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

by

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Dissertation submitted to the Faculty of the
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Combination and Non-Combination Classes

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June, 1986
Blacksburg, Virginia
TO

MY SON AND THE LOVE OF MY LIFE
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Brenda Roberts Spratt
Committee Co-Chairman: Kenneth E. Underwood
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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.
ACKNOWLEDGEMENTS

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CHAPTER I
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.

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- Teacher experience
- Teaching methods
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(SRA Math Score Analysis) - May 1984

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### TABLE 3

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

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|                  | 252 | 78  |
|                  | 292 | 153 |


TABLE 4
Number of Students Selected From Schools in Administrative Area IV
(SRA Math Score Analysis) - May 1984

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<tr>
<th>School</th>
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<td>0</td>
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<td>Fairhill</td>
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TABLE 7

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

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<td>169</td>
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<td>185</td>
<td>132</td>
<td>264</td>
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<td>354</td>
<td>188</td>
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<tr>
<td>IV</td>
<td>52</td>
<td>300</td>
<td>75</td>
<td>132</td>
<td>54</td>
<td>87</td>
<td>75</td>
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<td>Total</td>
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TABLE 8
Summary of Teachers Selected From Schools in Administrative Areas II and IV

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<th>3/4</th>
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</tr>
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<tr>
<td>II</td>
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<td>7</td>
<td>10</td>
<td>6</td>
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<td>IV</td>
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<td>3</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
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<td>10</td>
<td>17</td>
<td>8</td>
<td>17</td>
<td>9</td>
<td>28</td>
<td>19</td>
</tr>
</tbody>
</table>
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>
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<tr>
<th>Group</th>
<th>Dependent Measure</th>
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</thead>
<tbody>
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</tr>
<tr>
<td>Regular (Control)</td>
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</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Combination (Experimental)</th>
<th>Regular (Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
<tr>
<td>3</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
<tr>
<td>4</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
<tr>
<td>5</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
</tbody>
</table>
### TABLE 11

Design for Individual Grades

<table>
<thead>
<tr>
<th>Combination (Experimental)</th>
<th>Regular (Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Ability</th>
<th>Volunteer Measure</th>
<th>Rotation Measure</th>
<th>Combination of These Measure</th>
<th>With Experience Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
<td>Dependent Measure</td>
</tr>
</tbody>
</table>
## TABLE 13

Design

<table>
<thead>
<tr>
<th>Group</th>
<th>Dependent Measure</th>
<th>Covariate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1984 POS Reading Score</td>
<td>MRT Reading Score</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Student Ability Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upper Part</strong></td>
</tr>
<tr>
<td><strong>Lower Part</strong></td>
</tr>
<tr>
<td><strong>average</strong></td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td><strong>average to above</strong></td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td><strong>high</strong></td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
<tr>
<td>Dependent Measure</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th></th>
<th>Telephone Responses</th>
<th>Non Responses</th>
<th>Percent Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principals</td>
<td>53</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>
TABLE 16
Summary of Teacher Responses

<table>
<thead>
<tr>
<th>Mailed Responses</th>
<th>Non Responses</th>
<th>Percent Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers</td>
<td>68</td>
<td>61</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1101.094</td>
<td>29</td>
<td>37.969</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>306.342</td>
<td>1</td>
<td>306.347</td>
<td>8.068</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>3159.631</td>
<td>1</td>
<td>3169.631</td>
<td>83.480</td>
<td>.000</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>52.744</td>
<td>1</td>
<td>82.744</td>
<td>2.179</td>
<td>.151*</td>
</tr>
</tbody>
</table>

* 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>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>89.078</td>
<td>88.862</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>85.358</td>
<td>85.472</td>
</tr>
</tbody>
</table>
TABLE 19
Summary of Analysis of Covariance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>457.583</td>
<td>24</td>
<td>19.066</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>424.513</td>
<td>1</td>
<td>424.513</td>
<td>22.266</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>3598.855</td>
<td>1</td>
<td>3598.855</td>
<td>188.758</td>
<td>.000</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>50.848</td>
<td>1</td>
<td>50.843</td>
<td>2.667</td>
<td>.116*</td>
</tr>
</tbody>
</table>

* p > .05
### TABLE 20

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>90.622</td>
<td>90.582</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>87.717</td>
<td>87.740</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>193.637</td>
<td>22</td>
<td>8.802</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>138.166</td>
<td>1</td>
<td>138.166</td>
<td>15.698</td>
<td>.001</td>
</tr>
<tr>
<td>Constant</td>
<td>338.369</td>
<td>1</td>
<td>338.369</td>
<td>38.444</td>
<td>.000</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>31.715</td>
<td>1</td>
<td>31.715</td>
<td>3.603</td>
<td>.071*</td>
</tr>
</tbody>
</table>

*p > .05
TABLE 22
1984 POS Reading Scores Adjusted by SRA Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>91.054</td>
<td>90.516</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>87.819</td>
<td>88.072</td>
</tr>
<tr>
<td>Source of Variation</td>
<td>SS</td>
<td>DF</td>
</tr>
<tr>
<td>----------------------------</td>
<td>---------</td>
<td>----</td>
</tr>
<tr>
<td>Within Cells</td>
<td>1436.317</td>
<td>22</td>
</tr>
<tr>
<td>Regression</td>
<td>1034.099</td>
<td>1</td>
</tr>
<tr>
<td>Constant</td>
<td>.074</td>
<td>1</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>1.976</td>
<td>1</td>
</tr>
</tbody>
</table>

