

Small Classes in American Schools: Research, Practice, And Politics

Mr. Finn provides a brief overview of the current status of class-size reduction programs in the U.S., summarizes the research base that has moved districts and states to seek class-size reduction, and calls attention to the misapplication of the research in some contexts. He also discusses questions about smaller classes that remain unanswered and describes current research into the long-term consequences of small classes and efforts to explain why they are effective.

BY JEREMY D. FINN

IN RECENT YEARS, more than half of the states, countless districts, and the federal government have sponsored class-size reduction (CSR) programs. In California alone 28,000 new teachers were hired in the first three years of the statewide CSR initiative. Meanwhile, as part of its effort to reduce class sizes, the U.S. Department of Education has paid the salaries of 29,000 new teachers, mainly in poor urban school districts. Nationwide, it is impossible to count the number of new teachers hired and the number of classes that have been reduced in size. But these numbers are certainly large.

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Why is it that, after years of research and debate but little action, class sizes are finally being reduced in the elementary grades across the U.S.? There are a number of reasons, including the following:

- Everybody likes the idea of small classes — teachers, parents, policy makers, legislators, and even the courts¹ understand the importance of small classes for teaching and learning;
- High-quality research has demonstrated the benefits of small classes in the early grades — especially for students at risk;

- Until very recently education had risen to the top of state and national agendas; and
- The economy was healthy, so we had ample resources to direct toward school improvement.

But much has changed in recent months, making the future of smaller classes in the elementary grades less clear. The White House education plan, "No Child Left Behind," earmarked the federal reduced-class-size initiative as one of two programs to be eliminated. The recent instability in the economy may have left states and districts less able to hire additional teachers. And the events of September 11 refocused our national attention in a way that may well give lower priority to education issues. It remains to be seen if small class sizes have become sufficiently important and sufficiently institutionalized that they will continue to be part of our basic educational plans.

In this article I provide a brief overview of the current status of class-size reduction programs in the U.S.; the overview is brief because the situation is changing even as I write. I also summarize the research base that has moved districts and states to seek class-size reduction and call attention to the misapplication of the research in some contexts. Finally, I discuss questions about smaller classes that remain unanswered and describe current research into the long-term consequences of small classes and efforts to explain why small classes are effective.

My basic premise is that small classes in the elementary grades are *not* the solution to the problems of American schools; they are not the "silver bullet." Instead, small classes provide an *essential opportunity* for instruction to be more effective and for students to become optimally involved in the learning process. The most important question yet to be answered is "How can educators take best advantage of small class sizes to maximize learning outcomes?"

THE RESEARCH BASE

Prior to the 1980s, dozens of studies were conducted on the relationship between class size and pupil performance. Many of these suffered from methodological flaws, including small samples, poor research designs, and inadequate treatment of the data. Not one was a large-scale randomized experiment. However, reviews of this research found consistencies and supported some tentative conclusions:

- Reduced class size (below 20 pupils) can be expected to produce a modest increase in academic achieve-

ment.²

- Small classes are most beneficial in the early primary grades.³
- Students who are economically disadvantaged are most likely to benefit from small classes.⁴

PROJECT STAR

Beginning in 1985, the state of Tennessee, under Gov. Lamar Alexander, undertook a remarkable experiment to test these propositions. Project STAR (Student/Teacher Achievement Ratio) was a large-scale randomized within-school experiment, most unusual in education. Pupils entering kindergarten in each participating school were assigned at random to a small class (13-17 students), a full-size class (22-26 students), or a full-size class with a full-time teacher aide. Teachers were also assigned at random to the classrooms. Pupils were kept in the same condition — small, regular, or teacher aide — for up to four years (grade 3), with a new teacher assigned at random each year.

In addition to being a scientifically controlled experiment, STAR had other special features:

- The study was extensive. More than 6,000 students in 329 classrooms in 79 schools participated in the first year, and almost 12,000 students participated at some point in the four-year study.
- The class arrangement was maintained all day, all year long, and there was no other intervention. For example, there was no special training for teachers and no special curricula.
- Both norm-referenced and criterion-referenced achievement tests were administered to each pupil in the spring of each year. Other data on the students (e.g., classroom behavior, retentions in grade) and on their teachers were collected regularly.

- STAR pupils were followed after they returned to full-size classes in grade 4. Measures of academic performance and other outcome data were collected through high school, and information on postsecondary schooling and employment is still being collected.

The findings of Project STAR are important building blocks in today's knowledge base about small classes. From a scientific perspective, it is also important that the STAR data have been reanalyzed by researchers not associated with the project who have used a variety of statistical procedures.⁵ With only minor exceptions, these analyses have agreed with the original findings. Because STAR is one of the few large-scale randomized experiments in the field of education, it

has also been used by other agencies as a model in the push for more experiments to support education policies.

The findings of STAR have been summarized in a number of publications.⁶ The most intensive look at short- and long-term academic outcomes to date appeared in *Teachers College Record* in 2001.⁷ In that article, effect sizes are presented in two metrics, the usual "standard deviation" scale and in terms of "months of schooling." In the sections that follow, I summarize the highlights of the findings of Project STAR, drawn from those reports.

