

Class-Size Reduction

A Fresh Look at the Data

A new review of SAGE findings answers questions on how much class-size reduction improves student achievement and which groups it affects most.

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Wisconsin's Student Achievement Guarantee in Education (SAGE) program, first implemented in 1996, is designed to increase the academic achievement of low-income students by reducing K-3 class size to 15 students to 1 teacher; establishing "lighted schoolhouses" that are open longer than the traditional school day; developing more rigorous curriculums; and structuring professional development and accountability for school professionals.

To gauge just how much of an effect SAGE has had on student achievement, we tracked from 1996 to 2001 the academic performance of students in 30 schools from the 21 school districts that initially participated in the program. We compared the academic performance of SAGE students with the performance of a comparable group of students in larger classes from 17 non-SAGE schools in the same districts.

For each year of the SAGE study, we pretested 1st graders from both SAGE and the comparison group in the fall using level 10 of the TerraNova edition of the Comprehensive Test of Basic Skills (CTBS)¹ and posttested the same groups in the spring, using level 11. In the spring of 2nd grade, students were posttested using level 12 of the TerraNova, and in 3rd grade, the students took level 13.

Overall, SAGE 1st graders scored significantly higher than did the comparison group on the reading, language arts, and mathematics subtests of the CTBS. At the end of 1st grade, SAGE students' test results showed a 25-30 percent higher level of academic achievement than that of their counterparts in larger classes, and they maintained that gain through 3rd grade—the last year of the program. By the end of 3rd grade, SAGE students were achieving at a level of one-third to one-half a year ahead of students in larger classes (Smith, Molnar, & Zahorik, 2003).

Persistent Questions

Although advocates of class-size reduction have used the results of the SAGE study to fortify the argument for smaller classes, some policy analysts have questioned whether the benefits—including achievement gains, reduction of classroom discipline problems, and greater individualized attention for students—are worth the program's cost. Although an overall pattern of research findings points to the positive effects of class-size reduction on student learning and on teaching behaviors, skeptics have consistently raised five major questions:

- How big is the SAGE effect on achievement?
- Do SAGE benefits persist in 2nd and 3rd grade?
- Does SAGE reduce the achievement

gap between African Americans and whites?

- Are the benefits of SAGE limited to disadvantaged students?

- How much does SAGE benefit students with poor attendance?

We will address these questions by providing a fresh perspective on the data contained in the program's annual reports. We hope that our analyses will help decision makers understand and evaluate the impact of the SAGE program in a realistic context.

How Big Is the SAGE Effect on Achievement?

In a new analysis, we used average growth curves—a means of charting and predicting the average expected performance of a test's norm group over time—to measure SAGE's effect on the achievement of the cohort of SAGE students entering 1st grade in 1997-1998.² The average growth curves for the CTBS tests used in the SAGE evaluation indicate that students would be expected to gain, on average, 33 points on reading test scores and 29 points on mathematics test scores between fall and spring of 1st grade (Smith et al., 2003).

Although both groups in the study outperformed the expected gain, the SAGE students outscored the comparison group in both subjects, gaining 47 points in reading and 42 points in

mathematics compared with the comparison school students' gain of 38 points in reading and 35 points in math. On the basis of the norm groups' predicted performance, this difference translates into 25–30 percent of a year's growth by the end of 1st grade, a significant gain that supports SAGE's claim to improving student achievement (Smith et al., 2003).



Do SAGE Benefits Persist in 2nd and 3rd Grade?

After 1st grade, the SAGE advantage in reading remains fairly constant. In 2nd grade mathematics, the SAGE group also showed gains relative to the comparison group, which fell significantly off the norm group performance standard. Third grade changes for both SAGE and the comparison students are comparable to the norm standard for both reading and mathematics (Smith et al., 2003).

The greatest separation between the achievement of SAGE and comparison students occurs in 1st grade. From the data available, it is not possible to determine what might have happened had the program ended following 1st grade, forcing students to return to regular classrooms. It appears, however, that the gains made in 1st grade are sustainable and in some instances increase if similar classroom conditions exist in subsequent grades.

Does SAGE Reduce the Achievement Gap?

Class-size reduction benefits all students, but its effects are especially powerful for African Americans. African American students entering small 1st grade classes had lower reading and math scores than African American students entering larger classes in comparison schools. But by the end of 1st grade, their achievement scores

but by the end of 1st grade, they outscored the comparison students by 10 points—a 19-point gain which, when compared with the average growth curve, again represents two-thirds of a year's growth. The advantage in math achievement gained by African American SAGE students in 1st grade grew by another 10 points through 2nd grade, and the students maintained their overall 29-point gain throughout 3rd grade, representing nearly one year's growth advantage over African American students in comparison classrooms (Smith et al., 2003).

