A COMPARATIVE STUDY OF CHILDREN ENROLLED IN COMBINATION CLASSES AND NON-COMBINATION CLASSES IN FAIRFAX COUNTY, VIRGINIA PUBLIC SCHOOLS

by

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TO

MY SON AND THE LOVE OF MY LIFE

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(ABSTRACT)

This study compares the scholastic achievement of 2,811 students enrolled in Fairfax County, Virginia, Public Schools for the 1983-1984 school year. Scholastic achievement of an experimental group of 1,068 students enrolled in combination or split/grade classes is compared with a control group of 1,743 students enrolled in regular graded classes. Five research questions were developed, three of which related directly to grade level student scholastic achievement by comparing test results for combination and regular grade classes, and two which attempted to identify any significance resulting from differences used by principals to select teachers and students for placement in combination classes.

Each of the five research questions developed contained the hypothesis that scholastic achievement for students enrolled in combination classes is equal to that of regular graded classes of the same year.

An analysis of covariance was performed to test if there was a difference in scholastic achievement, as measured by 1984 Program of Studies reading and math scores, for combination and regular classroom groupings. The MRT and SRA scores were the covariates used to enable comparison of group means with the POS scores, the dependent variable. Assumptions were tested in each analysis. Classroom means, as opposed to individual test scores, were analyzed.

Overall, scholastic achievement in combination classes was found to equal or exceed that of regular graded classes.

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THE PROBLEM AND ITS SETTINGS

INTRODUCTION

In the spring of 1985 the Fairfax Education Association (FEA), Fairfax County, Virginia, surveyed its 6,300 members to elicit priorities for presentation to the Fairfax County School Board for the 1985-86 school year. The results of this survey were presented to the School Division Superintendent in September 1985 in the form of an FEA Communication Proposal. The first priority listed by survey respondents was a two part request to lower the pupil/teacher ratios and to eliminate combination classes. Essentially the representatives of the 6,300 teacher members proposed that combination classes at the elementary level not be formed, and, if unavoidable, that a full-time aide be provided. The proposal relative to combination classes as written and submitted by the FEA provided no rationale to support the association's position.

Elimination of combination classes may, in fact, be unnecessary if children enrolled in combination classes learn equally as well as those in single graded classes. What if differences in teacher selection, pupil assignment, teaching methods, and parental attitudes were found not to alter significantly the equality

of learning between combination and non-combination classes? What if in addition to equality of scholastic achievement it could be demonstrated that combination classes provided certain social and maturational benefits that more nearly parallel the non-class social conditions confronting students? What if Piaget's (1948) finding that children all pass through stages of learning and that they do not all pass through the same stage at the same time suggests that chronological and mental age may vary as much as the number of the grade?

STATEMENT OF THE PROBLEM

A combination class is simply a redistribution of students within prescribed pupil teacher ratios. Since children do not always come to school in precise sets as defined by these pupil/teacher ratios, classes are often organized that are either over or under established ratios. Accordingly school systems must establish suitable methods to attend to these ratio imbalances. Basically, school systems are faced with two choices. An additional teacher can be provided for each instance of overflow or students from contiguous grades can be combined to form a single classroom.

Many variables may influence the rate of learning found in combination classes. For example, each of

the following items, either separately or jointly may affect the rate of learning in a combination class.

1. Teacher attitude
2. Teacher experience
3. Teaching methods
4. Methods used by principals to select teachers for combination classes
5. Methods used by principals to select students for combination classes
6. Attitudes of school districts
7. Attitudes of principals
8. Attitudes of parents

Stigmas attached to combining students normally relate to objections raised by teachers and/or parents. Teachers generally object because: (1) they must prepare for and teach two different grades, (2) certain subjects are not conducive to combination classes, and (3) specialized materials are limited (Hirshberg, 1979). Parents generally object on the basis that they believe their child will be short-changed by enrollment in a combination class (Hammond, 1974; Hirshberg, 1979; Stehney, 1970).

Martin and Pavin (1976) found in their review of research on vertical or heterogeneous groupings that children participating in multi-age groupings not only appear to match scholastic achievement of

single graded groupings but also appear to gain additional maturational and social benefits. However, they indicate that much of this research is of limited value in that methods used to evaluate and examine questions posed by some studies do not satisfy all conditions for proper research nor do they include sufficient control and validation procedures. Way (1979) also concluded that research has focused primarily on reading and mathematics and that the research studies performed seem unwarranted because of troublesome research designs. She indicates, however, that with one exception, the studies which examined academic achievement in multi-age and single-age classrooms found no significant differences between these two types of classroom arrangements (Chace, 1962; Hoen, 1972; McDonald and Wurster, 1974; Mycock, 1967; Papay, Costello, Hedel, and Spielberger, 1975; Yerry and Henderson, 1964). The one exception was a study of gifted first graders (Runyon, 1962).

The wide variety of groups observed, the lack of research controls, the absence of specific validation procedures, and the limited size of the groups studied may have contributed to both the public perception of combination classes and to the general opposition shown by parents and often educators. However, the consistency of research findings, derived from both

qualitative and quantitative reviews, suggest that learning achievement may be equal. Thus objections by teachers, educators, and parents to combination classes may be unfounded.

The vast majority of students do not meet entry requirements for specialized placement but gain their education through what may be called "regular" or "general" class structures. Lefkowitz (1972) states that placement in special classes such as the gifted and talented program is a special form of student recognition that parents readily accept with pride. Conversely, placement in a combination classroom often has no similar positive connotation of recognition, perhaps the single greatest factor contributing to the controversy and opposition to combination classes.

Given the unstable conditions surrounding combination classes, additional evidence is needed to support, or oppose, combination classes as an equal alternative to graded classes. If educational development is linked to economics, the result is likely to be a continuance of combination classes. Ironically, some forms of vertical and heterogeneous groupings were considered innovative in the late sixties and seventies.

If children do indeed derive certain social and maturational benefits from involvement in combination

classes without jeopardizing scholastic achievement, the benefits of such classes cannot be overlooked.

PURPOSE

The purpose of this study is to compare the results of children enrolled in combination and non-combination classes in the Fairfax County, Virginia, Public Schools to determine whether scholastic achievement is equal for the two groups. Essentially, the following questions will be addressed statistically to determine significance:

- Is scholastic achievement for children in the upper grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?
- Is scholastic achievement for children in the lower grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?
- Is scholastic achievement the same for all combination classes or does effects of split-class grouping differ across 1/2, 2/3, 3/4, 4/5, or 5/6 combination groupings?
- Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?
- Is scholastic achievement affected by differences

in methods used by principals to select students for combination classes?

OVERVIEW OF THE PAPER

The research paper is divided into the following chapters:

Chapter I states the problem and purpose.

Chapter II includes a review of relevant literature and research related to both homogeneous and heterogeneous groupings.

Chapter III contains the research design, measurement instruments, population definitions, and data collecting procedures.

Chapter IV contains the data analysis of each research question and a brief discussion of the statistics derived.

Chapter V contains an overall summary of the research, discussion of results obtained in this investigation, a discussion of the implications and need for further research and a commentary from the researcher.

CHAPTER II

THEORETICAL ISSUES AND LITERATURE REVIEW

HISTORY

Historically, the objections of parents and teachers to combination classes have created problems for school principals and administrators. Parents object because they feel that their children are getting "short-changed." Teachers object to the additional workload of teaching what they perceive to be two classes at the same time. Principals and local administrations object to the necessity not only to constantly monitor the process but also to deal with and hopefully alleviate the fears of both parents and teachers.

What if children in combination classes learn equally as well as those in single grade classes? What if differences in teacher selection, pupil assignment, teaching methods, and parental attitudes were found to not alter significantly the equality of learning between combination and non-combination classes? What if in addition to equality of scholastic achievement it could be demonstrated that combination classes provided certain social and maturational benefits that more nearly parallel the non-class social conditions confronting students? What if Piaget's (1948) finding that children all pass through stages of learning

and that they do not all pass through the same stage at the same time suggest that chronological and mental age may vary as much as the number of the grade? Does this imply that combination classes can help reduce this variability? If the question of differences in scholastic achievement between children enrolled in single grade classes and children enrolled in combination classes is eliminated, then all the frustration, confusion, and objection could also be eliminated. Further, if the scholastic achievement is equal, as suggested by several research studies, are there affective social and maturational benefits that should be considered?

By 1870 graded schools had become the dominant model for school organization in the United States (Hammond, 1962). However, questions began to be raised about the value of grouping students exclusively by age when the mental age of students showed variability as great as the number of their grade. Piaget (1948) demonstrated that children pass through a series of mental stages until they reach maturity but that they all do not pass through the same stages at the same time. Any learning process involves such stages of development. In particular, the studies of Piaget (1948), Mycock (1967), and Junell (1971) to name a few, strengthen the hypothesis that varied levels

of maturity and experience may contribute more to the learning process, and interaction of varied age groups may contribute to the learning process. Further the interaction of varied age groups may contribute to social growth and understanding as well as academic growth.

A combination class as previously defined in Chapter I is simply a specialized grouping formed by combining students of two contiguous grades. The Commonwealth of Virginia permits combination classes to be formed when the pupil/teacher ratios exceed prescribed maximums. Thus, combination classes are a product of single grade overflow and is essentially an administrative procedure used to balance pupil/teacher ratios. In addition, by combining students from two grades to be taught by a single teacher, the school system needs to provide only one teacher rather than two to comply with the ratio.

In essence the combination class is an administrative convenience that has yet to gain widespread teacher and parental acceptance. Part of the problem is related to a general lack of procedures and standards for selecting teachers and students for combination classes (see principal/teacher survey results in Chapter IV). Principals are often given little guidance by school

districts and as a result establish their own procedures and techniques for assigning teachers and students.

ABILITY GROUPING

Much research has been done on ability grouping, its advantages, disadvantages, criteria, materials, and results. The synopsis of current research by Gage (1963) and Martin and Pavin (1976) and the Findley and Bryan (1971) review of studies of heterogeneous and homogeneous grouping from 1920-1970 suggest that in the area of scholastic achievement there is little to clarify the issue of which form of organization results in better instruction.

Part of the problem is that much of this research involves specialized forms of ability grouping. For example, Shane (1971), in an annotated listing of 40 grouping plans, stated that for over a century of United States education diverse grouping plans have been initiated, discarded, modified or gradually accepted on a widespread scale. Further, Robinson (1960) stated that any system of grouping is an attempt to reduce the range of achievement within the group so that the teacher can come closer to the individual pupil. The importance of the teacher in ability grouping was pointed out earlier by Betts (1958) who stated that the key to the problem of classroom organization

is the professional competence of the teacher. Gage (1963) in his analysis of research indicates that the doubts, confusion, and innumerable innovations in the classroom may be primarily attributable to the teacher factor. He states that the importance of the teacher factor becomes obvious when suggested practices for efficient grouping are examined in that all depend on advanced teaching skills. To the extent that combining students from contiguous grades in one class represents a form of grouping some of this research may apply, particularly the importance of the teacher factor. However, combination classes, as represented by this study are not special forms of ability grouping, but grouping of contiguous grades based on nonstandard methods of selection of pupils and teachers and formed when pupil/teacher ratios exceed prescribed standards.

FAMILY OR VERTICAL GROUPING

The British "Infant School" has been the focus of much research on multi-age classrooms. The general conclusion is that multi-age arrangements or "family groups" or "vertical grouping" can be a significant influence on the development of a child.

Mycock (1967) is perhaps the best known spokesperson for writings on the theoretical advantages of "vertical"

or "family" grouping. She suggests that vertical grouping results in a variety of affective gains for children. According to her research, children in multi-age classrooms have a greater sense of belonging, support, security, and confidence than pupils in same-age classrooms. Further she states that children in a multi-age classroom have a chance to form relationships with a wider variety of children than is possible in a traditional setting and that such grouping promotes the development of a balanced personality by fostering attitudes and qualities that enable children to lead happy, well-adjusted lives in a complex and changing social environment.

Another proponent of "family" grouping is Stanton (1973) who believes that vertical grouping in his school produces more secure teacher-child relationships and sees older children as becoming more attentive to younger children and the less able, while the younger children offer comfort to older ones in times of stress and distress. Further, Ridgway and Lawton (1969) state that "family" grouping gives children an increased sense of security and stability, and promotes poise, enjoyment, and confidence. Similarly, Franklin (1976), Stehney (1971), Carlson (1967), and Murrow and Murrow (1971), to name a few, also cite similar theoretical advantages.

The theoretical, maturational, and social advantages cited by these studies and observations have essentially been determined as an outgrowth of "family" grouping whereby children remain with the same teacher for several years, generally three. The concept of total child development as reported by Mycock, Way, and others may well be enhanced via such "family" groupings and create a more relaxed, self-confident, and responsible atmosphere for learning. However, there appear to be too many differences between the concepts and findings for "family" groupings as compared to combination classes to directly correlate the results of one with the other.

MULTI-AGE GROUPING AND/OR COMBINATION CLASSES

According to Way (1981), multi-age grouping is a classroom organizational structure in which children of different ages are placed together in classrooms without consideration of their levels or achievement. This type of grouping, often referred to as multi-grading, typically spans two or three years and is often used in secondary schools, particularly for small elective classes. Multi-age classrooms were common in the educational history of this country's rural areas where this classroom structure has been affectionately referred to as the "old country school." Way (1981)

also states that it should be understood that multi-age grouping is not contingent upon any particular educational theory or practice but refers only to the classroom organizational structure. Although the concepts of multi-age classrooms are similar to those for combination classrooms, the major difference is that children in multi-age classrooms remain in the same class for the two or three years that the classroom spans. Thus, the findings relative to multi-age arrangements, particularly those relating to the affective social and maturational benefits may not apply to regular combination efforts as defined by this study.

