THE EFFECTS OF DIFFERENTIATED TUTORING EXPERIENCES
ON THE READING AND MATHEMATICS ACHIEVEMENT OF SIXTH
GRADE TUTORS

A thesis submitted in partial satisfaction
of the requirements for the degree of Master
of Arts in Elementary Education

Reading Improvement

by

Michael Patrick Klentschy

June, 1971
The thesis of Michael Patrick Klentschy is approved:

[Signature]

Committee Chairman

San Fernando Valley State College

June, 1971
I dedicate this thesis to my wife,
Diane, for her love, encouragement
and patience.

-M. P. K.-

June, 1971
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>vi</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF ILLUSTRATIONS</td>
<td>viii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>ix</td>
</tr>
</tbody>
</table>

## CHAPTER

I  STATEMENT OF THE PROBLEM......................... 1
   Rationale for the Study......................... 2
   Definition of Terms.............................. 7
   Research Questions............................. 10
   Research Hypotheses............................ 11

II  REVIEW OF RELATED LITERATURE............... 14
   Elementary School Tutorial Programs......... 15
   Tutor Achievement and Attitude Gains......... 20
   Sex Differences and Academic Achievement.... 23
   Tutor Training................................. 28

III RESEARCH METHODS AND PROCEDURES.......... 32
   Research Design................................ 33
   Research Instruments.......................... 36
   Statistical Treatment of the Data.............. 37
   Method........................................ 37
   Tutor Training: Experimental Group I........ 38
   Tutor Training: Experimental Group II........ 40
   Pre-Instructional Techniques.................... 42
   Instructional Techniques....................... 43

IV  PRESENTATION AND ANALYSIS OF THE DATA...... 47

V  SUMMARY, CONCLUSIONS AND RECOMMENDATIONS
   Summary........................................ 60
   Conclusions.................................... 64
   Recommendations............................... 66
# TABLE OF CONTENTS (Continued)

**REFERENCES**

<table>
<thead>
<tr>
<th>APPENDICES</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Data Summary</td>
<td>70</td>
</tr>
<tr>
<td>B Pretest Reading Results</td>
<td>71</td>
</tr>
<tr>
<td>C Pretest Mathematics Results</td>
<td>71</td>
</tr>
<tr>
<td>D Tutor-Learner Pairings</td>
<td>72</td>
</tr>
<tr>
<td>E Sample-Dolch Job Card of Word Attack Skills</td>
<td>74</td>
</tr>
<tr>
<td>F Sample-Houghton Mifflin Basic Mathematics Facts Cards</td>
<td>75</td>
</tr>
</tbody>
</table>
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Posttest Analysis of Variance Summary Table on the Stanford Diagnostic Reading Test</td>
</tr>
<tr>
<td>2</td>
<td>The Scheffe Post-Hoc Multiple Comparison Summary Table on the Stanford Diagnostic Reading Test</td>
</tr>
<tr>
<td>3</td>
<td>The Posttest Analysis of Variance Summary Table on the California Test of Basic Skills, Mathematics Section</td>
</tr>
<tr>
<td>4</td>
<td>The Scheffe Post-Hoc Multiple Comparison Summary Table on the California Test of Basic Skills, Mathematics Section</td>
</tr>
<tr>
<td>5</td>
<td>A Comparison of Posttest Mean Scores of Boys and Girls in Experimental Group I as Measured by the Stanford Diagnostic Reading Test</td>
</tr>
<tr>
<td>6</td>
<td>A Comparison of Posttest Mean Scores of Boys and Girls in Experimental Group II as Measured by the California Test of Basic Skills, Mathematics Section</td>
</tr>
<tr>
<td>7</td>
<td>A Comparison of the Posttest Reading Achievement Mean Scores of Boys Who Tutored Boys and Girls who tutored Boys in Experimental Group I</td>
</tr>
<tr>
<td>8</td>
<td>A Comparison of the Posttest Reading Achievement Mean Scores of Boys Who Tutored Girls and Girls Who Tutored Girls in Experimental Group I</td>
</tr>
<tr>
<td>9</td>
<td>A Comparison of Posttest Reading Achievement Mean Scores of Boys Who Tutored Boys and Boys Who Tutored Girls in Experimental Group I</td>
</tr>
<tr>
<td>10</td>
<td>A Comparison of Posttest Reading Achievement Mean Scores of Girls Who Tutored Boys and Girls Who Tutored Girls in Experimental Group I</td>
</tr>
</tbody>
</table>
### LIST OF TABLES Continued

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>A Comparison of Posttest Mathematics Achievement Mean Scores of Boys Who Tutored Boys and Girls Who Tutored Boys in Experimental Group II</td>
<td>56</td>
</tr>
<tr>
<td>12</td>
<td>A Comparison of Posttest Mathematics Achievement Mean Scores of Girls Who Tutored Girls and Boys Who Tutored Girls in Experimental Group II</td>
<td>57</td>
</tr>
<tr>
<td>13</td>
<td>A Comparison of Posttest Mathematics Achievement Mean Scores of Boys Who Tutored Boys and Boys Who Tutored Boys in Experimental Group II</td>
<td>58</td>
</tr>
<tr>
<td>14</td>
<td>A Comparison of Posttest Mathematics Achievement Mean Scores of Girls Who Tutored Boys and Girls Who Tutored Girls in Experimental Group II</td>
<td>59</td>
</tr>
<tr>
<td>15</td>
<td>Data Summary Table</td>
<td>70</td>
</tr>
<tr>
<td>16</td>
<td>The Pretest Analysis of Variance Summary Table on the Stanford Diagnostic Reading Test</td>
<td>71</td>
</tr>
<tr>
<td>17</td>
<td>The Pretest Analysis of Variance Summary Table on the California Test of Basic Skills, Mathematics Section</td>
<td>72</td>
</tr>
</tbody>
</table>
# LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Illustration</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35</td>
</tr>
</tbody>
</table>

1. Pretest-Posttest Control Group Design
ABSTRACT

THE EFFECTS OF DIFFERENTIATED TUTORING EXPERIENCES 
ON THE READING AND MATHEMATICS ACHIEVEMENT OF SIXTH GRADE TUTORS

by

Michael Patrick Klentschy

Master of Arts in Elementary Education: Reading Improvement

June, 1971

Ninety-six sixth grade students were studied to investigate the effects of an intergrade tutorial program on sex differences in reading and mathematics achievement. Two experimental groups and one control group were utilized. The first experimental group received training and then tutored second graders in the area of reading. The second experimental group received training and then tutored third graders in the area of mathematics. The control group was only pretested and posttested. Both experimental groups were also pretested and posttested. The instruments used were the Stanford Diagnostic Reading Test, Level II and the California Test of Basic Skills, Mathematics Section.
A distinct one-way analysis of variance was used to analyze part of the data. The .01 level of significance was utilized. A correlated t test was utilized to test for sex differences with respect to tutor gains. The .05 level of significance was utilized.

The results indicated that there is a significant transfer of learning in what a tutor teaches to what a tutor learns. Sixth grade student tutors developed significantly different and more positive academic gains as a result of tutoring in a specific area. Experimental Group I made significantly greater gains in reading achievement due to tutoring in reading than either Experimental Group II or the Control Group. Experimental Group II made significantly larger gains in mathematics achievement due to tutoring in mathematics than either Experimental Group I or the Control Group.

The study also found significant differences in cross-age sex pairings for tutoring. In both reading and mathematics boys made the most significant gains. In reading, the boys who tutored boys made the largest gains. The boys who tutored girls also made significant gains in reading. In mathematics, the boys who tutored the girls made the largest gains. There was no significant difference in either experimental group between girls who tutored girls and girls who tutored boys.
CHAPTER I

STATEMENT OF THE PROBLEM

The major purpose of the present study was to determine whether a tutor learns what he tutors in the area of reading or mathematics. A second purpose was to determine the most advantageous cross-age sex pairings within an elementary school tutorial program regarding academic learning gains. Sixth graders identified as low achievers in reading and mathematics were trained to tutor second graders and third graders in the areas of reading and mathematics.

The research of the 1960's reveals that there have been numerous attempts to establish tutorial programs which have involved students teaching each other. The purposes of the tutorial programs have been to improve the academic skills and attitudes of the tutor, the learner or both. Compared to the learner, the tutor may or may not be: (1) older, (2) brighter, (3) better adjusted, (4) of a different socioeconomic class or (5) attending the same school.

With few exceptions, the evidence generated from these programs has been based upon descriptive studies, not empirical data. Little empirical data is available to support the assumption that tutors automatically learn what they tutor. As far as determined, no studies have determined whether tutoring results in significant achievement gains in a specific
subject area because the tutor has taught skills within that subject area to another student.

A number of studies have indicated, however, that the tutors as well as the learners may develop positive attitudes and make achievement gains. As Bender (1967) points out, the tutor is forced to organize the material he is tutoring in order to pass it on to the learner. In the same process, the tutor is organizing the material for his own learning or understanding. Bender's statement seems to have significant implications, but, to date there exists little empirical data which justifies his statement.

To date, no empirical studies are available which have investigated the sex difference pairing patterns of cross-age pairs in intergrade tutoring programs. Most studies have been concerned with the general learning patterns of the experimental group rather than the subsets of sexes. Most studies infer that various cross-age sex pairings are inconsequential, but no data has been generated to substantiate that inference.

**Rationale for the Study**

The major objective of this study was to determine the amount of transfer of learning which occurs for children who tutor. A second objective was to determine the extent that cross-age pairs play in the tutoring-learning process.

