A comparison of reading and mathematics achievement between Chapter 1 students and like students in grades four and five
by Roger Alan Johnston

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Education
Montana State University
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Abstract:
In 1965 the Congress of the United States established Title 1 of the Elementary and Secondary Education Act as part of its "war on poverty." The act served as a funding mechanism for the delivery of compensatory education services by providing financial assistance to local schools for the implementation of instructional programs for students determined to be educationally disadvantaged. Due to a federal name change in 1982, later programs were referred to as the Chapter 1 Program.

The major problem of this study was to determine if there was a significant difference between reading and mathematics achievement scores of fourth and fifth grade students who were served in Chapter. 1 and like students who were not served. Students were randomly selected from among Chapter 1 students and from among students who were qualified for Chapter 1 service but not served. Analysis of Covariance was used to answer the major questions. The attribute variables of socioeconomic class, attendance, and parent education attainment were examined and not used in the analysis because they were not highly correlated with the dependent variables which were reading and mathematics NCE scores on the 1991 ITBS. The attribute variable family status was used as a covariate in answering the questions about mathematics scores in fifth grade as it was highly correlated with the dependent variable, math scores. The 1990 ITBS NCE scores were used as the covariate in the ANCOVA procedures ($p > .05$). The conclusions were that there were no significant differences between the achievement scores of students served in Chapter 1 and like students in fourth grade reading and mathematics and fifth grade reading. There was a significant difference between the two groups of students in fifth grade math. Students served by Chapter 1 scored significantly higher than their like counterparts.

The second problem of the study was to determine if there was a significant difference between ITBS NCE scores in reading and mathematics between students who were served in only reading or only mathematics in Chapter 1 and scores of students who were served in both subject. Non-independent t-tests ($p < .05$) were used to answer the questions of the second problem of the study. The conclusions were that there were no significant differences between reading and mathematics scores between single and dual placement in the fourth and fifth grade.

Recommendations for further study included conducting the study again and controlling for loss of population due to movement out of the attendance areas and including scores of the Chapter 1 students who met the goals of the Chapter 1 program and were exited.

A COMPARISON OF READING AND MATHEMATICS ACHIEVEMENT BETWEEN CHAPTER 1 STUDENTS AND LIKE STUDENTS IN GRADES FOUR AND FIVE

by

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This thesis has been read by each member of the graduate committee and has been found to be satisfactory regarding content, English usage, format, citations, bibliographic style, and consistency, and is ready for submission to the College of Graduate Studies.

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Date April 14, 1992

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ABSTRACT

In 1965 the Congress of the United States established Title 1 of the Elementary and Secondary Education Act as part of its "war on poverty." The act served as a funding mechanism for the delivery of compensatory education services by providing financial assistance to local schools for the implementation of instructional programs for students determined to be educationally disadvantaged. Due to a federal name change in 1982, later programs were referred to as the Chapter 1 Program.

The major problem of this study was to determine if there was a significant difference between reading and mathematics achievement scores of fourth and fifth grade students who were served in Chapter 1 and like students who were not served. Students were randomly selected from among Chapter 1 students and from among students who were qualified for Chapter 1 service but not served. Analysis of Covariance was used to answer the major questions. The attribute variables of socioeconomic class, attendance, and parent education attainment were examined and not used in the analysis because they were not highly correlated with the dependent variables which were reading and mathematics NCE scores on the 1991 ITBS. The attribute variable family status was used as a covariate in answering the questions about mathematics scores in fifth grade as it was highly correlated with the dependent variable, math scores. The 1990 ITBS NCE scores were used as the covariate in the ANCOVA procedures ($p > .05$). The conclusions were that there were no significant differences between the achievement scores of students served in Chapter 1 and like students in fourth grade reading and mathematics and fifth grade reading. There was a significant difference between the two groups of students in fifth grade math. Students served by Chapter 1 scored significantly higher than their like counterparts.

The second problem of the study was to determine if there was a significant difference between ITBS NCE scores in reading and mathematics between students who were served in only reading or only mathematics in Chapter 1 and scores of students who were served in both subject. Non-independent *t*-tests ($p < .05$) were used to answer the questions of the second problem of the study. The conclusions were that there were no significant differences between reading and mathematics scores between single and dual placement in the fourth and fifth grade.

Recommendations for further study included conducting the study again and controlling for loss of population due to movement out of the attendance areas and including scores of the Chapter 1 students who met the goals of the Chapter 1 program and were exited.

CHAPTER 1

INTRODUCTION

In 1965 the Congress of the United States expressed as part of its efforts toward the solution of the "war on poverty" the establishment of Title 1 of the Elementary and Secondary Education Act (ESEA). The act served as a funding mechanism aimed at providing an expanded educational opportunity for students from an economically disadvantaged background. Service delivered to students under this act has become known as compensatory education. Through the creation of this act, Congress formally equated educationally disadvantaged with economically disadvantaged and used the terms together throughout the regulations governing Title 1. The act delivered compensatory education services to students by providing financial assistance to local schools for the implementation of instructional programs for students who were determined to be educationally disadvantaged (Kirshstein, 1987). The early compensatory education programs were referred to as the Title 1 Program within local schools. Due to a federal name change in 1982 (Chapter 1 Handbook, 1990), later programs were referred to as the Chapter 1 Program. In other words, teachers taught in, and students

attended, specialized programs simply called Title 1, and were referred to as Title 1 teachers and Title 1 students, respectively.

On April 28, 1988 President Reagan signed into law the Hawkins/ Stafford Elementary and Secondary School Improvement Amendments of 1988, Public Law 100-297. This law reauthorized almost every federal elementary, secondary and adult education program through 1993 and it also created several new education programs for preschoolers and secondary school students. The provisions of P.L. 100-297 were a complete replacement for the old Title I and Chapter 1 laws. The new Chapter 1 law became part of the amended Title I of the Elementary and Secondary Education Act (ESEA) of 1965 (Chapter 1 Handbook, 1990).

Archambault, in a 1986 study of delivery systems for compensatory education, reported, "All national studies concur that compensatory education students received their instruction in somewhat smaller classes than regular students" (p. 63). Usually, these Title 1 programs were in self-contained classrooms. Typically, students in the elementary school were pulled out of the regular program for extended help in reading and/or mathematics for 30 minutes or more each day. Secondary school students were typically scheduled into the Title 1 room to receive specialized help in reading and/or mathematics for specific periods within the school week. The early common pullout structure in the elementary school was a result of districts attempting to comply with the demand of federal regulations which specified that federal money could not be used

to supplant existing district funds. Chapter 1 funds could only be used to supplement existing programs (Gaffney, 1986; Moore, 1986).

The ESEA of 1965 was initially established as a funding mechanism and not a set of specific unified coherent educational treatments or ideologies. Most aspects of program delivery were left to the discretion of each district. Thus, outside of the pullout dimension, the educational frameworks used to implement Title 1 programs were as varied as the number of sites in which the programs were administered (Carter, 1984). For example, in some sites fully certified teachers were employed as Title 1 teachers, and in other districts, instructional aides were employed to do the job of providing supplemental reading and mathematics tutoring in special Title 1 rooms. Other examples included the use of in-class models or add-on systems of delivery. This diversity of implementation practices still exists today (Archambault, 1986).

The 1965 federal regulations defined financial boundaries with which school districts had to comply if they wished to continue to receive funds. Through those fiscal restrictions, the regulations established a certain commonness among programs, but these common features were totally fiscal, or fiscally driven, as in the example of the pullout structure. Another common fiscal feature was found in the handling of instructional materials. To avoid supplanting the local district's responsibility to provide instructional materials, those supplies that were needed to teach Title 1 students, which were deemed supplemental, or over and above the

levels required for all students, were intended to be housed separately and were not commingled with regular supplies. These conditions remain typical today.

Title 1 programs are refunded through the ESEA at the national level on a 5 year cycle and at the local level by an annual granting procedure through state agencies. The question of program effectiveness became part of the Congressional refunding debate in the late 1970s. The debate culminated in 1978 when the Congress of the United States funded what was to become known as the most comprehensive study of education ever undertaken (Carter, 1984). The study was conducted under the auspices of the Department of Education and the results were released in 1982 under the title, "A Study of Compensatory and Elementary Education: The Sustaining Effects Study" (Carter, 1984, p. 4).

The central purpose of the Sustaining Effects Study, which contained eight points and took 4 years to complete, was to determine if the huge amount of money that was spent during the first 13 years of the program's life was accomplishing what was intended. Specifically, the goals of the study were to determine whether or not students who received Title 1 support experienced increased academic achievement and greater levels of school success. Additionally, the study was designed to define what happened to students after compensatory service ended, what classroom practices influenced learning, the nature of the home environment of students who were served, and the contribution of the

background and home environment of elementary school children (Carter, 1984).

Even though the results were mixed and did not clearly define overarching achievement and success parameters, there was enough evidence to convince Congress to refund the program (Carter, 1983). Carter (1984), after reporting the findings to Congress, wrote, "The reports were reported to the Congress and seem to have been useful in increasing the funding of the Title 1 program over that requested by the administration. Beginning with the 1982-83 school year, Title 1 has been succeeded by Chapter 1 of the Educational Consolidation and Improvement Act of 1981" (p. 4). Thus, Chapter 1, as it is known today, came into existence.

Local Chapter 1 programs remained very autonomous and commonalties among programs at different sites remained fiscally defined. Program delivery mechanisms became even more varied as local agencies tried to meet conditions specific to their location.

Due to the varying conditions at the local level, the Congressional debate surrounding refunding began to change shape in the 1980s (Allington & Johnston 1986). Initiated by the final report of the Sustaining Effects Study which asked questions pertaining to program effectiveness, information began to appear in the literature pertaining to the effectiveness of the many different applications of the Chapter 1 Program. A variety of interpretations of acceptable use of funds without

supplanting also began to appear. These two factors changed the nature of the discussion surrounding refunding for compensatory education, and the federal government began to solicit opinions from state Chapter 1 education agencies (SEAs) and local Chapter 1 education agencies (LEAs) concerning needs for policy review.

Thus, the debate of the 1980s became one of individual program needs. As local programs were built to respond to both research and conditions specific to the location, the federal governing agency began to review its policy provisions in regard to those program designs, the result of which was new flexibility in the governing rules. Effective with the refunding bill of 1988 (Federal Register, Part 200; Ascher, 1987), the Chapter 1 Program placed new emphasis on local needs and redefined its policies concerning program design. The new flexibility, provided for through a local needs assessment process for designing programs, created more diversity among local district programs. A complete description of the changes and the discussion which surrounded the cause of rule changes is contained within the Federal Register, pages D1504-D1506, 1989.