* p > .05
### TABLE 24

1984 POS Math Scores Adjusted by SRA Math

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>78.369</td>
<td>77.053</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>75.874</td>
<td>76.446</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1793.585</td>
<td>34</td>
<td>52.752</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>619.140</td>
<td>1</td>
<td>619.140</td>
<td>11.737</td>
<td>.002</td>
</tr>
<tr>
<td>Constant</td>
<td>97.331</td>
<td>1</td>
<td>97.331</td>
<td>1.845</td>
<td>.183</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>.493</td>
<td>1</td>
<td>.493</td>
<td>.009</td>
<td>.924*</td>
</tr>
</tbody>
</table>

*p > .05*
TABLE 26
1984 POS Reading Scores Adjusted by SRA Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>86.001</td>
<td>86.946</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>86.979</td>
<td>86.675</td>
</tr>
</tbody>
</table>
TABLE 27
Summary of Analysis of Covariance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>3375.843</td>
<td>22</td>
<td>99.289</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>1050.558</td>
<td>1</td>
<td>1050.558</td>
<td>10.581</td>
<td>.003</td>
</tr>
<tr>
<td>Constant</td>
<td>14.843</td>
<td>1</td>
<td>14.843</td>
<td>.149</td>
<td>.701</td>
</tr>
<tr>
<td>Upper level Combination</td>
<td>2.177</td>
<td>1</td>
<td>2.177</td>
<td>.022</td>
<td>.883*</td>
</tr>
</tbody>
</table>

* *p > .05*
<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Upper level</td>
<td>71.380</td>
<td>71.473</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>70.944</td>
<td>70.913</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1032.212</td>
<td>28</td>
<td>36.863</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>306.501</td>
<td>1</td>
<td>306.501</td>
<td>8.314</td>
<td>.007</td>
</tr>
<tr>
<td>Constant</td>
<td>2685.403</td>
<td>1</td>
<td>2685.335</td>
<td>72.843</td>
<td>.000</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>58.403</td>
<td>1</td>
<td>58.403</td>
<td>1.584</td>
<td>.219*</td>
</tr>
</tbody>
</table>

*p > .05
TABLE 30

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>91.330</td>
<td>89.459</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>85.358</td>
<td>86.273</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>348.627</td>
<td>21</td>
<td>16.601</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>660.793</td>
<td>1</td>
<td>660.793</td>
<td>39.804</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>1505.146</td>
<td>1</td>
<td>1505.146</td>
<td>90.664</td>
<td>.000</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>7.824</td>
<td>1</td>
<td>7.824</td>
<td>.471</td>
<td>.500*</td>
</tr>
</tbody>
</table>

* p > .05
TABLE 32

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>90.074</td>
<td>87.471</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>87.717</td>
<td>88.789</td>
</tr>
</tbody>
</table>
TABLE 33
Summary of Analysis of Covariance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>157.148</td>
<td>23</td>
<td>6.833</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>230.836</td>
<td>1</td>
<td>230.836</td>
<td>33.785</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>304.427</td>
<td>1</td>
<td>304.427</td>
<td>44.555</td>
<td>.000</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>6.725</td>
<td>1</td>
<td>6.725</td>
<td>.984</td>
<td>.331*</td>
</tr>
</tbody>
</table>

* *p > .05*
TABLE 34

1984 POS Reading Scores Adjusted by SRA Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>89.224</td>
<td>87.551</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>87.819</td>
<td>88.706</td>
</tr>
</tbody>
</table>
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>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1611.449</td>
<td>23</td>
<td>70.065</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>814.227</td>
<td>1</td>
<td>814.227</td>
<td>11.621</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>74.310</td>
<td>1</td>
<td>74.310</td>
<td>1.061</td>
<td>.000</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>53.730</td>
<td>1</td>
<td>65.730</td>
<td>.910</td>
<td>.350*</td>
</tr>
</tbody>
</table>

* p > .05
### TABLE 36

1984 POS Math Scores Adjusted by SRA Math

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>76.454</td>
<td>73.798</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>75.874</td>
<td>77.280</td>
</tr>
</tbody>
</table>
TABLE 37

Summary of Analysis of Covariance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1543.875</td>
<td>43</td>
<td>35.904</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>856.444</td>
<td>1</td>
<td>886.444</td>
<td>24.689</td>
<td>.009</td>
</tr>
<tr>
<td>Constant</td>
<td>271.666</td>
<td>1</td>
<td>271.696</td>
<td>7.567</td>
<td>.009</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>.069</td>
<td>1</td>
<td>.069</td>
<td>.002</td>
<td>.965*</td>
</tr>
</tbody>
</table>