Many theories exist: (1) to explain how one learns and (2) to explain which sex is best suited for the elementary school environment. The investigator suggests that a high
correlation exists between attitudes and learning. In a recent study by Robertson (1971), empirical significance was established between tutoring and self-esteem gains on the part of the tutors. The tutors also showed gains in reading achievement after eight weeks of participation as tutors.

Four generalizations have emerged concerning tutorial programs: (1) various tutorial programs have arisen independent of each other in all parts of the United States, (2) the arrangements for tutoring take a great number of different forms, (3) educators generally agree that tutoring works and (4) little empirical data exists to support the viability of tutoring.

The above four conditions seem to suggest that tutors and learners benefit from tutoring programs. The benefits stem from the helping relationship of students working together. The major point of skepticism from the investigator stems from the fact that the assumptions of beneficial gains are based upon descriptive studies. Few tutoring studies have gathered empirical data from which to base any valid or reliable generalizations.

In the area of sex difference characteristics of cross-age pairs, no studies have attempted to measure the effect of tutoring on cross-age pairs to determine the most advantageous pairings for reading and mathematics. In studies where sex differences were listed as an adjunct (Lippitt and Lohman, 1965) and (Frager and Stern, 1970) no data were generated to base
valid or reliable generalizations, nor was the basic research design created to test for sex differences.

In the area of differences in learning patterns of elementary school boys and girls, most research indicates that girls generally score higher than boys at all levels on standardized tests. Gates (1961) points out that girls are academically superior to boys in the upper grades as well as the primary grades. Gates believes his data suggests environmental differences rather than maturational differences as the chief cause of the scholastic superiority held by the girls. He further states that it is possible that the girls pursue the kind of life in which more respect, more incentives and more opportunities for reading appear earlier and persist longer. It may be true that more boys than girls find little or no early need for learning to read. These boys fall behind at the beginning of school and a large number of them remain in a low reading group throughout the grades.

Robinson (1965) suggests that generally girls more than boys experience life situations in which there are greater opportunities, incentives and respect for reading. Because of different role expectations in our culture, the boys have felt less of a need for reading at an early age. Powell (1967) stated that there is a possibility that there is something inherent in the school situation which favors girls. The social setting may also militate against the progress of boys, according to Powell.
In the area of attitudes and goals of boys about school, Minuchin (1966) states that boys were more resistant and negative about school and therefore less concerned with achievement and recognition. Girls were more concerned with achievement and recognition, identified more positively with school and were more apt to find the school environment more pleasant.

The research literature indicates that there is something inherent in the elementary school of the 1970's which either turns boys off or simply never turns them on. The research also supports the notion that the schools of today are not particularly well suited for boys. The problem may be twofold: (1) lack of motivation on the part of boys due to the present structure of the system and (2) an archaic curriculum based upon cognitive skills with little or no emphasis on the affective domain. As stated by Lippitt and Lohman (1965), cross-age interaction is probably a potent learning experience for children of all ages. At present the powerful potential educational resource represented by cross-age relationships among children has not been fully utilized.

Intergrade tutoring may be a way to counteract the multifaceted problem just described. Intergrade tutoring rests upon three underlying assumptions. These underlying assumptions may be a partial solution to the problems experienced by boys in the elementary school environment.
One assumption underlying this study is that much of the process of socialization by young children stems from model identification with older children. Zach (1969) states that the relationship between tutor and learner appears to have become a potent source of social reinforcement for children. This relationship includes the notion that an older child can communicate more effectively with a younger child than a teacher, and is less likely to be looked at as an authority figure by the younger child. Cloward (1966) points out that the technique of tutoring has advantages for the younger child, where the value of having an individual tutor cannot be measured in terms of the acquisition of academic skills alone. For example, if the tutor is a male, he may serve as a model for the younger boy. Model identification is important in view of the motivational problems which may exist for boys.

A second assumption underlying this study is that the involvement of older children with an adult teacher in a non-classroom setting may result in both the teacher and the child perceiving each other's role in a different perspective. This may have a significant socialization effect because of: (1) the important motivational value of a trust and responsibility relationship for children with adults that seems to be lacking in the present structure of the elementary school and (2) according to Glasser (1969), the opportunity for children to work through some of their own peer relationship problems.
A third assumption underlying this study is that a child may develop a more realistic image of himself. According to Glasser (1969) and Robertson (1971), the child may gain a greater appreciation of his own abilities and skills, if he has an opportunity to help younger children acquire skills he already possesses.

The thesis of the investigator is that tutoring may be a vehicle for helping children develop positive affective behaviors and cognitive skills. The degree to which tutoring may facilitate the learning process was explored in this study. The study attempted to determine what cognitive skills are acquired by the tutor. The study also attempted to determine the most advantageous cross-age sex pairings for reading and mathematics so that the tutor and the learner gain maximum benefits from participation in an intergrade tutorial program.

DEFINITION OF TERMS

The following definitions were adopted for the purpose of the present study.

Affective Behavior: According to Krathwohl (1967), the affective domain pertains to the objectives which describe human organism changes in: (1) interest, (2) attitudes and (3) values. Affective behavior also describes the development of appreciation and adequate adjustment by the human organism.

Cognitive Skills: According to Bloom (1969), cognitive skills are those areas of the human organism which pertain to...
the recall or recognition of knowledge and the development of intellectual abilities and skills.

**Cross-Age Pairs:** Cross-age pairs are two people grouped together and engaged in the tutoring-learning process. One or both may function as the tutor or the learner. Cross-age pairs in the present study were a sixth grader paired with either a second grader or a third grader.

**Intergrade Tutoring:** Intergrade tutoring involves children from one grade level helping children from another grade level develop cognitive skills. The present study involved sixth grade students helping second and third graders in the disciplines of reading and mathematics.

**Learner:** A learner is a second grade child receiving sight word instruction and word attack instruction from a sixth grade tutor. A learner is also a third grade child receiving basic mathematics instruction from a sixth grade tutor.

**Model Identification:** Model identification refers to a child imitating the actions of someone he may identify with. In the present study, it was hoped that the learners would have positive identification with the sixth grade tutors and the sixth grade tutors would have positive identification with the investigator.

**Sex Differences:** Sex differences refer to environmental situations in which: (1) girls find a greater need for early
reading than boys, (2) girls find the elementary school environment more suited to their needs than the needs of boys, (3) girls exhibit a type of behavior which is accepted in the elementary school environment, where boys do not exhibit this type of behavior and (4) girls find a greater early need for success and recognition than do boys. These perceived differences enable girls to find greater success in the elementary school environment than boys.

Socialization: Socialization is the process of peer acceptance and the attainment of interpersonal skills which enable a person to develop a better understanding of himself and his relationships with others.

Tutor: A tutor is a sixth grade student trained to provide reading instruction to second graders and mathematics instruction to third graders.

Tutor Training: Sixth grade experimental subjects received training on specific tutor behaviors, tutoring procedures and program objectives from the investigator. The training was accomplished in five, one hour sessions. Since there were two experimental groups, separate but equivalent training sessions were conducted. A more descriptive discussion of tutor training is contained in the Research Methods and Procedures section of Chapter III.
RESEARCH QUESTIONS

Two basic questions are asked in the present study:

(1) "Is there significant transfer in what a tutor teaches to what a tutor learns?"

(2) "Is there a significant difference between various cross-age sex pairs regarding reading and mathematics achievement?"

(a) Boy tutor-Boy learner
(b) Boy tutor-Girl learner
(c) Girl tutor-Boy learner
(d) Girl tutor-Girl learner

One ancillary question is asked in the present study:

(1) "Is there a significant difference present which warrants the establishment of specific cross-age sex pairings for the subjects of reading and mathematics?"

For simplification purposes, the design of the present study employed two experimental groups and one control group. One experimental group of sixth grade children (Experimental Group I) received tutor training and then commenced with tutoring second grade children in the area of reading. The other experimental group of sixth grade children (Experimental Group II) received tutor training and then commenced tutoring third grade children in the area of mathematics. The additional experimental group was needed in order to determine whether the most advantageous sex pairing was determined by:
RESEARCH HYPOTHESES

The present study was designed to test and analyze the following null hypotheses:

Hypothesis No. 1: There will be no significant difference in the posttest reading achievement mean scores among groups as measured by the Stanford Diagnostic Reading Test, Level II.

Hypothesis No. 2: There will be no significant difference in the posttest mathematics achievement mean scores among groups as measured by the California Test of Basic Skills, Mathematics Section, Level I.

Hypothesis No. 3: There will be no significant difference between boys and girls in Experimental Group I in the posttest reading achievement mean scores as measured by the Stanford Diagnostic Reading Test, Level II.

Hypothesis No. 4: There will be no significant difference between boys and girls in Experimental Group II in the posttest mathematics achievement mean scores as measured by the California Test of Basic Skills, Mathematics Section, Level I.

Hypothesis No. 5: There will be no significant difference in the posttest reading achievement mean scores between the boys who tutor boys and the girls who tutor boys in Experimental Group I.
Hypothesis No. 6: There will be no significant difference in the posttest reading achievement mean scores between the boys who tutor girls and the girls who tutor girls in Experimental Group I.

Hypothesis No. 7: There will be no significant difference in the posttest reading achievement mean scores between the boys who tutor boys and the boys who tutor girls in Experimental Group I.

Hypothesis No. 8: There will be no significant difference in the posttest reading achievement mean scores between the girls who tutor boys and the girls who tutor girls in Experimental Group I.

Hypothesis No. 9: There will be no significant difference in the posttest mathematics achievement mean scores between boys who tutor boys and the girls who tutor boys in Experimental Group II.