It is important to note that by regulation (Federal Register, 1989, p. D1511-D1513) funding for a local Chapter 1 Program is, and has been since the program was initiated in 1965, determined by surveying the economic conditions that exist within the attendance area of a particular school and not by assessing the educational needs of the students within

the site. Once a site has been determined to be eligible, service is delivered to approximately 5 percent of the students in attendance at the school. The selection of students to receive service is based on ranking the achievement of the students within the school. Local districts are free to determine the selection criteria used in the ranking process (Federal Register, 1989, p. D1514).

Hallinan (1986) commented, "A consequence of the way Chapter 1 students are selected and of the way these resources are used within schools is that many low-achieving students are not the recipients of Chapter 1 resources while students who are not low achievers benefit from this program" (p. VI-61). This view was also supported in the Sustaining Effects Study (Carter, 1983 & 1984).

The varying conditions surrounding delivery of compensatory education services to students in different locations allow researchers to identify students who do not receive compensatory education and to use achievement scores of these students in comparison with achievement scores of students who do receive compensatory education. Conditions further allow researchers to classify students by economic situation and address the question of whether or not economic class has an effect on achievement.

Another aspect of the federal regulations that is important to note are policies that demand a stronger program responsibility to the parents of Chapter 1 students. The regulations specify: "To support the efforts

of parents, including training parents, to the maximum extent practicable, to work with their children in the home to attain the instructional objectives of the program; and understand the program requirements. To train parents, teachers and principals to build a partnership between home and school" (Federal Register, 1989, p. D1515). These policies were premised on the notion that literacy of parents is connected to literacy of students. It opens another set of variables that can be studied in relation to the achievement of Chapter 1 students.

In addition, the process within the Chapter 1 framework through which achievement data are collected and reported is of interest. Beginning in 1965, and through to the present time, LEAs have been accountable to SEAs. Accountability is determined at the beginning of a program year through the grant application process wherein the LEA defines itself in terms of the federal regulations and local program goals. Also, the LEA is responsible at the end of a budget year for reporting the achievement gains of students along with demographic data that evidences the program's ability to meet its objectives and comply with federal regulations. The federal government monitors the compliance and success of LEAs through the SEAs. Through the monitoring network, aggregate information is compiled which allows researchers to assemble national profiles and annual summaries of data which serve as a general description of the national and state programs. An example of this is A

Summary of State Chapter 1 Participation and Achievement Information for 1986-1987 (Steel & Gutmann, 1989).

The federal government exacts management expectations through control of funds. Those management practices exist today and guidelines for them are embodied in the regulations (Federal Register, 1989). The annual achievement report provides a valuable source of data to researchers.

Statement of the Problem

The Congress of the United States has spent millions of tax dollars providing supplemental education for America's children through compensatory education. The cost benefit ratio regarding these expenditures has been questioned and re-examined from many points of view and within many different educational settings (Gaffney, 1986). Yet, there remains much debate concerning the usefulness of compensatory education in the United States. A fundamental question whenever the Congress debates appropriations for the program is: Is it worth it? (Chapter 1 Handbook, 1990).

Therefore, the major purpose of this study was to determine if there was a significant difference in mathematics and reading scores on the Iowa Test of Basic Skills (ITBS) between elementary students in grades 4 and 5 who were served in the Chapter 1 Program in Billings, Montana and like students who do not receive Chapter 1 services.

Further, the study controlled for the influence of the attribute variables of socioeconomic class, parent educational attainment, student gender, student attendance, and family structure on reading and mathematics achievement scores on the ITBS. Finally, the second purpose of the study was to determine if there was a significant difference between the achievement of students who received just reading or just mathematics assistance and those students who received both reading and mathematics assistance in the Chapter 1 Program.

Questions To Be Answered

Questions Related to the Major Problem of This Study

1. Did the mathematics or reading achievement scores on the ITBS differ significantly for students in grades four and five who received compensatory education services from those of like students who did not receive compensatory education?

There are four additional questions that relate to the major question of the study. No hypotheses were constructed for these four questions. Instead they were answered in order to make decisions regarding the choice of attribute variables for use in the analysis.

2. Was socioeconomic status correlated with reading or mathematics achievement scores on the ITBS in grades four and

five for students who received compensatory education services and like students who did not receive compensatory education?

3. Was educational attainment levels of parents correlated with reading or mathematics achievement scores on the ITBS in grades four and five for students who received compensatory education services and like students who did not receive compensatory education?
4. Was school attendance correlated with reading or mathematics achievement scores on the ITBS in grades four and five for students who received compensatory education services and like students who did not receive compensatory education?
5. Was the relationship of single parent or intact family structure correlated with reading or mathematics achievement scores on the ITBS in grades four and five for students who received compensatory education services and like students who did not receive compensatory education?

Questions Related to the Second Problem of This Study

6. Was there a significant difference in achievement between students in grades four and five who received only reading assistance and students who received both reading and mathematics assistance in the Chapter 1 Program?

7. Was there a significant difference in achievement between students in grades four and five who received only mathematics assistance and students who receive both reading and mathematics in the Chapter 1 Program?

Contribution to Educational Theory

Gaffney (1986), listed 18 areas, outside of those that are regulated by the federal government, in which a district makes decisions concerning how to structure a local Chapter 1 Program. Each one of those decision areas is dependent on the clarity of the information that surrounds and influences it. Much of that information is gained by studying the literature that has been developed through the experiences of others. One of the objectives of this study was to add more information to that body of knowledge in order to assist others in making more effective decisions relative to Chapter 1.

The Sustaining Effects Study (Carter, 1983) and others (Anderson, & Stonehill, 1986; Cooley, 1981; McCann, 1986) described achievement in the Chapter 1 Program. These studies suggested that there was evidence to support the massive expenditures of federal dollars for the continuation of the program. In some cases, that evidence was based on studies of achievement using students who received Chapter 1 service within programs, and in other cases, achievement between students who received service in Chapter 1 programs and students who did not receive

service in Chapter 1 programs was compared (Anderson, & Stonehill, 1986; Carter, 1983 & 1984; Yap, 1983).

At the same time, the above literature supports the fact that Chapter 1 programs vary significantly from site to site. In other words, there was substantial variability among LEAs' instructional methods, demographic selection criteria of students, and program objectives (McCann, 1986; McBee & Kimball, 1982; Moore, 1986; Williams, 1986). This wide variance between programs leaves adequate room for examination in various locations of how different variables work together to influence student achievement. For example, two researchers, Frontera (1985) and Ashby (1986), both studying differences in achievement between students served in the Chapter 1 setting and like students not served, reached opposite conclusions. Their respective conclusions were drawn using different underlying variables, different sampling techniques and different statistics.

This study adds to the body of knowledge concerning student achievement in Chapter 1 programs by further clarifying variables that reside within the boundaries of the Billings program. The resulting data can be compared to similar data drawn from other programs to assist program developers in making decisions concerning the construction of their programs.

Further, Chapter 1 Program policies have evolved through time, and a recent emphasis has been added concerning the relationship

between parent literacy and student literacy. This emphasis is evident in the latest regulations (Federal Register, 1989, p. D1115) wherein there was a legislated call for local programs to train parents as well as students. The literature contains ample discussion pointing to the connection between parent support and involvement in their children's schooling efforts and student literacy (Brandt, 1989; Chrispeels, 1991; Lindle, 1990). Although there is research to support the idea that educational attainment of parents influences academic success of students (Bempechat & Ginsburg, 1989; Binkley et al., 1988), this researcher found no discussion of parent educational attainment levels and the interaction that factor might have in relation to the achievement of students specifically served in Chapter 1 programs. This study examined that factor as it resided in the educational setting in Billings, Montana.

Additionally, the Congress of the United States intended that educational funds spent through the ESEA Chapter 1 Program impact economically disadvantaged/educationally disadvantaged students. However, it is well documented that there are a substantial number of students who are low achieving and are not economically disadvantaged who receive services of a Chapter 1 program, and students who are low achieving and are economically disadvantaged that do not receive compensatory educational services (Ashby, 1986; Carter, 1983 & 1984; Hallinan 1986). This study explored the relationship between the economic status and achievement of students who received compensatory

education as well as those same relationships between students who were served by Chapter 1 and those who were not served within the parameters of the population of the study.

Finally, the literature revealed that the relationship of school attendance (Kirshstein, 1987), gender (Patterson, Kupersmidt, & Vaden, 1990), and the number of parents in the home (Allen & Tadlock, 1986) may play a role in the variance found in achievement scores. These attribute variables, along with the attribute variables of educational attainment levels of parents and socioeconomic status of students, were additional attribute variables in the study. Their respective influence on the dependant variable in this study was examined and controlled.

The clarification of the specified attributes variables and the elimination of their influence on achievement data will allow federal program examiners, state program evaluation agencies, and local program developers to answer a very important question. Did the Chapter 1 program in Billings make a difference in the achievement of students, and how does that information, together with information from other studies and reports, affect future program development?

Definition of Terms

AFDC means aid to families with dependent children.

Attendance means physical presence in the classroom where reading and mathematics instruction is being held.

Chapter 1 means the name given to the federally funded compensatory education program designed for economically disadvantaged students. Prior to 1982 the program was named the Title 1 Program.

Compensatory education means education which is funded through the Agustustas F. Hawkins - Robert T. Stafford Elementary and Secondary School Improvement Amendments (1988, PL 100-297) of the Elementary and Secondary Education Act of 1965 (Federal Register 1989).

Commingled means mixing together materials purchased from separate funding sources.

Economically/educationally disadvantaged means students who qualify for free lunch under the federal guidelines for family size and income. By federal definition, students who are economically disadvantaged are likewise educationally disadvantaged (Federal Register 1989).

Economic class means the classification of students through determining the annual earnings of their parents. The classification for this study is determined through free and reduced lunch qualification of students and consists of three levels: free lunch, reduced lunch and fully paid lunch.

Educational attainment levels means the number of years of formal education completed.

Educationally deprived means children whose educational attainment is below the level that is appropriate for children of their age (Federal Register 1989)

ESEA means Elementary and Secondary Education Act.

Free lunch means lunch that is provided to students free of charge based on the annual income of the family with which they reside.

Fully paid lunch means lunch which is entirely paid for by the student.

Head of household means the individual that has been designated within a family unit as being the head of household on a school district reporting form. Usually the individual who provides the most income is the indicated head of household.

Intact family means a family unit wherein there are two married individuals who are considered the parent or *In loco parentis*.

ITBS means Iowa Test of Basic Skills.

Like students means students who would qualify for and receive compensatory education if there was a Chapter 1 program in their school.

LEA means local education agency.

NCE means normal curve equivalent.

Pullout means a method of scheduling students for a specified period of time into a supplemental educational program which is physically located in an area away from the student's regular classroom, wherein the student misses a portion of instruction in an area of

curriculum other than the one for which the student receives compensatory education. For example, a student may miss science to receive additional help in reading but may not miss reading to receive the supplemental help in reading.