* p > .05
<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>89.637</td>
<td>88.069</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>86.979</td>
<td>87.986</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>3767.733</td>
<td>43</td>
<td>87.622</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>2089.424</td>
<td>1</td>
<td>2089.424</td>
<td>23.846</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>47.954</td>
<td>1</td>
<td>47.954</td>
<td>.547</td>
<td>.463</td>
</tr>
<tr>
<td>Lower level Combination</td>
<td>.545</td>
<td>1</td>
<td>.545</td>
<td>.006</td>
<td>.938*</td>
</tr>
</tbody>
</table>

* p > .05


<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>76.355</td>
<td>73.206</td>
</tr>
<tr>
<td>2 = Regular level</td>
<td>70.944</td>
<td>72.968</td>
</tr>
</tbody>
</table>

TABLE 40
1984 POS Math Scores Adjusted by SRA Math
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

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

* p = .05
TABLE 42

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Second Grade CC</td>
<td>90.174</td>
<td>88.397</td>
</tr>
<tr>
<td>2 = Third Grade CC</td>
<td>90.396</td>
<td>89.728</td>
</tr>
<tr>
<td>3 = Fourth Grade CC</td>
<td>90.083</td>
<td>89.179</td>
</tr>
<tr>
<td>4 = Fifth Grade CC</td>
<td>88.492</td>
<td>88.844</td>
</tr>
<tr>
<td>5 = Second Grade Regular</td>
<td>85.358</td>
<td>85.105</td>
</tr>
<tr>
<td>6 = Third Grade Regular</td>
<td>87.717</td>
<td>87.991</td>
</tr>
<tr>
<td>7 = Fourth Grade Regular</td>
<td>87.819</td>
<td>88.710</td>
</tr>
<tr>
<td>8 = Fifth Grade Regular</td>
<td>86.979</td>
<td>88.072</td>
</tr>
</tbody>
</table>
TABLE 43

Analysis of Covariance to Check for Homogeneous Slopes

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

*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>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1272.067</td>
<td>39</td>
<td>32.617</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>309.274</td>
<td>1</td>
<td>309.274</td>
<td>9.482</td>
<td>.004</td>
</tr>
<tr>
<td>Constant</td>
<td>4846.659</td>
<td>1</td>
<td>4846.659</td>
<td>148.593</td>
<td>.000</td>
</tr>
<tr>
<td>Code (combination or Regular)</td>
<td>128.118</td>
<td>1</td>
<td>128.118</td>
<td>3.928</td>
<td>.055*</td>
</tr>
</tbody>
</table>

*p > .05
<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Combination Class</td>
<td>90.174</td>
<td>89.557</td>
</tr>
<tr>
<td>2 = Regular Class</td>
<td>85.358</td>
<td>85.975</td>
</tr>
</tbody>
</table>
**TABLE 46**

Summary of Analysis of Covariance to Check for Homogeneous Slopes

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

* p > .05
TABLE 47
Summary of Analysis of Covariance to Check Covariate Within the Independent Variable

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Residual</td>
<td>1156.053</td>
<td>38</td>
<td>30.422</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>323521.935</td>
<td>1</td>
<td>323521.935</td>
<td>10634.316</td>
<td>.000</td>
</tr>
<tr>
<td>MRT Read Within Code</td>
<td>515.207</td>
<td>1</td>
<td>257.604</td>
<td>8.468</td>
<td>.001</td>
</tr>
<tr>
<td>Code (Combination or Regular)</td>
<td>153.635</td>
<td>1</td>
<td>153.635</td>
<td>5.050</td>
<td>.031*</td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>615.551</td>
<td>31</td>
<td>19.854</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>711.992</td>
<td>1</td>
<td>711.992</td>
<td>35.857</td>
<td>.004</td>
</tr>
<tr>
<td>Constant</td>
<td>4250.646</td>
<td>1</td>
<td>4250.646</td>
<td>214.068</td>
<td>.000</td>
</tr>
<tr>
<td>Code (Combination or Regular)</td>
<td>19.403</td>
<td>1</td>
<td>19.403</td>
<td>.997</td>
<td>.331*</td>
</tr>
</tbody>
</table>

* p > .05
TABLE 49

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Combination class</td>
<td>90.398</td>
<td>89.813</td>
</tr>
<tr>
<td>2 = Regular class</td>
<td>87.717</td>
<td>88.295</td>
</tr>
<tr>
<td>Source of Variation</td>
<td>SS</td>
<td>DF</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>--------</td>
<td>----</td>
</tr>
<tr>
<td>Within Cells</td>
<td>615.551</td>
<td>31</td>
</tr>
<tr>
<td>Regression</td>
<td>711.992</td>
<td>1</td>
</tr>
<tr>
<td>Constant</td>
<td>4250.646</td>
<td>1</td>
</tr>
<tr>
<td>Code (Combination or Regular)</td>
<td>19.403</td>
<td>1</td>
</tr>
</tbody>
</table>

