DOCUMENT RESUME

ED 398 644 EA 027 819

AUTHOR Egelson, Paula; And Others
TITLE Does Class Size Make a Difference? Recent Findings from State and District Initiatives.
INSTITUTION Southeastern Regional Vision for Education (SERVE), Tallahassee, FL.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE 96
CONTRACT RJ96006701
NOTE 40p.
AVAILABLE FROM SERVE, 345 South Magnolia Drive, Suite D-23, Tallahassee, FL 32301 (Stock No. RDCSD; $4 plus $2.50 shipping and handling charge; check or purchase order to Serve, Federal ID #59-6000-821).
PUB TYPE Information Analyses (070) -- Reports - Descriptive (141) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Academic Achievement; *Classroom Environment; *Class Size; Elementary Education; Outcomes of Education; Program Implementation; *School Organization; State Legislation; *Teacher Student Ratio
IDENTIFIERS Burke County Schools NC

ABSTRACT

Research has indicated that educators view class size as a factor in improving student learning. This publication summarizes findings about some recently implemented class-size initiatives. It highlights results from Tennessee's reduced class-size experiment of the 1980s; summarizes the efforts and results from other recent state-level initiatives (Florida, Nevada, Virginia, and Wisconsin); focuses on the efforts and results of a reduced class-size initiative in Burke County Schools, North Carolina; discusses the findings from and applications of these class-size initiatives; and provides an extensive reference section to enable educators to further explore issues surrounding class-size initiatives. Implemented in 1990, the Burke County initiative appears to have resulted in expanded classroom space, improved classroom management, strengthened instruction and assessment, enhanced student concept and relationships with peers, and improved teacher-parent communication. Data also show that students in the reduced-size classrooms had higher standardized test scores in reading and mathematics than did students in the control group. Issues to be dealt with include cost, allocation of classroom space, and the loss of teaching assistants in primary grades. One figure and two tables are included. (Contains 94 references.) (LMI)

Does Class Size Make a Difference?

Recent Findings from State and District Initiatives

R&D

SERVE
SouthEastern Regional Vision for Education

Does *Class Size* Make a *Difference?*

Recent Findings from State and District Initiatives

1996

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This document was produced with funding from the Office of Educational Research and Improvement, U. S. Department of Education, under contract no. RJ96006701.

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Author's Note

It is important to preface any discussion about class size by making a distinction between two terms which seem synonymous but are, in fact, quite different. These terms are *student-teacher ratio* and *average class size* which is the focus of this report. A student-teacher ratio is calculated by dividing the number of students in a school by the number of certified personnel at that school. Certified personnel include not only regular classroom teachers but also music, art, physical education, and special education teachers. Average class size is calculated by dividing the number of students in a school by the number of regular classroom teachers. For example, a recent study of the Boston Public Schools (Miles, 1995) found that the student-teacher ratio for the district was 13:1 but the average class size was 23, thus, a more accurate representation of the typical classroom setting.

About the SERVE Organization

SERVE, the SouthEastern Regional Vision for Education, is a consortium of educational organizations whose mission is to promote and support the continuous improvement of educational opportunities for all learners in the Southeast. Formed by a coalition of business leaders, governors, policymakers, and educators seeking systemic, lasting improvement in education, the organization is governed and guided by a Board of Directors that includes the chief state school officers, governors, and legislative representatives from Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina. Committed to creating a shared vision of the future of education in the Southeast, the consortium impacts educational change by addressing critical educational issues in the region, acting as a catalyst for positive change, and serving as a resource to individuals and groups striving for comprehensive school improvement.

SERVE's core component is a regional educational laboratory funded since 1990 by the Office of Education Research and Improvement (OERI). Building from this core, SERVE has developed a system of programs and initiatives that provides a spectrum of resources, services, and products for responding effectively to national, regional, state and local needs. SERVE is a dynamic force, transforming national education reform strategies into progressive policies and viable initiatives at all levels. SERVE Laboratory programs and key activities are centered around:

- Applying research and development related to improving teaching, learning and organizational management
- Serving the educational needs of young children and their families more effectively
- Providing field and information services to promote and assist local implementation of research-based practices and programs
- Offering policy services, information, and assistance to decision makers concerned with developing progressive educational policy
- Connecting educators to a regional computerized communication system, so that they may search for and share information, and network
- Developing and disseminating publications and products designed to give educators practical information and the latest research on common issues and problems

The Eisenhower Mathematics and Science Consortium at SERVE is part of the national infrastructure for the improvement of mathematics and science educa-

tion sponsored by OERI. The consortium coordinates resources, disseminates exemplary instructional materials, and provides technical assistance for implementing teaching methods and assessment tools.

The SouthEast and Islands Regional Technology in Education Consortium (SEIRTEC) serves 14 states and territories. A seven-member partnership led by SERVE, the consortium offers a variety of services to foster the infusion of technology into K-12 classrooms. The Region IV Comprehensive Assistance Center provides a coordinated, comprehensive approach to technical assistance through its partnership with SERVE.

A set of special purpose institutes completes the system of SERVE resources. These institutes provide education stakeholders extended site-based access to high quality professional development programs; evaluation and assessment services; training and policy development to improve school safety; and subject area or project-specific planning and implementation assistance to support clients' school improvement goals.

Following the distributive approach to responding and providing services to its customers, SERVE has ten offices in the region. The North Carolina office at the University of North Carolina at Greensboro is headquarters for the Laboratory's executive services and operations. Policy offices are located in the departments of education in Alabama, Georgia, Mississippi, North Carolina, South Carolina, and in the Florida office in Tallahassee.