Knight (1938) in his study Double Grades in the New Haven School System was one of the first to compare scholastic achievement of single and double grade children. He reported that it did not seem to make any difference whether children were combined with the grade above or the grade below since scholastically there was little difference. Further, Findley and Bryan (1971) in a review of both heterogeneous and homogeneous grouping from 1920-1970, concluded that there is little to clarify the issue of which form of organization results in better education. Likewise, Esposito (1973) reported that regardless of organization, whether heterogeneous or homogenous, the essential

pattern of instruction and achievement in the teaching/ learning process did not differ in self-contained elementary classrooms. Also Silluzio (1977) in a paper describing a study of kindergarten and first grade children in multi- and single-grade classes (Newton, Massachusetts) reported that primary grade students developed skills in reading, mathematics, word analysis, and listening equally well whether assigned to K-1 or to single-grade classes and that the number of years spent in multi-grade classes had no effect on the development of basic skills. Further, he reported that basic skill development in multi-grade classes did not depend on the amount of experience the teacher had had with this type of class and that neither multi-grade nor single-grade classes favored one sex over the other in reading achievement.

Ford (1977) in a review of recent research on multi-age grouping states that such research has provided little or no evidence that children's cognitive development is enhanced by multi-age groupings. She states that most studies show no greater gains in achievement than children in control groups and hence multi-age grouping must be defended on the grounds that it furthers children's social and emotional development.

Way (1981) states that multi-age skeptics have

always been fearful that achievement will suffer when children of different ages are in a multi-age classroom. She states, however, that achievement in multi-age classrooms is no different from achievement in single-age classrooms. Further, Stehney (1970) states that it is important that learning makes sense to children and that a classroom with multi-age grouping offers such a school environment. Also, Way (1981) states that multi-age grouping is believed to support the development of individuality in children and to encourage the type of teaching that fosters this development.

Nichols (1969) states that if each child shows unevenness in development of skills and other traits, the variability and need for individualization of instruction remains no matter what the grouping procedures. Lefkowitz (1972) points out that any student who is separated from other students in a systematic, planned environment is deprived of the possibilities achieved through equality. Students are prevented from association with peers - those of a student's own community, those with whom he must develop mutual understanding and respect, and those with whom he must learn to live. Further he states that researchers and classroom teachers have enforced the belief that children learn much from their peers, as much or more than from the imparting

of information by the teacher. Still we persist in grouping youngsters as though the flow of learning relates only to the teacher-pupil interaction or to interaction with peers as much like themselves as possible.

According to Way (1981) the research on multi-age grouping has focused primarily on reading and mathematics achievement and on various affective measures. She warns that some of the conclusions from these studies seem unwarranted because of troublesome research designs. She reports that with one exception, the studies that appear to have sound research designs found no difference in the academic achievement of multi-age and single-age classrooms.

CHAPTER III

RESEARCH PROCEDURES AND METHODOLOGY

INTRODUCTION

The purpose of this study is to determine whether scholastic achievement for children enrolled in combination classes in Fairfax County, Virginia, Public Schools is equal to scholastic achievement of children enrolled in non-combination classes. Essentially, the following questions will be addressed statistically to determine significance:

- Is scholastic achievement for children in the upper grade level of a combination class significantly different from the scholastic achievement of children in the same single grade?
- Is scholastic achievement for children in the lower grade level of a combination class significantly different from the scholastic achievement of children in the same single grade?
- Is scholastic achievement the same for all combination classes or does effects of split-class grouping differ across 1/2, 2/3, 3/4, 4/5, or 5/6, combination groupings?
- Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?

- Is scholastic achievement affected by differences in methods used by principals to select students for combination classes?

Research has shown that many variables such as teacher attitude, experience, teaching methods, teacher selection, student selection, administrative perceptions, principal attitudes, and parental attitudes may affect scholastic achievement in combination classes.

Studies on consequences of multi-age grouping have focused on effects of children's academic, social, and environmental development. However, recent research has provided little or no evidence that children's cognitive development is enhanced by these arrangements. Most studies find that children in multi-age groups show no greater gains in achievement than children in control groups.

Public perception of combination classes has been influenced by lack of research controls, absence of specific validation procedures, and groups studied have been of limited size and of wide variety. Research findings, however, suggest that scholastic achievement by students may be equal and that opposition by teachers, educators, and parents to combination classes may be unfounded.

For combination classes to be accepted as a viable alternative, additional evidence is needed to support such classes as an equal alternative to graded classes. If children do indeed derive certain social and maturational benefits from involvement in combination classes without jeopardizing scholastic achievement, the benefits of such classes cannot be overlooked.

The intent of this study is to determine if combination classes - mandated as much by economics as enrollment - provide equal educational opportunities.

FAIRFAX COUNTY, VIRGINIA - ISSUES AND REGULATIONS

Many questions have been raised relative to combination classes. For example, at the Superintendent's Advisory Council meeting, October 5, 1983, Mr. William J. Burkholder, Superintendent of Fairfax County, Virginia, Public Schools was asked:

> "With decreased enrollment in the elementary schools, there are many more combination classes causing both academic and morale problems. The curriculum doesn't fit a 4/5, 5/6, etc., especially in social studies and science. It is impossible to teach both. In some schools the teacher/teachers with the straight grade

have been told to take the children in the combination for instruction making them responsible for 60-70 children which is detrimental to the elementary child.

We need:

a. A special curriculum for combination classes 1/2, 2/3, 3/4, etc., which curriculum specialists should come up with.

b. A policy on how combination classes will be organized and taught. Some teachers are working with 15 children, while another teacher has a huge overload of 60-70. Do you see any help here in the near future?"

Mr. Burkholder's reply:

"Combination classes are formed because of enrollment or because appropriate placement of students makes them necessary. Combination classes sometimes cause planning and instruction to be more complex. However, a number of guidelines and suggestions have been developed to make these questions more manageable.

Regulation 6171 states:

- Children should be selected for combination classes who can work effectively in independent and group situations.

- The number of instructional groups in a class should be limited.
- Teachers are selected who have knowledge of the content of both levels, who can manage many different types of groups, and who can support the combination plan.
- Schools may use cooperative teaching or teaming when necessary to provide appropriate content at each grade level.

The Elementary Program of Studies suggests ways to integrate instructional activities and to coordinate the instructional program. These suggestions are particularly appropriate for teachers of combination classes. Combination classes present a challenge for classroom management, not only in science and social studies, but also in other areas of the curriculum. Although there are no easy solutions to this challenge, these guidelines and suggestions provide some ways of meeting it. Members of the area instructional staff can provide more specific suggestions."

SCHOOL DIVISION DEMOGRAPHICS

Fairfax County, Virginia, a suburban county

of the Washington, D.C. metropolitan area, encompasses 399 square miles of Northern Virginia, with a total population of 630,400 as of January, 1984. Fairfax County Public Schools is the largest school division in Virginia and the nation's tenth largest school system. The Fairfax County Public School enrollment was 122,721 students for the 1983-84 school year and 124,403 for the 1984-85 school year - the first increase in several years. The Fairfax County Public School system is comprised of 160 schools and 18 special services centers.

The basic instructional program for Fairfax County Public Schools is defined in the Program of Studies (POS), a series of documents containing instructional objectives for all subjects at each level of the curriculum, kindergarten through 12th grade; instructional activities; catalogs of instructional materials; and tests for measuring student achievement of selected objectives. The curriculum for vocational education is based on state prescribed competencies. A program for gifted/talented students is offered in kindergarten through grade twelve. Special educational services are based on individualized education programs developed for each handicapped student.

Fairfax County Public Schools is divided into

four Administrative Areas. This study will concentrate on Administrative Areas II and IV.

The student population for Area II was 27,770 for 1983-84 school year, divided among 28 elementary schools, six intermediate schools, and six high schools. Twenty-five of the 28 elementary schools have combination classes as part of their school organization. The enrollment for these 25 schools is 6,632.

The student population for Area IV is 34,071 for the 1983-84 school year, divided among 25 elementary schools, three intermediate schools, three high schools, and two secondary schools (grades seven through 12). Fourteen of the 25 elementary schools have combination classes as part of their organization. Combined enrollment for these 14 schools is 5,961.

DESCRIPTION OF STUDY POPULATION

The student population for this study includes children in grades two through five from 23 elementary schools in Administrative Area II and from 14 elementary schools in Administrative Area IV who were administered the Program of Studies tests in April-May of 1983 and 1984. The teacher population includes teachers for grades two through five from 23 elementary schools in Administrative Area II and from 14 elementary schools in Administrative Area IV.

Tables 1 - 8 show the number of students and teachers selected from Administrative Areas II and IV, with Tables 7 and 8 summarizing the data for ease of reading.

The total number of students used in the research study was 2811, 1068 in the experimental group (combination classes) and 1743 in the control group (non-combination classes).

The total number of teachers used in the research was 140, 57 in the experimental group (combination classes) and 83 in the control group (non-combination classes).

PURPOSE

This study compares the results of children enrolled in combination and non-combination classes in Fairfax County, Virginia, Public Schools to determine whether scholastic achievement is equal for the two groups.

Many variables may influence scholastic achievement in combination classes. For example, studies show that each of the following items, either separately or jointly may affect scholastic achievement in a combination class.

- Teacher attitude
- Teacher experience
- Teaching methods

TABLE 1

Number of Students Selected From Schools in Administrative Area II
(POS Reading Score Analysis) May 1984

School	Grade Levels 1/2	2	2 / 3	3	3 / 4	4	4 / 5	5	5/6
Beechtree	8	0	0	0	0	0	0	0	14
Belvedere	0	0	14	15	0	14	15	0	13
Bren Mar	15	13	0	0	37	0	0	20	0
Camelot	0	0	0	0	0	8	10	25	17
Canterbury Woods	13	0	0	0	0	0	0	27	9
Columbia	6	0	14	12	26	0	0	26	19
Fairhill	0	55	0	0	0	10	11	25	0
Glen Forest	0	0	0	0	0	0	0	0	0
Graham Road	12	0	0	0	31	0	0	0	0
Little Run	0	0	10	14	0	0	0	0	0
Mantua	0	0	9	17	0	0	0	0	0
Mosby Woods	0	0	0	0	0	17	7	25	0
North Springfield	0	0	0	0	0	0	0	0	10
Olde Creek	16	0	19	8	0	0	0	0	0
Parklawn	0	0	0	0	0	0	0	0	8
Pine Springs	6	0	11	8	0	0	0	28	20
Ravensworth	0	0	0	0	0	12	16	28	0
Shrevewood	0	46	0	0	50	0	0	27	18
Sleepy Hollow	0	0	0	0	0	0	0	0	19

TABLE 1 (continued)

School	Grade Levels 1/2	2	2 / 3	3	3 / 4	4	4 / 5	5	5 / 6
Timberlane	0	55	0	0	0	0	12	0	0	0	0	15
Wakefield Forest	0	0	0	0	41	0	0	33	14	12	0	17
Westlawn	8	0	0	0	0	0	0	0	0	0	38	0
Weyanoke	14	0	10	15	0	0	0	0	9	18	30	9
Totals	83	169	87	89	185	61	71	264	63	92	354	188

TABLE 2

Number of Students Selected From Schools in Administrative Area II (SRA Math Score Analysis) - May 1984

School	Grade Levels 3/4	4	4 / 5	5	5/6
Beechtree	0	0	0	0	14
Belvedere	15	0	0	0	13
Bren Mar	0	20	0	0	0
Camelot	10	25	0	55	17
Canterbury Woods	0	27	5	21	28	9
Columbia	0	26	0	0	24	19
Fairhill	11	25	11	15	23	0
Glen Forest	0	0	0	0	37	0
Graham Road	0	0	0	0	0	0
Little Run	0	0	0	0	0	0
Mantua	0	0	0	0	0	0
Mosby Woods	7	25	0	0	0	0
North Springfield	0	0	0	0	0	10
Olde Creek	0	0	11	11	43	0
Parklawn	0	0	0	0	27	8
Pine Springs	0	28	0	0	22	20
Ravensworth	16	28	0	0	0	0
Shrevewood	0	27	13	15	27	18
Sleepy Hollow	0	0	0	0	0	15

TABLE 2 (continued)

School	Grade Levels 3/4	4	4 / 5	5	5/6
Timberlane	12	0	0	0	15
Wakefield Forest	0	33	14	12	0	17
Westlawn	0	0	0	0	38	0
Weyanoke	0	0	9	18	30	9
Totals	71	264	63	92	354	188

TABLE 3

Number of Students Selected From Schools in Administrative Area IV
(POS Reading Score Analysis) - May 1984

School	Grade Levels											
	1/2	2	2 / 3		3	3 / 4		4	4 / 5		5	5 / 6
Cardinal Forest	0	91	0	0	53	0	0	0	0	0	0	0
Centreville	24	0	0	0	0	0	0	0	0	0	0	18
Clifton	17	0	0	0	0	7	19	32	0	0	23	14
Fairfax Villa	0	21	0	0	0	9	19	0	14	13	31	0
Fairview	0	0	0	0	33	0	0	0	0	0	0	0
Greenbriar East	0	0	0	0	0	0	0	0	0	0	63	14
Jermantown	0	0	12	9	0	0	0	0	0	0	0	0
Kings Glen	0	0	0	0	0	0	0	55	11	13	59	0
Keene Mill	0	0	6	22	0	0	0	0	0	0	13	17
Layton Hall	0	52	0	0	19	0	0	0	0	0	0	0
Orange Hunt	0	15	0	0	0	0	0	0	0	0	0	0
Rolling Valley	0	70	0	0	27	0	0	0	0	0	36	0
Westmore	11	51	0	0	0	0	0	0	13	11	27	0
West Springfield	0	0	15	11	0	0	0	0	0	0	0	15
Totals	52	300	33	42	132	16	38	87	38	37	252	78

TABLE 4

Number of Students Selected From Schools in Administrative Area IV (SRA Math Score Analysis) - May 1984

School	Grade Levels 3/4	4	4 / 5		5	5/6
Cardinal Forest	0	0	0	0	0	0
Centreville	0	0	0	0	0	18
Clifton	19	32	0	0	23	14
Fairfax Villa	19	0	14	13	31	0
Fairview	0	0	0	0	0	0
Greenbriar East	0	0	0	0	63	14
Jermantown	0	0	0	0	0	0
Kings Glen	0	55	11	13	59	0
Keene Mill	0	0	0	0	13	17
Layton Hall	0	0	0	0	0	0
Orange Hunt	0	0	0	0	0	0
Rolling Valley	0	0	0	0	36	0
Westmore	0	0	13	11	27	0
West Springfield	0	0	0	0	0	15
Totals	38	87	38	37	252	78