TABLE 1.
Small-Class Advantage in Months of Schooling, K-3*

Grade	Stanford Achievement Test Scale		
	Total Reading	Word Study Skills	Total Mathematics
Kindergarten	0.5	0.5	1.6
Grade 1	1.3	0.9	2.8
Grade 2	3.9	4.8	3.5
Grade 3	4.5	5.5	2.6

*Difference between mean of small classes and mean of full-size classes on grade-equivalent scale. Adapted from Table 2 of Jeremy D. Finn et al., "The Enduring Effects of Small Classes," *Teachers College Record*, vol. 103, 2001, p. 154.

Experimental years (K-3). Small classes had statistically significant academic benefits in every grade, in *all academic subjects*. The differences between small classes and full-size classes were in the range of 0.2 to 0.3 standard deviations in each school subject. Table 1 shows the advantage of attending small classes in terms of "months of schooling." For example, kindergarten students who attended small classes were about one-half month ahead of students who attended larger classes in reading and about 1.6 months ahead in mathematics. In grade 1, the small-class advantage was 1.3 months in reading and 2.8 months in mathematics. By spring of grade 3, the advantage in reading was 4.5 months (or about half a school year).

The magnitude of effects was greater for students who *started early* and *spent more years* in small classes. For example, first-graders who were in small classes for the first time were about 0.6 of a month ahead of their schoolmates in reading and about two months ahead in mathematics. First-graders who were in small classes for the second year (since kindergarten) were about two months ahead

of their schoolmates in reading and about 3.5 months ahead in mathematics. A similar pattern was found for students in grades 2 and 3 on every test.

In every grade, the benefits of small classes were *greater for minority students or students attending inner-city schools* than for white students in nonurban schools. Statistically, the advantages were often as much as two to three times as great, thus reducing the white/minority achievement gap. For example, the racial gap in pass rates on the grade 1 reading mastery test was 14.3% in full-size classes — that is, 14.3% more white students than black students mastered the reading objectives.

In small classes, the gap was reduced to 4.1%. Both black and white students gained significantly by being in small classes, but black students gained more. Economist Alan Krueger reanalyzed the STAR data and described the reduction in the achievement gap in other terms. He concluded that, by third grade, the black/white gap in school performance would be reduced by 38% if all students attended small classes.⁸

Post-experimental years (4-8). After all students returned to full-size classes, the benefits of small classes continued to be statistically significant through all subsequent grades in all subject areas.⁹ Table 2 shows the advantage in months of schooling in grades 4-8 of having attended small classes in grades K-3. The benefits in grade 4 ranged from 2.4 months to 4.6 months; in grade 6, from 3.0 to 5.1 months (apart from science); and in grade 8, from 3.4 months to 4.8 months.¹⁰ (The values in Table 2 are conservative because they include students who attended small classes for one, two, three, and four years.)

Starting early and *continuing* in small classes for multiple years are both related to the strength and duration of carryover effects. In any given grade (4-8), the

TABLE 2.
Overall Small-Class Advantages for Grades 4, 6, and 8*

Grade	CTBS Scale			
	Total Reading	Total Mathematics	Science	Social Science
Grade 4	3.9	2.4	3.1	4.6
Grade 6	3.0	3.1	1.0	5.1
Grade 8	4.1	3.4	4.3	4.8

*Difference between mean of small classes and mean of full-size classes on grade-equivalent scale. Adapted from Table 4 of Finn et al., p. 167.

effects were larger for students who had spent more years in small classes in grades K-3. For example, at the end of grade 6, students who had attended small classes for one year had a 1.2-month advantage in reading over students who had attended full-size classes. Students who had attended small classes for two years had a 2.8-month advantage; three years in a small class produced a 4.4-month advantage. And so on, in each school subject at every grade level.

OTHER CSR INITIATIVES AND THEIR FINDINGS

A large number of (nonexperimental) CSR initiatives have been undertaken since Project STAR, but many have not been systematically evaluated. Those that have been evaluated include Wisconsin's Project SAGE; the well-researched effort in Burke County, North Carolina; and California's statewide CSR program. The Wisconsin and North Carolina projects targeted schools serving low-income students. While all these programs have unique features, all have yielded findings consistent with STAR.

Project SAGE. Wisconsin's Student Achievement Guarantee in Education (SAGE) program, begun in 1996, was targeted to schools in which 50% or more of the students were eligible for Title I support. Participating schools were required to "systematically reduce class size to 15 in grades K-3; stay open from early in the morning to late in the day, . . . provide a rigorous academic curriculum to improve academic achievement, and establish staff development and accountability mechanisms."¹¹ In its first year of operation, SAGE was implemented in 30 schools in 21 districts across Wisconsin; it has expanded considerably since then. The majority of SAGE classrooms were self-contained small classes. Schools with insufficient space implemented alternative classroom models, including team-taught classrooms with two teachers and approximately 30 students and "floating teacher" classrooms, in which an additional teacher was brought in to share instructional responsibilities during reading and mathematics lessons.