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Acknowledgments

We wish to thank the many Burke County Schools (NC) educators we consulted, interviewed, or observed over a two-year period. Always gracious and cooperative, they provided the valuable information needed to evaluate their reduced class size initiative and write this document.

We are grateful to the following individuals who reviewed this document and provided us with helpful feedback. They include:

Becky Arndt-Brown, Homebound Instructor and parent, Burke County Schools, Morganton, NC

Ann Berlam, NC Legislative Director, State Board of Education, Raleigh, NC

Gina Burkhardt, SERVE Executive Services Manager, Greensboro, NC

Randall Brackett, Assistant Superintendent, Instructional Services and Finance, Burke County Schools, Morganton, NC

Brian Curry, SERVE Senior Policy Analyst, Tallahassee, FL

JoLane Hall, Teacher, Richland School District Two, Columbia, SC

Joel Hastings, Exceptional Children Program Director, Burke County Schools, Morganton, NC

Marla Holbrook, SERVE Senior Policy Analyst, Montgomery, AL

Wayne Honeycutt, Former Director of Elementary Education, (Retired), Burke County Schools, Morganton, NC

Sally Hutchings, Assistant Principal, Dade County Schools, Miami, FL

Nancy Livesay, SERVE Project Coordinator, SERVEing Young Children, Tallahassee, FL

Wendy McColskey, SERVE Research and Development Manager, Greensboro, NC

Linda McCulloch, Senior Associate, NC Governor's Education Office, Raleigh, NC

Steve Ricks, 1995 Alabama State Teacher of the Year, Childersburg, AL

Overview

Many variables affect how well students do in school. Although educators have little control over some variables, they do have control over many of the variables associated with student learning. In 1991, Wang and Walberg conducted a synthesis, using information from research and expert opinion, of variables considered important to learning. Through this synthesis, 228 variables were identified as having an influence on student learning. These variables were then classified into 6 broad categories such as *Student* variables and *School-Level* variables.

A survey, administered to a cross-section of educator groups, validated the list of variables and categories. These educators, including teachers, principals, state directors, and researchers, were asked to rate the importance of each variable. Under the *Program Design* category (i.e., curriculum design and instructional variables), size of the instructional group was one of nine variables rated as "highly important". Based on this research, educators view class size as a factor in improving student learning.

Educators seem to know intuitively that youngsters work and learn well in small groups and that it is more productive to teach smaller groups of children than the typical range of 24-32 found in elementary classrooms in America today. For example, educators who develop both remedial and advanced programs typically use small classes and even tutorials to deliver their programs.[1] Special education and compensatory education efforts provide participants "extra" help in groups that seldom exceed 10-15 participants. Successful remedial programs such as *Success for All* may start with small classes of about 15 and then add extras such as tutors or home and school counselors (Slavin, Karweit and Wasik, 1993; Slavin and Madden, 1995). Other programs, such as *Reading Recovery*, may use highly-skilled teachers as tutors (Pinnell, DeFord and Lyons, 1988; Dyer, 1992).

Most class-size research uses comparisons of test-score differences between class-size conditions. Equally important, however, are attempts to discern what actually happens in the smaller size classrooms that may help explain and account for some of the test-score differences that may be obtained. Understanding *why* differences occur is as important as understanding the raw data on achievement.

Educators, policymakers, parents, and community leaders need to understand and be knowledgeable of current research on class size issues. SERVE offers this report on some recent class-size initiatives as an update to educators. The purposes of this document are to 1) highlight results from Tennessee's reduced class-size experiment of the 1980s, 2) summarize the efforts and results from other recent state-level initiatives, 3) focus on the efforts and results of a reduced class-size initiative in Burke County Schools, North Carolina, 4) discuss the findings from and applications of these class-size initiatives, and 5) provide an extensive reference section to enable educators to further explore issues surrounding class-size initiatives.

A History of Reduced Class-Size Research

Introduction

By the 1970s, the general consensus regarding the efficacy of reducing class size to improve educational outcomes was, at best, that the research was inconclusive (see, for example, Ryan and Greenfield, 1975 and Porwoll, 1978). However, in September of 1978, Glass and Smith published a meta-analysis[2] of reduced class-size studies in which they considered the results to have "established clearly that reduced class-size can be expected to produce increased academic achievement (p. iv)" with the major benefits being accrued when class size is reduced below 20 students. In 1979, Glass and Smith published a second reduced class-size meta-analysis examining affective measures in which they found that reducing class size results in increases in student interest and teacher morale as well as changes in teacher practices. Rather than settling the class size issue, however, these studies set off a debate with other researchers. These researchers (Educational Research Service, 1980a,b; Simpson, 1980; and Cacha, 1982) criticized the meta-analytic studies' methodology, the reliance on few studies, interpretations which they viewed as contradictory, and conclusions they felt were overgeneralized. As a result, they cautioned against the use of these findings in developing educational policy.

Reducing class size to fewer than 20 students resulted in the greatest benefit in terms of achievement gains.

The average effect of reduced class-size was greater in well-controlled studies than in poorly-controlled studies.

The duration of the study impacted the findings.

The Glass and Smith studies did have an impact on educational policy, though. In 1981, Indiana initiated a reduced class-size demonstration project called *Prime Time* to test the feasibility of reducing classes statewide in grades 1-3. Spurred by increases in student achievement, fewer discipline problems, and increased teacher productivity in smaller classes (Indiana State Department of Public Instruction, 1983), the Indiana Legislature reduced first grade classes to 18 students in 1984 and expanded the effort to include third grade or, if a district chose, kindergarten in 1986. While no systematic statewide evaluation was conducted (Gilman, Swan, and Stone, 1988), results of the Prime Time initiative on student achievement and affective measures were considered positive. This led Mueller, Chase, and Walden (1988) to state, "The Prime Time findings make a strong case for reducing class size in the primary grades."