Hypothesis No. 10: There will be no significant difference in the posttest mathematics achievement mean scores between the boys who tutor girls and the girls who tutor girls in Experimental Group II.

Hypothesis No. 11: There will be no significant difference in the posttest mathematics achievement mean scores between the boys who tutor boys and the boys who tutor girls in Experimental Group II.
Hypothesis No. 12: There will be no significant difference in the posttest mathematics achievement mean scores between girls who tutor girls and girls who tutor boys in Experimental Group II.
CHAPTER II

REVIEW OF RELATED LITERATURE

There are four major areas of research literature which have a direct bearing on the present study. First, tutorial programs involving upper elementary school students tutoring younger students will be discussed. Second, studies focusing on tutor achievement and attitude gains will be reported. Third, studies dealing with sex differences and academic achievement will be examined. Fourth, guidelines and procedures for training tutors will be discussed.

Robertson (1971) has provided an excellent chronology highlighting the development of tutorial programs in order to provide historical perspective. He described "man's earliest attempts to share and communicate information by one-to-one instruction". Robertson cited the Lancastrian Tutorial System which was established in New York City in 1806 to provide the earliest mention of organized tutoring in the United States.

In the twentieth century, very little journalistic information regarding tutoring appeared prior to 1960. However, some important studies were done by Horst (1924, 1931, 1933, 1940) in which the effects of peer tutoring were examined. Horst concluded that about 60 percent of the students who were peer tutored benefited from it. Carter (1936) attempted
to analyze some of the limitations of tutors. Mason (1940) attempted to analyze some of the affective aspects of tutoring. These studies were all quite vague, with generalizations based upon observation, questionnaires and case studies. The basic research designs employed were based upon the descriptive study model of Thorndike.

**Elementary School Tutorial Programs**

This section describes several empirical and non-empirical tutorial programs in which: (1) the tutorial program was self contained on the elementary school site, (2) upper grade elementary school children were used as tutors for lower grade elementary school children and (3) the tutors were either trained or not trained.

In a study conducted by Durrell (1959) the criterion for program success was to determine pupil-team learning effectiveness. The study was conducted in Dedham, Massachusetts, under a contract obtained from the U. S. Office of Education during the 1958-1959 academic year. Forty-seven self contained classrooms of intermediate grade children were selected from eight schools. Research fellows were in the classrooms daily during the school year assisting the teachers. Metropolitan Achievement Tests were used for pretests and posttests of general achievement comparisons. Average achievement in the team learning group improved six months over the control group in grade six and four months in grade
four, except in spelling. There was no measure of sex
differences or whether the children making gains were
improving their self-esteem.

Meyers (1965) examined the pupil pair reinforcement in
verbal tasks. Subjects were 194 elementary school pupils
from grades four, five and six. Meyers established four
learning conditions for each pupil interaction. The objective
was for the children to teach one another certain German nouns.
The results indicated that children can successfully instruct
one another in the specific subject area of German.

Lippitt and Lohman (1965) conducted a series of pilot
projects funded by the U. S. Office of Education over a three
year period to determine the effectiveness of intergrade
tutorial programs. Their sample consisted of an undisclosed
number of sixth graders who were involved with first, second,
third and fourth graders in a tutorial program. The tutors
were trained in interaction skills as well as product referenced
skills. The tutors worked two to three times a week with the
same child. Each session lasted from twenty to thirty minutes
depending upon the age or attention span of the learner.
Low-achieving students were particularly interested in
functioning as tutors. Lippitt and Lohman concluded that the
older children, especially boys improved their relationship
with adults. The older children also obtained an improved
self-image from participation in the tutorial program. The
results reported by Lippitt and Lohman were based upon observations and subjective evaluations of the participating teachers.

Shaver and Nuhn (1968) conducted an experimental tutorial program in the Logan and Cache County Schools in Northern Utah. They obtained a sample of 68 sixth graders to receive on the job training to tutor first graders in the area of reading. Students were selected on the basis of having a poor self-image or being a low achiever. The tutors were assigned to a first grade classroom and instructed the first grade learners in sight word vocabulary for a period of twenty to thirty minutes a day. The results were that the first grade teachers felt that their first grade children improved their reading skills and that the sixth graders improved their self-image. No statistical measures were taken to verify their generalizations.

In a study conducted by Alsin (1969) sixth grade students were trained to work in readiness activities with first graders in Visalia, California. An undisclosed number of sixth and first graders participated in the program. The sixth grade students were trained to function as monitors in the first grade classrooms. The tutors spent a period of twenty-five minutes a day in working with the first graders. The tutors were trained to be positive in their interaction skills with the first graders. Only observation by the participating teacher
was used to measure the success of the program. The teachers of the sixth graders felt that the sixth graders had benefited from participation in the program.

In a study by Nyby (1968), remedial reading teachers at Bellvue School in Santa Rosa, California obtained the services of fifth and sixth grade students to assist primary children. These tutors had a tutoring center which was separate from the rest of the classroom where they worked with the second and third grade children. The major emphasis of the program was learner centered. No statistical measures were used to validate the generalizations that the program worked to the benefit of both the tutors and the learners.

Meleragno and Newmark (1969) planned a tutorial community concept where over a period of six years tutors would be trained and would interact with children of grade levels two or more years behind the level of the tutor. The Community Tutorial Center was financed by a grant from the Ford Foundation. The study is being conducted at Pacoima Elementary School in Los Angeles, California. In the first year of their study, Meleragno and Newmark took a random sample of 50 fifth graders to work with a random sample of 50 kindergarten children. The research design consisted of 18 unnamed instructional objectives. The kindergarten children were measured by subjective criteria and no significant gains were reported. The tutored kindergarten children achieved the
same as or lower than the non-tutored kindergarten children. The tutors were evaluated by the same subjective criteria (average days in attendance and grade point average) and showed no significant gains compared to the fifth graders who did not tutor. The posttest data was based on an N of 22 fifth graders (N of 50 in pretest data) compared to the 197 fifth graders who did not tutor. The research design and measurement instruments were very poorly designed to work in the desired program of Melaragno and Newmark.

The types of intergrade tutorial programs described in this section point out the need for effective research designs to be employed to measure the value of tutoring. Whether intergrade tutoring works remains unanswered by statistical verification. The research of the 1960's shows that educators generally agree that tutorial programs involving upper grade elementary school tutors working with primary grade learners works, but cannot verify tutorial success due to inadequate research designs and no serious attempts to measure the results in a form other than by observation. It is, therefore, one of the objectives of the present study to determine statistically the empirical value of tutoring.
Tutor Achievement and Attitude Gains

In the area of tutor achievement gains, very few empirical studies have been conducted to statistically verify the academic and attitudinal gains which are observed to take place by many investigators.

Frager and Stern (1970) in comparing two methods of training upper grade elementary tutors to instruct kindergarten children in reading readiness techniques, observed that the tutors experienced a change in attitude about themselves and toward the kindergarteners during participation in the program. The generalization was based upon observation by Stern rather than statistical validation.

Lippitt and Lohman (1965) reported experiences with sixth graders who tutored first, second, third and fourth graders. All statements about gains reported by Lippitt and Lohman were inferential and based upon subjective evaluation and observation (e.g. "the younger children seemed quite ready to accept the tutors, and applied themselves seriously to the learning tasks"). The study also stated that the sixth graders were observed to have made gains in self-image which was reflected in their classwork.

Bender (1967) reported in a descriptive study that the tutor has confidence that he knows the material passed on by him to the learner. As the material is explained to the learner by the tutor, it forces the tutor to understand,
perceptualize and verbalize and thereby to organize the material. Since the tutor is forced to organize the material in order to pass it on to the learner, he was in effect organizing the material for his own benefit. In this process, the learner was helped for the learner has: (1) been receiving individualized instruction and (2) received instruction at a level which has resulted in increased understanding for both the tutor and the learner. Bender's conclusions are monumental, but since they have not been statistically verified, they must remain only theories, not generalizations based upon empirical evidence.

In a study conducted by Taylor (1969), a sample of 31 tutored and 31 non-tutored children were matched by rank on their grade point averages. A t test was employed to test for significance. The results indicated that those children whose grade point average was less than 2.00 made significant gains. Those children whose grade point average was greater than 2.00 made gains that were not significant compared to the non-tutored counterparts. Again subjective measures were used in a research design to test for significance.

Hassinger and Via (1969) reported that tutors made observational behavior modifications in their appearance after tutoring for a period of five weeks. The tutors dressed neater, were cleaner and became more interested in what was going to happen to the learner after the tutorial
program culminated. Academically, a pre and post Nelson Denny Reading Test was administered to an N of 23 tutors and a Stanford Reading Test was administered as the pre and post instrument used to measure learner gains. The posttest F ratio of 5.82 was significant at the .01 level which indicated differences in achievement for the tutors. However, there was no control group used to verify the fact that the gains were made as a result of tutoring, not normal classroom instruction.

In all the studies reported by Harrison (1967, 1968, 1969, 1970, 1971) no statistical verification was established to verify the assumption that tutors made academic gains as a result of participation in an intergrade tutorial program. Harrison had empirically verified that structured tutoring results in academic gains for the learner, but not necessarily the tutor.