Reduced lunch means a lunch for which the student paid a rate which is equal to one half of the full rate.

SEA means state education agency.

Self-contained means all of a student's educational services are provided within a setting with all of the children in the same grouping as the individual.

SES means socioeconomic status.

Single parent family means a family unit wherein there is only one individual considered as the parent or *In loco parentis*.

Student achievement means mathematics and reading achievement as measured by the Iowa Test of Basic Skills

Supplant means to replace or provide materials, supplies or instructional services with federal funding, wherein those materials, supplies, or instructional services should have been provided through district funds.

Title 1 means the name given to the federally funded compensatory education program designed to supplement economically disadvantaged students prior to 1982 when the name was changed to Chapter 1.

General Analytical Techniques and Research Design

The design for the major question of this study utilized multi-factor one-way analysis of covariance statistics at each grade level for reading and mathematics. Two of the multi-factor ANCOVAs contained family status and ITBS scores from 1990 as covariates and two of the multi-factor ANCOVAs contained ITBS scores from 1990 as covariates. "In essence, analysis of covariance adjusts scores on a dependent variable for initial differences on some other variable" (Gay, 1987, p. 254). Further, there is an increase in power within the analysis of covariance statistic when multiple covariates are used. This condition occurs when there is a low correlation between each covariate and a high correlation between the covariates and the dependant variable (Huck, Cormier, & Bounds, 1974). Therefore, a correlation matrix was used to examine the relationships between dependant variables and the attribute variables. The resulting data was used to determine which of the attribute variables, together with the 1990 ITBS scores, were used as covariates.

An inter-correlation of .50 was used to place attribute variables into the ANCOVA analysis. A correlation of .50 was used based on the researcher's interpretation of information provided by Huck et al. (1974). "The correlation of .81 indicates a strong relationship, the correlation of .67, .62 and .59 indicates a moderate relationship, and the correlations of -.25, and .10 indicate weak relationships" (p. 32).

The design for the secondary question of this study utilized t-tests for non-independent samples (Gay, 1987). The t-tests were conducted to determine if there were differences in achievement between those students who received only reading or mathematics instruction in the Chapter 1 program and the achievement of students who received both reading and mathematics instruction in the Chapter 1 program.

Investigative Categories

Each elementary school in Billings housed an average of 335 students in grades kindergarten through six during the 1990-1991 school year. Nine of the elementary schools provided a Chapter 1 program for approximately 600 students in grades 1 through 6; and the remaining 14 schools did not offer Chapter 1 services. In order to qualify for the Chapter 1 Program, an elementary school had to house a percentage of students equal to or greater than the average number of students that received free or reduced lunches for the total elementary population in the district. In the year of the study, the percentage of elementary students who received free or reduced lunch was slightly above 23. Federal regulations allow a district to place the least qualifying school in a waiting status rather than serve that school (Federal Register, Part 200, 1989). One of the thirteen schools not served by Chapter 1 qualified for service and was not served during the 1990-1991 school term.

These conditions allowed for 2 investigative categories. These were the categories of (a) education which included Chapter 1 services, and (b) education which did not include Chapter 1 services.

Investigative Treatments

The major question of this study utilized reading and mathematics scores on the ITBS. Normal curve equivalent (NCE) scores in reading and mathematics were collected from student test records for the test taken in the spring of 1990 and again for the test taken in the spring of 1991. The 1990 scores served as a covenant in the analysis while scores from the 1991 test were the dependant variables for the study. A comparison of adjusted scores after completing the ANCOVA analysis was used to compare achievement of students who were served in the Chapter 1 program and like students who were not served. The independent variable for the major question was the type of education the student received. It was divided into the categories of (a) education that included compensatory services for students and (b) education that did not include compensatory services for like students.

There were four attribute variables of interest in this study: (a) socioeconomic class, (b) educational attainment levels of parents, (c) rate of school attendance, and (d) family structure. Each attribute variable was comprised of two or more factors. The attribute of socioeconomic class was divided into three levels. The three levels were

determined by grouping students into categories based on whether they received free lunch, reduced lunch, or fully paid lunch. They were designated as (a) free lunch, (b) reduced lunch, and (c) fully paid lunch. Educational attainment of parents was a linear factor and the actual number of years of education was used. Family structure was divided into two factors. They were (a) intact two-parent family and (b) other family structures. Rate of attendance was a linear factor and the actual days of attendance was used.

The second question of this study utilized reading and mathematics scores on the ITBS for students who received Chapter 1 services. The independent variable for the second question was the amount of service received. It was divided into the categories of (a) students who received reading and mathematics, (b) students who received only reading, and (c) students who received only mathematics. The NCE scores on the 1991 test were the dependent variable in the second treatment. The achievement of students who received both reading and mathematics was compared to achievement of students who received only mathematics or only reading.

Limitations and Delimitations

The study was limited in the following ways.

1. The study was delimited to 1990-91 Chapter 1 and non-Chapter 1 achievement data reported in Billings, Montana for students in

grades four and five who scored below the 40th percentile on the Iowa Test of Basic Skills.

2. The population of Chapter 1 and like students was delimited to students in fourth and fifth grade who had not moved out of the attendance area.
3. This study was delimited to students in fourth and fifth grade who had not met the goals of the Chapter 1 program and were no longer served by Chapter 1.
4. This study was limited by the classification of the socioeconomic factors of free, reduced, and fully paid lunch, and the number of years of formal education of the parents of students in the study.
5. This study was limited to the home environment factors of single-parent and intact family structure.
6. This study was limited to the achievement in reading and mathematics scores of Chapter 1 students and like students.
7. This study was limited by using means of NCE scores on the ITBS.

CHAPTER 2

REVIEW OF RELATED RESEARCH

This literature review examines specific topics as they pertain to achievement in the compensatory education program. The topics are (1) overview of Chapter 1 funding and regulations, (2) achievement of students who receive compensatory education and achievement of like students who do not receive compensatory education, (3) the relationship of economic status of students to their achievement, (4) the relationship of gender to achievement, (5) the relationship of attendance to achievement, and (6) the relationship of the family structure to achievement.

Overview of Chapter 1 Funding and Regulations

The ESEA Chapter 1 Program is a federally funded Title program which is governed through regulations.

> Federal programs are governed by the authorizing law and by the implementing regulations contained in the Code of Federal Regulations (CFR). The CFR is divided into various "Titles," each representing a separate subject, such as Agriculture or Education. Each title is divided into numbered "Parts" and further subdivided into numbered "Sections." Changes to the CFR are published in the government's official publication, the Federal Register, which is issued daily except weekends and holidays. (Chapter 1 Handbook, 1990, p D-3)

The regulations governing the many aspects of the Chapter 1 Program are divided into six parts. They are:

Part 200	Chapter 1 Program in Local Educational Agencies.
Part 201	Migrant Education Program
Part 203	State Agency Program for Neglected and Delinquent Children
Part 205	Migrant Education Coordination Program for State Educational Agencies
Part 212	Even Start Program (including Migrant Education Even Start)
Part 302	Chapter 1 State Agency Programs for Handicapped Children.

In addition to the Federal Regulations, there are many standard administration procedures which determine how programs are run. These rules are commonly termed the Education Department General Administration Regulations (EDGAR). Further, the Education Department sometimes issues nonregulatory guidance for program administration and publishes these guidelines in the policy manual.

Together these three sets of rules and regulations work to fund and govern the Chapter 1 programs in the country. The first set, or the CFRs, define the application procedures and the funding mechanisms for state and local projects. They also spell out the requirements that the federal government expects of state and local projects in terms of student selection, student achievement and program evaluation. The second set

of rules, or EDGAR, specifies the appropriate administrative practices that the state and local projects must follow in the discharge of their responsibilities under the federal regulations. The third set, or policy manual, clarifies the intent and philosophies contained in the federal regulations. It was developed as a source of interpretations where, in practice, difficulties arose over the meaning or intent of a particular regulation. It is often updated as state and local projects ask the federal government for clarification of specific rules in the CFRs or in EDGAR.

Achievement of Students Who Receive Compensatory Education and Achievement of Like Students Who Do Not Receive Compensatory Education

William Cooley (1981) stated that "It is possible to observe how much improvement or growth students in Title 1 are realizing, but the difficult task is to determine whether that growth can be attributed to their Title 1 experience" (p. 299). The notion that growth may not be attributed to Chapter 1 has been the motivation for many researchers as they have pursued the study of achievement of students in compensatory education.

Most of the research which has been conducted to date concerning compensatory education categorically described achievement of students by studying the reading and math scores of students by grade level. Carter (1984) in the Sustaining Effects Study concluded, "There is no one grade in which compensatory education is most effective, but it is more

effective in the lower grades than in the higher grades" (p. 7). Specifically, reading achievement scores in grades one through three were better than in grades four through six while math achievement rates were constant in all grades (Carter, 1983).

Carter (1983), was able to establish that achievement rates of Title 1 students in his study were slightly better for students who received compensatory education than for like students who did not. While he was unable to determine why this was so, he speculated that it may be a function of time. In other words, students who receive compensatory education simply spend more time reading in the primary grades and working on math in all grades than do other students. Hallinan (1986) corroborated Carter's findings by inspecting the results of achievement reports from a wide range of the Title 1 programs that appeared in the late 1970s. She reported:

1. Compared to low-achieving students who did not receive compensatory education, Title 1 students made significant gains in mathematics achievement in all grades, 1 through 6. However, they made significant gains in reading only in grades 1, 2, and 3. Title 1 programs showed no impact on the reading gains of 4th through 6th-grade students in the sample compared to non-Title 1 students.

2. The largest gains in reading and mathematics occurred in the first grade.

3. Title 1 services were found to be effective for students who were moderately low achievers but did not improve the relative achievement of students who were seriously disadvantaged.

4. By the time students reached junior high school, regardless of the number of years they had participated in Title 1 programs, no sustained or delayed effects of the programs were observed (p. VI-62).

Hallinan (1986) concluded her investigation by stressing that there may be serious consequences for students through their inclusion or exclusion in Chapter 1 programs. She indicated there may be a link between "negative interactional processes on the motivation of these students and their typically small academic gains" (p. VI-75). Anderson and Stonehill (1986) reached the same conclusions as Hallinan.

Carter (1984) also concluded that students with greater academic needs did not seem to progress any differently than did like students. Carter's (1983) general achievement findings were supported by Yap in 1983. However, Yap differed from Carter concerning progress of students with deeper needs when he noted that students in projects with lower pretest scores tended to end up with greater gains. Yap also contended that programs with higher funding levels tended to produce greater achievement gains in their students. This researcher notes that Yap's findings may have been due to "regression effect" as explained by Ferguson and Takane (1989). Further study would need to be done to ascertain if this is the case.