Amid all the controversies over the findings of the Glass and Smith meta-analyses, three important results of the achievement meta-analysis stood out. The first was that reducing class size to *fewer than 20 students* resulted in the greatest benefit in terms of achievement gains.

The second was that the average effect of reduced class-size was *greater in well-controlled studies* than in poorly-controlled studies (Glass and Smith, 1978). Studies that were "true" experiments with students randomly assigned to reduced or regular class-sizes showed more gain in achievement for reduced class-size students than did studies that did not use random assignment, any type of matching to equate students in regular and reduced classes, or "repeated measures" designs in which the same students were in both regular and reduced-size classes. That is, the stronger the experimental design, the stronger the achievement gain.

The third result was the realization that the *duration* of the study impacted the findings. In a synthesis of their research on class size, Glass, Cahen, Smith, and Filby (1982) demonstrated that the well-controlled studies exceeding 100 hours resulted in greater effects on student achievement for reduced-size classes. These three important features of well-designed reduced class-size studies were incorporated into Tennessee's statewide reduced class-size experiment.

Tennessee's STAR Initiative

In 1985, researchers in Tennessee initiated *Project STAR* (Student Teacher Achievement Ratio), a centerpiece of Governor Lamar Alexander's major education reform. Designed as a true educational experiment, Project STAR employed random

Figure 1

Progression of Students in the STAR Experiment by School Year and Grade

School Year	Grade			
	K	1	2	3
1985/86	●			
1986/87		●		
1987/88			●	
1988/89				●

assignment of more than 7,000 students and teachers at 79 sites to different class size conditions, used outside testing monitors at school sites, and three class-size treatments for pupils who entered kindergarten (K) in 1985 [3] (or grade 1 in 1986) and who progressed through grade 3. Figure 1 shows the progression of students in the STAR experiment from K through third grade.

Students were randomly assigned to one of three class-size conditions: 1) a small (S) class of about 15 students, 2) a regular (R) class of about 25 students, or 3) a regular class with a full-time teacher aide (RA). There were over 100 classes of each of the three types each year until the experiment ended at the conclusion of the 1988-89 school year. Thus, students had experienced one of the following "treatments" for a minimum of three years:

S = A small class with approximately 15 students

R = A regular class with approximately 25 students

RA = A regular class with approximately 25 students and a teacher aide

In 1989-1990, STAR pupils returned in grade 4 to "regular" classes. Student achievement was measured by the Stanford Achievement Test in grades K-3 and STAR's Basic Skills Criterion Tests in grades 1-3.

Findings from the STAR study showed that:

- At the end of the 1985/86 school year, kindergartners in small classes (S) had educationally and statistically significantly greater achievement than kindergartners in regular classes (R) or in regular classes with a teacher aide (RA) on the reading and math sections of the Stanford Achievement Test and the STAR Basic Skills Criterion Tests.

- At the end of the 1986/87 school year, first grade students in small classes (S) continued to significantly outperform students in regular classes (R) as well as regular classes with a teacher aide (RA) on reading and math sections of the Stanford Achievement Test and the STAR Basic Skills Criterion Tests.

- The pattern of students in smaller classes (S) significantly outperforming students in regular classes (R) and regular classes with a teacher aide (RA) continued in second (1987/88 school year) and third grades (1988/89) on the reading and math portions of the Stanford Achievement Test and the STAR Basic Skills Criterion Tests.

- Longitudinal results for a subsample of students in the same class size condition for three years (K-2) showed that the achievement advantage gained in kindergarten was maintained in grades 1 and 2.

- There was no consistent positive effect of the teacher aide in regular classes (RA) condition versus the regular classes with no teacher aide (R) condition in

Table 1

A Comparison of First Grade Reading Mean Scale Score Differences by Ethnicity and Treatment

Ethnicity	Treatment	1st Grade Stanford Achievement Test Reading Mean Scale Score	Mean Difference from Small Class-Size
White	Small	530	—
	Regular	518	-12
	Aide	525	- 5
Minority	Small	507	—
	Regular	489	-18
	Aide	492	-15

grades K-3. There were no differences in test scores between regular size classes that had teacher aides and those that did not.

- In grades K-3, minority pupils in small classes benefited more than non-minority pupils, particularly in reading. The mean difference between minority students in S classes and minority students in R and RA classes was greater than the mean difference between non-minority students in S and non-minority students in R and RA classes. An example of this finding in first grade is shown in Table 1. As can be seen, the mean scale score difference between white students in S and those in R was 12 scale score points (530 versus 518) while for minority students it was 18 scale score points (507 versus 489).

- Inner-city (predominantly minority) students in smaller classes had significantly higher self-concept scores in grades 1 and 2 than inner-city students in R or RA classes, and in grade 3 they also had significantly higher motivation scores than inner-city students in R or RA classes.

(Word et al., 1990; Finn and Achilles, 1990)

Project Challenge

When Project STAR ended, state leaders used state and Chapter I funds to initiate Project Challenge, a broad-scale policy application of STAR's results in 17 (ultimately 16) of the state's poorest counties. The goal of the project was to improve

Table 2

Grade 2 Average Ranking of Challenge Systems, TN: 1989-90 through 1992-93 (of 138 systems)

	89-90	90-91	91-92	92-93
Math	85	79	59	57
Reading	99	94	87	78

the academic performance of these "at-risk" students by enabling teachers, through reduced class sizes of approximately 15 students, to use more effective classroom practices. In these districts, class sizes were reduced in all K-2 classrooms in 1989. Part of the project's evaluation (Achilles, Nye, Zaharias and Fulton, 1995) simply examined changes in the average state rank of these school systems using grade 2 results. The results are shown in Table 2.

