

# Effects of Reduced Class Size in Primary Classes

Data from Program Prime Time in Indiana show that in primary classrooms with smaller teacher-student ratios, the atmosphere is less hectic, teacher morale is better, instruction is more individualized, and students, particularly those at risk, achieve better.



The state of Indiana has spent more than \$100 million in the past three years on Prime Time, a program to reduce class size in the primary grades.<sup>1</sup> In 1984, the state legislature allocated money to reduce 1st grade classes to 18 students. In 1985, a similar reduction (to 22 students per class) was budgeted for 2nd grade; and in 1986, for 3rd grade (with kindergarten class size reduction a district alternative). *Average* class size per district is the basis for funding, with prorated funding for districts averaging more than the targeted numbers. (Thus, some classes are smaller than 18, but some are much larger.) An option to reducing class size is the hiring of teacher aides; each aide counts as .33 FTE in the teacher-student ratio.

<sup>1</sup> In 1984 a Prime Time pilot project was conducted to assess the effects of class size reduction in 1st grade. Results showed significant increases in students' reading and mathematics achievement and in their attitudes toward self and school (Gilman 1985). Later, in 1986, after statewide implementation, we carried out a full-scale evaluation of 1st and 2nd grade Prime Time classrooms. The results of this study are reported here.

## Attitudes Toward Prime Time

In our study, 29 of 304 school districts throughout the state were surveyed. We collected data in two schools in each district and carried out structured observations in 300 classrooms. Interview and survey data were also

*One of the happiest outcomes of reduced class size in Prime Time is that each child receives more individual attention from the teacher and more immediate feedback about performance.*

collected from principals, teachers, and parents. And we compared achievement data obtained before and after program implementation in all 1st and 2nd grade classrooms in 10 school districts (Chase et al. 1986).

Our data indicate that teachers, parents, and principals are enthusiastic about Prime Time, believing above all else that smaller class size increases the amount of individual attention teachers give to students. There is also strong consensus that smaller class size increases teacher morale and student achievement.

We administered a questionnaire to 349 Prime Time teachers, asking them to compare a number of instructional conditions before and during Prime Time. Figure 1 lists these conditions in order of endorsement by teachers. Response categories were: "a great deal more," "somewhat more," "about the same," and "somewhat less." In addition to tallying the responses of all the teachers, we compared the responses of teachers in small classes (fewer than 18 students) and large classes (18 or more). It is important to note that in this comparison: (1) all teachers, in both small and large classes, were asked to estimate the effects of Prime Time, and not the effects of small class size; and (2) teachers did not know that their responses would be analyzed by class size, nor did they know the class size divisions that would be used by the researchers.

In the aggregated data (fig. 1, "Total" column), we see that large percentages of all teachers believe that Prime Time has a variety of educational benefits. For instance, some 90 percent of all teachers studied said that because of Prime Time each pupil receives more individual attention and that students receive more immediate feedback. Likewise, about 80 percent said that both below-average and above-average pupils are achieving more. Seventy-seven percent said that pupils are on-task more of the time and that pupils have more room to move around. And over 70 percent of the teachers believe that, as a result of Prime Time, they use a greater variety of instructional materials and that pupils progress more at their own rates.

Statistical tests were performed comparing the percentages of small- and large-class teachers who answered "somewhat more" or "a great deal more" to the 14 positive instructional conditions. For 10 of these comparisons, small-class teachers' perceptions of improvement were significantly greater than those of large-class teachers. In other words, while teachers in both large and small Prime Time classes were highly complimentary of the program, small-class teachers were significantly more so. On the four negatively stated instructional conditions (see bottom of fig. 1), there were no significant differences between large- and small-class teachers.

We also asked the Prime Time teachers whether students are more or less "spread out" in achievement due to Prime Time. (This question was prompted by disagreement regarding Prime Time goals on this variable. Some believe that with more instructional time per student, the slower

learning students can progress faster and thus "catch up." Others believe that if all students receive more instructional time from the teacher, the faster learning students will get even further ahead.) In response to this item, 27 percent of all teachers said that, due to Prime Time, students are more spread out in achievement, 15 percent said they are less spread out, and 58 percent said they are "the same."

Just as the attitudes of large- and small-class teachers were compared, so were the attitudes of the parents of children in large and small classes. Parents of children in small classes were significantly more likely to report that their child's school progress was above their expectations than were parents of children in larger classes. Likewise, small-class parents were more likely to report that their child's teacher was available for consultation, that their child's reading level was above expectations, that their