Achievement of Chapter 1 students in Maryland's Montgomery County Public Schools in 1986 was characterized as lower than that of regular education students in the same areas on all measures (Kirshstein,

1987). This study provided a demographic look at Chapter 1 students in Montgomery County and identified several socioeconomic factors which may have contributed to the low achievement scores; it supported Cooley's (1981) assumption concerning the difficulty of attributing achievement parameters of Chapter 1 students to treatment. For example, absentee rates for Chapter 1 students in Montgomery County were higher than other students, as were suspension rates. Further, the study indicated that differences between language, speech, listening, social and emotional adjustment of Chapter 1 students and regular students may have been probable factors influencing achievement. Like the Montgomery County study, many other studies have concluded that there may be influences, external to the delivery of service, that may impact achievement for compensatory education students (Good, 1982).

Robert Slavin (1987) and David Savage (1987) pointed to conflicting findings such as illustrated above and the fact that there is so much variance between LEAs. They called for reform of the Chapter 1 Program. They contended that most traditional Chapter 1 programs are not adequate for the job as they contribute little (1 percent to 3 percent at most) to increased achievement (Slavin, 1987). They recommended that the federal government direct policy to limit programs to those parameters (e.g. instructional methods, selection of student criteria, etc.) that research shows to be more effective than others.

However, in a meta-analysis of papers presented at the Designs for Compensatory Education Conference in June of 1986, McCann (1986) reached a different conclusion. He maintained that research had not been definitive enough in its description of what affects achievement of students for the government to limit programs to the available research. McCann stated, "Given this summary of what current research provides, what alternatives are there for federal leadership? From my perspective there are two: an expansion of current program of research, development, and dissemination, which incorporates current improvement, but challenges directly current beliefs and school structure" (VI-133). In other words, the program should not be limited by current research; it should be expanded through current and future research.

The answer to the question of whether or not compensatory education services increase student achievement is mixed (Ascher, 1987; Gaffney, 1986). Variables surrounding who is served, how they are served, and when they are served direct the answer to the question. The need for further exploration of the question is of paramount importance as the nation constructs future compensatory programs.

Factors Influencing Student Achievement

The notion that social context has an important influence on the success of students is one which is well established. Phillip Hallinger and Joseph Murphy (1987) offered the following rationale:

> The term social context refers to the socioeconomic status (SES) of the student and community population served by the school. Common indices used to determine the nature of the school social context include the occupational status, educational attainment, and income level of parents; the percentage of students from families receiving aid to families with dependent children (AFDC); and the percentage of students receiving free or reduced lunches. Social context is relevant to understanding the organization and management of schools because these measures of student socioeconomic status correlate highly with measures of student achievement and educational attainment (p. 189).

Economic Status

The socioeconomic status of students as a factor that plays a part in the educational attainment of students has been intensively studied. Most often researchers concluded that there is a relationship between the two. Results usually indicated that upper socioeconomic status (SES) students do better than low SES students (Allen, & Tadlock, 1986; O'Connor, & Spreen 1988; Patterson, 1990). However, the reasons for the disparity have not been clear. Allen and Tadlock (1986) pointed out the necessity for clarification of the disparity when they reported, "Poverty affects educational outcomes, schools require assistance; and curriculum revisions are needed" (p. 25).

The Chapter 1 Program is founded on the premise that lower SES means educationally disadvantaged and the program is placed in schools based on the economic status of the community in which the school is located. While the literature points to the relationship between SES and achievement, it does not clearly identify a common set of causes within

the lower SES parameter. An example is found in The Louisiana School Effectiveness Study (Louisiana State Department of Education, 1982), where it was concluded that "Lower achievement comes from lower socioeconomic schools" (p. 32).

This conclusion supports the reasoning behind the funding of local Chapter 1 programs. However, the Louisiana study went a little further when it offered the following in terms of direction for instruction within the schools. "In the case of schools which were predicted to do poorly [based on low SES] and did well, teachers may be constantly encouraging students from lower SES backgrounds to perform better" (p. 32). This provided an indication of the many variables at work within the SES classification.

Looking at other variables within the SES, another study considered differences in reading achievement in kindergarten students. The low socioeconomic condition that accounted for the variance in achievement was attributed to the lack of learning materials in the home environment. In other words, in this study parents with limited economic means could not afford to provide reading materials at home. As a result, those children came into the study with a limited experience base in comparison to higher SES students who did have ample reading like experiences in the home (Warren-Leubecker & Carter, 1988).

In another study, low achievement in low SES students was partly attributed to the number of parents in the family (Allen & Tadlock,

1986). Lower achievement coefficients were obtained with students from lower economic backgrounds who lived in single-parent families as compared to those in two parent-families.

It is evident that SES and achievement are tied together. Various researchers have studied various factors of SES and the subsequent relationship to achievement. The tie between low SES and achievement in each study was specific to the particular study. This specificity limited the ability of the investigators to generalize beyond their own unique circumstances. However, taken in total, future researchers can use the data to make generalized predictions.

Educational Attainment of Parents

"Students of mothers who have a high school degree are less likely to fall behind expected grade level" (Chaikind, 1985, p. 14). This statement sets the tone for the literature concerning educational attainment of parents and the relationship it has to student achievement. Chaikind also noted in the same study that a similar relationship was true when the father's education was factored into the statistic. He further observed that as family income increased (as a function of educational attainment), the chance that students would fall behind in their work decreased. These data, together with other supporting studies ranging from examinations of kindergarten children's achievement through college level, make a strong case for the equation that lower educational levels

of parents can be predictive of lower educational success rates for their children (Gruca, Pascarella, & Walberg, 1989; O'Connor & Spreen, 1988; Patterson et al., 1990).

Another aspect of how parents' educational level influenced aspects of the student's schooling was detailed by Useem (1990). She found that there was a high correlation between parents' education and their children's placement in ability groups in mathematics. The trend for students whose parents had less education than parents of other students to be placed in the lower ability groups holds with the equation that lower SES means lower achievement. Each of the studies cited above relied on differing combinations of independent variables, which makes the generalization of the inferences limited. However, taken all together, the sum of their inferences points to the suggestion that additional study would help researchers clarify the cause-and-effect relationships within specific circumstances.

Gender

The issue of gender as it applies to achievement is attributed to gender-related differences in experience rather than gender-related abilities. Included in the experiential differences for boys and girls are the sociological, or culturally motivated, expectations attributed to the differences in boys and girls (Tittle, 1986). In other words, boys are expected to do well in some areas and girls are expected to do well in

others. The acculturation process of our society dictates what the expectations are, and as boys and girls grow up they meet those expectations. However, those cultural mores are changing as attested to by Tittle (1986) when she reported:

> We can place the search for direct biological explanations of women's status in perspective by an example. Historically, the lower rate of women's participation in higher education and the professions was attributed to their "constitution," their unsuitability for intellectual development, and their lack of interest in such endeavors. Such arguments were not supported by subsequent experience. When professions and higher education were opened to women through social change and legal regulations, women entered in ever-increasing numbers. Today women comprise about half the enrollment in post secondary educational institutions and a substantial proportion of the entering class in professional schools (p. 1161).

In the area of mathematics, gender comparisons rarely show differences until the high school years and then only within certain areas of math and science (Tittle, 1986). The fact that the difference in mathematics achievement is not apparent in younger children is borne out by Rathbone (1989), who reported that gender was not a statistically significant factor in predicting attitudes towards mathematics for fifth grade students. Moreover, the idea that gender does not determine ability is confirmed in several studies of mathematics achievement (Kohr, Coldiron, Skiffington, Masters, & Blust, 1987; Randhawa, Fon Ng, & Beamer, 1989; Rathbone, 1989; Richards, Bratlon, Mathis, Tippit, & Prince-Lockley, 1989; Roberts, 1986).

On the other hand, an examination of gender as a predictor of reading achievement indicates that there is a difference in reading achievement in the primary grades. Girls seem to learn to read earlier (Levine & Ornstead, 1983). However, that early advantage disappears toward the end of the third grade. This phenomenon is commonly classified as a function of maturity and/or gender expectations.

In terms of general academic aptitude (IQ), differences for reasons of gender are nonexistent or inconsequential (Benbow, 1980; Finn, Dulberg, & Reis, 1979; Patterson et al., 1990).

Attendance

The overall view in the literature toward attendance and the effect it may have on achievement was toward the idea that low attendance is equated with lower achievement. In other words, students need to be in school to learn. Although this researcher found no specific studies correlating days missed with low achievement, there were numerous studies describing various attempts to improve student attendance. These reports compared improved attendance with achievement and found there was a significant improvement in achievement when attendance improved (Frederick, Stallings, & Rasher, 1979; Frederick & Walberg, 1980; Stallings, 1980; Stallings, 1987; Tomkins, 1986).

However, there were reports indicating that improved attendance was not necessarily the reason achievement improved (Davidoff &

Fishman, 1988; Lore & Chamberlain, 1987). These reports equated improved achievement with the intensification of educational services rather than just the fact that the students under study were at school for more time. In any case, it is obvious that the effect of attendance on achievement is a factor which needs either to be measured or controlled in studies of achievement.

Number of Parents

The consensus of the literature concerning family composition and achievement is perhaps best illustrated by a comment made by William Shreeve et al. (1985). "This research, set in the context of ongoing national research, clearly indicated that the children of single parents need help in order to gain equal school achievement with their two-parent counterparts" (p. 10). This study of achievement of seventh through twelfth grade students showed a clear difference between students from single-parent families and students from two parent families.

Even though the study of Shreeve et al. (1985) typifies most of the research on this topic, there are dissenters. Reglin and McAllister (1990) found no difference in achievement due to family composition of first grade students. Another study that showed no difference in achievement for students in grades one through four who had two parents was conducted by Chalker and Horns (1986). However, they did detect a difference at grade five. Careful inspection of the literature reveals that

most studies that identified differences in achievement of students from differing family compositions found those differences in older students, students above grade four (Clark & Alison, 1989; Fernandez & Velez, 1989; Marsh, 1989; Nock, 1988; Useem, 1990).

Another factor which is closely related to low achievement of students from single-parent families was low socioeconomic status (Clark, 1983). The two factors, low SES and single-parent family, working in concert were definite predictive indicators of student achievement in Clark's study. However, this was not true in all studies. In families where parents were involved in the child's education, achievement of the student was less at risk regardless of SES (Peterson, 1989). Moreover, other studies concluded that socioeconomic factors alone are stronger indicators of achievement than family composition (Bianchi, 1984; Clark, 1983).

Taken as a whole, the literature concerning family composition indicated a need for further study in order to clarify the issue. Also, because of the complexity of the variables within family structure, there is a need for researchers to control the influences of family composition on achievement when not studying it directly.