In interpreting these results consider that Tennessee had 138 systems. A ranking of 69 would be average; a ranking of 90 would be below average and a ranking of 50 would be above average. It should be noted that in 1989-90 pupils in grade 2 had only one year of smaller classes. In 1990-91 the pupils had two years in smaller classes and beginning in 1991-92, students had smaller classes for three years (K-2).

The continuing movement upward in the rankings suggests that the reduction in class size was helping to increase students' scores on the state tests. In math, the 16 districts had actually exceeded the average state ranking of 69 by 1992. By 1993, these districts had moved from an average ranking of 85 to 57 in math (an average gain of 28 ranks). The gain in reading was from 99 to 78 or an average of 21 ranks.

Lasting Benefits Study

Since there was concern about the lasting benefit of reduced-size classes, legislators provided funding for researchers to follow STAR students after they had returned to "regular" classes. This project, called the Lasting Benefits Study (LBS), has followed students through grade 9 (as of 1995). Evaluations of LBS show that the positive effect of small classes in early primary remains after students return to their "regular" classes, although the differences between pupils in small and in

regular classes diminish slightly over time (Nye, et al., 1994, 1993, 1992; Finn, Fulton, Zaharias and Nye, 1989).

Researchers hope to track students until they leave the education system after grade 12. Their "development" using such things as discipline, attendance, and participation will be analyzed along with the continuation of the achievement differences related to the class condition of the students' early primary schooling. Over 4,500 students are in the LBS database.

Conclusion

In Tennessee, these evaluations have had significant influence in generating support for K-3 reduced class size. Legislators in Tennessee were farsighted in providing funding for a comprehensive evaluation study of the state's reduced class-size initiatives. The state has legislated a class size of 20 in all K-3 classrooms since the end of STAR. Initiated in 1989, Project Challenge continues to provide resources for 16 districts within the state to have a class size of 15 in grades K-2.

Current State-Level Initiatives

Initiated in the 1980s, Indiana's Prime Time program and STAR in Tennessee are examples of pioneer state reduced class-size efforts. Other states, influenced by the two programs and local reforms, have legislated reduced class size. Some states have lowered the number of students in a class to the low twenties; other initiatives have been more in keeping with the research that recommends one teacher to every 15 students. In collecting information on current state-level initiatives, differences were found in how reduced class size was defined. The definition of "small" appears to be critical in studying evaluation findings because research has generally been unclear about effects when there are over 20 students in a classroom. When reports conclude that class size efforts have been unsuccessful, readers should look carefully at how "small class size" was defined. The following section highlights several initiatives of states that have accepted the challenge of reducing class size to 20 or fewer in the early grades.

Florida

In 1979, the Florida Legislature created the Primary Education Program (PREP) to provide individualized instruction for each student in kindergarten through third grade and to increase the number of teachers and other instructional personnel in primary classrooms.[4] The Legislature appropriated categorical funds for the PREP program from 1979-80 through 1990-91. The funds paid for a primary specialist in each school and for extra instructional personnel. Some Florida districts maintain elements of the PREP program such as screening students at kindergarten entry, assigning individual instructional strategies, and maintaining low class size. Since 1995, several bills before the Legislature proposed to reduce class size in primary grades to 20 students for every teacher.

In the 1995-96 General Appropriations Act, $40 million was set aside for school districts to begin reducing the size of first through third grade classes to a class size

of 20. Since many of the districts do not have the space to meet the goal, they were allowed to meet the goal by adding a teacher assistant for every 10 students above 20. The Department of Education is compiling a report for the Legislature about how districts used their 1995-96 class-size reduction money. Several class-size reduction bills were filed for the 1996 session.

Nevada

The Nevada Class Size Reduction Act was passed during the 1989 legislative session. Implementation began in fall 1990 and full implementation is expected to be completed by fall 1996. In the first year, a 15:1 student-teacher ratio was implemented in selected kindergarten classes and all first grades and, in 1991-92, second grades were added. A 15:1 ratio has been maintained through continued state funding in first and second grade Nevada classrooms. In the fall of 1996 there will be more funds available to reduce class size in the third grade. It is important to note that not all primary classrooms had a class size of 15. Because of space limitations in many schools, districts used alternative class configurations — two teachers and 30 children sharing a classroom, multi-grade classrooms, pull-out instruction, flexible grouping, developmental classes — to meet the reduced teacher-student ratio. Approximately 30 percent of first and second grade classrooms utilized alternative configurations. Thus, Nevada's Class Size Reduction Act is not strictly a reduced class-size initiative but also a reduced student-teacher ratio initiative.

The Nevada State Department of Education evaluation of the reduced class-size program (Snow, 1993) concluded:

- teachers and principals, as assessed by surveys, were very positive in their attitudes toward class-size reduction and believed it contributed to an improved learning environment
- school districts reported fewer special education referrals and less teacher absenteeism
- although achievement data results were mixed, African-American students performed better in reading and math in the smaller classes
- achievement comparisons between self-contained (1 teacher and 15 students) and alternative classroom configurations suggested that African-American and English as a Second Language students performed better in self-contained classrooms than in alternatively configured classrooms.

A 1995 evaluation of the Nevada Class Size Reduction Act by the Northwest Regional Educational Laboratory concluded that reduced class size had a small but significant effect on student performance as measured by 1993-94 second grade student test scores in mathematics and reading when compared to class sizes of more than 15 (Pollard and Yap, 1995).