Robertson (1971) empirically verified the assumption that tutors made gains in self-image as a result of participation in an intergrade tutorial program. Robertson used an N of 96 in a pretest-posttest experimental control group research design. Tutors made significant gains in the concept of self, reading, and teachers. The measurement instrument used was a form of Osgood's Semantic Differential. This was the first reported empirical verification of tutors making beneficial attitudinal gains as a result of intergrade tutorial participation.
The studies reported in this section refer only to limited attempts to quantify the academic or attitudinal gains made by tutors. Most studies reported generalizations of tutor benefit based upon observations. Those studies by Taylor (1969) and Hassinger and Via (1969) utilized weak research designs in which the variable of classroom instruction went uncontrolled. The study by Robertson (1971) was the only study reported in the literature that made use of a control group or a sound research design. In the present study a research design modeled after Robertson's will be employed to determine the achievement gains made by tutors who participate in an intergrade tutorial program.

An important consideration raised by Bender (1967) concerning the assumption that tutors learn what they tutor will also be examined. It is the purpose of the investigator to determine empirically whether Bender's theory be accepted or rejected by means of empirical investigation.

Sex Differences and Academic Achievement

This section will be concerned with the relationship of sex of the elementary school child as an influential factor in the determination of academic success or failure of boys and girls. The research of the 1960's indicated that the girls have many environmental advantages over the boys in the typical elementary school program. Increasingly, more and more journalistic references have appeared about sex differences
between boys and girls in relationship to academic success as being environmental rather than maturational. In perspective with an intergrade tutorial program, no specific studies have been undertaken to determine the most advantageous sex pairings in a cross-age tutorial program. Also no specific studies have been undertaken to determine if sex differences do exist in an intergrade tutorial program.

Arthur I. Gates (1961) conducted a monumental study in which he concluded that with respect to standardized tests of achievement, girls were superior to boys in the upper grades as well as the primary grades. Gates conducted his study in twelve school districts in ten states. His N was 13,144. The N consisted of equal numbers of boys and girls. The experimental groups were tested with all three of the Gates Reading Survey Tests: (1) Speed of Reading, (2) Reading Vocabulary and (3) Level of Comprehension.

The data generated from this study indicated that significant differences between boys and girls exist at grade levels from second to eighth. The F ratio for each grade level was found significant at the .01 level. Gates interpreted his data by departing from the usual explanation for the girls' superiority in reading as being maturational. Gates believed that his explanation was one of environment rather than maturation. It might be possible that girls pursue a kind of life in which more respect, more incentives
and more opportunities for reading appear earlier and persist longer. He further explained that more boys than girls might find little or no early success or need to read. These boys fall behind at the beginning of elementary school and a relatively large number of these boys remain in the low reading group throughout the grades.

Mildred Hughes (1953) also refuted the maturation explanation for the academic success attained by the girls over the boys. Hughes felt that by the end of Grade I, the girls read significantly better than the boys. Hughes compared reading achievement of boys with that of girls at the end of Grade II. She found the greatest difference at the end of Grade III. Hughes concluded her study by stating that it is not clear at present whether just being a girl gives a young child a better chance for early reading success or something inherent in the school environment mitigates against the progress of the boys.

Robinson and Huchman (1953) concluded in their study of 1200 elementary children at the University of Chicago that in diagnosing reading disorders, maturational characteristics were completely unrelated to reading progress. Robinson further stated that there may be something inherent in the social setting of the elementary schools that may hinder the reading progress of boys.

Powell (1967) reports that boys in our society are taught
to view feminine pursuits with disfavor and many boys have perceived reading in the same vein. Powell further stated that our "cultural heritage encourages boys to seek roles which exemplify that mythical 'All-American Boy'-and that role does not emphasize reading in the idealized model".

Robinson (1955) stated that there is strong evidence, supported by research, of sex differences in reading achievement in the elementary school. According to Robinson, different role expectations and conceptions in our culture for boys may result in a failure of motivation for reading on the part of the boys. Robinson concluded by stating, "perhaps, too, boys are less interested in the routine nature of school with emphasis on rote and manners instead of inquiry and discovery".

Kohlberg (1966) concluded that differences in activity levels between boys and girls favor the girls in the social setting of the typical elementary classroom. This comparison of active, aggressive behavior of the boys versus the conforming, "nice" behavioral responses of the girls was underscored by Kohlberg, who suggested that "niceness" is a very important value to school-age girls, connoting nonaggression, interpersonal conformity, restraint and helpfulness. Because aggression has been considered a major component of badness by many teachers, it logically follows that boys exhibit these qualities and are readily labeled "bad" by many teachers, thus further alienating them from motivation.
for early reading.

Sears and Feldman (1966) reported that boys receive significantly more disapproval or blame than girls. Further, teachers criticising a boy are more likely to use harsh or angry tones, while criticisms of girls were generally conveyed in a normal tone.

In the area of attitudes and goals of boys about school, Patricia Minuchin (1966) declared, after working in a project at the Bank Street College of Education, that boys were more resistant and negative about school. Education was even less of a concern of the boys. Girls were more concerned with achievement and recognition, more positively identified with school and were more apt to find the entire experience of school life comfortable, pleasant and meaningful.

Tutorial programs may be an answer to the motivational problems experienced by boys. However, no tutorial programs have attempted to measure the relationship of sex differences and tutor achievement. In studies where sex differences were listed as an adjunct (Lippitt and Lohman, 1965; Zach, 1969; and Frager and Stern, 1970) no data was generated to base valid generalizations nor was the basic research design created to test for sex differences.
Tutor Training

For a researcher to review the literature in the area of tutor training, one must look only to two sources. The work and research done by Harrison (1968, 1969, 1970, 1971) and Neidermeyer (1970) empirically validates the assumption that tutors should be trained before having them work with the learners in an intergrade tutorial program.

A study by Neidermeyer (1970) revealed that instructional behaviors of trained tutors and untrained tutors were significantly different. The instructional behaviors referred to the objectives of the program which were based upon established psychological principles. Neidermeyer concluded that if it is desired that the tutors behave according to the basic principles of a program, then they should be trained to do so.

Harrison (1971) described empirically that tutors should be trained to: (1) do things to put the learner at ease, (2) avoid punishing behavior, (3) clarify the tasks expected of the learner, (4) provide the learner with verbal praise when appropriate and (5) check for mastery of a concept. Using these five tutor training techniques, Harrison empirically proved at the .01 level that trained tutors were more effective than untrained tutors.
Harrison (1969) stressed one important function of tutor training, the function of role playing on the part of the tutors. The importance of role playing cannot be overlooked in view of the motivational problems existing today on the part of boys. By role playing, children may achieve an important socialization effect because of: (1) the important motivational value of the trust and responsibility relationship for children, especially boys, with adults and peers that seems to be lacking in the present structure of the elementary school and (2) boys will gain the opportunity to work through some of their own peer relationship problems.

Harrison (1971) empirically validated the importance of tutor training. In a study conducted in the Santa Monica City Schools, Harrison found significant differences between trained tutors and untrained tutors.

In summary, there remain some unanswered questions regarding the viability of tutorial programs. Lippitt and Lohman (1965) did not empirically test for tutor achievement. Subsequent studies by Melaragno and Newmark (1969), Nyby (1968), Alsin (1969) and Shaver and Nuhn (1968) point out the need for effective research designs to be employed to measure the value of tutoring. The research of the 1960's shows that educators generally agree that tutoring works, but has not yet verified the tutorial success on empirical evidence. It is therefore,
one of the major objectives of the present study to determine statistically the empirical value of tutoring.

In the area of tutor achievement and attitude gains, most studies reported generalizations of tutor benefit based upon observations. Studies conducted by Taylor (1969) and Hassinger and Via (1969) utilized weak research designs. Robertson (1971) provided a model research design for testing and measuring achievement gains by the tutors. It is the purpose of the investigator to empirically verify the assumption that tutors learn what they tutor and transfer that knowledge to a specific area of the curriculum, either reading or mathematics.

Many studies in the area of sex difference characteristics of boys and girls in relation to academic success (Gates, 1961; Hughes, 1953; Robinson, 1955; and Powell, 1967) concluded that there is something environmentally wrong with the social setting of the American elementary school, especially for the boys. This environmental difference enables girls to achieve more significantly than boys in grades two through eight. No studies have been specifically designed to measure the value of tutoring on sex differences between boys and girls. The present study was designed to measure empirically the effects of intergrade tutoring on the academic achievement of boys and girls.

Tutor training has been empirically verified by Harrison
has empirically verified the assumption that trained tutors are significantly more effective than untrained tutors. The tutors used in the present study were therefore trained in a manner prescribed by Harrison and modified by Robertson (1971).

In conclusion, it is the thesis of the investigator that tutoring may be a vehicle for helping children, especially boys, develop positive affective behaviors and cognitive skills. The degree to which tutoring may facilitate the academic gains of tutors was yet to be determined and was thus one of the primary objectives of the present investigation. The present study also attempted to determine the most advantageous cross-age sex pairings for reading and mathematics so that the tutor and the learner may gain maximum benefits from model identification and participation in an intergrade tutorial program.
CHAPTER III

RESEARCH METHODS AND PROCEDURES

The purpose of the present study was to determine whether a tutor learns what he tutors in the areas of reading and mathematics. A second purpose of the present study was to determine the most advantageous cross-age sex pairings within an elementary school tutorial program regarding academic gains. Trained sixth grade tutors were utilized to teach mathematics skills to third graders and to teach word attack skills to second graders. This chapter is concerned with the selection of the sample, the research design used, the instruments and procedures utilized to collect the data and the statistical treatments used to analyze the data.