CHAPTER 3

METHODOLOGY

Theoretical Framework

The major thesis of this study was achievement, whether or not compensatory education services increased achievement for students who received Chapter 1 services. This was accomplished through a comparison of reading and mathematics achievement of fourth and fifth grade students who received Chapter 1 services and like students who did not. Underlying the major problem of the study was the classical nature versus nurture question. Is achievement due to native ability or is achievement related to the environmental home and school conditions in which the students find themselves? The question about how much a student's environment contributes to academic progress and/or how much a student's native abilities contribute to how the student does in school has always intrigued educators. This study controlled the possible influence of nurture on achievement, through the attribute variables of socioeconomic class, parent education attainment, school attendance, and family structure. The following excerpts from the literature create a feeling and direction for the research concerning nature versus nurture.

> Environmental models that regard the child as simply a passive recipient of parental tutelage can not stand scrutiny--nor can those ideologies that focus exclusively on the refined epiphenomena of intellect such as occupational status and books around the home. Parents do not teach children everything they know, and children know more than they are taught ... it is a fact that a good deal of the IQ variance in the population lies within families and not just between one family and another. Where there is reason to believe that social factors are important, as seems likely in the case of IQ, we can work toward their remediation. (Willerman, 1979, p. 927-928)

> We have a great deal of understanding of how the environment works in terms of events that serve to reinforce behavior. We have much less understanding of the relation between reinforcement and development and when environmental events are most critical as reinforcers in developmental process.... The research agenda here is clear. We need a better understanding of how environmental experience works in relation to developmental processes and how individual differences and environmental experiences interact. (Horowitz, 1989, p. 443)

> Of course environments can have a major impact on such development and changes in one's environment can shape changes in behavior, a phenomenon called malleability. Yet malleability (or plasticity) does not mean that given the same environment, all individuals will behave alike. Individuals bring idiosyncratic responses to the same situations, and these differences are due in part to variations in genetic make-up. (Weinberg, 1989, p. 101)

> The move away from a rigid adherence to an environmental explanation of behavior development to a more balanced perspective that recognizes genetic as well as environmental sources of individual differences must be viewed as healthy for the social and behavioral sciences. Yes, genetic influences are significant and substantial, but environmental influences are just as important. (Plomin, 1989, p. 110)

The work of the researchers quoted above indicates that the questions of this study would have neither fish nor fowl for an answer.

Both nature and nurture contribute to the accumulation of knowledge. It is a matter of how much.

Different studies attribute differing amounts to each factor. Bouchard, Lykken, Segal, & Tellegen (1990) found about 70 percent (r=.84) of the variance between the IQ of twins reared apart was genetic, leaving 30 percent to environmental conditions. Willerman (1979) found 80 percent (r=.89) was due to genetic factors. He studied adoptive parents and their socioeconomic status and educational attainment as variance factors of the IQ of their adopted children. The important point brought out by these two studies is that there is dependence on both nature and nurture.

Another point of interest was explained in a study conducted by Coon, Fulker, DeFries, & Plomin (1990). This five-year longitudinal study of children (ages 2-7) determined that the ratio of influence between environmental factors and genetic factors on IQ remained relatively constant over time. The information provided by Coon et al. was useful in this study as it addresses achievement at four specific age levels. The proportional relationship of nature and nurture to the variables of interest in this study should remain constant between the age groupings.

Design

Experimental Treatment

This investigation was an *ex post facto*, or causal-comparative, study. It investigated differences between the dependent variable and the independent variables within each sample population. The study controlled certain conditions that existed at the time data about the dependent variable was collected. "The basic causal-comparative design is quite simple, and although the independent variable is not manipulated, there are control procedures that can be exercised" (Gay, 1987, p. 250). Control in this study was established through selection of the covariates in the analysis of covariance and through sampling procedures.

Population Description and Sampling Procedures

Setting of the Study

The setting for this study was the elementary schools in Billings, Montana during the 1990-1991 academic year. The Billings Public Schools, in its twenty-four elementary schools, served approximately 8,000 students during the year of the study. Another 8,000 students were served in grades seven through twelve in four middle schools and three high schools.

Nine of the elementary schools qualified for Chapter 1 services and each employed a full-time Chapter 1 teacher and a full-time Chapter 1

instructional aide. These staff members delivered supplemental reading and/or mathematics programs to approximately 5 percent of the school population in grades one through six. Service was delivered utilizing a pullout model and achievement was tracked using the Iowa Test of Basic Skills (ITBS). This study focused on Chapter 1 student achievement in grades four and five during the 1990-1991 academic year.

Billings is located in the south central part of Montana with a population in excess of 80,000 people. It is the largest metropolitan area in the state and has a cross section of economic and racial groups. Slightly more than 17 percent of the total student population received free or reduced lunch and the school district served approximately 4.7 percent Hispanic, 5 percent Native American, .8 percent Asian, and 89 percent white students. The remaining .5 percent of the district's student population was classified as other on the district's ethnicity report for 1991.

The city, during the year of the study, relied primarily on service industries as a center for its economy. However, agricultural, industrial, and manufacturing elements made up a portion of the economic foundation. These elements included two stockyards, two oil refineries, a sugar processing plant, and several cottage industries producing durable goods for the local population.

Population of the Study

Chapter 1 regulations require that students must score below the 50th percentile on a standardized test to be eligible for Chapter 1 services. The regulations allow local districts to prioritize eligible students and then provide service to students who have the greatest need first. This is accomplished through a locally designed and State approved prioritizing process. The prioritizing process in Billings placed students who scored below the 40th percentile in Chapter 1. Students who scored lower below the 40th percentile in reading and/or mathematics were the population of the study.

Students who scored lower than the 4Oth percentile on the ITBS in reading and/or mathematics and received compensatory education in the schools that offered the Chapter 1 Program made up one study group. Students who scored below the 40th percentile on the ITBS in reading and/or mathematics and were housed in the schools that did not offer the Chapter 1 Program were included in the study as like students and made up the other study group.

The population for the study was limited to students in grades four and five who completed 1 full year of instruction in reading and/or mathematics. The population of the study was further limited by the mobility of the students. Approximately 30 percent of the student population was no longer trackable for data collection due to two factors. The first was mobility. Many students had moved away from Billings.

The other factor was promotion of Chapter 1 students out of the Chapter 1 program. This promotion was due to students meeting the goals of the program. These promoted students rejoined the mainstream of the regular program in each Chapter 1 school and their data was no longer identifiable as Chapter 1.

There were too few students in grades one and two who received Chapter 1 services to include in the research data. Students in grade three were not included because they were not given the ITBS at the end of grade two in the spring of 1990. The 1990 ITBS scores were used as a covariate in the analysis. Further, students in grade six were not included because too many of them were no longer trackable for the purpose of collecting data.

Sampling Procedures

Two random stratified samples (Chein, 1959; Gay, 1987) were drawn from among the students who were identified as the population. One sample was drawn from among those students who were served by Chapter 1. The other sample was drawn from among those students who were not served by Chapter 1. Both samples were stratified by grade level such that the same number of students were represented at each grade within each study group. The sample size was based on the size of the population of Chapter 1 students in grades four and five.

Sample size for the study was determined by using the sampling table provided by Krejcie and Morgan (1970). The table was constructed using the following formula:

$$s = X^2 NP(1-P) + d^2(N-1)+XP(1-P)$$

where:

s = required sample size

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (.50 for maximum sample size)

d = the degree of accuracy expressed as a proportion (.05)

Sample size was established as 39 for the Chapter 1 group in grade four and as 50 for the Chapter 1 group in grade five. Samples of 39 and 50, respectively, were drawn from the like student groups as well.

The students who were drawn from the population to form the Chapter 1 sample were served in only reading or only mathematics or they were served in both reading and mathematics. Students who were drawn from the population to form the like group were categorized as like for reading or mathematics or as like for both reading and mathematics. There were 39 fourth grade and 50 fifth grade Chapter 1 students and 39 fourth grade and 50 fifth grade non-Chapter 1 students drawn to form the reading sample. The same was true for the mathematics sample. This procedure resulted in duplicate counts within

the samples. The duplication resulted in the following configuration of sample size for the ANCOVA analysis.

Grade	Subject	N
4	Reading	62
5	Reading	90
4	Mathematics	52
5	Mathematics	58

The duplication resulted in the following configuration of sample size for the non-independent t-test analysis.

Grade	Subject	N
4	Reading	13
4	Math	8
4	Both	18
5	Reading	21
5	Mathematics	5
5	Both	24

Student history and achievement data was stored on the district's central computer. The specifications for the population from which samples were drawn were entered into the computer and the resulting sort yielded the study population. This population was randomly sampled by selecting a number in the sampling table in Gay (1987) and counting through the population selecting members until the appropriate sample size was reached.

There was loss of students for the purpose of collecting socioeconomic status and parent education level information. Therefore,

mortality within the samples, due to loss of students as a result of transfer out of the district between the study year and the time at which the study took place, was adjusted by randomly re-drawing from the population until the appropriate sample size was reached. There were vacant cells within the attribute variable of parent education level due to less than 100 percent survey return. A total of 89.5 percent of the surveys were returned at grade four and 88 percent were returned at grade five.

Controls

The external attribute variable of family structure was statistically controlled through the use of ANCOVA. "The statistic can be used to equate groups on one or more variables" (Gay, 1987, p. 254). In this case, achievement scores were equated against the attribute variable of family status and the covariate of 1990 ITBS test scores. The influence on achievement of the attribute variables of socioeconomic status, educational attainment of parents, and attendance were controlled through sampling.

Although ethnicity and gender were not attribute variables under investigation in this study, an inspection of the data revealed that a similar proportion of ethnicity and gender existed within the total student body of the school district, the population of the study, and the sample of the study. This indicates that any influence these variables may have had

on the dependent variables was controlled through random sampling as well as the influence of any other unknown external variables (Gay, 1987).

Internal variability between groups was controlled through the use of homogeneous groups (Gay, 1987). "Another way of controlling an extraneous variable, which is also used in experimental research, is to compare groups which are homogeneous with respect to that variable" (Gay, 1987, p. 252). The homogeneity between the two sample groups in this study was established by drawing the like student sample from the population based on the same qualifying factor that was used to place students in the Chapter 1 program. That factor was scoring below the 40th percentile in reading and/or mathematics on the ITBS.

Methods of Data Collection

Achievement Data

All elementary students in grades three, four, five, six, seven and eight in Billings, Montana were administered the Iowa Test of Basic Skills (ITBS) in the spring of every year. The tests were scored within the district, and the results were distributed in three forms. The first was a report of aggregated achievement data which reported the overall student achievement of the district. The second report contained aggregated achievement data for each school. This report was made available to central administrators and building administrators. The third report

contained disaggregated individual student achievement data which were available to building administrators, teachers, and parents. The third report was posted in individual student records.