*p > .05*
### TABLE 51

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Combination class</td>
<td>90.398</td>
<td>89.813</td>
</tr>
<tr>
<td>2 = Regular Class</td>
<td>87.717</td>
<td>88.295</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>2029.093</td>
<td>53</td>
<td>38.285</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>1207.204</td>
<td>1</td>
<td>1207.204</td>
<td>31.532</td>
<td>.009</td>
</tr>
<tr>
<td>Constant</td>
<td>9168.602</td>
<td>1</td>
<td>9168.602</td>
<td>240.007</td>
<td>.000</td>
</tr>
<tr>
<td>Code (Combination or Regular)</td>
<td>5.993</td>
<td>1</td>
<td>5.993</td>
<td>.157</td>
<td>.694*</td>
</tr>
</tbody>
</table>

*p > .05
TABLE 53
1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Combination class</td>
<td>88.492</td>
<td>88.064</td>
</tr>
<tr>
<td>2 = Regular class</td>
<td>86.929</td>
<td>87.407</td>
</tr>
</tbody>
</table>
TABLE 54
Summary of Analysis of Covariance

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1924.540</td>
<td>77</td>
<td>24.994</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>951.885</td>
<td>1</td>
<td>951.855</td>
<td>38.083</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>14592.125</td>
<td>1</td>
<td>14592.125</td>
<td>583.824</td>
<td>.000</td>
</tr>
<tr>
<td>How Teach</td>
<td>181.413</td>
<td>1</td>
<td>45.353</td>
<td>1.815</td>
<td>.135*</td>
</tr>
</tbody>
</table>

*p > .05
TABLE 55

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Selection Method</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Ability</td>
<td>87.944</td>
<td>88.303</td>
</tr>
<tr>
<td>2 = Volunteer</td>
<td>91.538</td>
<td>92.657</td>
</tr>
<tr>
<td>3 = Rotation</td>
<td>90.326</td>
<td>89.641</td>
</tr>
<tr>
<td>4 = Combination</td>
<td>90.758</td>
<td>90.513</td>
</tr>
<tr>
<td>5 = With Experience</td>
<td>94.066</td>
<td>92.499</td>
</tr>
</tbody>
</table>
TABLE 56
Methods Used by Principals to Select Teachers for Combination Classrooms

<table>
<thead>
<tr>
<th>Selection Method</th>
<th>Number of Classrooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Ability</td>
<td>39</td>
</tr>
<tr>
<td>2 = Volunteer</td>
<td>6</td>
</tr>
<tr>
<td>3 = Rotation</td>
<td>11</td>
</tr>
<tr>
<td>4 = Combination</td>
<td>22</td>
</tr>
<tr>
<td>5 = With Experience</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>83</strong>*</td>
</tr>
</tbody>
</table>

*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

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

* p > .05
<table>
<thead>
<tr>
<th>Selection Method</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>88.406</td>
<td>92.238</td>
</tr>
<tr>
<td>Average to above</td>
<td>92.357</td>
<td>89.661</td>
</tr>
<tr>
<td>Average to above</td>
<td>95.805</td>
<td>94.109</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average to above</td>
<td>85.345</td>
<td>83.885</td>
</tr>
<tr>
<td>Average to above</td>
<td>88.940</td>
<td>89.041</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Below average</td>
<td>89.230</td>
<td>90.533</td>
</tr>
<tr>
<td>Average to above</td>
<td>85.330</td>
<td>87.304</td>
</tr>
<tr>
<td>High</td>
<td>91.738</td>
<td>91.023</td>
</tr>
<tr>
<td>Selection Method</td>
<td>Number of Classrooms Combination Classrooms Only</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Average to above</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Below average</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Average</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Average to above</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>Average to above</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Below average</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Average to above</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>83</strong></td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type Comparison</th>
<th>Grade</th>
<th>Dependent Measure</th>
<th>Covariate</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper level vs. regular</td>
<td>Second</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not significant</td>
</tr>
<tr>
<td>Upper level vs. regular</td>
<td>Third</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Upper level vs. regular</td>
<td>Fourth</td>
<td>POS Reading</td>
<td>SRA Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Upper level vs. regular</td>
<td>Fourth</td>
<td>POS Math</td>
<td>SRA Math</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Upper level vs. regular</td>
<td>Fifth</td>
<td>POS Reading</td>
<td>SRA Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Upper level vs. regular</td>
<td>Fifth</td>
<td>POS Math</td>
<td>SRA Math</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type Comparison</th>
<th>Grade</th>
<th>Dependent Measure</th>
<th>Covariate</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower level vs. regular</td>
<td>Second</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Lower level vs. regular</td>
<td>Third</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Lower level vs. regular</td>
<td>Fourth</td>
<td>POS Reading</td>
<td>SRA Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Lower level vs. regular</td>
<td>Fourth</td>
<td>POS Math</td>
<td>SRA Math</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Lower level vs. regular</td>
<td>Fifth</td>
<td>POS Reading</td>
<td>SRA Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Lower level vs. regular</td>
<td>Fifth</td>
<td>POS Math</td>
<td>SRA Math</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type Comparison</th>
<th>Grade</th>
<th>Dependent Measure</th>
<th>Covariate</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combination vs. regular</td>
<td>Combined Second - Fifth</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Significant p = .050</td>
</tr>
<tr>
<td>Combination vs. regular</td>
<td>Second</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Significant p = .055</td>
</tr>
<tr>
<td>Combination vs. regular</td>
<td>Third</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Combination vs. regular</td>
<td>Fourth</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Combination vs. regular</td>
<td>Fifth</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type</th>
<th>Grade</th>
<th>Dependent Measure</th>
<th>Covariate</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Selection</td>
<td>Combined</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
<tr>
<td>Criteria</td>
<td>Second - Fifth</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Type Comparison</th>
<th>Grade</th>
<th>Dependent Measure</th>
<th>Covariate</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student Selection</td>
<td>Combined</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Selection Criteria</td>
<td>Second - Fifth</td>
<td>POS Reading</td>
<td>MRT Reading</td>
<td>Not Significant</td>
</tr>
</tbody>
</table>
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.
Question/Response