Virginia

In 1995, the General Assembly established a long-term goal of reducing class sizes in grades K-3 in those schools with high or moderate concentrations of at-risk students. At-risk is defined as those students being at-risk for dropping out of school because of academic problems, high absenteeism, and/or behavior problems. Beginning in July 1996, there will be state funds available for localities to reduce class size voluntarily in K-3 classrooms. Local school systems will have to provide matching funds for class-size reductions based on a composite index of local ability to pay.

Wisconsin

Legislation passed in 1995 will phase in reduced-size classes of 15 students on the primary level in low-wealth schools. Low-wealth is defined as a high percentage of students on free and reduced lunch. Only one low wealth school per system is eligible to participate because of limited funding. For 1996-97, participating schools will have a class size of 15 in kindergarten and grade one, for 1997-98 a class size of 15 in kindergarten through second grade, and for 1998 through 2001 a class size of 15 in grades kindergarten through third.

The legislation also provides for comprehensive staff development for teachers and an accountability component by which participating teachers submit professional development plans that describe how they will improve pupil achievement with an accompanying evaluation of their student outcomes.

Spotlight on Burke County, North Carolina – A District Level Class-Size Initiative

Introduction

For the past 15 years, class-size initiatives have frequently been debated and initiated on the state level via legislation. While states continue to be interested in reducing class size in the primary grades, the initial state-wide costs associated with such efforts are high. Some districts consider class size to be such a critical component for improving student outcomes that they use local funds to initiate such a program. Such a local initiative in Burke County Schools in Morganton, North Carolina, shows how districts can impact class size. Educators in Burke County requested SERVE's assistance in evaluating the impact of this policy initiative.

Burke County Schools and Community

With 13,000 students, the Burke County school system is the 25th largest of North Carolina's 119 school systems. The system employs approximately 900 classroom teachers and operates 14 elementary schools, four middle schools, two high schools and one alternative school. Although several furniture, textile, and other industries are located there, the county remains essentially rural with isolated urban areas. The largest employer is state government with two prisons, two mental institutions, and other state facilities.

Over the past several years there has been a dramatic increase in the number of English as a Second Language (ESL) students entering Burke County Schools. For the 1995-96 school year, the system was 87% Caucasian, 8% African American, and 5% other minorities including approximately 1,000 Hmong, Hispanic, Laotian, Taglog, Guatemalan, and Chinese students. In comparison, for the 1994-95 school year there were 667 ESL students enrolled.

In Burke County, 40 percent of the adults have less than a high school education. Yet, most citizens hold education in high esteem, evidenced by the local effort to retain the reduced-size classes. The school board of Burke County allocated more than $1.3 million during the 1994-1995 school year for the reduced class-size project (grades 1-2 in all elementary schools and grades 1-3 in four schools). A similar amount was included in the 1995-1996 school budget.

Program Planning and Implementation

In 1990, Burke County Superintendent Carlos Hicks decided to pilot a reduced class-size program at the elementary level in order to increase student achievement in reading and mathematics. A feasibility committee, comprised of educators, parents, and community members, was asked to evaluate the practicality of a reduced class-size initiative. The committee was charged with four tasks: 1) the examination of current research of class-size and student achievement, 2) the evaluation of elementary school facilities as it related to classroom space, 3) a study of personnel requirements, and 4) a study of staff development needs.

In order to select the schools which would participate in the pilot, the feasibility committee developed an application process for each of the 14 elementary schools. The application required the interested school representative to: 1) write an education plan of what teachers would do differently in the reduced size classes, 2) discuss how they would physically accommodate the additional number of teachers and classes, and 3) demonstrate the staff's interest in pursuing the project. Seven elementary schools applied and three were accepted based on the selection criteria. One additional school became part of the project by using Chapter I funds to reduce class size in the primary grades. An evaluation of this first-year pilot effort was designed with future expansion dependent on the results.

First year evaluation results (1991-92) of the reduced class-size initiative of first grade classes in four elementary schools were positive.[5] The project was expanded in the second year to include the first grades in all 14 elementary schools and the second grades in the four original pilot schools. The second project-year evaluation (1992-93) again showed positive results and the project was expanded in 1993-94 to include all first grades, second grade in seven schools, and third grades in the four pilot schools. In 1994-95, the initiative was expanded to include all second grade classes. For the 1995-96 school year, the project was expanded to include the third grades at two additional elementary schools. Student enrollment for the reduced class size initiative for the 1995-96 school year was 2,860 with 1,193 first graders, 1,125 second graders, and 542 third graders.

Facets of the Burke County Reduced Class-Size Initiative

The reduced class-size project in Burke County is a multi-faceted school improvement initiative with financial, facility, personnel, staff development, and teacher adaptability issues to consider. Actions taken in these areas are described below.

Funding

The initial $180,000 cost of the first grade class-size reductions at the four pilot schools in 1991-92 was paid from contingency funds from the current operating budget. In 1992-93 local support for the project jumped to $274,000 with expansion to first grade in the 14 elementary schools and second grade in the four pilot schools.

In 1993, the cost of the program increased to $1,225,000 with full implementation in grade one, seven schools in grade two, and the four pilot schools in grade three. In 1994, 11 mobile units at $23,000 each were purchased for $253,000; the total cost of the program was $1,478,000. For the 1995-96 school year, there was a class size of 15 in all first and second grade classrooms in Burke County's 14 elementary schools. Six elementary schools also have reduced class sizes in their third grades. The budget (1995-1996) was $1,219,000 with the purchase of 10 additional mobile classroom units at a cost of $230,000. Based on financial resources and space, the ultimate plan is to have a class size of 15 students in every first, second and third grade classroom in Burke County.