An evaluation was conducted in each of four years, comparing SAGE classes to a matched comparison group of non-SAGE classes in the same districts. The results show consistent benefits of small classes with effect sizes similar to those of STAR.¹² The small-class advantage was also found to be significantly greater for minority students than for white students.

Burke County, North Carolina. Burke County is a

relatively poor rural community with an increasingly diverse population. Thirty-four percent of students in the Burke County schools are eligible for free or reduced-price lunch; 11% of the students have limited proficiency in English. In 1991, four Burke County elementary schools were selected to implement small classes (no more than 15 students) in grade 1. The following year the initiative was expanded to include grade 1 in 14 elementary schools and grade 2 in the original four schools. By 1995-96, small classes had been implemented in grades 1 and 2 in all schools and in grade 3 in six schools. Intensive staff development programs accompanied reduction in class size. By reallocating existing staff members, the schools in Burke County reduced class sizes with no increase in per-pupil expenditures.

The evaluation of the program included extensive classroom observations as well as statistical comparisons of small classes with matched full-size classes on reading and mathematics tests. Students in smaller classes had higher achievement scores in reading and mathematics in grades 1 through 3, and they continued to have higher reading scores in grades 4 through 7, after returning to full-size classes.¹³

California's statewide program. In the spring of 1996, the California legislature passed a reform initiative to limit class sizes statewide in grades K-3 to a maximum of 20 students. By the time school began in the fall of 1996 — just a few months later — 12,000 new teachers had been hired, and class sizes were reduced in 14% of the state's kindergarten classrooms, in 88% of its grade-1 classrooms, in 57% of its grade-2 classrooms, and in 18% of its grade-3 classrooms. By 1998-99, class sizes were reduced in virtually all grade-1 and grade-2 classrooms across the state and in 84% to 86% of kindergarten and grade-3 classrooms.

Initially, the state did not plan a major evaluation of its CSR initiative, despite the fact that it cost over \$1 billion per year. A broad-based evaluation was organized by a consortium of organizations, with funding from private and public sources.¹⁴ The evaluation of academic achievement was limited largely to grade 3; since most classes in grades 1 and 2 were reduced simultaneously, no comparison groups were available. In grade 3, students in small classes outperformed their peers who attended large classes to a small, but statistically significant, degree.¹⁵ Effect sizes in reading and mathematics ranged from 0.05 to 0.10 standard deviations. These effect sizes are very close to the effects found by Project STAR for grade-3 students with one

or two years of small-class participation. Larger effects were found in STAR for students who began in kindergarten or grade 1.

TEACHER AIDES

Project STAR's results for teacher aides have largely been overlooked because of the excitement about the findings for small classes, but the policy implications are considerable. When STAR was designed, Tennessee policy makers wondered if teacher aides could provide the same benefits as small classes but at a substantially lower cost. But the STAR analyses continually reported "no significant difference" between classes with teacher aides and full-size classes without aides. Those results were assembled and extended in several recent reports.¹⁶

Susan Gerber and her colleagues have estimated that there were more than 600,000 teacher aides in American classrooms in 1998, at an annual cost of about \$9 billion.¹⁷ We would certainly hope for demonstrable benefits from such an expenditure. Unfortunately, virtually all the research on the topic, including Project STAR, has found that, in general, teacher aides benefit neither teachers nor students.

To illustrate, consider some findings from a study reported in 2000 by my colleagues and me.¹⁸ In that report, the academic performance of students in classes with teacher aides was compared to both other class types (small and full-size classes without aides), ratings of student behavior were compared across the class types, and teachers in the three class types reported the severity of problems they encountered in the classroom in terms of time management, managing and controlling the class, and engaging students in productive learning activities.

The study posed two questions. The first was "Do students in teacher aide classes perform as well or behave as well as do students in small classes?" To quote from the report:

The answer is unequivocally "no." In terms of academic achievement, students in small classes performed significantly better on every test administered in every grade. There were no exceptions. . . . In terms of behavior . . . students who had attended small classes exhibited superior learning behaviors on two of three dimensions and on total engagement (in learning). . . . These attributes — academic achievement and engagement behaviors — are so

fundamental that on this basis alone, it is clear that teaching assistants are not a substitute for the benefits provided by reduced class size. When teachers were interviewed about their preference, 71% said they would prefer teaching a small class to teaching a regular class with a full-time assistant.¹⁹

The second question was "Do classes with teaching assistants have advantages over full-size classes without assistants?" The results led to these conclusions:

Here, too, the answer is "no." No overall differences in academic achievement were found between the performance of students in teacher aide classes and students in regular classes on any test in any grade. . . . In several instances, students in aide classes performed more poorly than did students in non-aide classes. . . . In terms of learning behavior, again no significant differences were found . . . in Grade 4 or Grade 8. In several instances, behavior was marginally poorer among students in classes with aides.²⁰

Finally, teachers with aides reported little or no relief from the responsibilities of teaching, even when teaching assistants were classified according to the types of duties they performed: administrative, noninstructional interactions with students, or instruction.