TABLE 5

Number of Teachers Selected From Schools in Administrative Area II

School	Grade Level Assignment								
	1/2	2	2/3	3	3/4	4	4/5	5	5/6
Beechtree	1	0	0	0	0	0	0	0	1
Belvedere	0	0	0	0	1	0	0	0	1
Bren Mar	0	1	0	2	0	1	0	0	0
Camelot	0	0	0	0	1	1	0	2	1
Canterbury Woods	1	0	0	0	0	2	1	1	1
Columbia	1	0	1	1	0	1	0	1	1
Fairhill	0	2	0	0	1	1	1	1	0
Glen Forest	0	0	0	0	0	0	0	3	0
Graham Road	1	0	0	2	0	0	0	0	0
Little Run	0	0	1	0	0	0	0	0	0
Mantua	0	0	1	0	0	0	0	0	0
Mosby Woods	0	0	0	0	1	1	0	0	0
North Springfield	0	0	0	0	0	0	0	0	1
Olde Creek	1	0	1	0	0	0	1	2	0
Parklawn	0	0	0	0	0	0	0	1	2
Pine Springs	1	0	1	0	0	2	0	1	1
Ravensworth	0	0	0	0	1	1	0	0	0
Shrevewood	0	2	0	2	0	1	1	1	1
Sleepy Hollow	0	0	0	0	0	0	0	0	1

TABLE 5 (continued)

School	Grade Level Assignment 1/2	2	2/3	3	3/4	4	4/5	5	5/6
Timberlane	0	2	0	0	1	0	0	0	1
Wakefield Forest	0	0	0	3	0	2	1	0	1
Westlawn	1	0	0	0	0	0	0	2	0
Weyanoke	1	0	1	0	0	0	1	1	1
Totals	8	7	7	10	6	13	6	16	14

TABLE 6
Number of Teachers Selected From Schools in Administrative Area IV

School	Grade Level Assignment								
	1/2	2	2/3	3	3/4	4	4/5	5	5/6
Cardinal Forest	0	5	0	2	0	0	0	0	0
Centreville	1	0	0	0	0	0	0	0	1
Clifton	1	0	0	0	1	1	0	1	1
Fairfax Villa	0	1	0	0	1	0	1	1	0
Fairview	0	0	0	2	0	0	0	0	0
Greenbriar East	0	0	0	0	0	0	0	2	1
Jermantown	0	0	1	0	0	0	0	0	0
Kings Glen	0	0	0	0	0	3	1	4	0
Keene Mill	0	0	1	0	0	0	0	1	1
Layton Hall	0	2	0	2	0	0	0	0	0
Orange Hunt	0	1	0	0	0	0	0	0	0
Rolling Valley	0	3	0	1	0	0	0	2	0
Westmore	1	2	0	0	0	0	1	1	0
West Springfield	0	0	1	0	0	0	0	0	1
Totals	3	14	3	7	2	4	3	12	5

TABLE 7

Summary of Students Selected From
Schools in Administrative Areas II and IV

Area	1/2	2	2/3	3	3/4	4	4/5	5	5/6
II	83	169	176	185	132	264	155	354	188
IV	52	300	75	132	54	87	75	252	78
Total	135	469	251	317	186	351	230	606	266

TABLE 8

Summary of Teachers Selected From
Schools in Administrative Areas II and IV

Area	1/2	2	2/3	3	3/4	4	4/5	5	5/6
II	8	7	7	10	6	13	6	16	14
IV	3	14	3	7	2	4	3	12	5
Total	11	21	10	17	8	17	9	28	19

- Methods used by principals to select teachers for combination classes.
- Methods used by principals to select students for combination classes
- Attitudes of principals
- Attitudes of school districts
- Attitudes of parents

Research findings, derived from both qualitative and quantitative review, suggest that scholastic achievement may be equal for both combination and non-combination students. However, the problem seems to be one of perception and acceptance rather than scholastic achievement. In part, the perception of combination classes as an equal or "better than" method of teaching than regular graded classes, has been hampered by the inconsistency of research efforts. In addition research efforts have lacked the necessary controls to provide for specific validation procedures and have been too limited in sample size to provide convincing evidence. All of these factors have contributed to the public perception of combination classes as less than desirable and to the general opposition shown by parents and often educators.

Additional evidence is needed to support, or oppose, combination classes as an equal alternative

to graded classes. If educational development is linked to economics, the result is likely to be a continuance of combination classes.

RESEARCH DESIGN

Kerlinger and Pedhazur (1973) emphasized the need for an overall, sound research design, based on theory, that underlies the gathering of data, making observations, selecting appropriate means of measurement, and analysis of data "...design is data discipline" (p. 448).

In order to test if there is a difference in scholastic achievement in relation to combination class groupings, an analysis of covariance was performed in this research study.

Huck, Cormier, and Bounds (1974) state that the analysis of covariance is used most often by researchers to compare group means on a dependent variable, after these group means have been adjusted for differences between the groups on some relevant covariate (concomitant) variable. In this study the dependent variable is the raw score achieved by students on the Fairfax County, Virginia, Program of Studies reading and math tests and the covariate is the test score (growth scale value) on the Science Research Associates (SRA) or raw score on the Metropolitan Readiness Test (MRT).

The purpose of the analysis of covariance is to adjust the scores of the dependent variable (POS scores) on the basis of the covariate (SRA or MRT scores) means and then compare these adjusted means to determine if there are any significant differences when applied to research groups. Bounds emphasizes that it is important to note that the adjustment is on the dependent variable (POS reading and math scores) and that the covariate means are never adjusted. He further indicates that a statistical test is powerful if it is sensitive to difference among the groups that are being compared.

If an analysis of covariance [F] is to be valid, several assumptions must be met and were addressed in this study. The assumptions are:

1. The scores in each group must have approximately the same variance, unless the group sample sizes are equal.
2. The relationship between the covariate and the dependent variable must be linear (not curvilinear).
3. Scores must be from independent samples and must be distributed normally.
4. When the analysis of covariance [F] is significant, the slopes of the covariate and independent variables must be homogeneous.

5. Scores of the covariate cannot be influenced by the dependent variable. Because covariate scores were completed before the dependent measure, this assumption was automatically met in this study.

Assumption five is not an issue and assumption four is addressed in Chapter IV. Wherever a significant difference was found, the first two assumptions are summarized by research question and level analysis as shown in Appendix A.

For assumption three the samples were independent but the POS reading and math scores were not distributed normally. In general the scores for Fairfax County, Virginia, are consistently and significantly higher than national and state averages as the POS scores used for this study confirmed. Although the POS scores tended to be skewed high, outliers also negated the normality assumption. Consequently, the validity of the [F] values must be tempered with the realization that at least one of the assumptions did not hold.

Each research question may be viewed as a different research design, by grade level, each including dependent measures representing achievement, adjusted by a covariate.

RESEARCH QUESTION I

Is scholastic achievement for children in the upper grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?

In this design, children in the upper level of combination classes (experimental group) are compared to children in regular classes (control group). The basic design used for research questions I and II is outlined in Table 9.

Research question I gives rise to the following hypotheses:

Ho: The mean of the upper level of combination classrooms equals the mean of the regular classrooms, both means adjusted by the covariate.

Ha: The means are unequal.

As indicated in Table 9 this design and analysis are repeated six times in response to research questions I and II, each with individual grade levels as outlined below.

TABLE 9

Research Design

Group	
Upper (Experimental)	Regular (Control)
Dependent Measure	Dependent Measure

Trials	Grade	Dependent Measures	Covariate
1	2	1984 POS Reading Score	MRT Reading
2	3	1984 POS Reading Score	MRT Reading
3	4	1984 POS Reading Score	SRA Reading
4	4	1984 POS Math Score	SRA Math
5	5	1984 POS Reading Score	SRA Reading
6	5	1984 POS Math Score	SRA Math

RESEARCH QUESTION II

Is scholastic achievement for children in the lower grade level of a combination class significantly different than the scholastic achievement in the same single grade?

In this design, children in the lower level of combination classes (experimental group) are compared to children in regular classes (control group). The following hypotheses are used for research question II:

Ho: The mean of the lower level of combination classrooms equals the mean of the regular classrooms, both means adjusted by the covariate.

Ha: The means are unequal.

RESEARCH QUESTION III

Is scholastic achievement the same for all combination classes or does the effects of split-class grouping differ across the 1/2, 2/3, 3/4, 4/5, or 5/6 combination groupings?

Because second graders did not take a POS math test, and both second and third graders did not take an SRA math test, achievement across grade levels can only be determined for reading. The POS reading scores are the dependent measure and the MRT reading scores the covariate. Tables 10 and 11 contain the design used for combined (two - five) and individual grades. The following hypotheses are used for research question III:

Ho: The mean of combination classrooms equals the mean of the regular classrooms, both means adjusted by the covariate, across all grade levels.

Ha: The means are equal.

As indicated in Table 10 this design and analysis are repeated five times as follows:

TABLE 10

Design for Combined Two Through Five

	Group	
Grade	Combination (Experimental)	Regular (Control)
2	Dependent Measure	Dependent Measure
3	Dependent Measure	Dependent Measure
4	Dependent Measure	Dependent Measure
5	Dependent Measure	Dependent Measure

TABLE 11

Design for Individual Grades

Combination (Experimental)	Regular (Control)
Dependent Measure	Dependent Measure

Trials	Grade Combined	Dependent Measures	Covariate
1	2-5	1984 POS Reading Score	MRT Reading
2	2	1984 POS Reading Score	MRT Reading
3	3	1984 POS Reading Score	MRT Reading
4	4	1984 POS Reading Score	MRT Reading
5	5	1984 POS Reading Score	MRT Reading

RESEARCH QUESTION IV

Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?

In this design, covariate-adjusted means of children in combination classrooms are compared in relation to how teachers were chosen to teach their respective combination classes as indicated in Table 12.

The following hypotheses are used for research question IV:

Ho: The covariate-adjusted means of children in combination classrooms are all equal, regardless of how teachers were chosen.

Ha: At least one mean is unequal.

Table 13 refers to the research design used in response to research questions IV and V.

TABLE 12

Design

Selection Criteria				
Ability	Volunteer	Rotation	Combination of These	With Experience
Dependent Measure	Dependent Measure	Dependent Measure	Dependent Measure	Dependent Measure

TABLE 13

Design

Group	
Dependent Measure	Covariate
1984 POS Reading Score	MRT Reading Score

RESEARCH QUESTION V

Is scholastic achievement affected by the differences in methods used by principals to select students for combination classes?

In this design, covariate-adjusted means of children in combination classrooms are compared in relation to how they were chosen by different ability levels for the lower and upper parts of the combination classroom as indicated in Table 14.

The following hypotheses are used in research question V:

Ho: The covariate-adjusted means of children in combination classrooms are all equal, regardless of how students were chosen.

Ha: At least one mean is unequal.

SAMPLE SELECTION

The original data set selected as the basis of this study included the entire population of students in combination classrooms in Administrative Area IV of Fairfax County, Virginia, Public Schools.

Area IV was selected from the four areas in the county by convenience sampling. Area II was chosen from the remaining areas to enlarge the numbers in

TABLE 14

Design

Student Ability Levels			
Upper Part	Lower Part		
	average	average to above	high
below average	Dependent Measure	Dependent Measure	Dependent Measure
average	Dependent Measure	Dependent Measure	Dependent Measure
average to above	Dependent Measure	Dependent Measure	Dependent Measure
high	Dependent Measure	Dependent Measure	Dependent Measure

the experimental group.

Examination of Fairfax County data showed that a number of students from both the experimental and control groups did not have the test scores necessary for comparison in this study. Consequently, to complete the analysis it was necessary to study group means of individual classrooms rather than individual student scores.

The selection process for classrooms included in the analysis was based on the following criteria.

1. Classrooms in both experimental and control groups were required to have at least 25 percent of the students with dependent measures (POS reading and math scores) and covariates (Metropolitan Readiness Tests and/or Science Research Associates reading and math achievement scores).
2. All experimental group classrooms meeting the initial criteria were automatically included in the study.
3. Those control group classrooms meeting the criteria were then analyzed by systematic random stratified sampling, to determine a control group which included the same

number of classrooms as the experimental group. While equal cell sizes are reflected in the analyses for research question III, cell sizes in the other analyses are unequal. For grades two and three a sufficient number of classrooms were found to enable systematic selection of schools that did not include classrooms in the experimental group. In grades four and five, however, some overlap did occur.

The analysis of data from principal surveys showed that many "better" (average and above) students were placed in combination classrooms. Such student selection introduces the possibility that the regular classrooms from the same schools would contain weaker students. While the overlap for grades two and three are minimal, the more substantial overlap for grades four and five creates the possibility of reduced variance within control groups for these grades and potentially lower test scores for grades four and five control groups.

RESEARCH INSTRUMENT

A. PROGRAM OF STUDIES TESTS

The Standards of Quality and Objectives for Public Schools in Virginia state (1976-1978):

"By September, nineteen hundred seventy-eight each school division shall primarily utilize testing programs that will provide the individual classroom teacher with information to help in assessing the educational needs of individual students."

The Standards of Quality for Public Schools in Virginia requires that all students in grades one through six take criterion-referenced tests in math and reading at least once each year. Use of Fairfax County, Virginia system constructed POS tests fulfills this state requirement for math testing in grades three through six, and for reading testing in grades two through six. In other cases, Basic Learning Skills (BLS) Tests must be administered.

Fairfax County Public Schools began development of POS tests to be used in fiscal year 1977. Since that time 22 tests have been developed from 44 pilot instruments (2200 items and 343 subtests within 22 major tests).

The purposes of POS testing are:

- To provide diagnostic information.
- To promote individualization of instruction.
- To evaluate student achievement in terms of

selected POS objectives.

- To provide well-developed tests, a scoring service, usable student records, and longitudinal student records.
- To simplify record-keeping procedures for teachers.