Space

Prior to the beginning of the 1991 project, the system went from a K-6 elementary, 7-9 junior high school, 10-12 high school configuration to a K-5, 6-8, and 9-12 scheme. This change made previous sixth grade classrooms in elementary schools available for primary classroom space. In elementary schools where space was limited, mobile units were added. If the reduced classes are expanded to the remaining third-grade classrooms, additional mobile units will be purchased or permanent space built. School personnel have made the mobile sites attractive by connecting the building and the mobile units with ramps and decks. Because parents strongly support the reduced class-size project, using mobile units for additional classroom space has not been an issue.

Personnel

Since the 1980s, the state of North Carolina has funded teacher assistants in all primary classrooms (K-3). With the reduced class-size initiative, Burke County officials made the decision not to use assistants in the smaller-sized classrooms. Since officials were prohibited from using assistant position money for teaching positions, displaced assistants were trained to work in a one-to-one tutoring program or were moved to work in the upper grades of their assigned schools. Some assistants who quit or retired were not replaced. The elimination of teacher assistants in K-3 has been the most controversial aspect of the initiative because support for the assistants is strong in the community and their reassignment/ removal has been questioned. (In 1995, the North Carolina Legislature passed a law that gave Burke County and Mecklenburg County unrestricted authority to convert assistant dollars to teacher dollars.)

Staff Development

When the reduced class-size program was implemented in Burke County, a comprehensive staff development program for reduced class-size teachers at the four schools was developed. The system's director of elementary education facilitated bi-monthly support meetings for teachers at various locations where they could receive inservice for professional growth and development. As schools were added, the meetings evolved into grade-level team meetings at the school site. Ideas and concerns were presented and shared.

With the smaller class sizes, district personnel realized that assessing student progress could be made more personal and ongoing. School officials formed a study group of teachers to work with a consultant to design a primary student

writing and reading portfolio. Administrators and teachers believed that the portfolios, which consisted of a reading log and monthly student writing samples, were a more individualized and authentic assessment of student work on the primary level than standardized tests and a more effective communication tool in discussing student progress.

Besides three comprehensive individual student-teacher conferences to assess reading and writing, teachers were encouraged to hold three teacher-parent conferences focusing on the portfolio. Ninety-percent of the parents participated.

Influenced by a revised Standard Course of Study in North Carolina, the primary-level curriculum programs in mathematics, science, and reading changed at the same time the reduced class-size initiative in Burke county was started. The state math curriculum went to an exploratory approach. The science curriculum was designed around thematic units which included a "hands on" component. Reading books were literature-based. During the first three years of the program, staff development was intensive and consultants conducted a series of workshops in the different curriculum areas. A staff development program continues with new primary teachers to the system receiving inservice programs in reading and math.

Burke County Project Evaluation

Evaluation results are critical in order for educators to make informed decisions about the effectiveness of a program and needed changes for future success. This realization is reflected in the planning and implementation of the project as well as in its annual evaluation reports. In the following sections, evaluation results are discussed in the areas of perceived benefits and comparisons of achievement between students in reduced classes and those in regular classes.

Perceived Benefits

What are the strengths and weaknesses of the Burke County reduced class-size initiative? How have participating primary teachers in Burke County accepted and responded to the reduced class-size program? What about parent approval and administrator support?

Since the onset of the program, teachers, administrators, and parents have completed surveys, been interviewed, and testified. Some participating teachers have been observed. Specifically these evaluation activities have included the following:

- At the end of the 1991-92 school year, 28 reduced class-size first grade teachers responded to a questionnaire designed to assess frequency of use of effective early childhood educational practices.
- At the conclusion of the 1993-94 school year, 112 first, second, and third grade reduced class-size teachers completed a survey comprised of open-ended questions about the strengths and weaknesses of the plan.
- In spring 1995, two trained observers observed reduced and regular-sized (about 25 students) third grade classrooms in four Burke County elementary schools. The viewers used the Personal-Instructional-Task instrument (PIT) developed by French and Galloway in 1970. The focus was on teacher-student communication events as related to instructional time and frequency of discipline incidents.
- Several participating teachers, principals, and parents were interviewed for a story on reduced class size that appeared in the *Raleigh News & Observer* newspaper on January 22, 1995.
- Since 1992, parents have testified at school board meetings in support of the reduced class sizes.

In all cases, the results of the surveys, interviews, and observations have strongly favored the reduced class-size initiative.[6] Responses to the surveys, interviews, testimonies, and observations were analyzed and fell into five categories: expanded classroom space, improved classroom management, a stronger instructional and assessment program, enhanced student self-concept and relationships with peers, and stronger teacher-parent communication. These categories are interrelated and complement each other.

In the following section, each category is detailed using background information and supporting evidence gleaned from teachers, administrators, and parents.

Janice McMahan, principal at Drexel Elementary School noted, "If you aren't working harder, you probably aren't doing it right. You now have 15, not one big class. If all you are going to do is pass out work sheets, go back to a bigger class."

Expanded Classroom Space

Teachers reported that there are unanticipated benefits to using regular-sized classrooms (approximately 600 square feet) for smaller classes. With fewer students in relatively large rooms, a more varied and active instructional program can be presented such as learning and activity centers, project-based instruction, and experiments. This complements a developmentally appropriate primary program. As one teacher observed, "More classroom space allows for better movement control, classroom centers, and large group activities."

Improved Classroom Management

Teachers said there were fewer discipline problems in their reduced class-size classrooms as compared to larger size classes. With fewer students, participating teachers said that they are able to know their students better and the atmosphere in their classrooms is more collaborative. The results of the PIT classroom observation instrument showed that in reduced class-size classrooms, 86% of classroom time was spent on instruction and 14% on institutional events like discipline, as opposed to 80% instructional time and 20% institutional events in regular-sized classrooms.