Sample Selection: Tutors

Ninety-six sixth grade students identified by their classroom teachers as low achievers in reading and mathematics served as subjects in this experimental study. Five sixth grade teachers from Wilbur Avenue Elementary School in Tarzana, California were asked to list students from the lower fiftieth percentile of the classes in reading and mathematics. Wilbur Avenue Elementary School, one of the 436 elementary in the Los Angeles City Unified School District, ranks in the lowest ten percent in terms of transiency.
Sample Selection: Learners

Five second grade teachers and five third grade teachers from Wilbur Avenue Elementary School selected 32 second grade children and 32 third grade children to receive tutoring. The second graders were chosen on the basis of needing individual help in word attack skills. The third grade children were chosen on the basis of needing individual help in learning basic mathematics skills. The only restriction placed in the selection of the learners was that from each grade level there were to be sixteen boys and sixteen girls in order to test and analyze the twelve hypotheses of the investigation.

Each second grade learner was paired with a sixth grade trained tutor on the basis of sex. Eight second grade boys were paired with eight sixth grade boys. Eight second grade boys were paired with eight sixth grade girls. Eight second grade girls were paired with eight sixth grade boys. Eight second grade girls were paired with eight sixth grade girls. A similar pairing relationship was designed with the third grade learners paired with the sixth grade tutors from Experimental Group II in an attempt to control for the subject matter variable.

Research Design

A Pretest-Posttest Control Group Design was used (Campbell and Stanley, 1969). An additional experimental
group was used in order to distinguish the effects of tutoring in two different disciplines, mathematics and reading.

Matching was used as an adjunct to randomization in order to gain statistical precision and to achieve equivalent groups (Campbell and Stanley, 1969). The ninety-six subjects were divided into three equivalent groups on the basis of their: (1) sex, (2) pretest scores on the Stanford Diagnostic Reading Test, Level II and (3) pretest scores on the California Test of Basic Skills, Mathematics Section, Level I. (See Appendices A, B, C, and D) Equivalent groups were achieved by ranking the boys and girls separately by their pretest scores on the reading and mathematics achievement tests. The three boys with the highest scores were then randomly assigned to either Experimental Group I, Experimental Group II or the Control Group. The three girls with the highest scores were then randomly assigned to either Experimental Group I, Experimental Group II or the Control Group. The same procedure was applied to the remaining subjects until Experimental Group I, Experimental Group II and the Control Group each had thirty-two subjects. The following paradigm represents the organization of the treatments.
<table>
<thead>
<tr>
<th>Week 1</th>
<th>Weeks 2-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>$O_1$</td>
<td>$X_R$</td>
</tr>
<tr>
<td>$O_1$</td>
<td>$X_M$</td>
</tr>
<tr>
<td>$O_1$</td>
<td>$M_r$</td>
</tr>
</tbody>
</table>

Where:
- $O$ indicates both a reading and mathematics achievement test occurs
- $M_r$ indicates subjects are matched according to a predetermined criteria and then assigned to one of the three groups utilized by the investigator
- $X_R$ indicates tutor training in reading
- $X_M$ indicates tutor training in mathematics
- $X'R$ indicates administration of the intergrade tutorial program in reading
- $X'M$ indicates administration of the intergrade tutorial program in mathematics

The subjects in Experimental Group I received tutor training in specific word attack skills (See Appendix E) followed by tutoring experience. The subjects in Experimental Group II received tutor training in specific mathematics skills (See Appendix F) followed by tutoring experience. The subjects assigned to the Control Group were only pretested and posttested. The two experimental groups and the control
group each had an n of 32 subjects.

The pretests were administered to all subjects during the last week of January, 1971. The posttests were given to all subjects during the first week of April, 1971.

Research Instruments:

The Stanford Diagnostic Reading Test (Level II) was used to measure the reading achievement of the sixth grade subjects. The Stanford Diagnostic Reading test is a group measure designed to identify needed areas of reading instruction. The Stanford Diagnostic Reading Test consists of six tests intended for students in the grade level range of 4.5 to 8.5. Four of the six tests were utilized in the present study. The four tests were: (1) vocabulary, (2) sound discrimination, (3) syllabication and (4) blending.

Robertson (1971) states that the Stanford Diagnostic Reading Test was standardized in 1965. The standardization procedures involved six school districts including approximately 12,000 cases. The information yielded norms, intercorrelations among subtests and other measures of test reliability.

The California Test of Basic Skills is the state mandated achievement for the sixth grade in the State of California. It consists of ten separate achievement tests covering verbal and quantitative skills. The mathematics section includes a test on computational ability and conceptual ability in the area of mathematics.
The California Test of Basic Skills was standardized in 1965. The standardization procedures involved eleven school districts in the State of California. The analysis included 14,500 cases. The information yielded norms, intercorrelations, validity and other test reliability measures.

Statistical Treatment of the Data:

A one-way analysis of variance was used to test null hypotheses 1 and 2 as stated in the present study. The .01 level of significance was utilized. Should the obtained F ratio be significant for either of the hypotheses, the Scheffe post-hoc comparison method will be employed to test the difference between all pairs of means. If the F ratios are insignificant, the null hypothesis will not be rejected.

For null hypotheses 3 through 12, a correlated t test was utilized. Should the obtained t score be significant, at the .05 level for a given null hypothesis, the null hypothesis will be rejected. If the obtained t score is not statistically significant for a given null hypothesis, the hypothesis will not be rejected.

Method:

The present study focuses on a differentiated intergrade tutoring program in which sixth grade students identified as low achievers in reading and mathematics performed as tutors for second and third graders in the disciplines of reading and mathematics. The prospective tutors were trained to (1)
provide word attack skills to the second graders and (2) provide basic mathematics instruction to third graders.

The training consisted of five, one hour sessions which were completed in five consecutive days. Since there were two experimental groups, separate, but equivalent training sessions were conducted. The training differed only as it pertained to the specific subject matter of mathematics and reading. All training sessions were conducted by the investigator. The investigator also functioned as liaison between tutors, learners and teachers.

The sixth grade students in the two experimental groups received training on specific tutor behaviors, program objectives and tutoring procedures. The subjects in Experimental Group I were taught how to use the Dolch Job Cards of Word Attack Skills. The subjects in Experimental Group II were trained in using the Houghton Mifflin Basic Mathematics Fact Cards. Both experimental groups were given opportunities to develop tutoring skills in role-playing situations with the investigator and with others from his particular experimental group. The tutor training model presented by Harrison (1969) and Robertson (1971) was synthesized for tutor training purposes.

Tutor Training: Experimental Group I

The first session consisted of informal discussions concerning (1) the function of a tutor, (2) the nature of the
learner, (3) means of rapport development with second graders, (4) the purposes and outcomes of the tutoring program and (5) specific techniques to be used in tutoring others.

The second session included an introduction, explanation, and demonstration of the *Dolch Job Cards of Word Attack Skills*. The principles covered in the first session were applied in practice during the second session. A question and answer period was held at the conclusion of this session to make sure that all subjects understood how to use the materials.

In the third session subjects in Experimental Group I again observed the proper use of the materials as demonstrated by the investigator. Experimental subjects then interacted with the investigator by alternating roles as a second grader and as a sixth grade student tutor. At the conclusion of the session a discussion of the role-playing interaction was held, pointing out the positive as well as the negative responses by the tutor and the learner.

The fourth session consisted of experimental subjects interacting with each other in role-playing activities, alternating the role of the tutor and the learner. At the conclusion of the session a review discussion was held. The discussion served as a summarization of the tutor training techniques acquired by the subjects in Experimental Group I.
The fifth and final session consisted of matching the tutor with the learner he was to tutor. Teachers from grade two attended the session and talked with the tutors discussing some general characteristics of second grade children. Following the discussion, each tutor was assigned to work with a second grade learner.

**Tutor Training: Experimental Group II**

The first session consisted of informal discussions concerning (1) the function of a tutor, (2) the nature of the learner, (3) means of rapport development with third graders, (4) the purposes and outcomes of the tutoring program and (5) specific techniques to be used in tutoring others.

The second session included an introduction, explanation and demonstration of the *Houghton Mifflin Basic Mathematics Fact Cards*. The principles covered in the first session were applied in practice during the second session. A thorough question and answer period was held at the conclusion of the session to make sure that all subjects understood how to use the materials.

In the third session, subjects from Experimental Group II again observed the proper use of the materials as demonstrated by the investigator. Experimental subjects then interacted with the investigator by alternating roles as a third grader and as a sixth grade student tutor. At the conclusion of the session a discussion of the role-playing interaction was held pointing out the positive as well as the negative responses.
by the tutor and the learner.

The fourth session consisted of experimental subjects interacting with each other in role-playing activities, alternating the role of the tutor and the learner. At the conclusion of the session a review discussion was held. The discussion served as a summarization of the tutor training techniques acquired by the subjects in Experimental Group II.

The fifth and final session consisted of matching the tutor with the learner he was to tutor. Teachers from grade three attended the session and talked with the tutors, discussing some general characteristics of third grade children. Following the discussion, each tutor was assigned to work with a third grade learner.

The actual tutorial sessions were held three days a week. Each tutor worked with his learner 25 minutes per day for a period of two months. Little instructional time was lost as the sixth grader tutored during his morning recess period.

As Robertson (1971) points out, tutoring sessions should be designed to provide: (1) continuous active response, (2) immediate knowledge of results, (3) positive reinforcement, (4) appropriate pacing of instruction and (5) correction of errors before proceeding. The present study followed the aforementioned criteria.

The tutor training program was designed to equip the tutors with ten specified tutoring techniques. The first three techniques will be referred to as Pre-Instructional
Techniques. The major purpose of these three techniques is to enable the tutor to develop rapport with the learner prior to and during each tutoring session. The remaining seven tutoring techniques are modified for each experimental group. These specified techniques will be referred to as **Instructional Techniques**. These techniques will be discussed in terms of the application by each experimental group.