PROGRAM OF STUDIES RELIABILITY FINDINGS

Fairfax County Public Schools began development of POS tests to be used in fiscal 1977. Since that time 22 tests have been developed from 44 pilot instruments (2200 items and 343 subtests within 22 major tests). The reliability findings for these tests are presented below.

1. Concerning internal item reliability, none of the 2200 items generated by the procedure falls below the .20 called for in the original specifications.

2. Subtest reliability in the .50-.80 range. Less than five percent of the 343 subtests studied are outside the predicted range. Of these few there is no difference in the reliability of Form A, Form B, and the 4-stage versus 3-stage development process. Over half of the low reliabilities are four item subtests as predicted. The remainder are mainly found in the seventh and eighth reading subtests. These tests

were devised without a set of POS objectives as a guide.

3. The procedures reported ...have reduced the concerns for content validity as planned. Teacher/ curriculum specialist critique of the item to objective correspondence has been minimal.

4. Further tabled results include:

a. Modestly high correlations between POS total score and SRA composite (raw score correlations).

Reading 4A	.71
Reading 4B	.71
Reading 8A	.77
Math 4A	.69
Math 4B	.69
Math 8A	.78
Math 8B	.78

b. Modest shrinkage occurs when cut scores rather than raw scores are used.

Finally, a factor analysis of item loading on derived factors proved stable over cross validation in spite of the limited variance of items so near the 100 percent pass rate. The number of factors required to explain 70 percent of the variance (30+) is quite high with a first factor variance in the

15-17 percent range. Further study of these loadings is indicated were we to attempt to develop objective level diagnostic tests.

In summary, the tests have uniformly met or exceeded the test specifications established at the onset of this program. Further analysis on a test-by-test basis may be conducted on the appended tables.

B. QUESTIONNAIRE

Combined class assignments are the product of many decisions and factors and any study of effectiveness requires an analysis of decisions that lead to combination class assignment. For this study two different questionnaires were used to gather responses from teachers and principals.

The first questionnaire solicited telephone responses from the 28 elementary principals from Area II and the 25 elementary principals from Area IV used in this study which represents 100 percent of the principals included in the sample (see Appendix B). Responses to this telephone questionnaire provided profiles for:

- the school
- perceived student outcomes
- perceived teacher attitudes
- perceived student attitudes

- principal attitudes
- selection criteria for teachers
- selection criteria for students

A second questionnaire (Appendix C) was used to determine the experience and attitude of teachers. Responses were received from 61 of the 68 teachers, or 90 percent, who taught combination classes in Fairfax County Public Schools for the 1983-1984 school year.

Table 15 summarizes the number of telephone responses from principals to the questionnaire.

Table 16 summarizes the number of mailed responses from the teachers to the questionnaire.

These two questionnaires provide the data for research questions four and five. Chapter V, under the heading Researcher's Commentary, includes a more detailed discussion of the principal and teacher questionnaires.

TABLE 15

Summary of Principal Responses

	Telephone	Responses	Non Responses	Percent Responses
Principals	53	53	0	100

TABLE 16

Summary of Teacher Responses

	Mailed	Responses	Non Responses	Percent Responses
Teachers	68	61	7	90

CHAPTER IV

PRESENTATION AND INTERPRETATION OF THE DATA

The data for this study are presented in the form of a solution for each of the five research questions. A restatement of the general question introduces each of the five sections appearing in this chapter.

The sources of the data and the methodology used in obtaining a solution to each of the research questions are reviewed in each of the sections. The presentation of various tables and the statistical computations are included to further aid the reader in more fully comprehending the solution of each research question.

RESEARCH QUESTION I

Is scholastic achievement for children in the upper grade level of a combination class significantly different from the scholastic achievement of children in the same single grade?

As seen in Table 17 there was no significant difference in covariate-adjusted reading test mean between the upper level of the second grade combination classrooms and the regular second grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 17 reflects the non-significant difference of the analysis of covariance.

TABLE 17

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1101.094	29	37.969		
Regression	306.342	1	306.347	8.068	.000
Constant	3159.631	1	3169.631	83.480	.000
Upper level Combination	52.744	1	82.744	2.179	.151*

*p > .05

Table 18 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 32 classrooms with 604 students. The upper level of the combination class has 11 classrooms with 135 students and the regular class has 21 classrooms with 469 students.

No significant difference was noted in covariate-adjusted reading test mean for the upper level of the third grade combination classrooms and the regular third grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 19 reflects the non-significant difference of the analysis of covariance.

Table 20 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 27 classrooms with 448 students. The upper level of the combination class has 10 classrooms with 131 students and the regular class has 17 classrooms with 317 students.

There was no significant difference in covariate-adjusted reading test mean between the upper level of the fourth grade combination classrooms and the regular fourth grade classrooms.

The dependent measure is the POS 1984 reading

TABLE 18

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Upper level	89.078	88.862
2 = Regular level	85.358	85.472

TABLE 19

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	457.583	24	19.066		
Regression	424.513	1	424.513	22.266	.000
Constant	3598.855	1	3598.855	188.758	.000
Upper level Combination	50.848	1	50.843	2.667	.116*

*p > .05

TABLE 20

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Upper level	90.622	90.582
2 = Regular level	87.717	87.740

score and the covariate is the SRA reading score.

Table 21 reflects the non-significant difference of the analysis of covariance.

Table 22 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 25 classrooms with 460 students. The upper level of the combination class has 8 classrooms with 109 students and the regular class has 17 classrooms with 351 students.

There was no significant difference in covariate-adjusted math test mean between the upper level of the fourth grade combination classrooms and the regular fourth grade classrooms.

The dependent measure is the POS 1984 math score and the covariate is the SRA math score.

Table 23 reflects the non-significant difference of the analysis of covariance.

Table 24 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 25 classrooms with 460 students. The upper level of the combination class has 8 classrooms with 109 students and the regular class has 17 classrooms with 351 students.

There was no significant difference in covariate-adjusted reading test mean between the upper level

TABLE 21

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	193.637	22	8.802		
Regression	138.166	1	138.166	15.698	.001
Constant	338.369	1	338.369	38.444	.000
Upper level Combination	31.715	1	31.715	3.603	.071*

*p > .05

TABLE 22

1984 POS Reading Scores Adjusted by SRA Reading

Cell	Observed Mean	Adjusted Mean
1 = Upper level	91.054	90.516
2 = Regular level	87.819	88.072

TABLE 23

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1436.317	22	65.287		
Regression	1034.099	1	1034.099	15.839	.001
Constant	.074	1	.074	.001	.973
Upper level Combination	1.976	1	1.976	.030	.863*

*p > .05

TABLE 24

1984 POS Math Scores Adjusted by SRA Math

Cell	Observed Mean	Adjusted Mean
1 = Upper level	78.369	77.053
2 = Regular level	75.874	76.446

of the fifth grade combination classrooms and the regular fifth grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the SRA reading score.

Table 25 reflects the non-significant difference of the analysis of covariance.

Table 26 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 37 classrooms with 735 students. The upper level of the combination class has 9 classrooms with 129 students and the regular class has 28 classrooms with 606 students.

There was no significant difference in covariate-adjusted math test mean between the upper level of the fifth grade combination classrooms and the regular fifth grade classrooms.

The dependent measure is the POS 1984 math score and the covariate is the SRA math score.

Table 27 reflects the non-significant difference of the analysis of covariance.

Table 28 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 37 classrooms with 735 students. The upper level of the combination class has 9 classrooms with 129 students and the regular

TABLE 25

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1793.585	34	52.752		
Regression	619.140	1	619.140	11.737	.002
Constant	97.331	1	97.331	1.845	.183
Upper level Combination	.493	1	.493	.009	.924*

*p > .05

TABLE 26

1984 POS Reading Scores Adjusted by SRA Reading

Cell	Observed Mean	Adjusted Mean
1 = Upper level	86.001	86.946
2 = Regular level	86.979	86.675

TABLE 27

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	3375.843	22	99.289		
Regression	1050.558	1	1050.558	10.581	.003
Constant	14.843	1	14.843	.149	.701
Upper level Combination	2.177	1	2.177	.022	.883*

*$p > .05$

TABLE 28

1984 POS Math Scores Adjusted by SRA Math

Cell	Observed Mean	Adjusted Mean
1 = Upper level	71.380	71.473
2 = Regular level	70.944	70.913

class has 28 classrooms with 606 students.

RESEARCH QUESTION II

Is scholastic achievement for children in the lower level of a combination class different from the scholastic achievement of children in the same single grade?

No significant difference was noted in covariate-adjusted reading test mean for the lower level of the second grade combination classrooms and the regular second grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 29 reflects the non-significant difference of the analysis of covariance.

Table 30 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 31 classrooms with 589 students. The lower level of the combination class has 10 classrooms with 120 students and the regular class has 21 classrooms with 469 students.

No significant difference was noted in covariate-adjusted reading mean for the lower level of the third grade combination classrooms and the regular third grade classrooms.

The dependent measure is the POS 1984 reading

TABLE 29

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1032.212	28	36.863		
Regression	306.501	1	306.501	8.314	.007
Constant	2685.403	1	2685.335	72.843	.000
Lower level Combination	58.403	1	58.403	1.584	.219*

*p > .05

TABLE 30

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Lower level	91.330	89.459
2 = Regular level	85.358	86.273

score and the covariate is the MRT reading score.

Table 31 reflects the non-significant difference of the analysis of covariance.

Table 32 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 25 classrooms with 396 students. The lower level of the combination class has 8 classrooms with 79 students and the regular class has 17 classrooms with 317 students.

No significant difference was noted in covariate-adjusted reading test mean for the lower level of the fourth grade combination classrooms and the regular fourth grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the SRA reading score.

Table 33 reflects the non-significant difference of the analysis of covariance.

Table 34 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 26 classrooms with 452 students. The lower level of the combination class has 9 classrooms with 101 students and the regular class has 17 classrooms with 351 students.

No significant difference was noted in covariate-adjusted math test mean for the lower level of the

TABLE 31

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	348.627	21	16.601		
Regression	660.793	1	660.793	39.804	.000
Constant	1505.146	1	1505.146	90.664	.000
Lower level Combination	7.824	1	7.824	.471	.500*

*p > .05

TABLE 32

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Lower level	90.074	87.471
2 = Regular level	87.717	88.789

TABLE 33

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	157.148	23	6.833		
Regression	230.836	1	230.836	33.785	.000
Constant	304.427	1	304.427	44.555	.000
Lower level Combination	6.725	1	6.725	.984	.331*

*p > .05

TABLE 34

1984 POS Reading Scores Adjusted by SRA Reading

Cell	Observed Mean	Adjusted Mean
1 = Lower level	89.224	87.551
2 = Regular level	87.819	88.706

fourth grade combination classrooms and the regular fourth grade classrooms.

The dependent measure is the POS 1984 math score and the covariate is the SRA math score.

Table 35 reflects the non-significant difference of the analysis of covariance.

Table 36 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 26 classrooms with 452 students. The lower level of the combination class has 9 classrooms with 351 students.

No significant difference was noted in covariate-adjusted reading test mean for the lower level of the fifth grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the SRA reading score.

Table 37 reflects the non-significant difference of the analysis of covariance.

Table 38 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 47 classrooms with 872 students. The lower level of the combination class has 19 classrooms with 266 students and the regular class has 28 classrooms with 606 students.

No significant difference was noted in covariate-

TABLE 35

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1611.449	23	70.065		
Regression	814.227	1	814.227	11.621	.000
Constant	74.310	1	74.310	1.061	.000
Lower level Combination	53.730	1	65.730	.910	.350*

*p > .05

TABLE 36

1984 POS Math Scores Adjusted by SRA Math

Cell	Observed Mean	Adjusted Mean
1 = Lower level	76.454	73.798
2 = Regular level	75.874	77.280

TABLE 37

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1543.875	43	35.904		
Regression	856.444	1	886.444	24.689	.009
Constant	271.666	1	271.696	7.567	.009
Lower level Combination	.069	1	.069	.002	.965*

*p > .05

TABLE 38

1984 POS Reading Scores Adjusted by SRA Reading

Cell	Observed Mean	Adjusted Mean
1 = Lower level	89.637	88.069
2 = Regular level	86.979	87.986

adjusted math test mean for the lower level of the fifth grade combination classrooms and the regular fifth grade classrooms.

The dependent measure is the POS 1984 math score and the covariate is the SRA math score.

Table 39 reflects the observed mean and the mean adjusted by the covariate.

Table 40 reflects the non-significant difference of the analysis of covariance.

The sample size contains 47 classrooms with 872 students. The lower level of the combination class has 19 classrooms with 266 students and the regular class has 28 classrooms with 606 students.

RESEARCH QUESTION III

Is the scholastic achievement the same for all combination classes or does effects of split-class grouping differ across the 1/2, 2/3, 3/4, 4/5, or 5/6 combination groupings?

A significant difference ($p = .05$) was found in the covariate-adjusted mean between combination and regular classrooms. Consequently, it was necessary to check for homogeneous slopes of the covariate and the independent variables to satisfy a necessary assumption for analysis of covariance.

Homogeneous slopes are present as there were

TABLE 39

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	3767.733	43	87.622		
Regression	2089.424	1	2089.424	23.846	.000
Constant	47.954	1	47.954	.547	.463
Lower level Combination	.545	1	.545	.006	.938*

*p > .05

TABLE 40

1984 POS Math Scores Adjusted by SRA Math

Cell	Observed Mean	Adjusted Mean
1 = Lower level	76.355	73.206
2 = Regular level	70.944	72.968

no significant interactions between the covariate and the independent variables. The first analysis of covariance on this research question reflects the correct analysis.

Although grade was not significant ($p = .179$), additional analyses by grade were performed to ascertain if differences in grade level existed.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 41 reflects the significant difference of the analysis of covariance.

Table 42 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 166 classrooms with 2811 students. The combination class has 83 classrooms with 1068 students and the regular class has 83 classrooms with 1743 students.

Table 43 reflects the analysis of covariance to check for Homogeneous Slopes.