Some districts (e.g., Burke County and San Diego) have used teacher aide funds to hire additional teachers. Given the absence of positive impacts and even the possibility of negative effects of aides, this seems to be a sensible policy. The other option discussed in the reports — to "remedy the deficient preparation of paraprofessionals for the tasks they perform, the lack of clearly defined roles for aides in the classroom, and the absence of training for teachers in utilizing their assistants"²¹ — also deserves serious consideration.

OTHER FINDINGS ABOUT SMALL CLASSES

Project STAR did not undertake sufficient studies of classroom processes. However, between the limited process research undertaken in STAR and research conducted in conjunction with other CSR initiatives, an array of additional findings has emerged, among them:

- teacher morale is improved in small classes;²²
- teachers spend more time on direct instruction and less on classroom management when classes are smaller;²³
- there are fewer disruptions in small classes and fewer

discipline problems;²⁴

- students' engagement in learning is increased;²⁵
- in-grade retentions are reduced;²⁶
- dropout rates may be reduced;²⁷ and
- greater numbers of students who attend small classes in the early grades elect to take SAT or ACT tests in high school — that is, aspirations to attend college are increased, especially among African American students.²⁸

THE COSTS OF REDUCING CLASS SIZES

Policy makers often want to know if the benefits produced by small classes are worth the costs, because small classes have been described as an expensive intervention. Unfortunately, only limited efforts have been made to answer this question. The most complete analysis of costs was performed by Dominic Brewer and his colleagues, who estimated the nationwide costs of CSR under such policy alternatives as small classes of different sizes, different amounts of spending flexibility, and targeting small classes to students at risk.²⁹ Indeed, this work produces some very large cost figures — \$2 billion and up.

However, none of these analyses have looked at possible resource tradeoffs, nor have they examined any factors on the benefit side of the equation. The issue of tradeoffs is quite complex, so it is not surprising that it hasn't been studied. Several districts used funds allocated for hiring teacher aides to hire additional teachers and so reduce class sizes. In financially poor Burke County, small classes were implemented in grades 1 through 3 by reassigning existing staff members with no increase in per-pupil expenditures. Researchers should give more attention to the approaches taken in these districts, especially if resources become less plentiful.

Nevertheless, the omission of benefits and the focus on costs alone in these analyses is surprising. The only analysis of benefits in recent years may be that produced by economist Alan Krueger. Using data from STAR and previous studies of school performance and personal income, Krueger concluded that the benefits — in terms of students' future earnings — of reducing class sizes are very close to the per-pupil cost of smaller classes. In other words, the costs are recovered in the form of personal income to the students.³⁰

However, the total benefits are greater still. If small classes are an incentive for teachers to remain in urban settings, if students are more likely to attend college, and if grade retentions and dropout rates are decreased, then these outcomes represent benefits as well. Such

data need to be included in any complete analysis of the costs and benefits of small classes.

HOW TO DO SMALL CLASSES THE WRONG WAY

The widespread implementation of reduced class sizes has produced some "tried and true" ways to negate the benefits. Policy makers and administrators should be aware of two pitfalls in particular.

OVERLOOKING THE NEED FOR PROFESSIONAL SUPPORT AND DEVELOPMENT

In the rush to hire and place new teachers in classrooms, it is tempting for administrators to overlook the need for professional development and support. The California CSR initiative demonstrated the serious side effects of doing things too quickly. In its haste to reduce K-3 class sizes in a matter of a few months, the state placed many individuals in classrooms who had less than full teaching credentials and lacked adequate experience managing students. The effect was so large that the preparation level of the entire state's teaching force declined.³¹ Since districts serving low-income students, minority students, or students learning English had more difficulty attracting qualified teachers, the decline in teacher qualifications was greatest in those districts. For example, schools serving 30% or more low-income students saw a 16% drop in fully credentialed teachers between 1995-96 and 1998-99. Similar problems have occurred in many other states and districts.

When inexperienced teachers are placed in classrooms without adequate preparation, the result can be a level of disorganization that requires weeks or even months to remedy. These dynamics can easily offset the academic benefits of small classes. Brian Stecher and his colleagues recommend that CSR initiatives be undertaken slowly and with careful planning.³² Well-designed programs of professional support and development can also help.

Project STAR demonstrated that the benefits of small classes are obtained *without* any special teacher preparation. However, STAR had an abundant supply of credentialed teachers — a resource not always available today. Several major CSR programs — for example, in Burke County, North Carolina; in Fairfax County, Virginia; and Wisconsin's Project SAGE — have made effective use of professional development in con-

junction with reduced classes. Experience shows how professional support and development activities can be put to best use.

- Many teachers placed in elementary classrooms are new to teaching, new to the classroom, and new to their school setting. They need help "getting started," and they need mentoring and other forms of support throughout their first year of teaching.

