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WILL REDUCED CLASS SIZE IMPROVE READING ACHIEVEMENT?

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Abstract

The purpose of this causal comparative study was to examine the effects of reduced class size on reading achievement for second grade students. It is hypothesized that there will be a significant gain in reading achievement for students in a reduced class setting. It is also thought that of those students, boys and minority students will show a considerable increase in their reading achievement. The experimental group receiving small group instruction (n = 82) while the control group (n = 88) from a previous year received reading instruction as a whole with all of their classmates. The procedure consisted of using Early Intervention Program funded teachers to teach classes in science or social studies which were formed by taking half of the students from one homeroom class and half from another homeroom class. Thus the two homeroom teachers were each able to teach reading to the remaining students as a small group. The dependent variable was the end of the year reading score on the Georgia Criterion Referenced Competency Test (CRCT). The pretest was the Accelerated Reader program STAR test on which the control group had higher mean scores (p = .001). An ANCOVA performed on the CRCT scores was statistically significant in favor of the experimental group when the STAR scores were used as the covariate [F (2,167) = 37.6, p<.001]. The effect size was .31. When race and gender were added as independent variables, the difference by race in favor of the African American students approached statistical significance. Although girls did better then boys on the CRCT in both groups, this difference was not statistically significant. Female minority students showed the most dramatic gains indicating that small group instruction may be effective in closing the achievement gap for minority students. The data supported the conclusion that small group instruction was more effective than whole group reading instruction.
The debate over the effects of class size has been going on for many years. With the current emphasis on accountability at the local, state, and federal level, schools are searching for ways to meet the standards. Most states have academic standards to measure a student's and a school's performance. One provision of The No Child Left Behind Act states that all children will read on grade level by third grade. Standards themselves are not enough to improve student performance. We have to provide learning opportunities that positively effect student learning/achievement (Wasley, 2002). School improvement plans for increasing student achievement must be designed using scientifically based research. Although President Clinton began a federal class-size reduction program in 1999 to hire 100,000 new teachers, the Bush Administration's No Child Left Behind Act appropriated the class size reduction (CSR) funds in a block-grant program to improve teacher quality (Kennedy, 2003). With current budget shortfalls, the CSR initiative has been inadequately funded.

Our school has been creative in using the staff already in-place while adjusting the Language Arts schedule to reduce class size in an effort to close the achievement gap of minority students. Results of a study could determine if teaching using small groups is effective in raising reading achievement. This could be accomplished by changing the schedule to allow the homeroom teacher to teach half of the students a directed reading lesson while the other half is receiving instruction from the extension teacher in Science, Social Studies, or Health.

Research has shown the benefits of reduced class-size in the lower grades for students in all subject areas, especially for students at risk (Finn, 2002). In addition to gains in student achievement, student behavior and participation has also improved in small classes. This improvement has continued into middle and high school, even after students return to regular-size classes. Student engagement has been an essential component of intervention programs for students at risk (Pritchard, 1999). Research has shown that small classes can deliver lasting benefits, especially for minority and low-income students. For minority students, small classes can shrink the achievement gap and lead to reduced grade retention, fewer disciplinary actions, less dropping out and more college-entrance test taking (Pritchard, 1999).

To best evaluate the benefits of class size reduction, we must educate ourselves about the programs used in the past. The Rural School and Community Trust favor small schools as a way to promote students achievement and success in life (Pool, 2002). One study in 1978
by Smith and Glass included the results of 77 empirical studies relating to class size and achievement. In effect, they found that small classes were associated with higher achievement in all grade levels. They also discovered that the greatest benefits were achieved when the number of students in a class was fewer than 20. In their second study, where they analyzed the class size relationship with other outcomes, they found that small classes were better in the areas of students' reactions, teacher morale, and the quality of the instructional environment (Pritchard, 1999).

Indiana instituted Project Prime Time in 1984 as a K-3 class-size reduction program. This study included all but one of their 300 school districts. Although the results of the study were mixed, overall there was more growth in reading than in mathematics. Because of the information gained from Indiana's Project Prime Time, Tennessee began Project STAR (Student/Teacher Achievement Ratio) in 1985 as a large-scale experimental study of class sizes. Students entering kindergarten were randomly assigned to either a small class (13-17), a full-size class (22-26), or a full-size class with a teacher aide. The STAR study has been thoroughly analyzed because of its extensive research. It included over 6,000 students from 79 schools. Students remained in their groups during the four-year program with a new teacher being randomly assigned each year. No additional teacher training or special curriculum was involved in the STAR program. The most significant findings were: (a) students in smaller classrooms performed significantly better on all sets of achievement measures, (b) benefits occurred regardless of school location or student gender, (c) some of the benefits were greater for minority students or students attending inner-city schools, (d) the more years spent in small classes in K-3, the longer the benefits lasted into later grades, and (e) there were no differences between smaller and larger classes in student scores on motivational scales (Gilman, 2003).