Near-significant difference was noted in the covariate-adjusted mean for the second grade combination classrooms and the regular second grade classrooms.

Homogeneous slopes of the covariate and the independent variables were next analyzed.

TABLE 41

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	4497.724	157	28.648		
Regression	2207.934	1	2207.934	77.071	.000
Constant	22966.542	1	22966.542	801.683	.000
Code (Combination or Regular)	111.300	1	111.300	3.885	.050*
Grade	138.460	3	46.153	1.611	.189
Code by Grade	42.594	3	14.198	.496	.686

*p = .05

TABLE 42

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Second Grade CC	90.174	88.397
2 = Third Grade CC	90.396	89.728
3 = Fourth Grade CC	90.083	89.179
4 = Fifth Grade CC	88.492	88.844
5 = Second Grade Regular	85.358	85.105
6 = Third Grade Regular	87.717	87.991
7 = Fourth Grade Regular	87.819	88.710
8 = Fifth Grade Regular	86.979	88.072

TABLE 43

Analysis of Covariance to Check for Homogeneous Slopes

Source of Variation	SS	DF	MS	F	Sig of F
Within Residual	4375.241	156	28.046		
Constant	1293203.003	1	1293203.003	46109.380	.000
MRT Read	2354.337	1	2354.337	83.944	.000
Code (Combination or Regular)	115.647	1	115.647	4.123	.044
Code by MRT Read	34.040	1	34.040	1.214	.272*
Grade	139.285	3	46.428	1.655	.179
Grade by MRT Read	130.940	3	43.647	1.556	.202*

*$p > .05$

There is a near-significant interaction between the covariate and the independent variable (combination or regular classes). Homogeneous slopes cannot be assumed. As a result, a third analysis was made. (See Table 46).

The existence of non-homogeneous slopes suggest that the covariate is adjusting one value of the independent variable differentially to another value of the dependent variable. This differential adjustment can be misinterpreted as part of the treatment effects and may be an explanation for the finding of overall significance across all grades when all but one individual grade were not significant.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 44 reflects the near-significant difference of the analysis of covariance.

Table 45 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 42 classrooms divided into two equal groups of 21 classrooms.

Table 46 reflects the near-significant interaction between the covariate and the independent variable (combination or regular classroom).

Table 47 reflects the existence of non-homogeneous

TABLE 44

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1272.067	39	32.617		
Regression	309.274	1	309.274	9.482	.004
Constant	4846.659	1	4846.659	148.593	.000
Code (combination or Regular)	128.118	1	128.118	3.928	.055*

*p > .05

TABLE 45

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Combination Class	90.174	89.557
2 = Regular Class	85.358	85.975

TABLE 46

Summary of Analysis of Covariance to Check for Homogeneous Slopes

Source of Variation	SS	DF	MS	F	Sig of F
Within Residual	1156.053	38	30.422		
Constant	323521.935	1	323521.935	10634.316	.000
MRT Read	424.711	1	424.711	13.960	.001
Code (Combination or Regular)	128.118	1	128.118	4.211	.047
Code by MRT Read	116.013	1	116.013	3.813	.058*

*p > .05

TABLE 47

Summary of Analysis of Covariance to Check Covariate Within the Independent Variable

Source of Variation	SS	DF	MS	F	Sig of F
Within Residual	1156.053	38	30.422		
Constant	323521.935	1	323521.935	10634.316	.000
MRT Read Within Code	515.207	1	257.604	8.468	.001
Code (Combination or Regular	153.635	1	153.635	5.050	.031*

*p < .05

slopes and that the covariate is adjusting one value of the independent variable differentially to another value.

No significant difference was noted in covariate-adjusted mean for the third grade combination classrooms and the regular third grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 48 reflects the non-significant difference of the analysis of covariance.

Table 49 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 35 classrooms. There were 18 combination classrooms and 17 regular classrooms.

No significant difference was noted in covariate-adjusted mean for the fourth grade combination classrooms and the regular fourth grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 50 reflects the non-significant difference of the analysis of covariance.

Table 51 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 34 classrooms divided into two equal groups of 17 classrooms.

TABLE 48

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	615.551	31	19.854		
Regression	711.992	1	711.992	35.857	.004
Constant	4250.646	1	4250.646	214.068	.000
Code (Combination or Regular)	19.403	1	19.403	.997	.331*

*p > .05

TABLE 49

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Combination class	90.398	89.813
2 = Regular class	87.717	88.295

TABLE 50

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	615.551	31	19.854		
Regression	711.992	1	711.992	35.857	.004
Constant	4250.646	1	4250.646	214.068	.000
Code (Combination or Regular)	19.403	1	19.403	.997	.331*

*p > .05

TABLE 51

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Combination class	90.398	89.813
2 = Regular Class	87.717	88.295

No significant difference was noted in covariate-adjusted mean for the fifth grade combination classrooms and the regular fifth grade classrooms.

The dependent measure is the POS 1984 reading score and the covariate is the MRT reading score.

Table 52 reflects the non-significant difference of the analysis of covariance.

Table 53 reflects the observed mean and the mean adjusted by the covariate.

The sample size contains 56 classrooms divided into two equal groups of 28 classrooms.

RESEARCH QUESTION IV

Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?

There was no significant difference in covariate-adjusted mean among students in combination classrooms. regardless as to how their teachers were selected.

The dependent measure is the 1984 POS reading score and the covariate is the MRT reading score.

Table 54 reflects the non-significant difference of the analysis of covariance.

Table 55 reflects the observed mean and the mean adjusted by the covariate.

Table 56 shows the criteria used by principals

TABLE 52

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	2029.093	53	38.285		
Regression	1207.204	1	1207.204	31.532	.009
Constant	9168.602	1	9168.602	240.007	.000
Code (Combination or Regular)	5.993	1	5.993	.157	.694*

*p > .05

TABLE 53

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Combination class	88.492	88.064
2 = Regular class	86.929	87.407

TABLE 54

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1924.540	77	24.994		
Regression	951.885	1	951.855	38.083	.000
Constant	14592.125	1	14592.125	583.824	.000
How Teach	181.413	1	45.353	1.815	.135*

*p > .05

TABLE 55

1984 POS Reading Scores Adjusted by MRT Reading

Selection Method	Observed Mean	Adjusted Mean
1 = Ability	87.944	88.303
2 = Volunteer	91.538	92.657
3 = Rotation	90.326	89.641
4 = Combination	90.758	90.513
5 = With Experience	94.066	92.499

TABLE 56

Methods Used by Principals to Select Teachers for Combination Classrooms

Selection Method	Number of Classrooms
1 = Ability	39
2 = Volunteer	6
3 = Rotation	11
4 = Combination	22
5 = With Experience	5
Total	83*

*Teachers in combination classes were counted twice if different assignment rules were used to choose the upper and lower grade levels of a class.

to select teachers for combination classrooms.

RESEARCH QUESTION V

Is scholastic achievement affected by differences in methods used by principals to select students for combination classes?

There was no significant difference in covariate-adjusted mean among students in combination classrooms, regardless of selection criteria used by principals to place students.

The dependent measure is the 1984 POS reading score and the covariate is the MRT reading score.

Table 57 reflects the non-significant difference of the analysis of covariance.

Table 58 reflects the observed mean and the mean adjusted by the covariate.

Table 59 shows the criteria used by principals to select students for combination classrooms.

The analysis of data presented in this chapter shows little difference between the rate of scholastic achievement for combination and non-combination classes. Chapter V includes commentary discussing both the individual and overall significance of these findings.

TABLE 57

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1840.542	74	24.872		
Regression	995.806	1	995.806	40.037	.000
Constant	12899.325	1	12899.325	518.624	.000
Lower	85.675	2	42.837	1.722	.186*
Upper	102.919	3	34.306	1.370	.256*
Lower by Upper	71.162	2	35.581	1.431	.246*

*$p > .05$

TABLE 58

1984 POS Reading Scores Adjusted by MRT Reading

Selection Method		Observed Mean	Adjusted Mean
Lower	Upper		
Average	Average	88.406	92.238
Average	Average to above	92.357	89.661
Average to above	Below average	95.805	94.109
Average to above	Average	85.345	83.885
Average to above	Average to above	88.940	89.041
High	Below average	89.230	90.533
High	Average to above	85.330	87.304
High	High	91.738	91.023

TABLE 59

Methods Used by Principals to Select Students for Combination Classrooms

Selection Method		Number of Classrooms Combination Classrooms Only
Lower	Upper	
Average	Average	5
Average	Average to above	3
Average to above	Below average	2
Average to above	Average	4
Average to above	Average to above	45
High	Below average	4
High	Average to above	1
High	High	19
Total		83

CHAPTER V

SUMMARY, CONCLUSION, RECOMMENDATIONS AND RESEARCHER'S COMMENTARY

This study compares the scholastic achievement of an experimental group of 1,068 students enrolled in combination or split/grade classes with a control group of 1,743 students enrolled in regular graded classes in Administrative Areas II and IV in the Fairfax County, Virginia, Public Schools in 1983-84. Five research questions are developed, three of which relate directly to grade level student scholastic achievement by comparing test results for combination and regular grade classes, and two which attempt to identify any differences resulting from methods used by principals to select teachers and students for placement in combination classes.

Each of the five research questions developed contain the hypothesis that comparison of scholastic achievement for students enrolled in combination classes will show that the rate of achievement is equal to that demonstrated by regular graded classes of the same year. The five research questions used for this review are:

- Is scholastic achievement for children in

the upper grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?

- Is scholastic achievement for children in the lower grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?
- Is scholastic achievement the same for all combination classes or does effects of split-class grouping differ across 1/2, 2/3, 3/4, 4/5, or 5/6 combination groupings?
- Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?
- Is scholastic achievement affected by differences in methods used by principals to select students for combination classes?

SUMMARY

Chapter I introduces the problem and identifies the controversy, objections, and uncertainty associated with combined class groupings, commonly referred to as combination classes. In Chapter I it is stated

that previous research, although inconclusive, shows that scholastic achievement of students enrolled in combination classes was generally no different than that shown by students enrolled in regular graded classes.

Chapter II reviews the literature and provides a history of the development of combination classes. Many of the studies enumerated in Chapter II suggest that the fears and/or objections of students, educators, principals, teachers and parents may be unfounded. In fact, several research studies showed that children enrolled in combination classes received certain maturational and social benefits that could, on this basis alone, assuming an equal scholastic rate of achievement, make combination classes the superior method of teaching. Chapter II identifies several research studies of note. Primarily Chapter II is divided into two groups of studies irrespective of whether the evidence was gathered empirically or statistically. The presentation of these two groupings is subtitled Ability Grouping, Family or Vertical Grouping and Multi-age Grouping and/or Combination Classes. The research analysis begins chronologically with Knight (1938) and his statistical study of combination students in New Haven, Connecticut which essentially determined that for

scholastic achievement there was little difference between that demonstrated for regular classes and that demonstrated for combination classes. Perhaps Ford (1977) best summarizes the analysis of research presented in this chapter. In a review of recent research on multi-age grouping Ford states that such research has provided little or no evidence that children's cognitive development is enhanced by multi-age groupings. Further, Ford states that most studies show no greater gains in achievement than children in control groups and hence multi-age groupings must be defended on the grounds that it furthers children's social and maturational development.

Although graded schools had become the dominant model for school organization by 1870 and continues today, Piaget (1948) demonstrated that children pass through a series of mental stages until they reach maturity and that they all do not pass through the same stage at the same time. In particular, the studies of Piaget (1948), Mycock (1967) and Junell (1971) strengthen the hypothesis that varied levels of maturity and experience may contribute more to the learning process.

Chapter III reviews the research design, procedures, and methodology used in this study. In particular,

this chapter develops the research design for the five research questions analyzed in Chapter IV.

In addition Chapter III indicates that necessary in the development of the research design is an understanding of the issues and regulations that relate to the problem, namely the widespread objection by principals, teachers, and parents to combination classes. In part, public perception of combination classes has been influenced by previous research that has suffered from lack of research controls, the absence of specific validation procedures, and the wide variety or limited size of the groups studied.

The basic instructional program for Fairfax County Public Schools is defined in Chapter III to be a series of documents containing instructional objectives for all subjects at each level of the curriculum, known as the Program of Studies. This study selected students from Administrative Area II and Administrative Area IV in the Fairfax County, Virginia, Public Schools. Although these two areas had a total enrollment of 27,962 students (K-6), only 2,811 met the criteria necessary for inclusion in this study. Examination of data from Fairfax County, Virginia, Public Schools showed that a number of students from both the experimental and control groups did not have the test scores necessary

for comparison in this study. Consequently, to complete the analysis, it was necessary to study group means of individual classrooms rather than individual student scores.

Chapter III outlines the selection process for inclusion in this study. It was based on the following criteria:

1. Classrooms in both the experimental and control groups were required to have at least 25 percent of students with dependent measures (POS reading and math scores) and covariates (Metropolitan Readiness Tests and/or Science Research Associates reading and math achievement scores).
2. All experimental group classrooms meeting the initial criteria were automatically included in the study.
3. Those control groups (non-combination) classrooms meeting the criteria were then analyzed by systematic random stratified sampling, to determine a control group which included the same number of classrooms as had been delineated for the experimental group. For grades two and three, a sufficient number of classrooms were found to enable systematic

selection of schools that did not include classrooms chosen for the experimental group. In grades four and five, however, some overlap did occur.

As stated in Chapter III the availability of data made it necessary to study group means. Huck, Cormier, and Bounds (1974) state that the analysis of covariance is used most often by researchers to compare group means on a dependent variable, after these group means have been adjusted for differences between the groups on some relevant covariate (concomitant) variable. In this study the dependent variable is the POS reading and math tests and the covariate is the MRT and SRA reading and math tests. By using the analysis of covariance to adjust the scores of the dependent variable (POS tests) mean on the basis of the covariate (MRT or SRA tests) mean it enabled comparisons to determine any significant differences.

Chapter IV provides the results of analysis of covariance for each of the five research questions. The results of these analyses are presented in the following section.

Chapter V summarizes the study and presents the researcher's conclusions, recommendations and commentary.