- Many veteran teachers are transferring from other settings to small classes. The instructional practices they have adopted over the years are not always "current best practice." They can benefit from updating and relearning those skills that work well with small classes but were too arduous to practice in large classes.

- It may be possible to *enhance* the benefits of small classes by taking advantage of the opportunities they provide. For example, professional development can show teachers how to cover content in greater depth and how best to take advantage of the increased sense of community that is typical of small classes.³³

Not all forms of professional development can accomplish these purposes effectively. Reduced class size creates its own particular needs. Support and development activities must focus on the specific needs of small-class teachers and follow the principles of effective programming.³⁴

CONFUSING PUPIL/TEACHER RATIOS WITH CLASS SIZE

The confusion of these two terms is common and constitutes a second major pitfall to be avoided in implementing CSR initiatives. "Class size" is the number of students regularly in a teacher's classroom for whom that teacher is responsible. The idea of class size is especially important to *teachers* because it constrains all their interactions with pupils, encourages or discourages learning behavior and pro- or antisocial behavior, and is clearly related to the amount of material students learn. As Charles Achilles puts it, "A class with 15 students and one teacher has a class size of 15. A class with 28 pupils and one teacher has a class size of 28. A class with 28 pupils and two teachers and a full-time teacher aide still has a class size of 28."³⁵

The "pupil/teacher ratio" is the ratio of the number of students in an educational unit to the number of full-time-equivalent professionals assigned to that unit. Pupil/teacher ratios have been used by *economists* for many years to develop funding formulas for dis-

tricts and states. However, the pupil/teacher ratio for a school, district, state, or nation *does not describe the proximal setting in which pupils are learning*. In the U.S., many large urban districts have small pupil/teacher ratios (e.g., 13 to 1) because of the large number of ancillary staff members, even though most students spend the entire school day in overcrowded classrooms.³⁶

This distinction between class size and pupil/teacher ratio is important for two reasons. First, the strong research base on small classes does not apply to large classes — no matter how many teachers are present. Some schools, facing a shortage of classroom space, have created large classes with several teachers or with teachers and aides instead of small classes. Indiana's Prime Time, which purported to be a CSR program, had class sizes ranging from 12 to 31; many "small" classes were actually large classes with a teacher and an aide. Not surprisingly, the achievement results of Prime Time have been quite mixed.³⁷

The possibility of having two full-time teachers "team-teach" a large class is permitted under the regulations guiding the U.S. Department of Education's CSR initiative, and this model has been used in some Project SAGE classrooms. Although the SAGE evaluation suggests that team-taught classes are sometimes as effective as small classes,³⁸ it has not been confirmed with large samples or through a controlled experiment. Simply put, we don't have the same level of scientific information about how these other classroom arrangements work.

The second reason that maintaining the distinction between small classes and low pupil/teacher ratios is important is that critics have used data on pupil/teacher ratios to attempt to show that small classes are not beneficial.³⁹ Because pupil/teacher ratios are usually computed for large, heterogeneous units (i.e., school districts, states, or countries), it is little surprise that they have a weak relationship with academic achievement. These levels of analysis may be appropriate for an economist's work, but they are not useful for educators concerned with teaching and learning in individual classrooms.⁴⁰

UNANSWERED QUESTIONS AND ONGOING RESEARCH

Many questions remain to be answered with regard to small classes. Among those that are asked repeatedly, we find:

- How small is "small"? Is a class of 20 students like-

ly to be as effective as, say, a class of 17?

- How effective are small classes in the middle grades? In high school?

- Can the effects of small classes be enhanced through particular instructional strategies? By combining CSR with other interventions, such as preschool programs or remedial programs? By taking advantage of the improved sense of community that arises in small classes?

Two broad questions are being addressed currently. First, what are the long-term impacts of small classes in the early grades? Princeton University's Alan Krueger and his colleagues are augmenting the STAR data with information about students who take college admissions tests, information about child bearing, and information about delinquent or criminal behavior. They will also collect information about unemployment rates. Preliminary reports have already shown that class size is associated with some of these outcomes.⁴¹

Also, together with Jayne Boyd-Zaharias of HEROS, Inc., the primary organization for Tennessee's STAR research, I am performing additional follow-up analyses. Among them will be an examination of the high school courses that STAR participants have taken, their high school grades, and their graduation rates. Approximately 500 telephone interviews are also being conducted with former STAR participants to document postsecondary schooling and employment. In all, this will create a formidable 17-year database for continuing research.