Another class-size initiative was the Student Achievement Guarantee in Education (SAGE) program in Wisconsin. This program sought to increase academic achievement of children living in poverty by reducing the student-teacher ratio in K-3 to 15:1. Their classroom models included 1 teacher with 15 students, 2 teacher teams with 30 students, and other arrangements. This program used a quasi-experimental, comparative change design. They used comparison groups from similar districts. Minority students showed significant gains in achievement. Project SAGE has been criticized for its lack of random sampling and poor experimental design methods (Finn, 2002).
The Burke County Project in North Carolina began its initiative to reduce class size in 1991. This program showed higher rates of time on task and more emphasis on student interaction. One significant feature of this program was implementing small class sizes with no additional expenditures. This was done by reallocating existing resources and reassigning qualified teachers to reduced size classes. The Burke County Project had improved achievement especially in third grade (Finn, 2002).

In 1996, California passed a reform to limit class sizes in K-3 to a maximum of 20 students. At a cost of over $1 billion each year, the achievement of students outperformed their peers in large classes to a significant degree. California's CSR provided some insight into the planning needed, since it was implemented so quickly with many uncertified teachers filling the additional classrooms (Gilman, 2003).

The outcomes of class size reduction have for the most part been positive. While the STAR program has received the most praise, other programs offer some benefits. Adequate planning, time, and strategies must be included in each program's components. Rather than abandoning these plans, careful evaluation of successes and shortcomings should be implemented (Finn, 2002).

The purpose of this study was to find out if implementing small groups would have a significant effect on reading achievement in the K-3 classrooms. Research has shown that students who attend small classes for consecutive years have higher achievement in all subject areas. All students have shown growth in academic areas, but minority students have shown the most significant gains with benefits lasting much past the life of the program. We expected to find that reduced class size in second grade reading groups would result in higher end of the year reading scores than before our intervention. We also expected to find that nonwhite students would benefit more than the white students and that there would be more gains for the boys.

Methods and Procedures

Participants

This study took place at an elementary school in a suburban town in Georgia. There are approximately 650 students in this K-5 school. The students come from low and middle socioeconomic status homes; 63% of the students are eligible for free or reduced lunch. The racial make-up of the school includes 54% African American, 44% Caucasian, 1% Asian, and 1% Hispanic.

The participants of this intact group included the entire second
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grade from the year 2002 and from the year 2004 (CRCT Scores were not available for the 2002-03 year, however the small class size intervention did start that year). Students in second grade are mostly 7 or 8 years old at the time of the test. In 2002, there were 65 boys and 51 girls in second grade. There were 58 boys and 37 girls in the second grade for the year 2004.

Instruments

The test used to measure the reading achievement was the Criterion Referenced Competency Test (CRCT) published by Riverside Publishing Company (Georgia Department of Education, 2004). This test has three components for second grade: Reading, English/Language Arts, and Math. The reading total score was the main area of concentration. The test also breaks down the scores by Performance Levels: Level 1=Does Not Meet Standard, Level 2=Meets Standard, and Level 3= Exceeds Standard. The scores differentiate the percentage at each level of performance. Test validity was achieved by matching the test questions to the Georgia Quality Core Curriculum (QCC) standards. Test reliability was optimized by training teachers/proctors in test administration following uniform guidelines. The CRCT test is designed to measure the knowledge of the performance standards for each grade level in Georgia. The reading component is broken down into these domains: Reading for Vocabulary Improvement, Reading for Locating and Recalling Information, Reading for Meaning, and Reading for Critical Analysis. The Accelerated Reader Standardized Test for Assessment of Reading (STAR) program is a computer-adaptive assessment that determines the reading level of students. A baseline was established by looking at the STAR scores. It gives reliable, norm-referenced reading scores that include grade equivalent, percentile ranks, and normal curve equivalents.