**Pre-Instructional Techniques** (Experimental Groups I and II)

1. Do things to put the learner at ease.

   **Specified behavior:**
   
   a. Say hello to the learner.
   
   b. Praise the learner for something.
   
   c. Call the learner by his first name.
      Have the learner call you by your first name.

2. Clarify the prescribed task.

   **Specified behavior:**
   
   a. Determine if the child knows the function of the materials. (This should be done before the tutor requires the learner to deal with the first task.)
   
   b. By means of example, explain to the learner how the problems are solved. (This should be done before the tutor requires the learner to deal with the first task.)

3. Teach the learner how to verify his answer.

   **Specified behavior:**
   
   a. Before providing any feedback on the learner's response to the first problem, the tutor will help the learner carry out the function of the problem.
b. The tutor will provide the learner with a basis for determining whether or not the answer is correct.

**Instructional Techniques** (Experimental Group I-Reading)

1. Have the learner read each task aloud.

   **Specified behavior:**
   
   a. The learner will read all words aloud before determining an answer.
   
   b. If the learner has difficulty reading the directions, the tutor will read them for him.
   
   c. The tutor will be sure that the learner knows how to attack the problem.

2. Have the learner determine his answer before providing any feedback.

   **Specified behavior:**
   
   a. The learner will determine his answer before receiving any feedback or confirmation from the tutor.

3. Have the learner verify his answer.

   **Specified behavior:**
   
   a. The tutor will help the learner check his answer and then have the learner determine if the answer is correct or incorrect.

4. Provide the learner with verbal praise.

   **Specified behavior:**
   
   a. If the learner's first response is correct or the learner discovers the answer after only one or two attempts the tutor will praise him.
   
   b. The praise will consist of something more than "O.K." or "Right". The tutor should say something like "Great, you are really doing a fine job."
5. Avoid punishing behavior.

**Specified behavior:**

a. If the learner's verbal or written response to a problem is incorrect, the tutor will not say "No, that is not right." or "You're wrong."

b. The tutor will have the learner determine the why the answer is incorrect and then assist him in discovering the correct answer.

6. Reward the learner when appropriate.

**Specified behavior:**

a. If the learner discovers the correct response without any assistance from the tutor, the tutor will reward the child by saying "You are doing fine" or by some other positive verbal reward.

b. The tutor will encourage the learner with positive verbal praise when the learner successfully masters 80% of the criterion for any specific lesson.

c. The tutor will read to the learner at least once a week. The learner will read from his reading book to the tutor at least once a week.

7. Check for mastery on designated problems.

**Specified behavior:**

a. The tutor will review incorrect responses by the learner from the Dolch materials and the tutor will attempt to have the learner check his answer independently.

b. The tutor will go on to the next problem if the learner is unsuccessful after three attempts with a given problem.

---

**Instructional Techniques (Experimental Group II-Mathematics)**

1. Have the learner read each equation aloud.

**Specified behavior:**

a. The learner will read the equation aloud before determining an answer.
b. The learner will describe the mathematical operation to be used to solve the problem.

2. Have the learner determine his answer before providing any feedback.

   Specified behavior:
   a. The learner will determine his answer before receiving any feedback or confirmation from the tutor.

3. The learner will verify his answer.

   Specified behavior:
   a. The tutor will help the learner check his answer and then have the learner determine if the answer is correct or incorrect.

4. Provide the learner with verbal praise.

   Specified behavior:
   a. If the learner's first response is correct or the learner discovers the answer after one or two attempts, the tutor will praise him.
   b. The praise will consist of something more than "O.K." or "Right". The tutor will say something like "Great, you are really doing fine."

5. Avoid punishing behavior.

   Specified behavior:
   a. If the learner's verbal or written response to a problem is incorrect, the tutor will not say "No, that is not right" or "You're wrong."
   b. The tutor will have the learner determine why the answer is incorrect and then assist him in discovering the correct answer.

6. Reward the learner when appropriate.

   Specified behavior:
   a. If the learner discovers the correct response without any assistance from the tutor, the tutor will reward the learner by saying "You are doing fine" or by some other positive verbal reward.
b. The tutor will encourage the learner with positive verbal praise when the learner successfully masters 80% of the criterion for any specific lesson.

7. Check for mastery on designated problems.

Specified behavior:

a. The tutor will review incorrect responses by the learner from the mathematics materials and the tutor will attempt to have the learner check his answer independently.

b. The tutor will go on to the next problem if the learner is unsuccessful after three attempts with a given problem.
CHAPTER IV
PRESENTATION AND ANALYSIS OF THE DATA

This chapter presents and analyzes the results of the study. A distinct, one-way analysis of variance was applied to test null hypotheses 1 and 2 as stated in the present study. The .01 level of significance was utilized. A correlated t test was used to analyze the data applied to null hypotheses 3 through 12. The data were analyzed for the for the significance between means (Garrett, 1966). In each instance the level of significance necessary to reject the null hypotheses was set at the .05 level. Each hypothesis was treated separately.

When the obtained F ratio was found statistically significant for hypotheses 1 and 2, the Scheffe post-hoc multiple comparison method was applied to test the difference between all pairs of means. Where the F ratio was non-significant, the null hypothesis was not rejected. When the obtained t score was found significant, the null hypothesis was rejected. When the obtained t score was found non-significant, the null hypothesis was not rejected.

Hypothesis No. 1

The null hypothesis stated that there would be no significant difference in the posttest reading achievement mean scores among groups as measured by the Stanford Diagnostic Reading Test, Level II.
TABLE 1

THE POSTTEST ANALYSIS OF VARIANCE SUMMARY TABLE ON THE STANFORD DIAGNOSTIC READING TEST (N = 96)

<table>
<thead>
<tr>
<th>Source</th>
<th>Errors of Estimate</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>14,241</td>
<td>2 (k-1)</td>
<td>7,121</td>
<td>10.02*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>66,114</td>
<td>93 (N-k)</td>
<td>711</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>80,355</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p <.001

There was significant difference among groups on the posttest reading achievement mean scores. Therefore, Hypothesis No. 1 was rejected. The results obtained from the analysis of variance showed that there were significant differences in the reading achievement of the three groups. The Scheffe test was applied to test the significance between all pairs of means. The results are reported in Table 2.

TABLE 2

THE SCHEFFE POST-HOC MULTIPLE COMPARISON SUMMARY TABLE ON THE STANFORD DIAGNOSTIC READING TEST

<table>
<thead>
<tr>
<th>Means</th>
<th>Diff.</th>
<th>Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set I</td>
<td>Set II</td>
<td>Set III</td>
</tr>
<tr>
<td>104.53</td>
<td>80.37</td>
<td></td>
</tr>
<tr>
<td>104.53</td>
<td></td>
<td>77.44</td>
</tr>
<tr>
<td></td>
<td>80.37</td>
<td>77.44</td>
</tr>
</tbody>
</table>
The results of the Scheffé test indicated that the differences between the means of Sets I and II and Sets I and III were significant at the .05 level. The difference between the means of Sets II and III was not significant at the .05 level.

These findings indicate that the sixth grade student tutors in Experimental Group I (Set I) achieved significant gains in reading. The gains made by the tutors in Experimental Group I were significantly different than those made by Experimental Group II (Set II) and the Control Group (Set III). There was no significant difference between the reading gains made by the Control Group and Experimental Group II. Neither the pretests nor the act of tutoring in mathematics had a significant effect on the posttest reading results.

**Hypothesis No. 2**

The null hypothesis stated that there would be no significant difference in the posttest mathematics mean scores among groups as measured by the California Test of Basic Skills, Mathematics Section.
TABLE 3
THE POSTTEST ANALYSIS OF VARIANCE SUMMARY TABLE
ON THE CALIFORNIA TEST OF BASIC SKILLS
MATHEMATICS SECTION (N = 96)

<table>
<thead>
<tr>
<th>Source</th>
<th>Errors of Estimate</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sum of Squares</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>17,775</td>
<td>2</td>
<td>8,888</td>
<td>9.39*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>88,001</td>
<td>93</td>
<td>946</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>105,776</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .001

There was a significant difference among groups on the posttest mathematics achievement mean scores. Therefore, Hypothesis No. 2 was rejected. The results obtained from the analysis of variance showed that there were significant differences in the mathematics achievement among the three groups. The Scheffé test was applied to test the significance of the differences between all pairs of means. The results are reported in Table 4.

TABLE 4
THE SCHEFFE POST-HOC MULTIPLE COMPARISON SUMMARY TABLE ON THE CALIFORNIA TEST OF BASIC SKILLS, MATHEMATICS SECTION (N=96)

<table>
<thead>
<tr>
<th>Means</th>
<th>Diff. M's</th>
<th>Confidence Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set I</td>
<td>Set II</td>
<td>Set III</td>
</tr>
<tr>
<td>63.78</td>
<td>80.06</td>
<td>16.28±(16.04)</td>
</tr>
<tr>
<td>63.78</td>
<td>57.34</td>
<td>6.44±(16.04)</td>
</tr>
<tr>
<td>80.06</td>
<td>57.34</td>
<td>22.68±(16.04)</td>
</tr>
</tbody>
</table>
The results of the Scheffe test indicated that the differences between the means of Sets I and II and Sets II and III were significant at the .05 level.