The achievement data needed for this study was collected from students' individual cumulative school records and from the aggregated data stored in the district's computer records. Achievement scores for the two groups of the major question and the three groups of the second question of this study was compared at grades four and five. Normal curve equivalent (NCE) scores for reading and mathematics from individual student ITBS results were used in the statistical comparisons.

Attendance Data

Attendance data was kept on all elementary students and recorded at the end of the year in each individual student's cumulative school record and archived on computer disk. The attendance data necessary for this study was collected by inspecting those records.

Educational Attainment and Family Structure Data

The school district collected information on the structure of the family on student intake forms. This information was on file in the district's computer but upon examination was found to be incomplete. Data concerning educational attainment of parents was not collected by the school district.

A written survey was developed and the parents of the students within the study were asked to provide information about family structure and educational attainment. The first question of the survey asked whether or not the student lived with both natural parents. There were two levels of this factor. The first, living with both natural parents, was the traditional family structure in which the assumption for this study was that the students who resided with both natural parents had a stable home life free from relative disruption which was conducive to study and success in school. For purposes of this study, the second level of the factor, living with other than both natural parents, assumed that the child's home life was less stable, more disrupted, which was less conducive to study and success in school.

The second question in the survey asked for the number of years of education of the adult living in the home who had the most education. This factor was linear and the actual years of education were used in the analysis. The underlying assumption concerning this factor was that the fewer the years of education the parents had the less supportive the parents were of the educational process and, conversely, the more years of education the more supportive the parents. Therefore, the number of years of education the parents had would be reflected in the success of their children in school.

Socioeconomic Data

Each school maintained hot lunch records which classified the students within the school as to their socioeconomic status (SES) as determined by the students qualification for free, reduced or fully paid lunch. Further, the Chapter 1 program used this information to establish which schools within the district qualified for the program. Schools that had more than 23 percent of their population on the free lunch rolls were eligible for Chapter 1 services. The SES data were collected through records kept within the Chapter 1 program and records kept at each school.

Instrumentation

Parent Survey Instrument

The parent survey was developed following guidelines established by Dillman (1978). Dillman provided general principles for writing survey questions and a cover letter. These suggestions were utilized in the design of the questionnaire. This questionnaire is in Appendix A of this study.

A three-step plan was developed and followed to distribute and collect the parent surveys. The first step called for students who were members of the sample groups to carry the surveys home to their parents and return the results to school. This step yielded an overall return rate of 68.1 percent. The second step required mailing surveys to parents who

did not return the surveys to school. This increased the yield to 76.7 percent. Finally, parents who did not return the second survey were called and the information was solicited by telephone interview. This increased the return rate to 88.75 percent. Sixteen parents were either not at home or declined the opportunity to participate in the survey, and 4 did not have telephones.

Validity of the data collected by means of the parent survey was obtained by cross checking survey response data with actual known data (Dillman, 1978). This was accomplished by spot checking data with the secretaries at each school and cross checking with data available in the district's records.

The school secretaries, through personal association, had knowledge of some of the actual parent education attainment information which the survey solicited. Fifteen surveys were spot checked. Two of the spot checked surveys had missing data on the parent education question. The ANCOVA calculations on the computer (FASTAT for the Mac, 1989) allowed for vacant cell counts. As such, the missing data was viewed as not significant. Otherwise the surveyed data agreed with the known data.

Vacant cells in the family status data were completed through inspection of the district's computer records. The 15 surveys that were spot checked for parent education attainment data were compared with the district's records to assess the accuracy of the family status data

collected by way of the survey. In this way, family status data was 100 percent complete and the spot check matched on all records.

The difference that can be caused on the dependent variable between the respondents and the non-respondents in data collection is difficult to determine, but indirect methods may be used to make limited checks for reliability (Dillman, 1978). In this case the indirect method of spot checking with the secretaries and cross checking with the district's computer records provided a measure of reliability.

Additionally, the survey was used to gather information which was used to place or not place attribute variables in the ANCOVA analysis. It was not used to collect the data for the dependent or independent variables. In a sense, the survey was a tool to test the validity of the sampling procedure as well as a means of providing data for control during the analysis. Therefore, the researcher viewed the return rate as acceptable within the design for control.

The Iowa Test of Basic Skills

The Iowa Test of Basic Skills (ITBS) has nine main uses. They are:

1. To determine the developmental level of students in order to better adapt materials and instructional procedures to individual needs and activities;

2. To diagnose specific qualitative strengths and weakness in students' educational development;

3. To indicate the extent to which individual students have the specific readiness skills and the abilities needed to begin instruction or to proceed to the next step in a planned instructional sequence;

4. To provide information that is useful in making administrative decisions in grouping or programming to better provide for individual differences;

5. To diagnose strengths and weaknesses in group performances (class, building, or system) that have implications for change in curriculum, instructional procedures, or emphasis;

6. To determine the relative effectiveness of the various procedures;

7. To assess the effects of experimentation and innovation;

8. To provide a behavioral model to show what is expected of each student and to provide feedback that will indicate progress toward suitable individual goals; and

9. To report performance in the basic skills to parents, students, and the general public in objective, meaningful terms. (Hambleton, 1987, p. 279-280)

Federal regulations require the use of a standardized test for measuring student achievement gains and in program evaluations (Federal Register, 1989). The ITBS is a nationally known and widely used standardized test of achievement (Hambleton, 1987). The NCE scores derived by the test are among the measures used by state and federal authorities to monitor Chapter 1 programs. The ITBS was the primary measurement tool used in Billings to select students for placement in Chapter 1 and report progress to the SEA and federal Chapter 1 regulatory agencies.

NCE scores are equal interval scales that are derived from percentages that can be averaged for purposes of comparison (Slavin, 1991). Thus, the ITBS was the appropriate instrument and the NCE scores the appropriate measure to use in this study.

Ability to Generalize the Results of the Study

Inferences were generalized from the sample to the population of the study as a result of the high degree of internal control over variables within the study, However, due to those same controls, the ability to generalize the results of the study to other populations was limited to the degree in which other population resemble the study population. Therefore, the best way to generalize to another, distinctly different population would be to replicate the study in that population.

Permission to Conduct the Study and Use Data

The researcher obtained permission from the Administration of School District #2 in Billings, Montana to conduct the study and to collect data for the purpose of the study in September of 1991. A copy of the letter granting permission is in the Appendix B. Permission to conduct the study, prior to collection of data, and the results of the study, after analysis of the data, was presented to the Education Committee of the School Board as part of the business of the district. The researcher guaranteed to maintain confidentiality of information and anonymity for

individuals within the study and to report the results of the study to the district upon completion.

Statistical Hypotheses

The following hypotheses were tested using the .05 level of significance. This decision was made in the light of the consequences of making a Type 1 or a Type 2 error, that is, rejecting a true null or retaining a false null, respectively (Ferguson & Takane, 1989). In the case of rejecting a true null, analysis of the data probably would not cause program developers to deviate from their current path. However, in the case of retaining a false null, the result could be the discontinuance of an existing program, thus possibly jeopardizing the educational opportunity of some of our youth.

ANCOVA Hypotheses of the Major Question

(1) HO: There is no significant difference in adjusted reading NCE scores on the ITBS between students in fourth grade who are served in the Chapter 1 program and like students who are not served by the Chapter 1 program.

(2) HO: There is no significant difference in adjusted reading NCE scores on the ITBS between students in fifth grade who are served in the Chapter 1 program and like students who are not served by the Chapter 1 program.

(3) HO: There is no significant difference in adjusted mathematics NCE scores on the ITBS between students in fourth grade who are served in the Chapter 1 program and like students who are not served by the Chapter 1 program.

(4) HO: There is no significant difference in adjusted mathematics NCE scores on the ITBS between students in fifth grade who are served in the chapter 1 Program and like students who are not served by the Chapter 1 program.

Group t-test Hypotheses of the Second Question

(5) HO: There is no significant difference in adjusted reading NCE scores on the ITBS between students in fourth grade who are served for reading in the Chapter 1 program and those who received reading and mathematics in the Chapter 1 program.

(6) HO: There is no significant difference in adjusted reading NCE scores on the ITBS between students in fifth grade who are served for reading in the Chapter 1 program and those who received reading and mathematics in the Chapter 1 program.

(7) HO: There is no significant difference in adjusted mathematics NCE scores on the ITBS between students in fourth grade who are served for reading in the Chapter 1 program and those who received reading and mathematics in the Chapter 1 program.

(8) HO: There is no significant difference in adjusted mathematics NCE scores on the ITBS between students in fifth grade who are served for reading in the Chapter 1 program and those who received reading and mathematics in the Chapter 1 program.

CHAPTER 4

ANALYSIS OF DATA

The results of the data analysis used to answer the questions of this study are presented in this chapter. The sections in this chapter are: Results, Decision to Use Attribute Variables, Hypothesis 1, Hypothesis 2, Hypothesis 3, Hypothesis 4, Hypothesis 5, Hypothesis 6, Hypothesis 7, and Hypothesis 8.

Results

The major problem of this study was to determine if there was a significant difference between adjusted reading and mathematics scores on the Iowa Test of Basic Skills (ITBS) between students who received Chapter 1 assistance in reading or mathematics and like students who did not receive Chapter 1 assistance in reading or mathematics. There were 4 hypotheses used to answer the questions related to the major problem of this study. These were tested at the .05 level of significance using the Analysis of Covariance statistic, wherein the 1990 ITBS reading or mathematics scores were used as covariates to adjust the scores of the dependent variables of the study in all four hypotheses. Family status was used as a second covariate in Hypotheses 3 and 4. The dependent

variable of the major problem of the study was mathematics or reading education. The variable had two levels: (a) reading or mathematics education that included Chapter 1 assistance, and (b) reading or mathematics education that did not include Chapter 1 assistance.

Decision to Use Attribute Variables

"In essence, analysis of covariance adjusts scores on a dependent variable for initial differences on some other variable" (Gay, 1987, p. 254). Further, there is an increase in power within the analysis of covariance statistic when multiple covariates are used. This condition occurs when there is a low correlation between each covariate and a high correlation between the covariates and the dependent variable (Huck, Cormier, & Bounds, 1974).

Comparison of attribute variables for the purpose of using them in the ANCOVA analysis resulted in the use of the attribute variable, family status in the ANCOVA analysis of two of the four hypotheses of the major question. Family status among students who were served in Chapter 1 schools was correlated highly with the dependent variable math scores and was used as a covariate in the ANCOVA procedures for Hypotheses 3 and 4. Family status did not correlate highly with reading scores in either sample and was not used in hypotheses 1 and 2.