The second question I am pursuing, along with

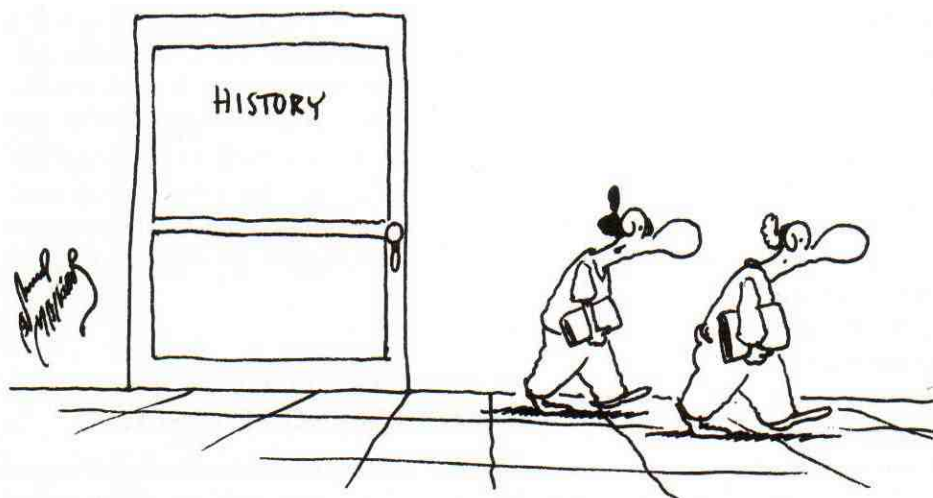
Gina Pannozzo and Charles Achilles, is the "black box" question: Why do small classes work as well as they do? People often speculate that teachers change their instructional styles in small classes, providing more one-on-one teaching and higher-quality instruction. Interestingly, neither STAR nor other process studies support this hypothesis. It is fairly clear that teachers of small classes spend somewhat more time on direct instruction and somewhat less time on classroom management and discipline. Beyond that, few if any qualitative differences occur when class sizes are reduced. Changes in instruction are generally small and do not explain the consistent academic benefits that are found.

This new line of research focuses on a second hypothesis: that students become better students in small classes. That is, students become more engaged in learning, and they display more prosocial behavior and less antisocial behavior. Past research on the topic consists of 15 published studies of students' learning and social behavior. These studies vary considerably in quality. Nevertheless, of 46 measures of students' engagement in learning, 30 are consistent with the hypothesis, and not one is contradictory. Likewise, of 27 measures of students' social behavior, 17 support the hypothesis; again, not one finding favors large classes.

Psychological theory also explains why students may become better students in small classes. Four different perspectives support this hypothesis. The first might be called "the firing line hypothesis": in a small class, each student experiences continuing pressure to participate.

Any student may be called upon at any time to answer questions or participate in a class activity and so can't avoid the teacher's attention by sitting in an obscure place in the classroom. Moreover, the teacher can't readily ignore any particular pupil (even if he or she would like to do so).

Second, small classes tend to encourage a closer "sense of community" among students and between teachers and students.⁴² Teachers of small classes report that they know each individual student better than they would in a larger class. Students tend to be more supportive of one another and to de-



"We'd better be nicer to Ms. Resnick. You never know when you might need a good lifeline."

velop a stronger sense of identification with the class as a whole.

Third, the concepts of "social loafing" and "diffusion of responsibility" have been used to explain why individuals in smaller groups are often more responsive than individuals in larger groups. These concepts have been demonstrated for "critical incidents." For example, a stranger in need tends to get attention if there are one or two bystanders but tends not to get help from members of a larger crowd.⁴³ The same principles may also apply to such settings as students in classrooms.

And fourth, the study of group dynamics has shown that the norms of small groups promote different behavior than do the norms of large groups. In fact, social psychologists have documented a negative correlation between the size of a group and its "functional size" — that is, the number of group members who participate in any given activity.⁴⁴ Once again, these principles may apply to the classroom as well.

These propositions are only theory at this time. But all four perspectives lead to the conclusion that the intensity of the teaching/learning experience is increased for students in smaller classes. More research is needed to test these propositions. Between the empirical research base and psychological theory, there seems to be strong support for the hypothesis that the biggest change when class sizes are reduced is in student behavior.

A CONCLUDING COMMENT

Ongoing programs provide the opportunity for continued research on class size — work that is badly needed. In recent years, many districts have undertaken CSR initiatives, often without any accompanying research or evaluation. Given the extent of the existing research base, it may not be necessary to show that academic achievement is improved at every site, and further large-scale randomized experiments may be even less necessary.

However, it is necessary to make sure that smaller classes are implemented correctly and that problems are addressed quickly. The Buffalo Public Schools, with a significant CSR program, conducted an exemplary evaluation.⁴⁵ It focused on program implementation so that administrators could identify problems as they arose and make useful midcourse corrections. Evaluations can also provide the basic information needed by administrators, parents, and legislators to decide

whether resources have been allocated properly.

There is still much to learn about small classes and classroom processes. CSR sites provide researchers with a rare opportunity — a large number of "natural laboratories" for answering questions about implementation, processes, and outcomes. Educators working in settings where class sizes are reduced should encourage the administrators to engage in formative evaluation *and* research — for their benefit and for the benefit of the broader education community.