CONCLUSIONS

An analysis of covariance was performed to test if there was a significant difference in scholastic achievement, as measured by 1984 Program of Studies reading and math scores, for combination and regular classroom groupings. The MRT and SRA scores were the covariates used to enable comparison of group means with the POS scores, the dependent variable. Assumptions were tested in each analysis. Classroom means, as opposed to individual test scores, were analyzed.

Tables 60 - 64 report the research question, type of comparison, grade levels, dependent measures, covariates, and conclusions. Only two of the nineteen analyses produced a significant [F]. Research question III, which compared combination and regular classrooms, was found to be significant for both second grade and combined grades (second through fifth). Implications of this finding suggest that overall significance was found partly due to the significance found at the second grade level. Second grade appears to be the preferred grade to combine with contiguous grades. Overall, scholastic achievement in combination classes was found to equal or exceed that of regular graded classes.

Research Question I

Is scholastic achievement for children in the upper grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?

TABLE 60

Summary of Analysis of Covariance
Research Question I

Type Comparison	Grade	Dependent Measure	Covariate	Results
Upper level vs. regular	Second	POS Reading	MRT Reading	Not significant
Upper level vs. regular	Third	POS Reading	MRT Reading	Not Significant
Upper level vs. regular	Fourth	POS Reading	SRA Reading	Not Significant
Upper level vs. regular	Fourth	POS Math	SRA Math	Not Significant
Upper level vs. regular	Fifth	POS Reading	SRA Reading	Not Significant
Upper level vs. regular	Fifth	POS Math	SRA Math	Not Significant

Research Question II

Is scholastic achievement for children in the lower grade level of a combination class significantly different than the scholastic achievement of children in the same single grade?

TABLE 61

Summary of Analysis of Covariance
Research Question II

Type Comparison	Grade	Dependent Measure	Covariate	Results
Lower level vs. regular	Second	POS Reading	MRT Reading	Not Significant
Lower level vs. regular	Third	POS Reading	MRT Reading	Not Significant
Lower level vs. regular	Fourth	POS Reading	SRA Reading	Not Significant
Lower level vs. regular	Fourth	POS Math	SRA Math	Not Significant
Lower level vs. regular	Fifth	POS Reading	SRA Reading	Not Significant
Lower level vs. regular	Fifth	POS Math	SRA Math	Not Significant

Research Question III

Is scholastic achievement the same for all combination classes or does the effects of split-class grouping differ across the 1/2, 2/3, 3/4, 4/5, or 5/6 combination grouping?

TABLE 62

Summary of Analysis of Covariance
Research Question III

Type Comparison	Grade	Dependent Measure	Covariate	Results
Combination vs. regular	Combined Second - Fifth	POS Reading	MRT Reading	Significant p = .050
Combination vs. regular	Second	POS Reading	MRT Reading	Significant p = .055
Combination vs. regular	Third	POS Reading	MRT Reading	Not Significant
Combination vs. regular	Fourth	POS Reading	MRT Reading	Not Significant
Combination vs. regular	Fifth	POS Reading	MRT Reading	Not Significant

Research Question IV

Is scholastic achievement affected by the differences in methods used by principals to select teachers for combination classes?

TABLE 63

Summary of Analysis of Covariance
Research Question IV

Type Comparison	Grade	Dependent Measure	Covariate	Results
Teacher Selection Criteria	Combined Second - Fifth	POS Reading	MRT Reading	Not Significant

Research Question V

Is scholastic achievement affected by the differences in methods used by principals to select students for combination classes?

TABLE 64

Summary of Analysis of Covariance
Research Question V

Type Comparison	Grade	Dependent Measure	Covariate	Results
Student Selection Criteria	Combined Second - Fifth	POS Reading	MRT Reading	Not Significant

The study of combination classroom grouping shows that children learn equally as well in combination classrooms as they do in regular graded classrooms. Skeptics of combination classes have always been fearful that children do not achieve as well in combination grade classrooms as they do in single grade classrooms. The findings of this study and previous studies indicate that their fears are certainly unfounded. Scholastic achievement in combination grade classrooms is no different from achievement in non-combination grade classrooms. Why then should we object to combination classrooms if the rate of scholastic achievement is equal? Those studies that have concentrated on the affective aspects of such classes show that students enrolled in combination classes demonstrate more self-assuredness, have a greater sense of belonging, support, security, and have a chance to form relationships with a wider variety of children than is possible in a traditional setting. Further such grouping promotes the development of a balanced personality by fostering attitudes and qualities that enable children to lead happy, well-adjusted lives in a complex and changing social environment.

If multi-age grouping does impact certain social and maturational benefits then it may be related to

Piaget's findings that children pass through stages of mental development and that they do not all pass through the same stages at the same time. Clearly, the fiscal and evaluative issues affecting education today suggest educational designs and processes to fit the paradigm of "more for less." If the concept of education is to include teaching the "whole" child, then it would appear that the social and maturational benefits, inherent in the design of multi-age grouping, cannot be ignored, or else you modify the concept.

RECOMMENDATIONS

This study started with the intent of statistically comparing the scholastic test scores of students in grades two-five enrolled in Administrative Area IV of the Fairfax County, Virginia, Public Schools. The intended design was to analyze the data by performing a pretest-posttest comparison of all those students who took the Program of Studies test in April-May of 1983 and again in April-May of 1984. The results for the experimental group (combination class students) would then be compared with the control group (regular grade class students) to determine the relative rates of progress for the two groups.

Although the necessary data to perform the above study was not available, this researcher believes

that such a review - using a large population of students and a pretest-posttest comparison - is warranted. Other recommendations include:

- Use the SRA reading and math scores as the covariate in grades 2-6. (In 1985 Fairfax County Public Schools began administering the SRA tests in the second grade).
- Use the SRA tests as the dependent measure instead of the POS tests. The MRT or earlier SRA test could be the covariate.
- Include sex, race, maturity, and economic levels as variables to ascertain their effects on scholastic achievement.
- Conduct a study of children in combination and non-combination classrooms based on affective measures using some type of children's self-concept scale.
- Collect data to compare individual scores instead of classroom means.
- Determine which grade levels are the best to combine.
- Disseminate results of this study including the researcher's commentary to principals, teachers, and parents to alleviate their fears of student's achievement suffering

due to combining contiguous grades.

- Include findings of this study in curriculum development in Fairfax County Public Schools.
- Provide inservice for principals and teachers who have combination classes. Share guidelines and strategies for grouping and classroom management.

If we continue our journey to obtain excellence in education, our main goal should be to assure children an educational setting which will provide each child with the optimum learning experience to help him/her to develop mentally, physically, socially and emotionally. The rapidly accumulating volume of knowledge about the way in which children unfold educationally suggests that children's growth in academic achievement is tuned to the growth of the child as a whole. Suitable nurture for optimum individual development requires diversified opportunities, contacts, and resources. Interaction with older and younger children comprise a part of the broader environment for learning. As long as absurd extremes are avoided, every school should have a variety of avenues through which multi-age and multi-grade groupings can take place. In the early years of elementary education, multi-age grouping of children was necessary. Grouping today should be

one of designed choice, not an administrative necessity. This researcher believes that the creative teacher is the most important element regardless of the grouping plan chosen. As Harold Shane stated, "The philosophy and ability of the able teacher are undoubtedly more important than any grouping plan, however ingenious it may be, with respect to creating good environments for teaching and learning."

RESEARCHER'S COMMENTARY

The researcher would like to conclude this study by exercising her right to present what, in her mind, is additional pertinent material for further analysis and study.

Although the principal questionnaire was used as part of the research design to determine the rationale for selecting students and teachers for combination classes, the researcher believes a more indepth analysis of the principal and teacher questionnaire is appropriate. Combined class assignments is the product of many decisions, possibly the least significant of which is whether it is effective or not. A study of the effectiveness of this grouping needs the complement of an analysis of the decisions that led to the combination class assignment.

A telephone interview was administered to all

the principals in Administrative Area II and Administrative Area IV in Fairfax County Public Schools. Included in the questionnaire is a profile of the school, a profile of students perceived outcomes, attitudes, criteria of selection, etc. (see Appendix B).

This is the mind of the school as perceived by the principal. This is the material out of which decisions are made. Principals are at the center of the administrative/educational/economic issue and are an ongoing repository of generous parent and teacher input.

The researcher has selected certain questions from the questionnaire that she feels merit further analysis and would be of utmost importance in organizing combination classes.

The pertinent questions are indicated on the following pages along with the response and researcher's commentary. Obviously the reader may draw his or her own conclusions when reviewing the data.

PRINCIPAL SURVEY

SELECTED QUESTIONS

Question/Response

6. Do you make your combination classes larger or smaller than regular classes?

	Frequency	Percent
LARGER	6	11.3%
SMALLER	30	56.6%
SAME	17	32.1%

Researcher's Commentary

Over half (56.6%) of the principals indicated they make combination classes smaller than regular classes.

Question/Response

10. Why do you combine classes?

	Frequency	Percent
NECESSITY	52	98.1%
CHOICE	1	1.9%

Researcher's Commentary

It's most obvious that given the choice, principals would not form combination classes.

Question/Response

11. Do you consider ability and/or achievement in choosing children for combination classes?_____

Other?_____

	Frequency	Percent
ABILITY	2	3.8%
ACHIEVEMENT	8	15.1%
BOTH	43	81.1%

Researcher's Commentary

Most (81.1%) principals consider both ability and achievement in choosing children for combination classes. Other criteria for selection include:

	Frequency	Percent
INDEPENDENT WORKER	33	62.3%
NO DISCIPLINE PROBLEM	6	11.3%
READING GROUPINGS	4	7.5%
TEACHER RECOMMENDATION	3	5.7%
RETENTION	1	1.9%

Question/Response

12. How do you group for the lower half of your combination classes?

	Frequency	Percent
LOW TO AVERAGE	1	1.9%
AVERAGE	14	26.4%
AVERAGE TO ABOVE	22	41.5%
ABOVE AVERAGE	11	20.8%
SUPERIOR	5	9.4%

Researcher's Commentary

Almost three-quarters (71.7%) of the principals indicated they choose students who are above average for the lower level of combination classes.

Question/Response

13. How do you group for the upper half.

	Frequency	Percent
LOW TO AVERAGE	3	5.7%
AVERAGE	11	20.8%
AVERAGE TO ABOVE	23	43.4%
ABOVE AVERAGE	12	22.6%
SUPERIOR	4	7.5%

Researcher's Commentary

As with grouping for the lower half of combination classes, almost three-fourths (73.5%) of the principals indicated they choose above average students for the upper level of combination classes.

Question/Response

14. How do you choose teachers for combined classes?

	Frequency	Percent
ABILITY	29	54.7%
VOLUNTEER	5	9.4%
ROTATION	5	9.4%
COMBINATION OF ABOVE	11	20.8%
EXPERIENCE INCLUDED	3	5.7%

Researcher's Commentary

Over one-half (54.7%) of the principals indicated they choose their better teachers to teach combination classes.

Question/Response

15. Do you think combination classes benefit the students in general?

	Frequency	Percent
YES	31	58.5%
NO	16	30.2%
SAME	5	9.4%
UNDECIDED	1	1.9%

Researcher's Commentary

Over one-half (58.5%) of the principals indicated that they feel combination classes benefit the students.

Question/Response

16. Which most? Upper_____ Lower_____

	Frequency	Percent
UPPER	3	5.7%
LOWER	28	52.8%
BOTH	21	39.6%
NEITHER	1	1.9%

Researcher's Commentary

While over half (52.8%) of the principals indicated they felt the children in the lower level of a combination class received the most benefit, a large percentage (39.6%) felt that combination classes were beneficial to children in both levels.

Question/Response

17. Do the teachers in general feel combined classes are beneficial for students?

	Frequency	Percent
YES	14	26.4%
NO	36	67.9%
UNDECIDED	3	5.7%

Researcher's Commentary

Over two-thirds (67.9%) of the principals indicated that they believe the teachers do not feel combined classes are beneficial for students.

Question/Response

18. If you had a choice, would you combine classes?

	Frequency	Percent
YES	6	11.3%
NO	46	86.8%
UNDECIDED	1	1.9%

Researcher's Commentary

As in question ten (see page 137), principals overwhelmingly (86.8%) indicated they would not combine classes if given the choice.

Question/Response

19. Do your teachers like combination classes? What do they like most? What do they like least?

	Frequency	Percent
YES	8	15.1%
NO	42	79.2%
SOME	3	5.7%

Researcher's Commentary

Most principals (79.2%) indicated that their teachers do not like combination classes. When asked what teachers like most, (about combination classes), responses included:

	Frequency	Percent
GROUPING	39	73.6%
BEHAVIOR	14	26.4%

When asked what teachers like least, (about combination classes), they responded:

	Frequency	Percent
DEMANDS	46	86.8%
STUDENT DIFFICULTIES	3	5.7%
LACK OF PARENT UNDERSTANDING	4	7.5%

Question/Response

20. Do your parents like combination classes? What do they like most? What do they like least?

	Frequency	Percent
YES	5	9.4%
NO	41	77.4%
SOME	7	13.2%

Researcher's Commentary

Over three-fourths (77.4%) of the principals indicated that they felt their parents did not like combination classes. When asked what parents liked most, (about combination classes), responses included:

	Frequency	Percent
GROUPING	9	17.0%
TEACHER	11	20.8%
STATUS	9	17.0%
STUDENT POTENTIAL	3	5.7%
LIKED LOWER LEVEL, NOT UPPER	16	30.2%
NOTHING	5	9.4%

When asked what parents like least, (about combination classes), responses included:

	Frequency	Percent
BEING IN UPPER LEVEL	12	22.6%
GROUPING	3	5.7%
COMBINATION CLASSES ARE UNNECESSARY	2	3.8%
STUDENTS SHORTCHANGED	32	60.4%
TEACHER DEMANDS	3	5.7%
NOTHING	1	1.9%

Question/Response

21. Do children in combined classes achieve as well as children in straight classes?

	Frequency	Percent
YES	52	98.1%
NO	1	1.9%

Researcher's Commentary

All but one (98.1%) of the principals indicated that children achieve in combination classes as well as children in regular classes.