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

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARGER</td>
<td>6</td>
<td>11.3%</td>
</tr>
<tr>
<td>SMALLER</td>
<td>30</td>
<td>56.6%</td>
</tr>
<tr>
<td>SAME</td>
<td>17</td>
<td>32.1%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>NECESSITY</td>
<td>52</td>
<td>98.1%</td>
</tr>
<tr>
<td>CHOICE</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

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? ____
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABILITY</td>
<td>2</td>
</tr>
<tr>
<td>ACHIEVEMENT</td>
<td>8</td>
</tr>
<tr>
<td>BOTH</td>
<td>43</td>
</tr>
</tbody>
</table>

**Researcher's Commentary**

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

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDEPENDENT WORKER</td>
<td>33</td>
</tr>
<tr>
<td>NO DISCIPLINE PROBLEM</td>
<td>6</td>
</tr>
<tr>
<td>READING GROUPINGS</td>
<td>4</td>
</tr>
<tr>
<td>TEACHER RECOMMENDATION</td>
<td>3</td>
</tr>
<tr>
<td>RETENTION</td>
<td>1</td>
</tr>
</tbody>
</table>

**Question/Response**

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

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW TO AVERAGE</td>
<td>1</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>14</td>
</tr>
<tr>
<td>AVERAGE TO ABOVE</td>
<td>22</td>
</tr>
<tr>
<td>ABOVE AVERAGE</td>
<td>11</td>
</tr>
<tr>
<td>SUPERIOR</td>
<td>5</td>
</tr>
</tbody>
</table>
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.**

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW TO AVERAGE</td>
<td>3</td>
<td>5.7%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>11</td>
<td>20.8%</td>
</tr>
<tr>
<td>AVERAGE TO ABOVE</td>
<td>23</td>
<td>43.4%</td>
</tr>
<tr>
<td>ABOVE AVERAGE</td>
<td>12</td>
<td>22.6%</td>
</tr>
<tr>
<td>SUPERIOR</td>
<td>4</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

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?**
<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABILITY</td>
<td>29</td>
<td>54.7%</td>
</tr>
<tr>
<td>VOLUNTEER</td>
<td>5</td>
<td>9.4%</td>
</tr>
<tr>
<td>ROTATION</td>
<td>5</td>
<td>9.4%</td>
</tr>
<tr>
<td>COMBINATION OF ABOVE</td>
<td>11</td>
<td>20.8%</td>
</tr>
<tr>
<td>EXPERIENCE INCLUDED</td>
<td>3</td>
<td>5.7%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>31</td>
<td>58.5%</td>
</tr>
<tr>
<td>NO</td>
<td>16</td>
<td>30.2%</td>
</tr>
<tr>
<td>SAME</td>
<td>5</td>
<td>9.4%</td>
</tr>
<tr>
<td>UNDECIDED</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPPER</td>
<td>3</td>
<td>5.7%</td>
</tr>
<tr>
<td>LOWER</td>
<td>28</td>
<td>52.8%</td>
</tr>
<tr>
<td>BOTH</td>
<td>21</td>
<td>39.6%</td>
</tr>
<tr>
<td>NEITHER</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

**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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>14</td>
<td>26.4%</td>
</tr>
<tr>
<td>NO</td>
<td>36</td>
<td>67.9%</td>
</tr>
<tr>
<td>UNDECIDED</td>
<td>3</td>
<td>5.7%</td>
</tr>
</tbody>
</table>

**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?
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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>8</td>
</tr>
<tr>
<td>NO</td>
<td>42</td>
</tr>
<tr>
<td>SOME</td>
<td>3</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPING</td>
<td>39</td>
</tr>
<tr>
<td>BEHAVIOR</td>
<td>14</td>
</tr>
</tbody>
</table>

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

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:

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:

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEING IN UPPER LEVEL</td>
<td>12</td>
<td>22.6%</td>
</tr>
<tr>
<td>GROUPING</td>
<td>3</td>
<td>5.7%</td>
</tr>
<tr>
<td>COMBINATION CLASSES ARE UNNECESSARY</td>
<td>2</td>
<td>3.8%</td>
</tr>
<tr>
<td>STUDENTS SHORTCHANGED</td>
<td>32</td>
<td>60.4%</td>
</tr>
<tr>
<td>TEACHER DEMANDS</td>
<td>3</td>
<td>5.7%</td>
</tr>
<tr>
<td>NOTHING</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