1. The issue of class size has been raised in many court cases in recent years. The January 2001 decision in *Campaign for Fiscal Equity (CFE), Inc. v. State of New York*, however, went further than all the others. Having found the state in violation of its constitution, which requires the provision of a "sound basic education," Justice Leland DeGrasse listed seven resources that must be provided to students to meet this requirement. First on the list is "sufficient numbers of qualified teachers, principals, and other personnel." Second is "appropriate class sizes."

2. Gene V Glass and Mary L. Smith, *Meta-analysis of Research of the Relationship of Class Size and Achievement* (San Francisco: Far West Laboratory for Educational Research and Development, 1978); and Robert E. Slavin, "Achievement Effects of Substantial Reductions in Class Size," in idem, ed., *School and Classroom Organization* (Hillsdale, N.J.: Erlbaum, 1989), pp. 247-57.

3. Glen E. Robinson, "Synthesis of Research on the Effects of Class Size," *Educational Leadership*, April 1990, pp. 80-90.

4. Ibid.

5. See, for example, Alan B. Krueger, "Experimental Estimates of Education Production Functions," *Quarterly Journal of Economics*, vol. 114, 1999, pp. 497-532; Larry V. Hedges, Barbara Nye, and Spyros Konstantopoulos, "The Long-Term Effects of Small Classes: A Five-Year Follow-Up of the Tennessee Class Size Experiment," *Educational Evaluation and Policy Analysis*, vol. 21, 1999, pp. 127-42; and Harvey Goldstein and Peter Blatchford, "Class Size and Educational Achievement: A Review of Methodology with Particular Reference to Study Design," *British Educational Research Journal*, vol. 24, 1998, pp. 255-68.

6. Elizabeth Word et al., *Student/Teacher Achievement Ratio (STAR): Tennessee's K-3 Class-Size Study* (Nashville: Tennessee State Department of Education, 1990); Jeremy D. Finn, *Class Size and Students at Risk: What Is Known? What Is Next?* (Washington, D.C.: Office of Educational Research and Improvement, National Institute on the Education of At-Risk Students, U.S. Department of Education, 1998); and Jeremy D. Finn and Charles M. Achilles, "Tennessee's Class Size Study: Findings, Implications, Misconceptions," *Educational Evaluation and Policy Analysis*, vol. 21, 1999, pp. 97-110.

7. Jeremy D. Finn et al., "The Enduring Effects of Small Classes," *Teachers College Record*, vol. 103, 2001, pp. 145-83.

8. Alan B. Krueger and Diane M. Whitmore, "Would Smaller Classes Help Close the Black-White Achievement Gap?," Princeton University Industrial Relations Section Working Paper No. 451, Princeton, N.J., March 2001. This paper is available at www.irs.princeton.edu/wpframe.html.

9. The Tennessee state testing program for all students ends in grade 8, but there was no indication that the benefits would not continue into later grades.

10. There appears to be an anomaly in the grade-6 science data that may come from erroneous scoring or data entry. Close examination of the data did not reveal why it occurred.

11. Alex Molnar, Philip Smith, and John Zahorik, *1998-99 Evaluation*

Results of the Student Achievement Guarantee in Education (SAGE) Program (Milwaukee: School of Education, University of Wisconsin, December 1999), p. 3.

12. Alex Molnar et al., *1999-2000 Evaluation of the Student Achievement Guarantee in Education (SAGE) Program* (Milwaukee: School of Education, University of Wisconsin, December 2000).

13. For evaluations of the Burke County CSR initiative, see Pauline Egelson, Patrick Harman, and Charles M. Achilles, *Does Class Size Make a Difference? Recent Findings from State and District Initiatives* (Greensboro, N.C.: Southeast Regional Vision for Education [SERVE], 1996); and Pauline Egelson and Patrick Harman, "Ten Years of Small Class Size in Burke County, North Carolina," in Margaret C. Wang and Jeremy D. Finn, eds., *How Small Classes Help Teachers Do Their Best* (Philadelphia: Center for Research in Human Development and Education, Temple University, and U.S. Department of Education, 2000), pp. 227-78.

14. The consortium of organizations included the American Institutes for Research, the RAND Corporation, Policy Analysis for California Education, WestEd, and EdSource.

15. CSR Research Consortium, *Class Size Reduction in California: The 1998-99 Evaluation Findings* (Sacramento: California Department of Education, 2000).

16. Charles M. Achilles, Jeremy D. Finn, and Susan Gerber, "It's Time to Drop the Other Shoe: The Evidence on Teacher Aides," paper presented at the annual meeting of the Mid-South Educational Research Association, Bowling Green, Ky., November 2000; Jayne Boyd-Zaharias and Helen Pate-Bain, *Teacher Aides and Student Learning: Lessons from Project STAR* (Arlington, Va.: Educational Research Service, 1998); Jeremy D. Finn et al., "Teacher Aides: An Alternative to Small Classes?," in Wang and Finn, pp. 131-73; and Susan B. Gerber et al., "Teacher Aides and Students' Academic Achievement," *Educational Evaluation and Policy Analysis*, vol. 23, 2001, pp. 123-43.

