-grade students who had been in larger classes in the third grade (and in earlier grades, depending on the year they were assigned to the study).

In general, students who participated in small classes for at least one year continued to show higher scores on standardized mathematics tests at grade nine. Minority students in small classes had greater gains in achievement than white students in

had greater gains in achievement when placed in small classes. The researchers found that minority students participating in small classes had larger gains in achievement than white students in small classes for both reading and mathematics in grades K-3. (The gains were slightly more modest for math.) In both reading and math, minority boys had greater gains than white boys, and minority girls had greater gains than white girls.

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Gains for African-American students were even greater than those for white students.

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small classes, and girls in small classes had larger gains than boys.

Penny Fidler looked at the impact of smaller classes over time within the California CSR program. The study examined the Stanford Achievement Test reading, language, and mathematics subtest scores of students in grades four to six who had completed at least one year of the CSR program in the Los Angeles Unified School District. The analysis found that the longer students participated in CSR, the greater their achievement gains. Specifically, students who participated in CSR for three years or longer had greater gains than students who participated for just one year. These gains were modest but statistically significant.

Minority and At-Risk Populations

Molnar's evaluation of Wisconsin's SAGE also assessed the achievement gains of African-American students. Results for grades two and three showed that African-American students in SAGE classrooms performed higher on all subtests of the Comprehensive Test of Basic Skills (that is, reading, language arts, and mathematics) than African-American students in comparison schools. African-American SAGE students in grades one through three also achieved greater gains than white SAGE students on the total score from the pretest to post-test, closing the achievement gap.

Nye analyzed Project STAR data to determine if certain subgroups of students

In another look at Project STAR data, Nye explored the long-term effects of reading and mathematics achievement for minority students in small classes. When the original experiment concluded, minority students in small classes had showed greater gains in reading and mathematics achievement than white students in small classes. In this study, the researchers found that students maintained these gains, to some extent, for up to five years—through grade eight.

Both white and minority students who took part in small classes had statistically significant higher scores in reading and mathematics than students in large classes. Minority students who participated in

SELECTED STATEWIDE CLASS SIZE REDUCTION PROGRAMS

- California's Class Size Reduction (CSR) Program www.cde.ca.gov/ls/cs
- Indiana's Project Prime Time www.doe.state.in.us/primetime/overview.html
- North Carolina's Class Size Reduction Program www.serve.org/rsi/csr_nc.html
- Tennessee's Project STAR www.heros-inc.org/star.htm
- Wisconsin's Student Achievement Guarantee in Education (SAGE) www.dpi.state.wi.us/dpi/oea/sage

small classes for four years had higher reading achievement scores than white students who were in small classes for the same amount of time. It also appears that girls maintained their gains in mathematics achievement for up to five years.

Lack of Gains

Other studies identified through our literature search found no convincing evidence linking reduced class size and increased student achievement. However, these studies often involved programs that:

- Set reduced class size at 20 students or more;
- Were short term or unevenly implemented; and
- Encountered unanticipated consequences that affected outcomes.

In some instances, the researchers pointed out inadequacies in the research methodology that might contribute to these findings. (Details of these findings are available in the full report.)

Conclusion and Implications

Even in light of findings that suggest no relationship between class size and student achievement, the preponderance of the evidence supports positive effects and academic gains—especially for young minority students—when class size reduction programs in the primary grades are well designed and properly implemented.

Student achievement, however, is not the only factor in play. The possible benefits of smaller classes must be weighed against the costs. (See Caroline Hoxby for one analysis of the costs of class size reduction.) To reduce class size in a meaningful way, school districts might need to hire more teachers, add more classes, purchase more supplies—or all of the above. Questions of class size can figure in deci-

sions from teacher contracts to school construction.

Hiring more teachers can be especially difficult. Public schools already are straining to fill positions as an aging workforce edges closer to retirement and fewer young people enter the profession. New standards for teacher quality established by the No Child Left Behind Act could further complicate the supply-and-demand problem. Reducing class size in the early grades may also be a strategy school districts consider as they strive to meet NCLB's Adequate Yearly Progress mandates that begin in grade three.

Some researchers believe school districts would do better to hire fewer teachers with better credentials than to hire more teachers without regard to their credentials and experience. They argue that the quality of the teacher, rather than the size of the class, drives student achievement.

In short, the stakes are high when undertaking these initiatives since debates continue about the ability of reduced class size to fuel student achievement, making it critical to approach the issue armed with credible research that helps inform decision-making. ■

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