

Discussion Paper: Impacts of Class Size Reduction

Prepared by Debbie Look for PUSD Excellence Committee

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Background

Class size reduction, which refers to the practice of reducing the number of students in a particular classroom assigned to one teacher, is a politically popular educational reform. It is also popular with the general public, an NBC/Wall Street Journal poll in 1997 reported that 70% of adults believe that reducing class size would lead to significant academic improvements in public schools. In the 1999/2000 federal budget, Congress authorized \$1.2 billion to hire 30,000 new teachers nationally in early elementary grades to reduce class sizes in Kindergarten through 3rd grade to an average of 18 students.

Research Findings

Class size reduction (CSR) is also one of the most studied education reforms with over 1,100 studies in the past twenty years. Three of the most widely studied CSR initiatives are the Tennessee Student Teacher Achievement Ration (STAR) project, the Wisconsin Student Achievement Guarantee in Education (SAGE) and California's Class Size Reduction (CSR) project. These are described below:

1. Tennessee STAR project

This remains one of the largest and most enduring studies of class size reduction. It involved a longitudinal study of 7,000 students in 70 schools from 1985-89. Students were randomly assigned into one of three interventions: small class of 13-17 students; regular class of 22-25 students; or a regular class with a full-time teacher's aide. The interventions were initiated as students entered kindergarten and continued through to the end of 3rd grade. The results showed that students in small classes consistently outperformed peers in larger classes in all achievement categories. The greatest gains were found for minority students in urban schools. Students who began the program in kindergarten or 1st grade were found to perform better than those who transferred in during 2nd or 3rd grade, suggesting that earlier is better. It was also concluded that longer is better as those students who remained in the program for three or more years showed the greatest gains in achievement and that these were more enduring over time.

Numerous studies have identified ongoing benefits to the students who had been assigned to smaller classes in the original STAR experiment. These students were more likely to:

- Pass the 8th grade state competency exam in language arts and math
- Achieve higher scores on standardized math tests in 9th grade
- Consistently earn better grades in high school in English, math & science
- Be enrolled in a foreign language class in high school
- Graduate from high school in top 25% of their class
- Take college entrance exams (especially true for African American students)
- Pursue college studies

At the same time, these students were less likely to:

- Have been retained in grade
- Drop out of school

- Be suspended from school

2. Wisconsin SAGE Project

The SAGE project was signed into law, in Wisconsin, in 1995. It established a class size requirement for K-3 of 15:1. The project was phased in over three years; with priority given to schools where over 50% of the students were living in poverty. The mandate also specified that participating schools were to implement a rigorous academic curriculum; extend the number of hours that the school was open to students; and to develop staff development plans. Some authors suggest that not all the SAGE schools complied with these additional requirements.

Evaluations of student achievement, after the 1st and 3rd years of implementation of SAGE, showed a positive impact. The impact proved to be greater for math than for reading and language arts. Those most positively affected were African-American students. The findings did not demonstrate a significant difference between students based on family income levels. The largest gains were achieved during the first year of the program.

Follow-up studies showed that gains in student achievement for SAGE students persisted up to six years after the students had been in the smaller classes. These continued to be strongest in mathematics and, to a lesser degree, in reading and language arts. It is widely accepted that the SAGE results support the findings of the Tennessee STAR project and other studies showing a positive impact on student achievement.

3. California Class Size Reduction (CSR)

California's CSR program was authorized through Senate Bill 1777 in 1996. It has been identified as one of the most expensive educational reforms ever undertaken by any state. The program reduced class size from an average of 29 to 19 for 92% of eligible students in K-3 by the 3rd year of implementation at a cost of \$4.1 billion: \$3.3 billion for operations and \$.8 billion for facilities. This does not include the additional funds expended by local school districts.

Researchers have noted that it is difficult to isolate the impact of California's CSR initiative due to a number of problematic factors. A large number of other educational reforms were implemented in the same time frame. In addition, the deployment of CSR in California occurred very quickly with little lead-time for planning. This resulted in difficulties associated with a lack of facilities to house the additional classes required and a lack of qualified teachers. Students were often housed in inadequate facilities including libraries, gyms, multipurpose rooms and portable classrooms and under-qualified and non-credentialed teachers led many classes. This was especially true to schools serving low income and minority students as these school districts were slower to adopt the CSR program due to the added costs involved.

California does not administer standardized testing to students until the end of the 2nd grade; therefore, it has not been possible to test the impact of the CSR on students in the 1st two years of its implementation. This is the point at which other studies found the largest gains in achievement.

Researchers found that the impact of California's CSR initiative on student achievement was quite modest, possibly due to the limitations noted above. In addition, there has been no credible evidence for a differential impact on low income and underrepresented minority students. One researcher notes

that California's CSR was associated with declines in teacher qualifications and an inequitable distribution of credentialed teachers and produced inconclusive evidence of improvements in student achievement.

