Having fewer children in a class is attractive to both parents and teachers. One recent national poll found that 70% of adults believe that reducing class size would result in big improvements in public schools. Fewer than 10% believed that it would make no improvement at all. A 1997 Education Week survey found that 83% of teachers and 60% of principals agree that class size in elementary schools should not exceed 17 students, compared with a national average of 25 students per class. Teachers feel that smaller classes encourage increased student-teacher interaction, allow for more thorough evaluation of students, and promote greater teaching flexibility. However, because of the additional teachers and facilities required, reducing class size is costly. In California, for example, school districts claimed nearly $1 billion in state funds for class size reduction in 1996–97 alone.

Recent publicity and legislative action in several states have fueled interest in smaller classes, particularly in the lower grades. Although research and debate on class size are not new, some of the increased attention comes from an evaluation of a Tennessee demonstration project. The study found that students in grades K–3 did significantly better on achievement tests when they were in classrooms with 13 to 17 students per teacher than when they were in standard-size classes (22 to 25 students) or in standard classes with a teacher and an aide. Children from the smaller classes continued to perform better than children from the larger classes, even in subsequent years when all children were in standard-size classes. The value of class size reduction is still being debated, however, because of the high resource costs of widespread efforts to reduce class size and uncertainty as to whether results comparable to those achieved in Tennessee can be replicated on a large scale. For reasons of space, this article does not review the literature on the effects of class size reductions on student achievement.

When class size reduction is a policy goal, measuring class size consistently is important. Staffing decisions play a major role in class size because the administrative and instructional relationships between teachers and pupils result in part from the amount and type of staff hired by a school dis-
Definitions and Measurement

Two different statistics are used to describe the relationship between the number of students and the number of professional staff members in an educational setting: class size and the pupil-teacher ratio. Class size is an administrative measure typically defined as the number of students for whom a teacher is primarily responsible during a school year. The teacher may be responsible for most of the instruction of the students (as in a self-contained classroom) or just for instruction in one subject (as in a departmentalized program in which teachers are assigned to several classes of different students). In the Schools and Staffing Survey (SASS), conducted by the National Center for Education Statistics, this class size measure is obtained by simply asking teachers how many students are enrolled in their classes. The average of all of the teacher responses is reported as average class size. In the SASS 1993–94 report, classes taught by special education teachers (which tend to be very small) are excluded from the calculation of average class size. This is true with regard to the estimates of class size from the SASS shown in Figure 1.

Although small classes may be associated with self-contained classrooms, the types of space used for education vary widely from fully enclosed classrooms to portable buildings to large open spaces (such as converted cafeterias or gymnasiums) which may be occupied by one or several classes at a time. Most class size statistics do not address the nature or adequacy of the physical space used for instruction. In the SASS, for example, there are no questions about the amount or type of space used for instruction. Pupil-teacher ratios are typically calculated by dividing the number of enrolled students by the number of teachers. There are several ways that the relationship between the number of students and staff can be measured, and the statistic chosen can determine whether schools faced with a mandate to decrease class size add teachers, build classrooms, or reassign existing staff and space. This Child Indicators article examines the measurement of class size and a related measure, the pupil-teacher ratio. It also looks at variations across states in the number of students per classroom and long-term trends in class size and pupil-teacher ratios.

This article finds that pupil-teacher ratios are consistently lower than average class size because class size statistics do not reflect the use of specialized teachers or teachers who work in multiple classrooms. Because the utilization of school facilities is not included in either statistic, class size and pupil-teacher ratios do not provide any information about the adequacy of the physical environment for education. Moreover, averages of either statistic do not provide information about the range of classes of different sizes within a state, district, or school. Class size varies widely within states, and average class size in a state is not a good predictor of the prevalence of large classes in that state. Despite the differences between the two statistics, over the long term the trend has been toward both smaller classes and lower pupil-teacher ratios.
students in an educational unit—school, district, or state—by the number of full-time-equivalent (FTE) teachers assigned to that unit. Pupil-teacher ratios are available from the SASS and from the National Survey of Salaries and Wages in Public Schools (NSSW), which is conducted annually by the Educational Research Service. NSSW respondents in school systems are asked to report their fall enrollment and the number of FTE employees in 27 positions.¹⁰ These figures include special education students who are in grades K–12 and special education teachers who have a class assigned to them. Teachers who pull students from regular classrooms for a few hours each day are not included in these teacher-pupil ratios.¹¹ By contrast, pupil-professional ratios include all teachers, as well as librarians, nurses, and administrative staff, and thus provide a broader picture of the staffing resources per pupil. The pupil-teacher ratios from both surveys are shown in the middle portion of Figure 1, and the pupil-professional staff ratio from the NSSW is in the bottom part of Figure 1.