Enhanced Instruction and Assessment

This is a critical area in the implementation of a reduced class-size program. Reduced class size requires a change in traditional teaching methods from whole-group instruction and use of textbooks to small-group and individualized instruction using teacher-made materials and "hands on" activities. Janice McMahan, principal at Drexel Elementary School noted, "If you aren't working harder, you probably aren't doing it right. You now have 15, not one big class. If all you are going to do is pass out work sheets, go back to a bigger class."

In 1992, when 28 participating first grade teachers were asked about instructional practices, the majority reported that they employed child-centered practices in their classrooms. They believed that it was important for students to make choices

within their learning environments — whether selecting a center or choosing a partner for an activity. The teachers considered it beneficial to have large and small-group activities for children in a noncompetitive atmosphere. Work sheets were discouraged as a method of instruction with active exploration regarded as crucial. The types of activities incorporated into classrooms on a daily basis included reading stories to children as well as using centers for small group work and manipulatives to teach mathematics. Other instructional activities included gross motor exercises, music, dramatic play, and educational games.

Reduced class-size teachers reported having more time to work with and assess individual students. Teachers covered more material and at greater depth than in previous years. These teachers also reported that students were able to contribute more in class than in past years. Some of their observations:

- "In larger groups it took twice as long to do anything — like going to the lunchroom or rest room, returning papers, or taking attendance. In smaller classes, I have quality time with the students. There is quicker transition time."
- "Students have more opportunities to contribute in class and receive more individual attention."
- "I am more aware of individual progress and have a better feel for individual needs than I had before. I have had a chance to assess each child's strengths and weaknesses."
- "The greatest difference is that children learn more in a class size of 15. I cover more material and at greater depth."
- "It is so much easier to get to know the kids. I know more about them by November than I might learn in a whole year with a bigger class. You are much more likely to reach a child who you really know."

Enhanced Student Self-Concept and Relationships with Peers

School system and state officials are motivated to move to reduced-size classes primarily to improve student achievement. Another positive payoff of a reduced class-size initiative, which is rarely discussed, is the social/emotional impact on students. Teachers and parents commented that students in reduced classes develop strong friendships with peers and work together well in teams. Students appeared more confident in the smaller classes. Teachers and parents reported:

- "Students develop closer friendships among themselves. They support, encourage, and respect each other."
- "They get to know each other really well. I really think they want to help each other succeed."
- "Children in reduced-sized classes feel more comfortable with school and are, in general, more confident."

Teacher-Parent Communication

On surveys, teachers reported that they had better and more frequent communication with parents than in previous years with larger classes. There were three parent-teacher conferences throughout the year and two night meetings for parents focusing on how to help their children in reading and math. Parents noted that in the reduced-class size schools, they could talk with teachers almost daily.

Concerns Related to Reduced Class Size

Concerns were raised by the teachers related to the lack of assistants in their classrooms. Many felt they needed an "extra set of hands" to handle paperwork and to be available to assist with rest room breaks and emergencies. Some mentioned frustration over the additional paperwork associated with student portfolios. A few teachers reported that they felt that students in reduced-size classes were more dependent on teachers and that this dependence carried over into the intermediate grades. Overall, no single, dominant concern emerged in response to the reduced class-size initiative.

"I am more aware of individual progress and have a better feel for individual needs than I had before. I have had a chance to assess each child's strengths and weaknesses."

"Children in reduced-sized classes feel more comfortable with school and are, in general, more confident."

Student Achievement Comparisons

In fall 1991, personnel in Burke County designed the student achievement component of the class-size reduction initiative evaluation. In 1993-1994, the Burke County "pilot" pupils were in third grade and the system personnel sought outside evaluation assistance. In keeping with SERVE's mission to promote and support the continuous improvement of educational opportunities for all learners in the Southeast, the staff seeks opportunities to collaborate with educators on reform efforts — particularly those reforms such as the reduced class-size initiative which can affect the entire region. SERVE Research and Development staff provided assistance in designing and conducting statistical analyses. Presented below are the evaluation design and a summary of results from the first three years of the project.

In the 1991-1992 school year, the reduced class-size initiative began in first grade with four schools selected to have class sizes of 15. The remaining 10 elementary schools had class sizes of approximately 25 and were available as "control" schools. Students in the "experimental" condition were matched as closely as possible to students from the control schools.

Two different matched groups of students were selected to serve as comparisons to the "experimental" condition: one group was selected for reading achievement and a second group was selected for math achievement. The criteria on which students

for the control group were selected were matches to gender, free-lunch status, teacher experience, and the D.C. Heath reading and state math pre-test scores of students in reduced-sized classes.

At the end of first grade, reduced class students significantly outperformed the control students (class size of 25) on both the state math test and the D.C. Heath reading test (Burke County, 1992). Since there were only six months between the pre- and post-tests, estimates of the program's impact were likely underestimated.

At the end of the 1992/1993 school year, with students from the experimental first grade classes moving into second grade, two additional control groups (reading and math) were selected based on the first grade D.C. Heath reading and state math post-tests and free lunch status. This re-matching provided information on the effect of reduced class-size for the second grade experience only.

At the end of second grade, after two years of smaller classes, reduced class students significantly outperformed the control students at the end of second grade on the D.C. Heath reading test and the state math test (Burke County, 1993). Thus, reduced class size at the second grade produced achievement gains in reading and math when compared to control groups over and above gains produced in the first year.