Summary of findings of the impact of CSR on student achievement

It is widely accepted that, as K-3 class size decreases, achievement increases. Prominent researchers in the field have suggested that the Tennessee STAR research leaves no doubt that small classes have an advantage over larger classes in reading and math in the early grades. The optimal level of class size continues to be debated among researchers with some suggesting that benefits begin to accrue as the class size falls below 20, with others suggesting that it must be within 14-17 or 15-18 students. Some researchers qualify their conclusions with the caveat that reducing class size without ensuring that there are sufficient classrooms and well-qualified teachers available may have little positive impact on student achievement. Many agree that professional development for teachers and a rigorous curriculum enhance the effects of reduced class sizes on academic achievement.

Despite the body of literature pointing to positive impacts of class size reduction, there are some who suggest that there is not enough evidence to support a positive impact on achievement to justify the large costs involved in implementing CSR. They suggest that other reform measures may hold more promise at less cost. One researcher disputes the benefits of CSR by referencing his study which examined data from the 1998 National Assessment of Educational Progress (NAEP) reading examination administered to students in 4th, 8th and 12th grades, to analyze the effect of class size on academic achievement. The study found, on average, being in a small class does not increase the likelihood that a student will attain a higher score on the NAEP reading test. It is not clear, however, whether the author used actual figures for class size or a proxy of pupil-teacher ratio (PTR), which only approximates class size by calculating the total number of teachers in a school and district versus the total number of students. Some suggest that critics of CSR have not considered the latest data, which corrects the methodological problems inherent in the earlier research.

Additional benefits of class size reduction

In addition to the demonstrated impacts on student achievement, class size reduction has been shown to have a number of additional benefits, some of these shown through research and others identified anecdotally through surveys of teachers and others. Teachers working in small classes are likely to suffer less fatigue and thus have a higher level of morale. This makes it easier to recruit and retain high quality teachers. Parents have reported very strong support for small classes, which translates into overall stronger support for public education.

A leading researcher on CSR has identified the following additional benefits of smaller classes:

- Improved behavior in classes resulting in less disciplinary actions and safer schools
- Higher degree of citizenship and participation/engagement in and outside of schools
- Greater enthusiasm for school and a higher level of attendance
- Development of productive persons who contribute to society and are responsible for their actions.

Explaining the impacts of class size reduction

Numerous researchers have put forward theories attempting to explain why class size reduction has a positive impact on student achievement. Some quotes from the literature include:

“...certain teaching strategies and skills, particularly those that actively engage students in the learning process, lead to improved student learning when combined with smaller classes.”

“...among the characteristics of good teaching is the ability to communicate challenging content; involving students in hands-on experiences; providing clear and immediate feedback; and supporting family involvement;... smaller classes afford more opportunity to implement all of these activities.”

“Students do best in places where they can’t slip through the cracks, where they are known by their teachers and where their improved learning becomes the collective mission of a number of trusted adults.”

It is generally accepted that smaller classes provide more time for teachers to focus on instruction rather than classroom management (e.g. taking attendance, collecting/passing out papers, disciplining students). The teacher has more time for individual contact with students allowing for greater feedback to students and more opportunity to work with individual students who may need additional help.

The second major point identified is that smaller classes enable the teachers to get to know each student better and to understand their learning preferences. This leads to a greater opportunity for early intervention and diagnosis of learning disabilities. It has been suggested that this may lead to a decrease in special education referrals over time as students are identified and appropriate remediation is enabled at an earlier stage. For those already identified with learning disabilities, smaller classes may increase the amount of time these students spend in regular classrooms. In addition, teachers report they feel more able to keep track of how each student understands the current lesson and to intervene more effectively to help the students progress. They also suggest that the pace of instruction is quicker and more content and deeper content is acquired by students in smaller classes.

Smaller classes also provide a greater opportunity for a wider range of learning activities including cooperative learning and project-based learning. Students have more opportunity to work in small groups where they can participate more actively, feel freer to express themselves, help each other and see their ideas as having worth when they receive attention from others. Researchers have also noted an increased use of hands-on activities in smaller classes (e.g. math manipulatives, drama in reading, and other non-worksheet activities).

There is also widespread agreement that smaller class sizes produce classrooms more conducive to learning. The fewer number in the class means less crowding and therefore, fewer conflicts between students. There is more flexibility for room arrangements as there are fewer desks, allowing for options such as the provision of learning centers. The noise level is lower, therefore students are less likely to be distracted and misbehave. Teachers suggest that all of these factors lead to a more personal, relaxed and family-like atmosphere in the classrooms. This allows students to form stronger relationships with their teacher and classmates leading to an increased level of student engagement. Students are more likely to feel comfortable asking questions and contributing to class discussions than

they would in a larger class. This factor is especially important in primary grades when children are learning to become students and to adapt to the school environment.

Finally, it is reported that parents are more likely to be involved and participate by volunteering in the classroom, due to the greater level of parent teacher communication enabled by the smaller number of students each teacher is responsible for.

Challenges related to class size reduction

The availability of sufficient numbers of qualified teachers to meet the demands of large scale class size reduction initiatives continue to be a major issue that is likely to continue due to the impending shortage of teachers nationwide.