The attribute variables of attendance, parent education level, and socioeconomic status did not correlate highly with either reading or

mathematics sores in either group, nor did they correlate significantly with each other or family status. These variables were not used as covariates in any of the ANCOVA hypotheses. The data are displayed in Table 1.

Table 1. Correlation between attribute variables.

	LUNCH	R91	M91	ATTEND	FAM	PED
LUNCH	1.000					
R91	0.146	1.000				
M91	0.074	0.160	1.000			
ATTEND	0.062	0.030	0.025	1.000		
FAM	-0.213	0.064	0.531	0.023	1.000	
PED	0.152	0.015	-0.325	0.009	-0.493	1.000

Hypothesis 1

Hypothesis 1 stated that there was no significant difference between the adjusted means of the reading scores of students in the fourth grade who were served by Chapter 1 and like students who were not served by Chapter 1. A total of 62 cases were tested. The results of the analysis showed that there was no significant difference between the adjusted means (Chapter 1 = 48.130 and non-Chapter 1 = 36.918). Therefore, Hypothesis 1 was retained. These data are presented in Table 2.

Table 2. Analysis of Covariance of 1991 ITBS reading achievement NCE means of fourth grade students.

Source	SS	df	MS	F	p
Reading 90	38.197	1	38.197	1.279	.263
ED Status	.989	1	.989	.033	.856
Within	1761.868	59	29.862		

The means on the 1990 and 1991 tests were examined. It was established that while non-Chapter 1 students' adjusted means were not significantly different than the means of their Chapter 1 counterparts on the 1991 ITBS reading test, it appeared that the non-Chapter 1 students' means declined between the 1990 test and the 1991 test while the Chapter 1 students' test means increased between the two tests. However, the ANCOVA analysis indicates that this trend was not meaningful. These data are presented in Table 3.

Table 3. NCE means of ITBS reading achievement scores of fourth grade students.

	N	1990	1991
Chapter 1 students	62	33.935	36.935
Like students	62	40.935	37.161

Hypothesis 2

Hypothesis 2 stated that there was no significant difference between the adjusted means of the reading scores of students in the fifth grade who were served by Chapter 1 and like students who were not served by Chapter 1. A total of 90 cases were tested. The results of the analysis showed that there was no significant difference between the adjusted means (Chapter 1 = 38.640 and non-Chapter 1 = 36.300). Hypothesis 2 was retained. These data are presented in Table 4.

Table 4. Analysis of Covariance of 1991 ITBS reading achievement NCE means of fifth grade students.

Source	SS	df	MS	F	p
Reading 90	2801.241	1	2801.241	55.139	.001
ED Status	129.333	1	129.337	2.546	.114
Within	4419.870	87	50.139		

The means on the 1990 and 1991 test were examined. It was established that while non-Chapter 1 students' means were not significantly different than the means of their Chapter 1 counterparts on the 1991 ITBS reading test, it appeared that the non-Chapter students' means declined between the 1990 test and the 1991 test while the Chapter 1 students' test means increased between the two tests. However, the ANCOVA analysis indicated that this trend was not meaningful. These data are presented in Table 5.

Table 5. NCE means of ITBS reading achievement scores of fifth grade students.

	N	1990	1991
Chapter 1 students	90	31.244	36.844
Like students	90	40.756	38.467

Hypothesis 3

Hypothesis 3 stated that there was no significant difference between the adjusted means of the mathematics scores of students in the fourth grade who were served by Chapter 1 and like students who were not served by Chapter 1. A total of 52 cases were tested. The results of the analysis showed that there was no significant difference between the adjusted means (Chapter 1 = 37.143 and non-Chapter 1 = 35.703). Hypothesis 3 was retained. These data are presented in Table 6.

Table 6. Analysis of Covariance of 1991 ITBS mathematics achievement NCE means of fourth grade students.

Source	SS	df	MS	F	p
Fam Status	28.285	1	28.285	.452	.505
Math 90	725.354	1	725.354	11.583	.001
ED Status	22.652	1	22.652	.362	.550
Within	3005.990	48	62.6225		

The means on the 1990 and 1991 test were examined. It was established that while non-Chapter 1 students' means were not significantly different than their Chapter 1 counterparts on the 1991 ITBS mathematics test, it appeared that the non-Chapter students' means declined between the 1990 test and the 1991 test while the Chapter 1 students' test means increased between the two tests. However, the ANCOVA analysis indicated that this trend was not meaningful. These data are presented in Table 7.

Table 7. NCE means of ITBS mathematics achievement scores of fourth grade students.

	N	1990	1991
Chapter 1 students	26	33.500	35.923
Like students	26	41.000	36.923

Hypothesis 4

Hypothesis 4 stated that there was no significant difference between the adjusted means of the reading scores of students in the fifth grade who were served by Chapter 1 and like students who were not served by Chapter 1. A total of 59 cases were tested. The results of the analysis showed that there was significant difference between the adjusted means (Chapter 1 = 41.104 and non-Chapter 1 = 40.704). Hypothesis 4 was rejected. These data are presented in Table 8.

Table 8. Analysis of Covariance of 1991 ITBS mathematics achievement NCE means of fifth grade students.

Source	SS	df	MS	F	p
Fam Status	1987.270	1	1987.270	18.359	.001
Math 90	5364.875	1	5364.875	67.658	.001
ED Status	421.951	1	421.957	5.321	.025
Within	4361.184	55	79.294		

Mean differences between the 1990 and 1991 test were examined through inspection of those means. It was established that non-Chapter 1 students' means were significantly greater than their Chapter 1 counterparts on the 1991 ITBS reading test and the non-Chapter students' means declined between the 1990 test and the 1991 test while the Chapter 1 students' test means increased between the two tests. The ANCOVA analysis indicated that this trend was meaningful. These data are presented in Table 9.

Table 9. NCE means of ITBS mathematics achievement scores of fifth grade students.

	N	1990	1991
Chapter 1 students	29	32.483	37.276
Like students	29	38.345	36.793

The results of the ANCOVA showed that the adjusted means of Hypotheses 1, 2, and 3 did not differ significantly. The adjusted means of Hypothesis 4 did differ significantly. Three of the four hypotheses of the major problem of the study were retained. One of the hypotheses of the major problem was rejected.

The second problem of the study was to determine if there was a significant difference between the test means of students who were placed in Chapter 1 for only reading or only mathematics and students who were placed in Chapter 1 for both reading and mathematics. There were four hypotheses used to answer the questions related to the second problem. They were tested at the .05 level of significance using the independent samples t-test statistic. There were no significant differences in any of the four hypotheses, and they were all retained.

Hypothesis 5

Hypothesis 5 tested the difference between 1991 ITBS reading scores of fourth grade students who received only reading and students who received both reading and mathematics in the Chapter 1 program. There was no significant difference between means of the reading scores. Hypothesis 5 was retained. These data are presented in Table 10.

Table 10. ITBS NCE means of students in grade four who were served by Chapter 1.

Group	N	Mean
Reading only	13	37.692
Both R & M	18	36.389
Pooled variance	t = .688 df = 29 p = .497	

Hypothesis 6

Hypothesis 6 tested the difference between 1991 ITBS reading scores of fifth grade students who received only reading and students who received both reading and mathematics in the Chapter 1 program. There was no significant difference between means of the reading scores. Hypothesis 6 was retained. These data are presented in Table 11.

Table 11. ITBS NCE means of students in grade five who were served by Chapter 1.

Group	N	Mean
Reading only	21	37.333
Both R & M	24	36.417
Pooled variance	t = .340 df = 43 p = .736	

Hypothesis 7

Hypothesis 7 tested the difference between 1991 ITBS mathematics scores of fourth grade students who received only mathematics and students who received both reading and mathematics in the Chapter 1 program. There was no significant difference between means of the mathematics scores. Hypothesis 7 was retained. These data are presented in Table 12.

Table 12. ITBS NCE means of students in grade four who were served by Chapter 1.

Group	N	Mean
Math only	8	38.250
Both R & M	18	34.889
Pooled variance t = 1.489	df = 24	p = .147

Hypothesis 8

Hypothesis 8 tested the difference between 1991 ITBS mathematics scores of fifth grade students who received only mathematics and students who received both reading and mathematics in the Chapter 1 program. There was no significant difference between means of the mathematics scores. Hypothesis 8 was retained. These data are presented in Table 13.

Table 13. ITBS NCE means of students in grade five who were served by Chapter 1.

Group	N	Mean
Math only	5	29.400
Both R & M	24	38.917
Pooled variance t = .648 df = 27 p = .522		

CHAPTER 5

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Introduction

The information in this chapter summarizes this study and provides conclusions and recommendations relative to the results of the analysis of data of this study. The first section summaries the findings of the study. The second section presents conclusion drawn from the findings and the third section presents recommendations relative to the conclusions.

Summary

The study was divided into two problem areas. The first, or major, problem of the study determined if there was a difference between reading or mathematics achievement of students who received Chapter 1 services and like students who did not receive Chapter 1 services. The second problem of the study determined if there was a difference between the reading or mathematics achievement of students who received only reading or only mathematics services in Chapter 1 and the achievement of students who received both reading and mathematics in Chapter 1.

This study examined the reading and mathematics achievement of fourth and fifth grade students at the end of 1991 school year. The students were divided into two categories of educational status. The first group was served by Chapter 1 for reading and/or mathematics and the second group was not served by Chapter 1. The second group was selected based on the same factors that qualified students in the first group for Chapter 1 and were referred to as like students in the study. A total of 78 fourth grade students and 100 fifth grade students were drawn from the total population of fourth and fifth grade students in Billings, Montana using random sampling techniques. Each sample group contained 39 members in grade four and 50 members in grade five for a total of 178 students.

Achievement data for the study was gathered through inspection of student records and the school district's centralized computer records. Attribute variable data was gathered through inspection of district computer records and by surveying parents of students in the study.

Four hypotheses were formulated to test the major problem of the study. The major problem examined reading and mathematics scores of students in grade four and five. All four of the hypotheses were tested using Analysis of Covariance wherein 1990 Iowa Test of Basic Skills (ITBS) normal curve equivalent (NCE) reading or mathematics scores were used as covariates to adjust the dependent variables of the study. Two hypotheses, 3 and 4, which tested mathematics achievement also used

the attribute variable of family status as a second covariate. The dependent variables of the major question were 1991 ITBS NCE scores in reading or mathematics.

Attribute variables of parent education levels, attendance, and socioeconomic class were also examined as possible covariates through a correlation matrix and were not used. The first three of the four hypotheses of the major question of the study were retained. The fourth hypothesis of the major problem of the study was rejected.