These findings indicate that the sixth grade student tutors in Experimental Group II made significant academic gains in mathematics. The gains made by the tutors in Experimental Group II (Set II) were significantly different from the gains made by Experimental Group I (Set I) and the Control Group (Set III). There was no significant difference between the mathematics gains made by the Control Group and Experimental Group I. Neither the pretests nor the act of tutoring in reading had significant effect on the posttest mathematics results.

Hypothesis No. 3

The null hypothesis stated that there would be no significant difference between boys and girls in Experimental Group I in the posttest reading achievement mean scores as measured by the Stanford Diagnostic Reading Test.

TABLE 5
A COMPARISON OF POSTTEST MEAN SCORES OF BOYS AND GIRLS IN EXPERIMENTAL GROUP I AS MEASURED BY THE STANFORD DIAGNOSTIC READING TEST

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SEm</th>
<th>Dm</th>
<th>D-SEm</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>16</td>
<td>116.31</td>
<td>18.92</td>
<td>4.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>16</td>
<td>97.75</td>
<td>26.62</td>
<td>6.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .01 (2.75)
The difference between the reading achievement mean scores of boys and girls in Experimental Group I was found to be significant. Therefore, Hypothesis No. 3 was rejected. The results indicate that boys in Experimental Group I made significantly larger reading achievement gains than girls as a result of tutoring second graders in the area of reading.

Hypothesis No. 4

The null hypothesis stated that there would be no significant difference between boys and girls in Experimental Group II in the posttest mathematics achievement mean scores as measured by the California Test of Basic Skills, Mathematics Section.

TABLE 6

A COMPARISON OF POSTTEST MEAN SCORES OF BOYS AND GIRLS IN EXPERIMENTAL GROUP II AS MEASURED BY THE CALIFORNIA TEST OF BASIC SKILLS, MATHEMATICS SECTION

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SE&lt;sub&gt;m&lt;/sub&gt;</th>
<th>D&lt;sub&gt;m&lt;/sub&gt;</th>
<th>D-SE&lt;sub&gt;m&lt;/sub&gt;</th>
<th>df</th>
<th>t</th>
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<tr>
<td>Boys</td>
<td>16</td>
<td>83.25</td>
<td>10.61</td>
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<td>6.29</td>
<td>4.31</td>
<td>31</td>
<td>1.43*</td>
</tr>
<tr>
<td>Girls</td>
<td>16</td>
<td>76.86</td>
<td>12.72</td>
<td>3.28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p > .05 (2.13)

The difference between the mathematics achievement mean scores of boys and girls in Experimental Group II was non-significant. Therefore, the null hypothesis was not rejected.
Hypothesis No. 5

The null hypothesis stated that there would be no significant difference in the posttest reading achievement mean scores between the boys who tutored boys and the girls who tutored boys in Experimental Group I.

TABLE 7

A COMPARISON OF THE POSTTEST READING ACHIEVEMENT MEAN SCORES OF BOYS WHO TUTORED BOYS AND GIRLS WHO TUTORED BOYS IN EXPERIMENTAL GROUP I

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SEM</th>
<th>Dm</th>
<th>D-SEM</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys-Boys</td>
<td>8</td>
<td>121.84</td>
<td>14.00</td>
<td>4.24</td>
<td>17.84</td>
<td>5.12</td>
<td>15</td>
<td>3.68*</td>
</tr>
<tr>
<td>Girls-Boys</td>
<td>8</td>
<td>104.00</td>
<td>11.50</td>
<td>4.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .01 (3.01)

The difference between the reading achievement mean scores of boys who tutored boys and girls who tutored boys in Experimental Group I was found to be significant. Therefore, Hypothesis No. 5 was rejected. The results indicate that the boys in Experimental Group I who tutored boys made significantly larger reading achievement gains than girls who tutored boys in Experimental Group I.

Hypothesis No. 6

The null hypothesis stated that there would be no significant difference in the posttest reading achievement mean scores between the girls who tutored girls and the boys who tutored girls in Experimental Group I.
TABLE 8
A COMPARISON OF THE POSTTEST READING ACHIEVEMENT MEAN SCORES OF BOYS WHO TUTORED GIRLS AND GIRLS WHO TUTORED GIRLS IN EXPERIMENTAL GROUP I

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SE_m</th>
<th>D_m</th>
<th>D-SE_m</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys-Girls</td>
<td>8</td>
<td>112.97</td>
<td>12.1</td>
<td>4.31</td>
<td>20.94</td>
<td>7.81</td>
<td>15</td>
<td>2.55*</td>
</tr>
<tr>
<td>Girls-Girls</td>
<td>8</td>
<td>92.03</td>
<td>22.1</td>
<td>6.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p <.05 (2.13)

The difference between reading achievement mean scores of boys who tutored girls and girls who tutored girls in Experimental Group I was found to be significant. Therefore, Hypothesis No. 6 was rejected. The results indicate that the boys who tutored girls in Experimental Group I made significantly larger reading gains than girls who tutored girls.

Hypothesis No. 7

The null hypothesis stated that there would be no significant difference in the posttest reading achievement mean scores between boys who tutored boys and boys who tutored girls in Experimental Group I.
TABLE 9

A COMPARISON OF POSTTEST READING ACHIEVEMENT MEAN SCORES OF BOYS WHO TUTORED BOYS AND BOYS WHO TUTORED GIRLS IN EXPERIMENTAL GROUP I

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SE_m</th>
<th>D_m</th>
<th>D-SE_m</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys-Boys</td>
<td>8</td>
<td>121.84</td>
<td>14.00</td>
<td>4.24</td>
<td>8.97</td>
<td>5.89</td>
<td>15</td>
<td>1.48*</td>
</tr>
<tr>
<td>Boys-Girls</td>
<td>8</td>
<td>112.97</td>
<td>12.20</td>
<td>4.31</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p > .05 (2.13)

No significant difference appeared between the mean scores of the boys who tutored boys and the boys who tutored girls in Experimental Group I. Therefore, the null hypothesis was not rejected.

Hypothesis No. 8

The null hypothesis stated that there would be no significant difference in the posttest reading achievement mean scores between the girls who tutor boys and the girls who tutor girls in Experimental Group I.

TABLE 10

A COMPARISON OF POSTTEST READING ACHIEVEMENT MEAN SCORES OF GIRLS WHO TUTORED BOYS AND GIRLS WHO TUTORED GIRLS IN EXPERIMENTAL GROUP I

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SE_m</th>
<th>D_m</th>
<th>D-SE_m</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls-Boys</td>
<td>8</td>
<td>104.00</td>
<td>11.50</td>
<td>4.13</td>
<td>11.97</td>
<td>7.17</td>
<td>15</td>
<td>1.61*</td>
</tr>
<tr>
<td>Girls-Girls</td>
<td>8</td>
<td>92.03</td>
<td>22.10</td>
<td>6.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p > .05 (2.13)
No significant difference appeared between the mean scores of the girls who tutored boys and the girls who tutored girls in Experimental Group I. Therefore, the null hypothesis was not rejected.

**Hypothesis No. 9**

The null hypothesis stated that there would be no significant difference in the posttest mathematics achievement mean scores between the boys who tutored the boys and the girls who tutored boys in Experimental Group II.

**TABLE 11**

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SEₘ</th>
<th>Dₘ</th>
<th>D-SEₘ</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys-Boys</td>
<td>8</td>
<td>87.00</td>
<td>7.31</td>
<td>3.36</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls-Boys</td>
<td>8</td>
<td>82.00</td>
<td>6.81</td>
<td>2.43</td>
<td>5.00</td>
<td>3.24</td>
<td>15</td>
<td>1.69*</td>
</tr>
</tbody>
</table>

*p > .05 (2.13)*

The difference between the mathematics achievement mean scores of boys who tutored boys and girls who tutored boys in Experimental Group II was non-significant. Therefore, the null hypothesis was not rejected.

**Hypothesis No. 10**

The null hypothesis stated that there would be no significant difference in the posttest mathematics achievement mean scores between the boys who tutor girls and the girls who tutor girls
in Experimental Group II.

**TABLE 12**

A COMPARISON OF POSTTEST MATHEMATICS ACHIEVEMENT MEAN SCORES OF GIRLS WHO TUTORED GIRLS AND BOYS WHO TUTORED GIRLS IN EXPERIMENTAL GROUP II

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
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<th>D_m</th>
<th>D-SE_m</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys-Girls</td>
<td>8</td>
<td>79.00</td>
<td>8.54</td>
<td>2.84</td>
<td>6.47</td>
<td>3.13</td>
<td>15</td>
<td>2.21*</td>
</tr>
<tr>
<td>Girls-Girls</td>
<td>8</td>
<td>73.00</td>
<td>5.14</td>
<td>2.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p < .05 (2.13)

The difference between the mathematics achievement mean scores of boys who tutored girls and girls who tutored girls in Experimental Group II was found to be significant. Therefore, Hypothesis No. 10 was rejected. The results indicate that the boys who tutored girls made significantly larger mathematics achievement gains than girls who tutored girls in Experimental Group II.

**Hypothesis No. 11**

The null hypothesis stated that there would be no significant difference in the posttest mathematics mean scores between the boys who tutored boys and the boys who tutored girls in Experimental Group II.
Hypothesis No. 12

The null hypothesis stated that there would be no significant difference in the posttest mathematics achievement mean scores between girls who tutored girls and girls who tutored boys in Experimental Group II.