Question/Response

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

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>52</td>
<td>98.1%</td>
</tr>
<tr>
<td>NO</td>
<td>1</td>
<td>1.9%</td>
</tr>
</tbody>
</table>

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?
<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>BETTER TEACHING</td>
<td>3</td>
</tr>
<tr>
<td>GROUPING</td>
<td>41</td>
</tr>
<tr>
<td>NO BEHAVIOR PROBLEMS</td>
<td>2</td>
</tr>
<tr>
<td>EDUCATING PARENTS</td>
<td>1</td>
</tr>
<tr>
<td>NOTHING</td>
<td>6</td>
</tr>
</tbody>
</table>

**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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARENTS</td>
<td>34</td>
</tr>
<tr>
<td>TEACHER RELATED</td>
<td>6</td>
</tr>
<tr>
<td>GROUPING</td>
<td>6</td>
</tr>
<tr>
<td>SCHEDULING</td>
<td>3</td>
</tr>
<tr>
<td>DUAL PREPARATION</td>
<td>4</td>
</tr>
</tbody>
</table>

**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?
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?

<table>
<thead>
<tr>
<th>Years</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>8</td>
<td>13.1%</td>
</tr>
<tr>
<td>6-10</td>
<td>7</td>
<td>11.5%</td>
</tr>
<tr>
<td>11-15</td>
<td>19</td>
<td>31.1%</td>
</tr>
<tr>
<td>16-20</td>
<td>13</td>
<td>21.3%</td>
</tr>
<tr>
<td>over 20</td>
<td>14</td>
<td>23.0</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>54</td>
<td>88.5%</td>
</tr>
<tr>
<td>NO</td>
<td>7</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>31</td>
<td>50.8%</td>
</tr>
<tr>
<td>NO</td>
<td>29</td>
<td>47.5%</td>
</tr>
<tr>
<td>N/A (No answer)</td>
<td>1</td>
<td>1.6%</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>11</td>
</tr>
<tr>
<td>2/3</td>
<td>24</td>
</tr>
<tr>
<td>3/4</td>
<td>21</td>
</tr>
<tr>
<td>4/5</td>
<td>20</td>
</tr>
<tr>
<td>5/6</td>
<td>18</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>33</td>
</tr>
<tr>
<td>2/3</td>
<td>11</td>
</tr>
<tr>
<td>3/4</td>
<td>18</td>
</tr>
<tr>
<td>4/5</td>
<td>12</td>
</tr>
<tr>
<td>5/6</td>
<td>18</td>
</tr>
</tbody>
</table>
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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>NECESSITY</td>
<td>56</td>
</tr>
<tr>
<td>CHOICE</td>
<td>1</td>
</tr>
<tr>
<td>BOTH</td>
<td>4</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABILITY</td>
<td>37</td>
</tr>
<tr>
<td>ACHIEVEMENT</td>
<td>30</td>
</tr>
<tr>
<td>MATURITY</td>
<td>54</td>
</tr>
</tbody>
</table>

Researcher's Commentary

Other reasons cited are work habits (32.8%) and behavior (14.8%).
150

Question/Response

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

<table>
<thead>
<tr>
<th>Ability Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>6</td>
<td>9.8%</td>
</tr>
<tr>
<td>HIGH AVERAGE</td>
<td>25</td>
<td>41.0%</td>
</tr>
<tr>
<td>HIGH</td>
<td>19</td>
<td>31.1%</td>
</tr>
<tr>
<td>AVERAGE TO HIGH</td>
<td>9</td>
<td>14.8%</td>
</tr>
<tr>
<td>N/A</td>
<td>1</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Ability Level</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>LOW TO AVERAGE</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>14</td>
<td>23.0%</td>
</tr>
<tr>
<td>HIGH AVERAGE</td>
<td>27</td>
<td>44.3%</td>
</tr>
<tr>
<td>HIGH</td>
<td>7</td>
<td>11.5%</td>
</tr>
<tr>
<td>AVERAGE TO HIGH</td>
<td>11</td>
<td>18.0%</td>
</tr>
</tbody>
</table>
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: ____

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABILITY</td>
<td>8</td>
<td>13.1%</td>
</tr>
<tr>
<td>VOLUNTEER</td>
<td>13</td>
<td>21.3%</td>
</tr>
<tr>
<td>ROTATION</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>COMBINATION OF ABOVE</td>
<td>19</td>
<td>31.3%</td>
</tr>
<tr>
<td>ALL OF ABOVE</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>UNCERTAIN</td>
<td>14</td>
<td>23.0%</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABILITY</td>
<td>16</td>
<td>26.2%</td>
</tr>
<tr>
<td>VOLUNTEER</td>
<td>12</td>
<td>19.7%</td>
</tr>
<tr>
<td>ROTATION</td>
<td>10</td>
<td>16.4%</td>
</tr>
<tr>
<td>COMBINATION OF ABOVE</td>
<td>22</td>
<td>36.1%</td>
</tr>
<tr>
<td>ALL OF ABOVE</td>
<td>1</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>36</td>
<td>59.0%</td>
</tr>
<tr>
<td>NO</td>
<td>22</td>
<td>36.1%</td>
</tr>
<tr>
<td>N/A</td>
<td>3</td>
<td>4.9%</td>
</tr>
</tbody>
</table>
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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPPER</td>
<td>9</td>
<td>14.8%</td>
</tr>
<tr>
<td>LOWER</td>
<td>31</td>
<td>50.8%</td>
</tr>
<tr>
<td>BOTH</td>
<td>6</td>
<td>9.8%</td>
</tr>
<tr>
<td>N/A</td>
<td>15</td>
<td>24.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>7</td>
<td>11.5%</td>
</tr>
<tr>
<td>NO</td>
<td>50</td>
<td>82.0%</td>
</tr>
<tr>
<td>N/A</td>
<td>4</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>7</td>
<td>11.5%</td>
</tr>
<tr>
<td>NO</td>
<td>53</td>
<td>86.9%</td>
</tr>
<tr>
<td>N/A</td>
<td>1</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>NO</td>
<td>56</td>
<td>91.8%</td>
</tr>
<tr>
<td>N/A</td>
<td>2</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