Question/Response

22. What do you perceive as the biggest asset to combination classes?

	Frequency	Percent
BETTER TEACHING	3	5.7%
GROUPING	41	77.4%
NO BEHAVIOR PROBLEMS	2	3.8%
EDUCATING PARENTS	1	1.9%
NOTHING	6	11.3%

Researcher's Commentary

Grouping practices and flexibility was the most frequent (77.4%) reason cited as the biggest asset to combination classes.

Question/Response

23. What do you perceive as the biggest problem to combination classes?

	Frequency	Percent
PARENTS	34	64.2%
TEACHER RELATED	6	11.3%
GROUPING	6	11.3%
SCHEDULING	3	5.7%
DUAL PREPARATION	4	7.5%

Researcher's Commentary

Parental objections was perceived as the biggest problem (64.2%) to having combination classes.

Question/Response

25. Do you think combination classes provide a good learning experience?

	Frequency	Percent
YES	49	92.5%
NO	4	7.5%

Researcher's Commentary

Most principals (92.5%) indicated that combination classes provide a good learning experience.

TEACHER SURVEY

SELECTED QUESTIONS

Question/Response

1. How long have you been a teacher?

Years	Frequency	Percent
0-5	8	13.1%
6-10	7	11.5%
11-15	19	31.1%
16-20	13	21.3%
over 20	14	23.0

Researcher's Commentary

Three-fourths (75%) of the teachers surveyed indicated they have over ten years' experience.

Question/Response

2. Have you taught a combination class before?

	Frequency	Percent
YES	54	88.5%
NO	7	11.5%

Researcher's Commentary

The majority (88.5%) of the teachers said they had previously taught a combination class.

Question/Response

3. Did you volunteer to teach your combination class?

	Frequency	Percent
YES	31	50.8%
NO	29	47.5%
N/A (No answer)	1	1.6%

Researcher's Commentary

About the same percentage of teachers volunteered or were asked to teach their combination class.

Question/Response

4. In your opinion, which are the best grade levels to combine?

The following percentages reflect the most preferred grade levels to combine.

	Frequency	Percent
1/2	11	18.0%
2/3	24	39.3%
3/4	21	34.4%
4/5	20	32.8%
5/6	18	29.5%

Researcher's Commentary

Clearly, teachers indicated they feel that grades one and two are the worst grade levels to combine.

Question/Response

7. In your opinion, which are the worst grade levels to combine?

	Frequency	Percent
1/2	33	54.1%
2/3	11	18.0%
3/4	18	29.5%
4/5	12	19.7%
5/6	18	29.5%

Researcher's Commentary

Consistent with question four, teachers indicated that the first and second grades are worst to combine.

Question/Response

8. Why do schools combine classes?

	Frequency	Percent
NECESSITY	56	91.8%
CHOICE	1	1.6%
BOTH	4	6.6%

Researcher's Commentary

Most (91.8%) teachers said schools combine classes out of necessity.

Question/Response

9. What should be considered when choosing children for combined classes?

	Frequency	Percent who said "yes"
ABILITY	37	60.7%
ACHIEVEMENT	30	49.2%
MATURITY	54	88.5%

Researcher's Commentary

Other reasons cited are work habits (32.8%) and behavior (14.8%).

Question/Response

10. Children for the lower level of a combination class should be of what ability level?

	Frequency	Percent
LOW	1	1.6%
AVERAGE	6	9.8%
HIGH AVERAGE	25	41.0%
HIGH	19	31.1%
AVERAGE TO HIGH	9	14.8%
N/A	1	1.6%

Researcher's Commentary

The majority of teachers (86.9%) indicated that children in the lower level of a combination class should be of above average ability.

Question/Response

11. Children for the upper level of a combination class should be of what ability level?

	Frequency	Percent
LOW	1	1.6%
LOW TO AVERAGE	1	1.6%
AVERAGE	14	23.0%
HIGH AVERAGE	27	44.3%
HIGH	7	11.5%
AVERAGE TO HIGH	11	18.0%

Researcher's Commentary

Almost three-fourths (73.8%) of teachers indicated children chosen for the upper level of a combination class should be of above average ability level.

Question/Response

12. In your school, how do you believe teachers are chosen for combination classes?

Ability _____Volunteer _____Rotation_____

Don't Know_____ Other:_____

	Frequency	Percent
ABILITY	8	13.1%
VOLUNTEER	13	21.3%
ROTATION	2	3.3%
COMBINATION OF ABOVE	19	31.3%
ALL OF ABOVE	3	4.9%
UNCERTAIN	14	23.0%
N/A	2	3.3%

Researcher's Commentary

While almost one-third (31.1%) of the teachers said that teachers should be chosen for combination classes through a combination of ability, volunteer, and rotation, under one-fourth said they were either uncertain (23.0%) regarding teacher selection or that teachers are chosen on a voluntary basis (21.3%).

Question/Response

13. How should they be chosen?

	Frequency	Percent
ABILITY	16	26.2%
VOLUNTEER	12	19.7%
ROTATION	10	16.4%
COMBINATION OF ABOVE	22	36.1%
ALL OF ABOVE	1	1.6%

Researcher's Commentary

While over one-third (36.1%) of the teachers indicated that they believe teachers should be chosen by a combination of ability, volunteer, and rotation (which in fact is consistent with how they say they believe teachers are chosen - see question twelve, p. 151), over one-fourth (26.2%) of the teachers said ability should be the primary criterion for selection.

Question/Response

14. Do you think combination classes benefit the children in general?

	Frequency	Percent
YES	36	59.0%
NO	22	36.1%
N/A	3	4.9%

Researcher's Commentary

Almost three out of five (59.0%) of the teachers indicated they think combination classes benefit children in general.

Question/Response

15. If yes, which level benefits the most?

	Frequency	Percent
UPPER	9	14.8%
LOWER	31	50.8%
BOTH	6	9.8%
N/A	15	24.6%

Researcher's Commentary

Half (50.8%) of the teachers said they felt the lower level of a combination class benefits students the most.

Question/Response

16. Do teachers in general feel combined classes are beneficial for students?

	Frequency	Percent
YES	7	11.5%
NO	50	82.0%
N/A	4	6.6%

Researcher's Commentary

The majority of teachers (82%) indicated that teachers feel combination classes are not beneficial for students.

Question/Response

17. If given the choice, would you combine classes?

	Frequency	Percent
YES	7	11.5%
NO	53	86.9%
N/A	1	1.6%

Researcher's Commentary

Most (86.9%) of the teachers said that, if given the choice, they would not combine classes.

Question/Response

18. Do you think that teachers like combination classes?

	Frequency	Percent
YES	3	4.9%
NO	56	91.8%
N/A	2	3.3%

Researcher's Commentary

Practically all (91.8%) of the teachers indicated they do not think teachers like combination classes.

Question/Response

19. What do teachers like most about combination classes?

	Frequency	Percent
GROUPING	12	19.7%
ABILITY LEVEL	11	18.0%
SIZE	2	3.3%
MATURITY	5	8.2%
COMBINATION OF ABOVE	20	32.8%
OTHER	3	4.9%
NOTHING	3	4.9%
N/A	5	8.2%

Researcher's Commentary

While teachers differed on what they like most about combination classes, grouping and ability level were the most frequently indicated choices (19.7% + 18% + 32.8% = 70.5%).

Question Response

20. What do teachers like least?

	Frequency	Percent
GROUPING	2	3.3%
DUAL PREPARATION	37	60.7%
PARENTAL OBJECTIONS	2	3.3%
COMBINATION OF ABOVE	18	29.5%
ALL OF ABOVE	2	3.3%

Researcher's Commentary

While three out of every five (60.7%) teachers indicated dual preparation is what they liked least about combination classes, an additional percentage (29.5%)

said a combination of grouping, dual preparation, and parents all contributes to what teachers like least about combination classes.

Question/Response

21. Do you think parents like combination classes?

	Frequency	Percent
YES	8	13.1%
NO	49	80.3%
N/A	4	6.6%

Researcher's Commentary

Four out of five (80.3%) teachers said they think parents do not like combination classes.

Question/Response

22. What do you think parents like most?

	Frequency	Percent
MORE BENEFICIAL FOR LOWER LEVEL	28	45.9%
PRESTIGE	11	18.0%
GROUPING	2	3.3%
ENRICHMENT	8	13.3%
SMALLER CLASSES	3	4.9%
NO BEHAVIOR PROBLEMS	1	1.6%
NOTHING	3	4.9%
N/A	5	8.2%

Researcher's Commentary

Just under half (45.9%) of the teachers indicated that what parents like most about combination classes is that the lower level is more beneficial than the upper level of a combination class.

Question/Response

23. What do you think parents like least?

	Frequency	Percent
LESS BENEFICIAL FOR UPPER LEVEL	17	27.9%
PEER SEPARATION	3	4.9%
DIVIDED CURRICULUM	6	9.9%
LESS ATTENTION FROM TEACHERS	28	45.9%
LOWER LEVEL	2	3.3%
OTHER	2	3.3%
N/A	3	4.9%

Researcher's Commentary

Almost one-half (45.9%) of the teachers indicated that parents perceive their children receive less attention from teachers in combination classes. In addition, over one-fourth (27.9%) indicated parents feel that combination classes are less beneficial for children in the upper level.

Question/Response

24. Do principals like combination classes?

	Frequency	Percent
YES	6	9.8%
NO	48	78.7%
N/A	7	11.5%

Researcher's Commentary

Over three-fourths (78.7%) of the teachers indicated they believe principals do not like combination classes.

Question/Response

25. What do you think principals like most?

	Frequency	Percent
GOOD LEARNING EXPERIENCE	11	18.1%
GOOD PUBLIC RELATIONS	1	1.6%
GROUPING FLEXIBILITY	22	36.1%
NOTHING	6	9.8%
N/A	21	34.4%

Researcher's Commentary

Over one-third (36%) of the teachers indicated that principals like the flexibility of grouping their school population with the utilization of combination classes to group remaining numbers within each grade level. It should also be noted that over one-third (34.4%) of the teachers did not respond to this question.

Question/Response

26. What do you think principals like least?

	Frequency	Percent
PARENTAL CONCERNS	34	55.7%
GROUPING	11	18.0%
SCHEDULING	2	3.3%
TEACHER CONCERNS	3	4.9%
NOTHING	3	4.9%
N/A	8	13.1%

Researcher's Commentary

Over half (55.7%) of the teachers indicated that parental concerns are what principals like least about combination classes.

Question/Response

27. In general, do you feel that children in combination classes achieve as well as children in regular classes?

	Frequency	Percent
YES	45	73.8%
NO	12	19.7%
N/A	4	6.6%

Researcher's Commentary

Almost three-fourths (73.8%) of the teachers indicated they feel children in combination classes achieve as well as children in regular classes.

Question/Response

28. Do you think combination classes provide a good learning experience?

	Frequency	Percent
YES	45	73.8%
NO	11	18.0%
N/A	5	8.2%

Researcher's Commentary

Almost three-fourths (73.8%) of the other teachers said they think combination classes provide a good learning experience.

Question/Response

29. Would you volunteer to teach a combination class?

	Frequency	Percent
YES	41	67.2%
NO	19	31.1%
N/A	1	1.6%

Researcher's Commentary

Over two-thirds (67.2%) of the teachers indicated they would volunteer to teach a combination class.

This research study did not intend to address which level (upper or lower) in a combination class benefits the most. As a result of the principal and teacher questionnaires, where over half of the principals (52.8%) and teachers (50.8%) indicated that the lower level benefited more than the upper level, this researcher felt professionally compelled to answer this concern. Consequently an analysis of covariance was run between the lower and upper levels of combination classes.

There was no significant difference in the covariates adjusted reading score means between the 2/3, 3/4, and 4/5 lower and upper levels of combination classrooms. While the observed mean of the lower level students was one point higher than the upper level students, the adjusted mean of the upper level students was 1.76 points higher than the lower. While this difference is not significant it does appear to indicate that the upper level students are not at a disadvantage in their classroom placement.(See table 65 and 66).

The dependent measure was the 1984 POS Reading Score and the covariate was the MRT Reading score. The sample size included 53 classrooms, 26 in the lower level and 27 in the upper level.

TABLE 65

Summary of Analysis of Covariance

Source of Variation	SS	DF	MS	F	Sig of F
Within Cells	1346.559	50	26.931		
Regression	818.955	1	818.955	30.409	.000
Constant	8115.254	1	8115.254	301.333	.000
Part	36.300	1	36.300	1.348	.251*

*p > .05

TABLE 66

1984 POS Reading Scores Adjusted by MRT Reading

Cell	Observed Mean	Adjusted Mean
1 = Lower level	90.282	88.839
2 = Upper level	89.210	90.599

These surveys provide additional insight on how teachers and principals perceive combined classes, their attributes and their problems. The reader is free to make observations and draw his or her own conclusions.

This researcher noted the following observations, contradictions, conclusions, and speculations which she feels highlight the results of these surveys and direct attention to particular areas of consistency or inconsistency that may be of further interest to other researchers.

Principals

- primarily combine classes out of necessity.
- tend to make the classes smaller (often this is intent rather than result).
- consider both ability and achievement in selecting children for combination classes.
- tend to select students who are above average for both the lower and upper levels of a combination class.
- tend to select their better teachers for combination classes.

Teachers

- about 75 percent of combination class teachers had ten or more years experience.

- almost 90 percent had taught combination classes before (half had volunteered).
- believe that grades one and two are the worst grade levels to combine.
- three out of five dislike the dual preparation.
- two of every three (67 percent) would volunteer to teach a combination class again.

General Observations

- Both the teachers (86.9 percent) and the principals (86.8 percent) surveyed indicated that if given the choice they would not combine classes. However, the teachers (59 percent) and the principals (58.5 percent) indicated that they believed that combination classes benefit the children. Further, the teachers (82 percent) and the principals (68 percent) indicated that they do not believe that teachers, in general, believe that combined classes are beneficial for students.