TABLE 14
A COMPARISON OF POSTTEST MATHEMATICS ACHIEVEMENT MEAN SCORES OF GIRLS WHO TUTORED GIRLS AND GIRLS WHO TUTORED BOYS IN EXPERIMENTAL GROUP II

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>SE_m</th>
<th>D_m</th>
<th>D-SE_m</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls-Girls 8</td>
<td>73.00</td>
<td>5.14</td>
<td>2.47</td>
<td>9.00</td>
<td>4.84</td>
<td>15</td>
<td>1.93*</td>
<td></td>
</tr>
<tr>
<td>Girls-Boys 8</td>
<td>82.00</td>
<td>6.81</td>
<td>2.43</td>
<td>* p&gt;.05 (2.13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The difference between the mathematics achievement mean scores of girls who tutored girls and girls who tutored boys was non-significant. Therefore, the null hypothesis was not rejected.
CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This study investigated the effects of an intergrade tutoring program on the reading and mathematics achievement of sixth grade student tutors. The study also investigated the determination of the most advantageous cross-age sex pairings for second grade reading and third grade mathematics.

The significance of the study was based upon the assumption that tutors might learn what they tutor. It was also based on the assumption that the school environment of the 1970's is not well suited for boys. Tutoring may be a way for boys to: (1) develop positive attitudes toward school and themselves and (2) develop academic skills in the areas of reading and mathematics.

Factors which lent significance to the present study included the need: (1) to provide empirical evidence regarding the achievement gains in reading and mathematics for sixth graders who tutored in reading and who tutored in mathematics; (2) to determine whether boys make better tutors and make greater academic gains than girls as a result of tutoring; (3) to verify the assumption that the use of tutoring as a vehicle for model-identification for boys is positive and of benefit for boys who participate in an intergrade tutorial program.
The subjects were ninety-six sixth grade students identified as low achievers in reading by their classroom teachers. The sample was divided into two experimental groups and one control group.

A modified Pretest Posttest Control Group Design was used. The Stanford Diagnostic Reading Test was used to measure the reading achievement of the sixth grade children. The California Test of Basic Skills, Mathematics Section was used to measure the mathematics achievement of the sixth grade children. The pretests were administered during the last week of January, 1971. The posttests were administered during the last week of March, 1971.

Following the pretests, the two experimental groups each received five, one hour tutor training sessions in which they were taught specific tutor behaviors, tutoring procedures and program objectives. The two experimental groups were taught to use two instructional behaviors: (1) Pre-Instructional Skills and (2) Instructional Skills. Role-playing techniques were utilized in tutor training.

The subjects in Experimental Group I were assigned to tutor a second grader in the area of reading. The subjects in Experimental Group II were assigned to tutor a third grader in the area of mathematics. The subjects assigned to the Control Group did not tutor.
A one-way analysis of variance was applied to test null hypotheses 1 and 2. The .01 level of significance was utilized. The Scheffe post-hoc multiple comparison method was applied to test the difference between all pairs of means when the F ratio was found significant for either hypothesis 1 or 2. A correlated t test was used to measure null hypotheses 3 through 12. The .05 level of significance was utilized. If a given null hypothesis was found significant, it was rejected. If a given null hypothesis was found non-significant, it was not rejected.

Null Hypothesis No. 1 was rejected. There was a significant difference (p < .01) in the posttest reading achievement scores among groups. The results of the Scheffe test indicated that the sixth grade tutors who tutored in the area of reading were significantly different when compared to the other two groups.

Null Hypothesis No. 2 was rejected. There was a significant difference (p < .01) on the posttest mathematics achievement mean scores among groups. The results of the Scheffe indicated that the sixth graders who tutored in the area of mathematics were significantly different in their mathematics gains than the other two groups.

Null Hypothesis No. 3 was rejected. There was a significant difference (p < .01) between the boys and girls in Experimental Group I on posttest reading achievement.
mean scores. The results indicate that boy tutors in Experimental Group I made significant gains in reading achievement compared to the girls in Experimental Group I.

Null Hypothesis No. 4 was not rejected. There was no significant difference between boys and girls in Experimental Group II on the posttest mathematics achievement mean scores.

Null Hypothesis No. 5 was rejected. There was a significant difference (p < .01) on the posttest reading achievement mean scores. The results indicate that boys in Experimental Group I who tutored boys made significantly larger reading achievement gains than girls who tutored boys in Experimental Group I.

Null Hypothesis No. 6 was rejected. There was a significant difference (p < .05) on the reading achievement posttests. The results indicated that boys who tutored girls in Experimental Group I made significantly larger reading achievement gains than girls who tutored girls in Experimental Group I.

Null Hypothesis No. 7 was not rejected. There was no significant difference between the mean scores of the boys who tutored boys and the boys who tutored girls in Experimental Group I.

Null Hypothesis No. 8 was not rejected. There was no significant difference between the mean scores of the girls who tutored boys and the girls who tutored girls in Experimental Group I.
Null Hypothesis No. 9 was not rejected. No significant difference between the mean scores of boys who tutored boys and girls who tutored boys in Experimental Group II was found.

Null Hypothesis No. 10 was rejected. There was a significant difference (p < .05) in the posttest mathematics achievement mean scores. The results indicate that the boys who tutored girls made significantly larger mathematics achievement gains than girls who tutored girls in Experimental Group II.

Null Hypothesis No. 11 was not rejected. The difference between the mathematics achievement mean scores of boys who tutored boys and boys who tutored girls in Experimental Group II was non-significant.

Null Hypothesis No. 12 was not rejected. The difference between the mathematics achievement mean scores of girls who tutored girls and girls who tutored boys in Experimental Group II was non-significant.

**CONCLUSIONS**

The findings of the present study indicate that there is a significant transfer of learning in what a tutor teaches to what a tutor learns. Sixth grade student tutors developed significantly different and more positive academic gains as a result of tutoring in a specific area. Experimental Group I made significantly greater gains in reading achievement
due to tutoring in reading than either Experimental Group II (which tutored in mathematics) or the Control Group. Experimental Group II made significantly larger gains in mathematics achievement due to tutoring in mathematics than either Experimental Group I or the Control Group.

The present study also found significant differences in cross-age sex pairings for tutoring. In both reading and mathematics boys made the more significant gains. In reading, the boys who tutored the boys made the larger gains. In mathematics, the boys who tutored the girls made the larger gains. The boys who tutored girls in reading also made significant gains in reading achievement. There was no significant difference in either experimental group between girls who tutored girls and girls who tutored boys.

The possible explanations for the research results may be: (1) the girls may have emulated classroom teachers as a result of a more positive identification with school and teachers than boys, (2) the girls appeared to be not as easy to train as tutors compared to the boys, possibly because of the role expectations and model identification of their upper middle class environment and (3) boys seemed to relate more positively to the non-structured setting of one-to-one instruction.

The present study indicates that change can be made in the present structure of the school environment for boys. Tutoring may be a way to facilitate the motivational as well
as the model identification problems of boys. The present study also indicates that children who perform as tutors have a transfer of learning from what they teach to what they learn. The study indicates that for tutoring in the areas of reading and mathematics in an upper middle class elementary school, boys make the better tutors.

**Recommendations for Further Research**

In view of the findings of the present study, the following areas are recommended for further research.

First, a different testing instrument could be utilized to verify the results of the study.

Second, the present tutors could be utilized to train new tutors could be a source of further investigation.

Third, the utilization of a multi-media approach of tutor training, tutoring and tutor evaluation could be a source of further investigation.

Fourth, a series of longitudinal studies could be undertaken to follow and measure the growth of both the tutors and the learners in the present study.

Fifth, a study could be undertaken to identify the variables in tutors and the traits that make tutors successful.

Sixth, a study designed to train upper middle class sixth grade girls to be better tutors could prove beneficial.

Seventh, a replicative study could be undertaken to verify the results of the present study.
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Nyby, F. Students helping other students is helpful. *Clearing House*, 1968, 43, 27-34.


# APPENDIX A
## DATA SUMMARY OF GROUPS

<table>
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<th>MATCHED TRIO</th>
<th>CONTROL R1 R2 M1 M2</th>
<th>EXPERIMENTAL II R1 R2 M1 M2</th>
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</tr>
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<td>117  119  62  61</td>
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<td>113  118  78  80</td>
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<tr>
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<td>107  107  70  72</td>
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</tr>
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</tr>
<tr>
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<td>88   94   65  96</td>
<td>87   124  70  71</td>
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<td>87   119  53  57</td>
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</tr>
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APPENDIX B

TABLE 16

THE PRETEST ANALYSIS OF VARIANCE SUMMARY TABLE ON THE STANFORD DIAGNOSTIC READING TEST (N = 96)

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There was no significant difference in the pretest Stanford Diagnostic Reading Test mean scores among groups. This result was expected as a matching procedure was used to achieve equivalent groups.

APPENDIX C

TABLE 17

THE PRETEST RESULTS OF ANALYSIS OF VARIANCE SUMMARY TABLE ON THE CALIFORNIA TEST OF BASIC SKILLS, LEVEL I

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There was no significant in the pretest mathematics achievement mean scores among groups. This result was expected, as a matching procedure was used for grouping.
## APPENDIX D

### READING TUTORING

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## APPENDIX D (Continued)

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APPENDIX E

Sample-Dolch Job Card of Word Attack Skills

Say the word to your tutor.
How many syllables do you hear?
Draw a circle around each syllable.

1. window
2. chair
3. door
4. neighbor
5. following
6. teacher
7. telephone
8. street
9. monkey
10. rabbit
APPENDIX F

Sample-Houghton Mifflin Basic Mathematics Fact

Read the equation to your tutor. What operation will you use to solve the equation? Work the equation.

1. $22 + n - 34$

2. $n + 15 = 37$

3. $45 - 34 - n$

4. $78 - 45 - n$

5. $67 + n = 89$