Positive Factors			
"In comparison with pre-Prime Time classrooms, to what extent has Prime Time affected each of the following instructional conditions?"			
(Percent indicating "somewhat more" or "a great deal more")			
	Small	Large	Total
1. Each pupil receives individual attention.	95%**	87%	91%
2. Students receive immediate feedback.	94%*	87%	90%
3. Below-average pupils are achieving.	91%**	75%	81%
4. Above-average pupils are achieving.	87%**	74%	79%
5. Pupils are on-task.	84%**	73%	77%
6. The pupils have room to move around.	84%**	73%	77%
7. A variety of instructional materials is used.	83%*	71%	76%
8. Pupils progress at their own rate.	75%**	68%	71%
9. The classroom is quiet and peaceful.	72%**	56%	63%
10. Computers are a part of instruction.	60%	55%	57%
11. I talk to parents about pupils' progress.	62%	51%	55%
12. Time is spent in preparation for teaching.	49%	51%	50%
13. Transitions between subjects are smooth.	57%**	44%	49%
14. We take field trips.	10%	12%	11%
Negative Factors			
(Percent indicating "somewhat less")			
	Small	Large	Total
1. There are discipline problems.	65%	57%	60%
2. Time is spent grading papers.	58%	57%	57%
3. Pupils are retained.	47%	35%	40%
4. There is pressure on the teacher to increase student achievement.	2%	1%	1%
* = chi square significant .05			
** = chi square significant .01			

Fig. 1. Perceived Effects of Prime Time

child received "adequate" or "more than adequate" individual attention, that class size is "an important factor" in their child's learning, and that their child had homework three or more times per week.

Once again, it is important to understand that parents had no knowledge of the class size distinctions made in the data analysis. All were approached as Prime Time parents and were simply asked to report about their child's school progress. Even the question about the effect of class size on learning was asked in the abstract, with no reference to their child's class.

There were no differences in the responses of the two parent groups to questions about: number of parent-teacher conferences attended, number of times contacted by child's teacher, or how happy their child was with school. In fact, 90 percent of all parents reported that their child was "very" or "generally" happy with school.

### Achievement Differences

We studied achievement differences using the standardized tests ordinarily administered by school districts. After identifying those school districts using the two most popular tests (Iowa Test of Basic Skills and Stanford Achievement Tests), we selected 15 to represent the state. We asked testing officers in each of the districts to supply mean achievement test scores, per class, in reading and mathematics for all 1st and 2nd grade classes for the first Prime Time year and for the year immediately preceding the project. (Note that this research design is different from that used in the rest of the study. Only in the case of achievement was it possible to obtain pre-Prime Time data for comparison purposes.) Four of the 15 districts declined to participate. In addition, one district had changed tests in 1st grade during the study years, and another in 2nd grade. This left 10 districts each in the 1st and 2nd grades. The average decrease in 1st grade class size was from 22 to 19 students, as reported in the achievement data. The average 2nd grade decrease was from 21 to 20 students. (Some post-Prime Time classes were as large as pre-Prime

Time classes because Prime Time allows the hiring of teacher aides as an alternative to reducing class size. Thus, the cumulative effects of small class size and of the use of aides were studied here.)

We conducted a total of 40 pre- and post-Prime Time statistical tests by grade, subject, and district. In 1st grade reading 50 percent of the districts sampled had significantly higher post- than pre-Prime Time achievement test scores<sup>2</sup>. In 1st grade mathematics 30 percent had a significant gain. The respective percentages for 2nd grade are 20 percent and 10 percent. Clearly, the Prime Time program affected 1st grade more than 2nd grade, and reading more than mathematics.

### Teacher-Student Interactions and Use of Aides

We also collected observation data in 300 1st and 2nd grade classrooms. The instructional interactions of teachers and aides with students were tallied and analyzed by group size. We found that in smaller classes a significantly greater proportion of teacher and aide interactions were with small groups (2 to 5 students) than in larger classes.

An attractive alternative to small class size for increasing the teacher-student ratio is the use of teacher aides. Our observational data indicate that having aides in the classroom significantly increases the proportion of instructional interactions with individual students. In fact, the aides spent large amounts of time tutoring individual students. In addition, some aides worked with small groups, which allowed the classroom teacher also to work more with small groups.

### A Strong Case

The Prime Time findings make a strong case for reducing class size in the primary grades. The costs are formidable, but school districts with low achievement levels would be well advised to pay the price. Likewise, federal intervention programs in primary grades should make small class size a high priority. Minority students, students with learning disabilities, and all categories of at-risk students are likely to receive special benefits from smaller teacher-student ratios. The instruc-

tional atmosphere is less hectic in small classes, and teachers have more time to spend with each student. Thus, teachers can also monitor and respond more frequently to individual needs. Teachers also assign more homework because they have the time and the resources to attend to it. In addition, teachers are happier and more enthusiastic about their teaching. All of these instructional conditions are conducive to learning—indeed, our study data show that students are learning more in smaller classes. □

1. For more than half a century studies of the relationship between class size and educational outcomes have appeared with regularity in the educational literature. Two recent reviews list more than 50 studies reporting such data (Educational Research Service 1978, Ryan and Greenfield 1975). See Robinson and Wittebols (1986) for an analysis of class size effects by grade level, subject, and other factors.

2. The .10 level of significance was used here because an especially conservative study design was used—class rather than student as the unit of analysis.

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