Figure 1 shows that, because of the additional staff included in pupil-professional ratios, these ratios (15.4 pupils per FTE staff) are lower than pupil-teacher ratios (17 to 18.4 pupils per FTE teacher). In addition, the pupil-teacher ratios are lower than average class size (23.2 to 25.2 pupils per class). There are several reasons for the difference between the pupil-teacher ratio and average class size. Class size is larger than the pupil-teacher ratio because class size does not include teachers who work either in multiple classrooms (such as music teachers), or in specialized settings (such as special education teachers), nor does it include teachers who do administrative work and do not interact with students. For example, a study of teacher workloads in Boston revealed that 9% of certified teachers for elementary schools and an additional 30% for secondary schools were full-time substitute teachers whose primary assignment was to release teachers from their classrooms so that they could take part in professional training, assume administrative duties, or do classroom planning (see the article by Monk, Pijanowski, and Hussain in this journal issue). This routine use of a large share of the teaching staff as substitutes does not affect the size of the classes that children experience but is reflected in pupil-teacher ratios and would account for some of the difference between pupil-teacher ratios and average class sizes.

Other staffing decisions also play a large role in determining average class size and student-teacher ratios. With a set budget and student body, if more regular classroom teachers are hired, classes can be smaller; if more specialty teachers are hired, classes will be larger. The Boston study found that more than 40% of teachers in the Boston Public School system worked in areas other than general education (for example, in special education or bilingual programs).¹² These programs have relatively small numbers of students per teacher, and in some instances, teachers work individually with students. Hiring such a large proportion of teachers to work with small numbers of students provides special services to many students but leaves regular classroom teachers with larger classes. As mentioned above, in some statistical reports, these small specialized classes are excluded from class size calculations, which would bias mean class size upward. If the faculty members who teach these classes are included in the staff count used to calculate pupil-teacher ratios, the difference between these ratios and class size may be particularly great. In that same Boston area district, the districtwide pupil-teacher ratio was 13.2 students per teacher, but most classes had more than 23 students per teacher.

Neither average class size nor pupil-teacher ratios provide information about the distribution of classes of different sizes. Take, for example, two schools with an average class size of 20. School A has 10 classes, 5 with 10 students and 5 with 30 students. School B has 10 classes, all with 20 students. The average class size and the school-wide pupil-teacher ratios are the same in both schools, but the number of classes of each size is very different. These differences within schools can result from different
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Educational programs in the schools (for example, more small specialized classes in one school) or from union contracts and other management practices which stipulate a maximum class size. For example, the union contract in the Boston school district referred to above stipulated a limit on class sizes based on school level and program areas. Often, classes were added to a grade when necessary to avoid exceeding the maximum class size. This practice resulted in considerable variation in class sizes across grades and schools.

Geographic Variations

Measures such as average class size can obscure the wide variation in class sizes across schools, districts, and states. Statistics that provide information about the distribution of class sizes or pupil-teacher ratios,
such as medians or the proportion of classes under or above a certain size, are helpful in determining the extent to which students are actually in classes of different sizes. The proportion of classes with 30 or more students is one such measure which happens to focus on larger classes.

Data about average class size and the percentage of classes with 30 or more students in grades K–6 in all 50 states and the District of Columbia are presented in Figure 2. Figure 2 illustrates that, although no state has an average class size of more than 30, the percentage of large classes in grades K–6 in 1993–94 varied widely and that average class size is not a good predictor of the prevalence of large classes in a state. For example, Arizona and North Carolina had approximately the same average class size, but the percentage of classes with more than 30 students was more than twice as high in Arizona. Only six states (Arizona, California, Maryland, Nevada, New York, and Utah) had more than 30% of their classes with 30 or more students in 1993–94. Of those six states, California, Nevada, and Utah have enacted class-size reduction legislation since the survey data were collected.14

Considering data only at the state level gives an incomplete picture of the distribution of class sizes or pupil-teacher ratios. Substantial variations in class sizes and pupil-teacher ratios can be found at the district, school, and even classroom level, and these are closely linked to per-pupil expenditures. A 1993 study of pupil-teacher ratios in 4,000 districts found, not surprisingly, that districts with higher expenditures per pupil had lower pupil-teacher ratios.15 For example, districts that spent from $1,500 to $1,999 per pupil had an average of 19 pupils per teacher, while districts that spent more than $6,000 per pupil had an average of 10 pupils per teacher. The study concluded that, on average, a district that is given a 10% increase in funding will spend 4% on decreasing the pupil-teacher ratio.

**Trends**

As shown in Figure 3, the trend over the past century is toward smaller classes and lower pupil-teacher ratios. Despite recent increases in enrollment, the pupil-teacher ratio is smaller today than at any time since data have been reported.6 In the 1901–02 academic year, the average pupil-teacher ratio in elementary and secondary schools was 36.3, and it has since declined steadily to its present level of about 17.16 Between 1961 and 1991, the average number of pupils per class in public schools, as recorded by the National Education Association’s survey entitled “The Status of the American Public School Teacher,” declined from 29 to 24.17

Changing enrollment and staffing patterns are two major causes of the decline. The article by Guthrie in this journal issue discusses the changes in enrollment from 1949 to the present during the baby boom, baby bust, and baby boom echo periods that drove the ratios down. Even when enrollment was booming during those periods, rapidly expanding school faculties outstripped the growth in the number of students. Between 1972 and 1986, enrollment declined, making it easier for class sizes and pupil-teacher ratios to decline. Now, however, when enrollment is on the rise, reducing class size is more of a challenge, and the decline in pupil-teacher ratios has stalled. Changes in program have also contributed to the rapid decline of pupil-teacher ratios. Schools have added special education and other specialty teachers to better address the specific needs of students and enrich their curricula.18 As noted earlier, these additional staff members can cause a reduction in pupil-teacher ratios even when class size does not change.