At the end of the 1993/1994 school year, comparisons were made using the North Carolina 3rd Grade End-of-Grade (EOG) test. A unique feature of the EOG test is the developmental scale score that provides an indication of a student's growth from year to year. For example, the average third-grade developmental reading scale score is approximately 143. The average fourth-grade reading scale score is 147. One would, therefore, expect an average growth in reading proficiency to be four developmental scale score points.

At the end of third grade[7], after three years in smaller classes, reduced class-size students were compared to the control students selected at the beginning of first grade. Reduced-class students significantly outperformed regular-class students by approximately a year in reading and math as measured by the North Carolina End-of-Grade test developmental scale scores.

Conclusion

The evidence convinced Burke County educators of the value of reducing class sizes. There were struggles and issues to resolve which included cost, allocation of classroom space, and the loss of teaching assistants in primary grades. The process was not easy but support remains strong from the Burke County Board of Education, Burke County Superintendent Tony Stewart, teachers and administrators, community members, and parents. Burke County has demonstrated that school district officials can take the lead in reducing class sizes given sufficient political will and educator commitment.

Other Reduced Class-size Plans

Previously, state and district level reduced class-size initiatives were highlighted. With the implementation of site-based management and decentralized decision making in many districts, decisions about allocation of resources and, ultimately, class size may fall to the school level. Although no comprehensive research review of initiatives at this level was attempted, leadership at Oak Hill Elementary School in High Point, North Carolina, confirmed that educators at the school level can also be proactive in reducing class sizes.

Educators at Oak Hill, a designated Chapter 1[8] school, made the decision in 1992 to reduce class sizes on the primary level based on research and problem diagnosis. From 1992 to 1994, K-2 classes at Oak Hill had approximately 15 students. The advantages of the initiative included spacious classrooms appropriate for a variety of activities, more individual time devoted to each student, a reduction in discipline problems, and a sense of community within individual classrooms (Achilles, Kiser-Kling, Owen and Aust, 1994).

Many school system officials want to reduce the number of students in classrooms but lack the resources to hire additional teachers and locate extra space. Two ways of reducing class size without additional expense include parallel block scheduling and the Oak Park Plan. These two plans shift the concept of class size to the notion of instructional group size suggesting the real issue is not the number of students per classroom but how instruction is organized and how many students are grouped together for particular instructional programs (Mitchell, Carson, and Badarak, 1989). Both of these methods have been successfully implemented on the elementary level.

... the real issue is not the number of students per classroom but how instruction is organized and how many students are grouped together for particular instructional programs (Mitchell, Carson, and Badarak, 1989).

Parallel block scheduling (Canady, 1990) decreases class size for part of the school day. Regular-sized classes are split in two during reading and math instruction. Half of the class remains with the teacher for reading and math instruction while the other half attends specialty classes such as music, art, or computer lab. The two groups then trade places. The second strategy, the Oak Park Plan (Mueller, 1985), requires that all teachers in a school — including specialists — teach 15 students in core academic areas (reading, math, language arts) for three hours a day. For the remaining 2.5 hours of the school day, the other subjects are taught in regular class sizes of approximately 25 students, and specialists provide service opportunities and consultative services. Both of these plans emerged because educators believed that pull-out and ability classes for students on either end of the spectrum were not entirely effective. If class size could be reduced in core academic areas, then students' instructional needs could be individualized.

Conclusions

The results of reduced class-size studies found in this document are positive and add an important replication to class-size research studies. The consistency in the findings of these studies may be attributed, in part, to the *duration* of these studies, the numbers of pupils in the studies, and the fact that the studies are implemented in the early primary grades — the first years of schooling for the pupils in the studies. Reduced class size gives a good early start in school, which is important for student achievement and later success. Smaller class sizes make sense for all children but appear to especially benefit minority children as evidenced in the Tennessee study, the results in Nevada, and the reduced class-size plan in Wisconsin.

These findings should give education leaders added confidence in the results of class-size research. Attention to smaller class sizes in early elementary grades holds promise for the improvement of educational outcomes. As evidenced in the Burke County plan, the outcomes of a reduced class-size initiative included increased student achievement, a more focused instructional and assessment program in primary grades with an emphasis on the individual learner, more time devoted to instruction and less on classroom discipline, better teacher-parent communication, and improved student self-concept and peer relationships.

Any effort to improve educational outcomes must include development of a comprehensive plan addressing needed changes in curriculum, instruction and assessment, staff development and support, and cultivation of a broad base of understanding and support. The process should also include an evaluation component that studies implementation, allows for needed adjustments, provides teacher input and planning time, and evaluates results. The uniqueness of the Tennessee STAR and Burke County programs is their demonstrated long-term attention to collecting data on their efforts that, in turn, lead to better decisions.

Finally, the determination of class size is an aspect of ongoing decision making about how best to allocate available resources. With increased decentralization, these kinds of decisions are being made more frequently at district and school levels. The research suggests that for states, districts, and even schools, class size is a very basic and significant variable to consider in improving educational outcomes.

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Endnotes

[1] for examples, see Ross, Smith, Casey, and Slavin, 1995

[2] Meta-analysis is a set of quantitative procedures designed to compare and combine results of studies which addressed the same research question (Rosenthal, 1984).

[3] In 1985, kindergarten was not mandatory in Tennessee. Consequently, there were approximately ten percent more students enrolled in first grade than in kindergarten.

[4] Section 230.2312 Florida Statutes

[5] Evaluation results are discussed in the next section.

[6] Some teachers have expressed concerns about the initiative and those concerns are reviewed in the latter portion of this section.

[7] For more information on 3rd grade results, please see Achilles, Harman, and Egelson (1995b)

[8] allotted additional funding from the federal government because of the large number of students on free and reduced lunch.

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