African American students seem to profit more from the SAGE experience than white students, when compared with non-SAGE students. The SAGE program narrows the achievement gap between African American and white students in 1st grade and prevents it from widening in 2nd and 3rd grade. In the larger comparison classrooms, the achievement gap between African American and white students widens each year (Smith et al., 2003).

Are SAGE Benefits Limited to Disadvantaged Students?

Because the SAGE program originally targeted high-poverty schools, some critics have claimed that the effects of SAGE are limited to students of poverty. Even in schools that serve large numbers of students living in poverty, however, there is variation in family incomes. The SAGE evaluation monitored student participation in the federally subsidized school lunch program and used eligibility for free and reduced-price lunch as a means to assess the effect of SAGE on students with different socioeconomic statuses. We found that the higher a student's socioeconomic status, the greater the impact of the program.

For this analysis, we grouped students into three socioeconomic categories: high (not participating in subsidized lunch program); moderate (receiving reduced-price lunch); and low (receiving free lunch). At the beginning of 1st grade, African American students of low socioeconomic status actually outscored the group with high socioeco-

were significantly higher than those of the African American students in larger classes. They also narrowed the achievement gap that had separated them from their white classmates at the start of 1st grade. In 2nd and 3rd grade, the academic performance of African American students in small classes kept pace with that of their white peers (Smith et al., 2003).

In the 1st grade reading pretest, the African Americans in the SAGE program scored an average of 6 points below their comparison school counterparts. But on the end-of-year posttest, they outscored the comparison students by 14 points. This 20-point gain translates into two-thirds of a year's advantage in academic growth (Smith et al., 2003).

The study found the same general trends for mathematics. The African Americans in the SAGE program had a pretest score that averaged 9 points below that of the comparison group,

conomic status by 7 points, but they fell behind that group by 15 points by the end of 3rd grade, a 22-point swing (Smith et al., 2003). Coupled with the "achievement gap" results presented above, these figures suggest that although all students benefit, African American students—especially those with higher socioeconomic status—profit the most from the program.

How Much Does SAGE Benefit Low-Attending Students?

Anyone familiar with schools that serve a large number of students living in poverty knows that attendance is a problem. The SAGE program helps compensate for the negative effects of poor attendance.

For this analysis, we divided students into three groups: high attenders (missed 5 or fewer days in the school year); moderate attenders (missed 6–15 days); and low attenders (missed more than 15 days). The achievement scores for both the SAGE students and the comparison students ranked as expected: High-attending students had the highest score average and low-attending students had the lowest average (Smith et al., 2003). The achievement pattern in reading and math for low-attending SAGE students is, however, nearly identical to that of the high-attending comparison school students (Smith et al., 2003), which indicates that SAGE mitigates the devastating effects of poor attendance that schools with a high poverty rate and low student achievement face.

SAGE's Effect on Teaching and Learning

Smaller classes allow for changes in teachers' classroom practices that may help account for students' achievement gains in the highest-performing SAGE classrooms. Teachers in smaller classes spend more time teaching, provide students with more individual attention, and know more about the needs and interests of their students than do teachers in larger classes. The SAGE teachers in our study spent less time on classroom management and paperwork and more time on hands-on, individual-

ized activities. As a result, they had fewer discipline problems and, not surprisingly, reported higher levels of job satisfaction (Maier, Molnar, Percy, Smith, & Zahorik, 1997; Molnar, Smith, & Zahorik, 1998; Molnar, Smith, & Zahorik, 1999; Molnar, Smith, & Zahorik, 2000; Molnar et al., 2001).

In general, the SAGE findings support what most people would consider common sense: Fewer students means more teacher attention for each student. More teacher attention translates into fewer students slipping between the cracks, more students getting personal help with their work, and better relationships developing between teachers and students. Teachers of small classes also have more time to communicate with parents, inform them of their children's performance, and engage them in supporting their children's learning.

The evidence that the SAGE program significantly increases student achievement is clear, consistent, and powerful. The program appears to promote effective teaching, mitigate the impact of poor attendance, and narrow the achievement gap between African Americans and whites. Whether such benefits as these are worth the cost of the program is not a question that we can answer. The answer will depend on the values and political priorities of policymakers. ■

Authors' note: For a complete version of the authors' latest research report on SAGE (*Class-Size Reduction in Wisconsin: A Fresh Look at the Data*), visit www.asu.edu/educ/eps/EPRL/documents/EPRL-0309-110-EPRL.doc.

¹The CTBS is a norm-referenced test that allows schools to compare their own students' achievement with the performance of comparable students nationwide. The TerraNova is an updated assess-

ment that also provides information on how a given school's students perform in relation to other U.S. students.

²We selected this cohort for our analysis because the data available for this group are the most complete and powerful.

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