  COMMENT: Perhaps this contradiction suggests a need for a concerted effort to educate teachers and school administrations about research that indicates that academic achievement for children in combined classes is equal

and that children are not penalized for being in a combined class. It appears that the opportunity to teach a combined class results in a change of teacher opinion regarding the benefits of combined classes.

- Overwhelmingly, the principals (98.1 percent) surveyed indicated that they combine classes out of necessity, yet teachers (59 percent) and principals (58.5 percent) indicated that they believe combination classes benefit students, particularly the lower half or younger children. These positive effects are challenged by the 87 percent of principals that would not have combined classes. Perhaps the fact that 77 percent of the principals indicated that parents do not like combined classes since they feel their children are being "short-changed" explains why principals would not have combined classes if given the choice, even though they believe them to be beneficial. Even more surprising is that 98 percent of the principals indicated that children achieve as well and 93 percent believed that combined classes provide a good learning experience.

COMMENT: Can the objections of parents,

the general attitude of teachers, and attitudes of school districts create sufficient problems for principals that they would choose to ignore any benefits rather than put up with the "hassle"?

- Both the teachers and the principals overwhelmingly indicated that above average students should be selected for the upper and lower grade levels of a combined class. They also indicated that maturity, independent worker, and behavior should be considered when selecting students for combined classes.
- Principals (74 percent) indicated that teachers of combined classes liked most the concept of grouping and that they liked least (87 percent) the demands (dual preparation). The teachers (70 percent) concurred, indicating that they generally liked grouping and ability level and liked least (61 percent) the dual preparation (demands). However, the teachers (80 percent) indicated that they believed that parents did not like combined classes and further the teachers (56 percent) indicated that they believed the biggest problem of principals was parental concerns. Likewise,

the principals (64 percent) indicated that their biggest problem for combined classes was parental concerns.

COMMENT: It seems clear that parental concern is the primary ongoing issue causing dislike by teachers and principals for combined classes. It seems that both the teachers and principals are saying that factors other than parental concern are realistic factors for disliking combined classes, but that in reality the factor of parental concern constitutes the biggest problem.

- In general both the teachers (74 percent) and the principals (93 percent) indicated that combined classes provide a good learning experience and that children achieve as well in combined classes as children in regular classes (teachers 74 percent, principals 98 percent).

  COMMENT: The conclusions of this study are consistent with the beliefs indicated by the teachers and principals.

- Over half of the teachers (51 percent) and the principals (53 percent) indicated that the lower grade level of a combined class

benefits more than the upper grade level. Also, both teachers (28 percent) and principals (23 percent) believe that parents object to combination classes and this is related to their children being in the upper grade level of a combined class.

COMMENT: The composite conclusion is that parents see combined classes as providing less for their child and thus believe that their child is "short-changed." This study does not confirm parental objections or the beliefs of teachers and principals that children in the upper level of a combined class are at a disadvantage in their classroom placement.

What is clear is that a more concerted effort is needed to better inform parents, teachers, and administrators about the various research studies indicating that academic achievement in combined classes equals or exceeds that in regular classes.

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APPENDIX A

Research Question I

- Is scholastic achievement for children in the upper level of a combination class significantly different from the scholastic achievement of children in the same grade?

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3.10142) df = 1.37820

p = .248

X^2(3df) = 4.13595

p = .247

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for second grade upper level combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Third Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,10957)df = 1.48710

p = .216

X^2(3df) = 4.46265

p = .216

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for third grade upper level combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fourth Grade (Reading)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,3903)df = .52281

p = .667

X^2(3df) = 1.56980

p = .666

Examination of the scatter plots of the POS reading scores vs. SRA reading scores for fourth grade upper level combination and regular classes indicates the dependent (POS reading) and covariate (SRA reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fourth Grade (Math)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,3903)df = .93933

p = .421

X^2(3df) = 2.82044

p = .420

Examination of the scatter plots of the POS math scores vs. SRA math scores for fourth grade upper level combination and regular classes indicates the dependent (POS) and covariate (SRA math) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fifth Grade (Reading)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,3343)df = .73828

p = .529

X^2(3df) = 2.21703

p = .529

Examination of the scatter plots of the POS reading scores vs. SRA reading scores for fifth grade upper level combination and regular classes indicates the dependent (POS reading) and covariate (SRA reading) are not linearly related for the upper level classes.

Analysis and scatter plates were made using a transformed (square root) dependent and covariate. While the first assumption again held, the second did not.

Because only the first of the two assumptions hold, the analysis of covariance F values are not necessarily valid.

Fifth Grade (Math)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,3343)df	=	.13463
	p =	.939
X^2(3df)	=	.40429
	p =	.939

Examination of the scatter plots of the POS math scores vs. SRA math scores for fifth grade upper level combination and regular classes indicates the dependent (POS math) and covariate (SRA math) are not linearly related for the upper level classes.

Plots and analyses were made using a square root transformation of the dependent and covariate but linearity still did not exist.

Because only the first of the two assumptions hold, the analysis of covariance F values are not necessarily valid.

Research Question II

- Is scholastic achievement for children in the lower grade level of a combination class significantly different from the scholastic achievement of children in the same grade?

Second Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds, but is questionable.

Homogeneity of Variance Tests

F with (3,6751) df = 1.63541

p = .179

X^2(3df) = .490863

p = .179

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for second grade lower level combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Third Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,2335)df = .76416

p = .514

X^2(3df) = 2.29589

p = .513

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for third grade lower level combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fourth Grade (Reading)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,6491)df	=	1.17217
	p =	.319
X^2(3df)	=	3.51832
	p =	.318

Examination of the scatter plots of the POS reading scores vs. SRA reading scores for fourth grade lower level combination and regular classes indicates the dependent (POS reading) and covariate (SRA reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fourth Grade (Math)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,6491)df = 1.20333

p = .307

X^2(3df) = 3.61185

p = .307

Examination of the scatter plots of the POS math scores vs. SRA math scores for fourth grade lower level combination and regular classes indicates the dependent (POS math) and covariate (SRA math) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fifth Grade (Reading)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,57369)df = 1.66268

p = .173

X^2(3df) = 4.98831

p = .173

Examination of the scatter plots of the POS reading scores vs. SRA reading scores for fifth grade lower level and regular classes indicates the dependent (POS reading) and covariate (SRA reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fifth Grade (Math)

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,57369)df = 1.82592

p = .140

X^2(3df) = 5.47806

p = .140

Examination of the scatter plots of the POS math scores vs. SRA math scores for fifth grade lower level combination and regular classes indicates the dependent (POS math) and covariate (SRA math) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Research Question III

- Is the scholastic achievement the same for all combination classes or does effects of split-class grouping differ across 1/2, 2/3, 3/4, 4/5, or 5/6 combination groupings?

Overall

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (21,63171)df = 1.51667

p = .061319

$X^2(21)$ =31.86123

p = .060

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for combined second through fifth combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are not linearly related for both combination and regular classes.

Although the variances are not equal, the first assumption holds because sample size are equal. To compensate for the second assumption the analysis and plots were made using transformed (square root) data. Results of the transformations show equality of variance and a linear relation between the dependent and covariate for regular classes. Even with the

transformation, linearity does not exist for the combination classes.

Because the second assumption cannot be met the analyses of covariance F values are not necessarily valid.

Second Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance does not hold.

Homogeneity of Variance Tests

F with (3,288000)df = 2.57141

p = .053

X^2(3df) = 7.71397

p = .052

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for second grade combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Although the variances are not equal, the first assumption holds because sample sizes are equal. The second assumption also holds, so the analysis of variance F values are considered valid.

Third Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,184320)df = 1.22061

p = .301

X^2(3df) = 3.66171

p = .300

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for third grade combination and regular classes indicates the dependent (POS) and covariate (MRT reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fourth Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,184320)df = .80265

p = .492

X^2(3df) = 2.40790

p = .492

Examination of the scatter plots of the POS reading scores vs. SRA reading scores for fourth grade combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related. Because the two assumptions hold, the analysis of covariance F values are considered valid.

Fifth Grade

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (3,524880)df = .17464

p = 1.000

X^2(3df) = .52391

p = .914

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for fifth grade combination and regular classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Because the two assumptions hold, the analysis of covariance F values are considered valid.

Research Question IV

- Is scholastic achievement affected by differences in methods used by principals to select teachers for combination classes?

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (12,1988) df = 2.06798

p = .016

X^2(12df) =24.98531

p = .015

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for combination classes indicates the dependent (POS reading) and covariate (MRT reading) are somewhat linearly related.

Analyses were run on transformed data, using the square root and the natural log, but the variances remained unequal.

Because the first of the two assumptions does not hold, the analysis of covariance F values are not necessarily valid.

Research Question V

- Is scholastic achievement affected by differences in methods used by principals to select students for combination classes?

The multi-variate tests for homogeneity of variance indicate the assumption of common variance holds.

Homogeneity of Variance Tests

F with (15,654) df = 1.0078

p = .445

X^2(15df) =15.57084

p = .411

Examination of the scatter plots of the POS reading scores vs. MRT reading scores for upper and lower combination classes indicates the dependent (POS reading) and covariate (MRT reading) are not linearly related for the upper level classes. Plots and analyses were made using the transformed (square root) dependent and covariate, but linearity still did not exist.

Because the second of the two assumptions does not hold, the analysis of covariance F values are not necessarily valid.

APPENDIX B

Principal Questionnaire

Principal _____ School_____

1. How long have you been a principal?_____
2. What is your school's enrollment _____
3. Do you have any combination classes? (1983-1984)? _____
   How many? _____ What levels? _____ _____ _____
4. Did you have any combination classes last year? _____
   How many? _____ What levels? _____ _____ _____
5. Do you think you'll have combined classes next year? _____
6. Do you make your combination classes larger or smaller than regular classes? _____
7. When did you administer the POS tests? _____
8. How do you describe the general ability of your student body? _____
9. How do you describe the predominant economic levels of the families of your students? _____
10. Why do you combine classes? _____
11. Do you consider ability and/or achievement in choosing children for combination classes? _____ Other? _____
12. How do you group for the lower half of your combination classes? _____
13. How do you group for the upper half? _____
14. How do you choose teachers for combined classes? _____
15. Do you think combination classes benefit the students in general? _____
16. Which most? Upper _____ Lower _____

17. Do the teachers in general feel combined classes are beneficial for students? _____

18. If you had a choice, would you combine classes? _____

19. Do your teachers like combination classes? _____
What do they like most? _____

20. Do your parents like combination classes? _____
What do they most? _____
What do they like least? _____

21. Do children in combined classes achieve as well as children in straight classes? _____

22. What do you perceive as the biggest asset to combination classes? _____

23. What do you perceive as the biggest problem to combination classes?_____

24. Are you aware of Regulation 6171? _____

25. Do you think combination classes provide a good learning experience? _____

26. Is there anything about grouping of combination classes that you think I haven't covered? _____

APPENDIX C

Teacher Questionnaire

1. How long have you been a teacher? _____ years

2. Have you taught a combination class before? _____Yes _____no

3. Did you volunteer to teach your combination class? _____yes _____no

4. In your opinion, which are the best grade levels to combine?_____1/2 _____2/3 _____3/4 _____4/5 _____5/6

5. Which combination class did you teach in 1983/1984? _____1/2_____2/3 _____3/4 _____4/5 _____5/6

6. Which combination classes have you taught in the past? _____1/2 _____2/3 _____3/4 _____4/5 _____5/6

7. In your opinion, which are the worst grade levels to combine? _____1/2 _____2/3 _____3/4 _____4/5 _____5/6

8. Why do schools combine classes? _____Necessity _____Choice _____ Other_____

9. What should be considered when choosing children for combined classes? _____Ability _____Achievement _____Maturity _____Other _____

10. Children for the lower level of a combination class should be of what ability level? _____Low _____Average _____High Average _____High

11. Children for the upper level of a combination class should be of what ability level? _____Low _____Average _____High Average _____High

12. In your school, how do you believe teachers are chosen for combination classes? _____Ability _____Volunteer _____Rotation _____Don't Know _____Other _____

13. How should they be chosen? _____Ability _____Volunteer _____Rotation _____Other

14. Do you think combination classes benefit the children in general? _____yes _____no

15. If yes, which level benefits the most? _____Upper level _____Lower level

16. Do teachers in general feel combined classes are beneficial for students? _____yes _____no

17. If given the choice, would you combine classes? _____yes _____no

18. Do you think that teachers like combination classes? _____yes _____no

19. What do teachers like most about combination classes? _____ The way they are grouped _____Ability Levels _____Size _____Maturity _____Other: _____

20. What do teachers like least? _____Grouping _____Dual Preparation _____Parental Objection _____Other

21. Do you think parents like combination classes? _____yes _____no

22. What do you think parents like most? _____

23. What do you think parents like least? _____

24. Do principals like combination classes? _____yes _____no

25. What do think principals like most? _____

26. What do you think principals like least? _____

27. In general, do you feel that children in combination classes achieve as well as children in regular classes? _____yes _____no

28. Do you think combination classes provide a good learning experience? _____yes _____no

29. Would you volunteer to teach a combination class? _____yes _____no

APPENDIX D

March 22, 1985

Dear

Your principal has identified you as a teacher of a combination class in the 1983-1984 school year. As you know, combination classes result when single-grade classes have been filled and there are additional children in these same levels but not enough to fill an entire class.

I am studying several aspects of combination classes as they are currently structured in Fairfax County Public Schools. The results of this study will be given to our school system and highlights of the study will be sent to each of you. In addition, the data will be included in my doctoral dissertation.

You are being asked to participate in a survey that is a very important part of this study. The Fairfax County Public School system has approved this study for voluntary teacher participation. In order to ensure the results accurately represent Fairfax County Public School teachers, 100 percent response is necessary. Please return your survey by April 5. The survey is anonymous. Place the completed survey in the envelope provided and return it to me via our county courier service (pony).

I would like to thank you in advance for your cooperation and your time. Teacher input is a most important and vital part of this study. I sincerely appreciate your participation and effort.

Very truly yours,

Brenda R. Spratt, Principal
White Oaks Elementary School

Attachment (Survey)

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