This decline in class size and pupil-teacher ratios suggests that, although class size is currently a topic of great interest to policymakers, this interest does not stem from a national increase in average class size or pupil-teacher ratios over the long term.

**Conclusion**

The national data reviewed in this article document several important points about the utilization of professional staff in education: (1) mean class sizes have been declining over time and appear to be at an all-time low, yet class sizes are still significantly above
Figure 2

Public School Average Class Size and Percentage of Classes with 30 or More Students by State, Grades K–6, 1993 to 1994

Note: Data for this figure come from the 1993–94 Schools and Staffing Survey, Public School Teacher Questionnaire. Teachers of grades K–6 were asked the number of children in their classes. Average class size masks the large differences in the distribution of classes of different sizes in different states. Nevada, California, and Utah have recently taken action to decrease class size.

levels regarded as “ideal”; (2) mean class size measures can mask considerable variability in actual class size, and it appears that many children are still being taught in classes with more than 30 students; and (3) student-teacher ratios, which are generally below class size ratios, are also at all-time lows. What the data do not reveal, however, are the resource implications implicit in specific policy decisions regarding class size and class size reductions. Some key issues are reviewed below.

Together, teaching staff and facilities make up at least 70% of the resources that are typically spent on schools, so decisions about class size can have a big impact on how resources are allocated. If a school board decides to decrease class size, it could do so without adding to its budget by increasing spending on regular classroom teachers and classrooms and decreasing spending on other aspects of education such as specialized teachers and facilities. A school district with many specialized teach-
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ers and facilities, for example, could use the funds designated for special education or for at-risk children to serve those children in reduced-size regular classroom settings rather than on special classes. Many class size reduction efforts, however, have kept spending on the other aspects of education relatively constant and, thus, require significant additional resources. Because, as noted above, instructional costs make up the majority of school budgets, a school with one teacher for every 30 students would have to nearly double its budget to have one teacher for every 15 students (which is the number recommended by the National Education Association).

Specific requirements of class size reduction initiatives, such as maximum allowable class size and facilities requirements, can affect both the costs of reducing class size and the educational environment reflected in class size statistics. For example, the maximum allowable class size requirement of 20 pupils per class included in the recent California class size reduction initiative will result in an average class size below 20 among participating schools in the state and will substantially reduce the variability in class size and the prevalence of large classes in the state. California’s space requirement that each class be in a self-contained space or in a “space that provides the same average square footage per pupil enrolled in the same grade levels at the school site” as in 1995–96 (before the class size reduction program began) means that schools may not simply add teachers to existing classrooms and declare that class sizes have been reduced. Because of the space requirement in California, recent reductions in class size have meant that 1,400 computer labs, music rooms, and child care facilities permanently lost their space, even though the state’s class size reduction program added funding to the educational system.

In Virginia, legislation passed in 1995 set up an initiative program for grades K–3 which provided schools with extra funding if they reduced both pupil-teacher ratios and maximum class size for poor children. Most states other than California which have enacted legislation to reduce staffing ratios have done so by focusing on pupil-teacher ratios without maximum class size or facilities requirements. These differences in strategy will have direct implications for the route schools take to implement class size policy as well as the associated costs and benefits of the changes. Reducing class size can be accomplished without providing new facilities by dividing existing classrooms, and pupil-teacher ratios can be reduced by adding teachers anywhere in the school system—no additional facilities or even separate classrooms are required.

Whether the benefits from current efforts to reduce class size in the elementary grades will justify their considerable cost is an empirical question that cannot yet be answered. Results of this major educational reform may depend as much on the way teaching staff and students are organized as on the validity of the science behind the push for smaller classes. Current national data on overall pupil-teacher ratios or average class size provide only limited information about the actual size of the classes experienced by young children during the very early school years. Attention will need to be paid to both the educational and cost implications of actual class size, staffing ratios, and space requirements before it will be possible to determine if the current push to reduce class size is working and worth the cost.

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9. See note no. 8, Broughman.


13. See note no. 12, Miles.


17. This survey of public school teachers at all grade levels has been conducted every five years since 1956. Whiting, Brooke. Senior Professional Associate, National Education Association. Personal communication, April 25, 1997.


21. California SB1414. Education code Section 52123(g), see question numbers 92, revised 15, revised 16, and revised 28.


23. Schools with 20% to 49% of the students in the free lunch program must bring their ratio to an average (per building) of 20 to 1 with a maximum class size of 23. Schools with 50% to 69% of students receiving free lunches must bring their ratio down to 18 to 1 with a maximum class size of 22, and schools with 70% or more students receiving free lunches must bring their ratio to 15 to 1 with a maximum class size of 20. Virginia Omnibus Educational