17. Gerber et al., op. cit.

18. Finn et al., "Teacher Aides: An Alternative to Small Classes?"

19. Ibid., p. 163.

20. Ibid., pp. 163-64.

21. Ibid., p. 165.

22. Glass and Smith, op. cit.; and John M. Johnston, "What Are Teachers' Perceptions of Teaching in Different Classroom Contexts?," paper presented at the annual meeting of the American Educational Research Association, Boston, 1990.

23. Molnar, Smith, and Zahorik, op. cit.

24. CSR Research Consortium, op. cit.; and Charles M. Achilles et al., "A Study of Reduced Class Size in Primary Grades of a Fully Chapter 1-Eligible School: Success Starts Small (SSS)," paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1995.

25. Jeremy D. Finn et al., "Carry-Over Effects of Small Classes," *Peabody Journal of Education*, vol. 67, 1989, pp. 75-84; and Carolyn M. Evertson and John K. Folger, "Small Class, Large Class: What Do Teachers Do Differently?," paper presented at the annual meeting of the American Educational Research Association, San Francisco, 1989.

26. Barbara Harvey, "An Analysis of Grade Retention for Pupils in K-3" (Doctoral dissertation, University of North Carolina, Greensboro, 1993); and Word et al., op. cit.

27. Helen Pate-Bain, B. DeWayne Fulton, and Jayne Boyd-Zaharias, "Effects of Class Size Reduction in the Early Grades (K-3) on High School Performance: Preliminary Results (1999) from Project STAR," paper presented at the National Press Club, Washington, D.C., April 1999.

28. Krueger and Whitmore, op. cit.

29. Dominic Brewer et al., "Estimating the Cost of National Class Size

Reductions Under Different Policy Alternatives," *Educational Evaluation and Policy Analysis*, vol. 21, 1999, pp. 179-92.

30. Krueger, op. cit. Henry Levin conducted an independent analysis of these variables, presented at the 1998 meeting of the American Educational Research Association. Although the analysis was not published, Levin obtained figures very close to Krueger's.

31. Brian Stecher et al., "Class-Size Reduction in California: A Story of Hope, Promise, and Unintended Consequences," *Phi Delta Kappan*, May 2001, pp. 670-74.

32. Ibid.

33. Lorin W. Anderson, "Why Should Reduced Class Size Lead to Increased Student Achievement?," in Wang and Finn, pp. 3-24.

34. For elaboration on these points, see Gina M. Pannozzo and Jeremy D. Finn, "Professional Development and Support Needs of Class Size Reduction Teachers," paper presented at the National Invitational Conference on Taking Small Classes One Step Further, Washington, D.C., December 2000.

35. Personal communication.

36. Eugene M. Lewit and Linda S. Baker, "Class Size," *The Future of Children*, vol. 7, 1997, pp. 112-21; and Karen H. Miles, "Free Resources for Improving Schools: A Case Study of Teacher Allocation in Boston Public Schools," *Educational Evaluation and Policy Analysis*, vol. 17, 1995, pp. 476-93.

37. Jennifer McGiverin, David Gilman, and Chris Tillitski, "A Meta-Analysis of the Relation Between Class Size and Achievement," *Elementary School Journal*, vol. 90, 1989, pp. 47-56; and Daniel J. Mueller, Clinton I. Chase, and James J. Walden, "Effects of Reduced Class Size in Primary Classes," *Educational Leadership*, February 1988, pp. 48-53.

38. See Molnar et al., op. cit.

39. See, for example, Eric A. Hanushek, *The Evidence on Class Size* (Rochester, N.Y.: W. Allen Wallis Institute of Political Economy, University of Rochester, 1998).

40. Other economists have called into question Hanushek's conclusion that there is "no relationship" between resources and student achievement, showing that more appropriate analyses of his data — even based on pupil/teacher ratios — lead to the conclusion that resources are related to student achievement. See, for example, Larry V. Hedges, Richard D. Laine, and Rob Greenwald, "Money Does Matter Somewhere: A Reply to Hanushek," *Educational Researcher*, May 1994, pp. 9-10; and Alan B. Krueger, "An Economist's View of Class Size Research," in Wang and Finn, pp. 99-130.

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43. John M. Darley and Bibb Latane, "Bystander Intervention in Emergencies: Diffusion of Responsibility," *Journal of Personality and Social Psychology*, vol. 10, 1968, pp. 202-14; and John M. Levine and Richard L. Moreland, "Small Groups," in Daniel T. Gilbert, Susan T. Fiske, and Gardner Lindzey, eds., *The Handbook of Social Psychology*, Vol. 2, 4th ed. (New York: McGraw-Hill, 1998), pp. 415-69.

44. Robert M. Bray, Norbert L. Kerr, and Robert S. Atkin, "Effects of Group Size, Problem Difficulty, and Sex on Group Performance and Member Reactions," *Journal of Personality and Social Psychology*, vol. 36, 1978, pp. 1224-40.

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