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?
<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPING</td>
<td>12</td>
<td>19.7%</td>
</tr>
<tr>
<td>ABILITY LEVEL</td>
<td>11</td>
<td>18.0%</td>
</tr>
<tr>
<td>SIZE</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>MATURITY</td>
<td>5</td>
<td>8.2%</td>
</tr>
<tr>
<td>COMBINATION OF ABOVE</td>
<td>20</td>
<td>32.8%</td>
</tr>
<tr>
<td>OTHER</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>NOTHING</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>N/A</td>
<td>5</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUPING</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>DUAL PREPARATION</td>
<td>37</td>
<td>60.7%</td>
</tr>
<tr>
<td>PARENTAL OBJECTIONS</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>COMBINATION OF ABOVE</td>
<td>18</td>
<td>29.5%</td>
</tr>
<tr>
<td>ALL OF ABOVE</td>
<td>2</td>
<td>3.3%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>8</td>
<td>13.1%</td>
</tr>
<tr>
<td>NO</td>
<td>49</td>
<td>80.3%</td>
</tr>
<tr>
<td>N/A</td>
<td>4</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>MORE BENEFICIAL FOR LOWER LEVEL</td>
<td>28</td>
<td>45.9%</td>
</tr>
<tr>
<td>PRESTIGE</td>
<td>11</td>
<td>18.0%</td>
</tr>
<tr>
<td>GROUPING</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>ENRICHMENT</td>
<td>8</td>
<td>13.3%</td>
</tr>
<tr>
<td>SMALLER CLASSES</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>NO BEHAVIOR PROBLEMS</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>NOTHING</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>N/A</td>
<td>5</td>
<td>8.2%</td>
</tr>
</tbody>
</table>
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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>LESS BENEFICIAL FOR UPPER LEVEL</td>
<td>17</td>
</tr>
<tr>
<td>PEER SEPARATION</td>
<td>3</td>
</tr>
<tr>
<td>DIVIDED CURRICULUM</td>
<td>6</td>
</tr>
<tr>
<td>LESS ATTENTION FROM TEACHERS</td>
<td>28</td>
</tr>
<tr>
<td>LOWER LEVEL</td>
<td>2</td>
</tr>
<tr>
<td>OTHER</td>
<td>2</td>
</tr>
<tr>
<td>N/A</td>
<td>3</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>6</td>
</tr>
<tr>
<td>NO</td>
<td>48</td>
</tr>
<tr>
<td>N/A</td>
<td>7</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD LEARNING EXPERIENCE</td>
<td>11</td>
</tr>
<tr>
<td>GOOD PUBLIC RELATIONS</td>
<td>1</td>
</tr>
<tr>
<td>GROUPING FLEXIBILITY</td>
<td>22</td>
</tr>
<tr>
<td>NOTHING</td>
<td>6</td>
</tr>
<tr>
<td>N/A</td>
<td>21</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>PARENTAL CONCERNS</td>
<td>34</td>
<td>55.7%</td>
</tr>
<tr>
<td>GROUPING</td>
<td>11</td>
<td>18.0%</td>
</tr>
<tr>
<td>SCHEDULING</td>
<td>2</td>
<td>3.3%</td>
</tr>
<tr>
<td>TEACHER CONCERNS</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>NOTHING</td>
<td>3</td>
<td>4.9%</td>
</tr>
<tr>
<td>N/A</td>
<td>8</td>
<td>13.1%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>45</td>
<td>73.8%</td>
</tr>
<tr>
<td>NO</td>
<td>12</td>
<td>19.7%</td>
</tr>
<tr>
<td>N/A</td>
<td>4</td>
<td>6.6%</td>
</tr>
</tbody>
</table>

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?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>45</td>
<td>73.8%</td>
</tr>
<tr>
<td>NO</td>
<td>11</td>
<td>18.0%</td>
</tr>
<tr>
<td>N/A</td>
<td>5</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

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

Researcher's Commentary

29. Would you volunteer to teach a combination class?

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>41</td>
<td>67.2%</td>
</tr>
<tr>
<td>NO</td>
<td>19</td>
<td>31.1%</td>
</tr>
<tr>
<td>N/A</td>
<td>1</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