Procedures

I received permission from the principal to conduct this research study. Using records in the student's cumulative file, I recorded their first grade end-of-the-year scores from the Accelerated Reader STAR program. Since some students had transferred to other schools, scores were acquired by searching through files at other schools in our county and in our school's drop files. Test Trax was also utilized to find
scores of students who had moved from the school, but were still enrolled in the county. All students that attend public school in this county were administered the Criterion Referenced Competency Test in the spring of the years 2002 and 2004. The students were all given the test under the same conditions with the exception of some special education students, who may have accommodations. All teachers, staff, and proctors were given specific guidelines for administering the tests. A training session was required by anyone participating in the testing procedures. Strict adherence to the exact script from the test manual is required.

The test results usually arrive toward the end of the school year. School administrators received the results and analyzed before sharing the information with the teachers. Test results from year 2002 and 2004 were compared to find areas of strengths and weaknesses. Because the test materials, procedures, and students given the test were all similar; they could be adequately compared. In 2002, the second grade classes were all taught using the whole class as an intact group for reading instruction. For the 2003-2004 school year, each second grade class taught reading using reduced class size for reading. This was accomplished by the extension teacher, Early Intervention Teacher, taking half of the students from one homeroom and half of the students from another homeroom to her room for instruction in Science, Social Studies, or Health. This approach allowed the homeroom teacher to teach half of her students a direct reading lesson in small groups.

**Design & Data Analysis**

The two groups of scores compared were an intact group of second grade students from the year 2002 and 2004. The four sub scores along with the total reading score were tested. Analysis of Covariance (ANCOVA) with the students' first grade STAR score as the covariate was used to test all three hypotheses by including the factors of gender and race. The alpha level was set at .05 for each test. Group equivalence was tested by comparing their Accelerated Reader STAR scores from the end of first grade. A comparison of the total reading scores from the CRCT from each year was used in this study.

**Results**

The results supported the hypothesis that small group instruction would have a significant effect on reading achievement in
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the K-3 classrooms. A baseline was obtained from the scores of the STAR test of both the control and experimental groups. The baselines were compared and the results showed the two groups were not equivalent, but this difference was in favor of the control group. See Table 1. On the CRCT test, the experimental group mean ($M = 352$, $SD = 42$) was 14 points higher than the control group mean ($M = 338$, $SD = 34$). The ANCOVA using the high end of the reading range from the STAR test score as the covariate was statistically significant, $F(2,167) = 37.6, p<.001$. Observed power was 1.0 and the effect size, Partial Eta Squared was .31. The estimated marginal mean for the control group was 333 and for the experimental group $M = 358$, a difference of 25 points.

For hypotheses two and three the girls scored higher in both groups, this difference was not statistically significant. The female CRCT score mean ($M = 349$, $SD = 38$) was seven points higher than the male CRCT score mean ($M = 342$, $SD = 39$). As expected, black children showed a stronger benefit from reduced class size. While the difference was not statistically significant, the difference did approach statistical significance. There were no statistically significant interaction effects. The mean of the scores from the black participants in the experimental group ($M = 353$, $SD = 40$) was 3 points higher than the mean of the scores of the white participants ($M = 350$, $SD = 45$). The highest mean was in the black female group. See table 2.

Discussion

This study was conducted to determine the effects of small group reading instruction on reading achievement. The findings of this study supported the hypothesis that reduced class size would improve reading achievement. The experimental group scores were actually from the second year using the reduced class size for reading instruction. It is possible that as each year goes by and the teachers become more skilled in teaching to individual differences, that the reading achievement scores will improve even more.

Although the better scores of the minority students were not statistically significant, this finding is a promising development in closing the achievement gap. We were surprised that the girls scored better than the boys, since we had predicted that boys would benefit more from this program. It is possible that girls involved in this program showed the most benefit because it allowed them the comfort of a small group setting to learn. This aspect is similar to research by Costa and Terracciano (2001). Because students are different in so many ways, whole class grouping does not provide for adapting a les-
son's objective to each student's learning needs, nor does it provide the corrective feedback that comes from personalized instruction in small groups. Cost was not a factor in implementing the reduced class model at our school, since we used teachers already designated to work in the Early Intervention Program (EIP). Since the Class Size Reduction initiative has been under-funded, this approach is a viable alternative to reaching the needs of the students.

In summary, students in smaller classes showed significant benefits from this approach. A surprising finding was that African American girls scored the highest, although this may have been idiosyncratic for this cohort of students. However it is possible that the effectiveness of the reduced class size model is particularly beneficial for this group. Because small group instruction allows students to talk more freely and have more immediate feedback from the teacher, it offers more opportunities for success. Small group reading instruction is a viable approach that other schools might want to consider as a school improvement project.
References