The second problem of the study examined reading and mathematics scores of students who were served in Chapter 1. Hypotheses 5, 6, 7,and 8 were tested using a non-independent t-test to determine if there was a difference between the reading or mathematics NCE scores of students who were served for just reading or mathematics and the NCE scores of students who received both reading and mathematics. There were no significant differences found in any of the four hypotheses of the second question of the study.

Hypothesis 5 tested reading scores and Hypothesis 6 tested mathematics scores of fourth grade students. There were no significant differences between the means of the two groups and both hypotheses were retained.

Hypothesis 7 tested reading scores and Hypothesis 8 tested mathematics scores of fifth grade students. There were no significant

differences between the means of the two groups and both hypotheses were retained.

Conclusions

Theoretically, random sampling should control the influence of attribute variables by evenly distributing them between samples (Ferguson & Takane, 1989). However, in this study it was found that the attribute variable of family structure was not evenly distributed between the groups and was controlled through use of the variable as a covariate in the ANCOVA comparison of mathematics NCE scores at both the fourth and fifth grade levels.

The Chapter 1 program in grades four and five in Billings, Montana during the study year provided additional instruction in reading and mathematics for students who met the selection criteria for the program. Students were pulled from the regular education program for thirty minutes per day for additional instruction. This additional instruction did not cause the adjusted reading and mathematics scores for fourth grade students who were served by Chapter 1 to differ significantly from the scores of students who qualified for the program and were not served. Nor did additional instruction cause the adjusted reading scores of students in fifth grade who were served by Chapter 1 to differ significantly from the scores of students who qualified for the program and were not served. The conclusion drawn from these findings is that

the pullout instructional model used by the Billings school district is not causing improved achievement for the students served through the model.

These findings support the work of Slavin (1987) and Frontera (1985) and portions of the Sustaining Effects Study (Carter, 1984), all of whom found specific incidences where Chapter 1 instruction did not cause increased student achievement.

However, the adjusted scores of fifth grade math students who were served in Chapter 1 were significantly greater than the adjusted scores of their like counterparts. The conclusion drawn from this finding is that the pullout instructional model used by the Billings school district is causing improved achievement for the students served through the model. This conclusion supports the work of Ashby (1985) and portions of the Sustaining Effects Study (Carter, 1984). Both of these studies found cases where Chapter 1 did cause increased student achievement in mathematics.

Together these two different results support the trend found during the review of the literature that indicated that some programs are effective while others are not. The reasons for these differences could be found in the differing specifics of each Chapter 1 program such as pullout or in-class delivery models. Additionally, these two different results add to the examination of the question concerning the cost effectiveness of federal tax monies being spent to support compensatory education (Gaffney, 1986). The monies are providing the additional support that is

making a difference in terms of the educational opportunity for educationally disadvantaged children in Billings in fifth grade mathematics. On the other hand, in fifth grade reading and fourth grade reading and mathematics, the monies are not making a difference.

The conclusion drawn from the evidence of this study is that the federal expenditure for compensatory education in the Billings Chapter 1 program is delivering what it is expected to at grade five in mathematics and needs to be revised to do a better job in grade five in reading and in grade four in reading and mathematics. Further, the goals of the ESEA of 1965 and the amendments to the act in 1988 are not being met in grade four and five in reading and grade four in mathematics in Billings, while those goals are being met in grade five in mathematics.

The actual means for Hypotheses 1, 2, 3 and 4 were presented in the analysis of data. These means were presented by the researcher to illustrate that the trends indicated by simple comparison of the means can be misleading. Through simple comparison the means, when examined by themselves, appeared to show that the Chapter 1 Program in both reading and mathematics in grades four and five in Billings cause students to gain in achievement while students without the Chapter 1 support tend to fall further behind their peers in reading and mathematics achievement. This conclusion, when examined more closely through statistical adjustment of those means on the students' previous scores, thus giving them an even start which is the purpose of ANCOVA (Huck et al., 1974), is false.

The conclusion drawn from this illustration is that educators should exercise care when drawing inferential conclusions without using inferential procedures. This conclusion supports the work of Slavin (1991). He cautions educators to use comparative procedures rather than simple gain scores and understand the value of NCE scores to ascertain the merit of their Chapter 1 programs.

Recommendations

The primary purpose of the study was to determine if there was a difference in achievement for students who receive Chapter 1 services and those like students who did not. This study found that there were no significant differences for students in grade four in reading and mathematics while there were significant differences in fifth grade mathematics. This researcher recommends that the fifth grade mathematics program be examined to find differences between it and the unsuccessful fourth grade reading and mathematics and fifth grade reading programs. The Billings program needs to examine these differences and redesign the implementation aspect of the program in such a way as to maximize the cost benefit ratio for the federal monies being spent on compensatory education in Billings. The study should then be repeated following the modifications to find if they caused improvements in fifth grade reading and fourth grade reading and math. Additionally, the study should be repeated and expanded to include all

grades in Billings that offer the Chapter 1 Program. This should be done in order to examine the cost effectiveness and achievement effectiveness of the entire compensatory education program. Follow-up studies should use a comparative design wherein Chapter 1 students' achievement is compared to students like them who are not served in the Chapter 1 setting. Typically, Chapter 1 Program evaluation lacks this comparative aspect and program administrators do not get a clear view of student achievement within their programs (Slavin, 1991).

Further, additional study should be conducted to examine or control two aspects that this study did not control or examine. The first is time on task. The amount of time spent on reading and mathematics may influence achievement (Allington & Johnston, 1986; Frederick & Walberg, 1980). It is true that by design Chapter 1 students spend more time in reading and mathematics instruction than do their like counterparts. Second, students who were promoted from the Chapter 1 program mid-year were not included in the data for the Chapter 1 student population. These students' scores may have had an influence on the aggregate achievement means of the Chapter 1 students. That influence may have been great enough to cause the differences between the adjusted means to be significant.

The second problem of the study determined that there was no impact on student achievement for dual placement students in grades four and five.

Final Reflection

Efforts to control the possible influences of nature through the attribute variables socioeconomic status, family status, attendance, and parent education resulted in an interesting phenomenon. Whatever influence the four attribute variables may have had on the dependent variable, ITBS scores, was controlled through sampling or through the ANCOVA procedure. The only attribute variable that was not controlled through sampling was family status; it was controlled through ANCOVA. The only place family status influenced variability between achievement scores was at grade five in the Chapter 1 schools. It was not a factor in the non-Chapter schools. Further, the study found that the only place Chapter 1 was effective was in mathematics at grade five.

The factor family status was divided into two levels, natural parents and other. This study did not attempt to explain which level of the factor contributed to the variability in mathematics scores, but the conclusion was that there was an influence attributed to family status on mathematics scores at grade five in Chapter 1 schools in Billings. This may or may not say anything about labeling students for special mathematics treatment, but the researcher concluded that further study should be conducted to examine the possibility that labeling students for special mathematics treatments may affect achievement scores, and since the phenomenon did not occur in grade four, the influence may be age dependent.

Further, additional study should be conducted to explore the various levels of the family status factor for the purpose of discovering exactly where and how the factor influences student achievement.

One additional conclusion was drawn from the examination of the unadjusted aggregate NCE means of the sample groups. Local Chapter 1 programs are required by federal regulations to implement their services in the most needy schools in a district (Chapter 1 Handbook, 1990). The 1990 ITBS NCE means show that the aggregate means of the Chapter 1 schools were lower than the aggregate means of the non-Chapter 1 schools. The conclusion drawn from these data was that the Billings school district did implement the Chapter 1 program in the schools with the most need. These data are presented in Table 14.

Table 14. Aggregate NCE means.

	N	R 90	M 90
Chapter 1	89	33.573	34.719
Non Chapter 1	89	42.438	44.809

Analysis of data relating to the second question of the study indicated that there were no significant differences between ITBS NCE scores of fourth and fifth grade students who received just reading or just mathematics and the ITBS NCE scores of student who received both reading and mathematics in Chapter 1. The conclusion drawn from these

data was that single or dual placement did not impact achievement of these students.

Subsequent discussion with the teaching staff concerning this issue revealed that, in their opinion, as the students grow older they are less motivated towards leaving the regular classroom. The opinion of these staff members was that it is about grade five where this change of attitude toward the pullout program seems to appear. This was an interesting point of view. However, the evidence did not bear out this expected outcome. Single or dual placement did not make a significant difference in reading or mathematics scores. Additionally, the results of Hypothesis 4, wherein fifth grade Chapter 1 mathematics adjusted scores were significantly higher than the adjusted scores of students not served by Chapter 1, further suggests that the teachers' point of view regarding students' motivation was not valid. The conclusion drawn from this evidence was that single or dual placement should not be a factor in deciding whether or not a student should be singly or dually placed in the Chapter 1 program in grade four or five in Billings.

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APPENDICES

APPENDIX A

Parent Survey

BILLINGS PUBLIC SCHOOLS

BILLINGS, MONTANA 59102-5899

December 6, 1991

Dear Parent or Guardian,

The school district is engaged in studying the achievement of students in one of its educational programs. The results of the study will enable the school district to examine the effectiveness of the program for our students. Achievement data from your child's Iowa Test of Basic Skills has been selected as part of the study and two pieces of additional information from you is needed as part of the study.

All information, once it has been paired with student achievement scores will be separated from the names of students and families and be part of group totals. The results of the study will be reported as group data and at no time will any individual student or family be specified. You are guaranteed that your answers to the following two questions and the achievement scores of your child will be kept totally confidential and remain anonymous.

Although your participation in this study is voluntary, information provided by you is essential and will provide a more accurate overall picture of the educational program for district students. Thank you very much for your assistance. Please call me at 255-3765 if you have any questions or concerns about the information or the study.

Sincerely,

R Johnston

Roger Johnston, Chapter 1 Specialist

Please mark your answers and return the completed questionaire sealed in the enclosed envelope to the principal's office at your child's school.

****

1. The student lives with both natural parents. Yes ☐ No ☐

2. The number of years of education of the adult living in the home having the most education is _____ years.

APPENDIX B

Permission to Conduct the Study

BILLINGS PUBLIC SCHOOLS

BILLINGS, MONTANA 59102-5899

Lincoln Center
415 North 30th Street
November 4, 1991

Dear Roger,

I Received your request to conduct the study entitled "A Comparison of Reading and Mathematics Achievement Between Chapter 1 Students and Like Students in Grades Four and Five". I think the results of your doctoral study will be useful to the school district and approve.

Please be prepared to present your proposal as an informational item to the Education Committee of the School Board at next month's regular meeting. Further, you may expect to report the final results of the study to the Education Committee upon completion, so keep me advised concerning your progress.

You may also use district letterhead and authority to conduct the survey you outlined for me and you may expect reasonable cooperation from the staff of the district as your work goes foreword.

Sincerely,

Peter L. Carparelli

Peter Carparelli
Superintendent

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