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>
<thead>
<tr>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Sig of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Cells</td>
<td>1346.559</td>
<td>50</td>
<td>26.931</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>818.955</td>
<td>1</td>
<td>818.955</td>
<td>30.409</td>
<td>.000</td>
</tr>
<tr>
<td>Constant</td>
<td>8115.254</td>
<td>1</td>
<td>8115.254</td>
<td>301.333</td>
<td>.000</td>
</tr>
<tr>
<td>Part</td>
<td>36.300</td>
<td>1</td>
<td>36.300</td>
<td>1.348</td>
<td>.251*</td>
</tr>
</tbody>
</table>

* $p > .05$
TABLE 66

1984 POS Reading Scores Adjusted by MRT Reading

<table>
<thead>
<tr>
<th>Cell</th>
<th>Observed Mean</th>
<th>Adjusted Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Lower level</td>
<td>90.282</td>
<td>88.839</td>
</tr>
<tr>
<td>2 = Upper level</td>
<td>89.210</td>
<td>90.599</td>
</tr>
</tbody>
</table>
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.
BIBLIOGRAPHY
BIBLIOGRAPHY


Prince George's County Public Schools, Maryland (1979). Combination classes in the elementary schools. Elementary Organization, December.


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**

\[
F \text{ with } (3.10142) \text{ df} = 1.37820
\]

\[
p = .248
\]

\[
\chi^2(3\text{df}) = 4.13595
\]

\[
p = .247
\]

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

\[ F \text{ with } (3, 10957) \text{df} = 1.48710 \]

\[ p = .216 \]

\[ \chi^2(3 \text{df}) = 4.46265 \]

\[ p = .216 \]

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

\[ F \text{ with } (3,3903) \text{df} = .52281 \]

\[ p = .667 \]

\[ X^2(3df) = 1.56980 \]

\[ p = .666 \]

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**

\[ F \text{ with } (3,3903) \text{df} = 0.93933 \]
\[ p = 0.421 \]
\[ X^2(3df) = 2.82044 \]
\[ p = 0.420 \]

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**

\[
F \text{ with } (3, 3343) df = 0.73828 \\
p = 0.529 \\
X^2(3df) = 2.21703 \\
p = 0.529
\]

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

χ²(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**

\[
F \text{ with } (3, 6751) \text{ df } = 1.63541 \\
p = .179
\]

\[
\chi^2 (3 df) = .490863 \\
p = .179
\]

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**

\[ F \text{ with } (3,2335)\text{df} = 0.76416 \]

\[ p = 0.514 \]

\[ X^2(3\text{df}) = 2.29589 \]

\[ p = 0.513 \]

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.

<table>
<thead>
<tr>
<th>Homogeneity of Variance Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>$F$ with $(3, 6491)\text{df} = 1.17217$</td>
</tr>
<tr>
<td>$p = .319$</td>
</tr>
<tr>
<td>$X^2(3\text{df}) = 3.51832$</td>
</tr>
<tr>
<td>$p = .318$</td>
</tr>
</tbody>
</table>

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**

\[
F \text{ with } (3, 6491) \text{df} = 1.20333
\]

\[p = .307\]

\[
X^2(3df) = 3.61185
\]

\[p = .307\]

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**

\[ F \text{ with } (3,57369) \text{df } = 1.66268 \]

\[ p = .173 \]

\[ \chi^2(3\text{df}) = 4.98831 \]

\[ p = .173 \]

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

\[ F \text{ with } (3, 57369) \text{df} = 1.82592 \]

\[ p = .140 \]

\[ \chi^2(3\text{df}) = 5.47806 \]

\[ p = .140 \]

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

\[ F \text{ with } (21, 63171) \text{df} = 1.51667 \]
\[ p = .061319 \]
\[ X^2(21) = 31.86123 \]
\[ p = .060 \]

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**

\[
F \text{ with } \frac{3}{288000} df = 2.57141 \\
p = .053 \\
\chi^2 (3df) = 7.71397 \\
p = .052
\]

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**

\[ F \text{ with } (3, 184320) \text{ df } = 1.22061 \]
\[ p = .301 \]
\[ \chi^2(3 \text{df}) = 3.66171 \]
\[ p = .300 \]

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**

\[ F \text{ with } (3,184320) \text{df} = .80265 \]

\[ p = .492 \]

\[ \chi^2(3\text{df}) = 2.40790 \]

\[ p = .492 \]

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**

\[ F \text{ with } (3, 524880) \text{ df } = 0.17464 \]

\[ p = 1.000 \]

\[ \chi^2(3 \text{ df }) = 0.52391 \]

\[ p = 0.914 \]

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

\[ F \text{ with } (12, 1988) \text{ df } = 2.06798 \]
\[ p = 0.016 \]
\[ X^2(12 \text{df}) = 24.98531 \]
\[ p = 0.015 \]

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**

\[
F \text{ with } (15, 654) \text{ df } = 1.0078
\]

\[p = .445\]

\[
\chi^2(15df) = 15.57084
\]

\[p = .411\]

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.
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 like 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


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
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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