The second major concern relates to the availability of facilities. It may be difficult for schools to provide sufficient space for the additional classrooms required without comprising the availability of other important space including libraries, gyms, multipurpose rooms, etc. Funds may not be readily available for the construction of additional classrooms. Across the board implementation of class size reduction may increase the inequities due to differences in school district's abilities to pay for more experienced teachers and adequate facilities.

There is some dispute about the role of professional development in the success of class size reduction programs. Many suggest that it is critical to provide a significant level of professional development to ensure teachers are able to maximize the benefits offered by small classes. However, research has not provided sufficient information about the most effective instructional strategies in small classes.

Finally, from a political perspective, small classes tend to be a preventative measure rather than a remedial one, as solid results of class size reduction may take three to four years to show up in testing outcomes. Thus, CSR cannot be seen as a quick fix for poor levels of student achievement.

Financial considerations

Class size reduction is generally a costly undertaking, however, some suggest that these costs may be minimized through creative strategies and/or that many of the benefits accruing actually offset the increased costs. For example, it has been suggested:

“...one means of financing class-size reductions is to shift resources that are being spent on ineffective educational interventions. Extra teachers in a school who do not have regular class assignments (e.g. pullout remedial, special education and Title I teachers) are costly and may not have the same positive impact on achievement as shrinking class size.”

Some schools have taken this approach to cost containment of CSR by reducing teaching aide positions and reallocating teaching specialists to classrooms.

Others suggest that many of the results of class size reduction will lead to lower costs to schools in the longer term, including:

- Reduced discipline problems & violence
- Reduced numbers of special education referrals

- Fewer retentions in grade
- Reduced high school dropout rates
- Diminished need for remedial instruction
- Increased teacher satisfaction and retention

Alternatives to class size reduction

Some have suggested that there are alternatives to a full implementation of class size reduction that will have a positive impact on student achievement. These include staggering start times for students so that some students remain for an hour at the end of the day in a smaller class environment; offering one-on-one or small group pull-out tutoring sessions to low performing students in reading and math; to offer CSR in K and 1st grade only; and to keep classes at 22 and provide in-depth training for teachers. These suggestions have been put forward but were not accompanied by research to support their validity.

Considering class size reduction at higher grade levels

It has been noted that “there is not corresponding evidence of higher academic achievement associated with smaller middle and high school classes because there have not been a sufficient number of class size studies at those grade levels.” Some suggest that the extra gains associated with small classes may not appear at all at the upper grade middle and secondary levels. One theory posits that “...older students have long since developed both good and bad habits in coping with standards classrooms and evolved both effective and ineffective self-concepts relevant to academic subjects and these are not likely to change just because class size is reduced.”

A small number of articles have been identified, which consider the effects of CSR at higher grades:

One study found that high school math teachers with small classes were found to engage with individual students and small groups more frequently than teachers of larger classes, possibly due to less time spent on classroom management.

The Los Angeles Unified School District used federal class size reduction funds in 1999/2000 to, among other things, reduce 8th grade language arts and ESL classes to a maximum of 20 students per classroom. Evaluations of this initiative found, however, that non-credentialed teachers were teaching approximately 45% of these classes. Observers noted that larger class sizes hinder a teacher’s ability to lead quality discussions or provide feedback of consistently high quality. They found higher levels of student engagement in classes of 17-22 students. It was concluded that a teacher’s ability to provide high quality, student-centered instruction in a middle school language arts classroom is diminished once the number of students exceeds 24.

A national study looked at 10,000 4th graders in 203 school districts across the country and 10,000 8th graders in 182 school districts to compare their 1992 NAEP math scores to class size as well as other variables that might impact student achievement. Small classes were identified as those with less than 20 students. The results showed that students in small classes performed better than students in large classes even taking into account factors such as SES, educational expenditure and cost of living. They also found that the gains were larger for 4th graders than for 8th graders and concluded that a 4th grader in a small class could be expected to progress 33% more quickly than he/she would have in a larger class. For 8th graders, the differential was 12.5%. Gains were shown to be greatest for inner-city

students as it was found that 4th grade inner city students would progress 75% faster if they were in a smaller class than if they were in a larger class.

A large survey of math and science achievements for 8th grade students, based on 1998 NAEP data, found student achievement was associated with a higher level of qualifications possessed by their teachers and the use of more effective pedagogic techniques but it was not significantly associated with small-class size.

Conclusions

It is clear that class size reductions at the K-3 level, when implemented in a careful and thoughtful manner, will lead to an increase in student achievement, particularly for disadvantaged students. Whether the costs of this approach is justified, remains somewhat open to debate. It is also evident that supporting class size reduction initiatives with a strong and rigorous curriculum and ensuring teachers receive adequate professional development is likely to enhance the effects of implementing smaller class sizes. It is not possible to offer any conclusions about the effects of class size reduction on student achievement at higher-grade levels due to a lack of evidence.

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