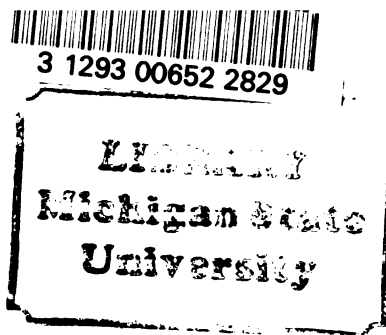




This is to certify that the
thesis entitled

The Effect of Team Teaching Upon Achievement
in and Attitude Towards Mathematics and English.

presented by

Karyn M. Ford

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Curriculum & Instruction

A handwritten signature in black ink, appearing to read "S. Corl III", written over a horizontal line.

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THE EFFECT OF TEAM TEACHING UPON
ACHIEVEMENT IN AND ATTITUDE TOWARD
MATHEMATICS AND ENGLISH

By

Karyn M. Ford

A DISSERTATION

Submitted to

Michigan State University

in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

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1981

ABSTRACT

THE EFFECT OF TEAM TEACHING UPON ACHIEVEMENT IN AND ATTITUDE TOWARD MATHEMATICS AND ENGLISH

By

Karyn M. Ford

Team teaching, which grew from the teacher shortage of the 1950's and survived the shift to teacher surplus, has proved to be an enduring innovation; yet, its support has been derived more from affirmation than through validation based on empirical evidence. Supporters of the team approach claim that it promotes development of a positive attitude toward subject while sustaining cognitive achievement. This study was an attempt to evaluate the effectiveness of the team teaching method versus the traditional method in advancing student achievement and evolving a positive attitude toward subject in mathematics and English so that more informed decisions regarding the continuation of the team environment in the Linden Senior High School could be made.

A review of the literature intimated that no clear or consistent data existed to support or refute that team teaching is superior to traditional teaching in promoting superior cognitive or affective outcomes.

The instrumentation utilized in this study to ascertain cognitive growth and data on attitudes toward subject consisted of the SRA Achievement Series, forms E and F/Red Level, mathematics and English subtests, and the Youth Questionnaire.

The subjects used in the study were freshmen students randomly scheduled by computer into the team or traditional sections of mathematics or English.

The English team taught group evidenced consistently lower achievement than did the English traditionally taught group in all subtest areas. The team teaching environment affected lesser achievement at a significant level in reading and in vocabulary when the data were analyzed for the total treatment group.

In mathematics, the traditional environment produced higher achievement in math concepts than did the team teaching environment, but not at a significant level. Achievement did prove significant in math computation when the data were analyzed for the total treatment group with the team taught group regressing more severely than the traditional group.

The results from the Youth Questionnaire failed to provide conclusive evidence that either environment affected attitude change at a significant level except for a negative change in the team taught students' attitude toward the importance of high grades in English, which was significant

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when analyzed for the total group. Responses from both treatment groups in English and mathematics clustered in the average to below average range.

The study evidenced little significant difference between the team taught and the traditionally taught students in either achievement or feelings of competency in subject. The tendency for the team taught group to achieve less and for the traditional group to have more positive attitudes was consistent in both mathematics and English. The study intimated that the team environment was less successful than the traditional environment in producing cognitive or affective growth, although not at statistically significant levels except in isolated subtest areas.

This research effort is dedicated
to my two daughters,
Kimberly Ann and Andrea Lynn,
whose childhoods were partly consumed
while this degree was undertaken.

ACKNOWLEDGEMENTS

I would like to acknowledge Dr. Sam Corl whose steady support, confidence and understanding have had a formative influence upon the completion of this degree. I would also like to acknowledge Dr. Ben Bonhorst for his insight and humane attitude, Dr. Richard Gardner for his constructive suggestions and Dr. Gene Rex for his perceptive criticism and helpfulness.

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CHAPTER I

INTRODUCTION TO STUDY

Background

Stemming from the teacher shortage in the 1950's, theorists devised the team teaching approach which has since become firmly implanted in the language and practices of American educators.

Born in a time of acute teacher shortage and a national concern for improving scientific and technical education... team teaching has survived both a shift from teacher shortage to teacher surplus and a change in the national concensus concerning the proper outcomes of education. Team teaching, in short, has proved to be an extraordinarily resilient innovation. (Armstrong, 1977, p. 65)

Since the original impetus for team teaching came from secondary education specialists, a greater number of studies have been conducted at this level; yet "the number of reported studies is small in light of the enormous publicity that team teaching has enjoyed..." (Armstrong, p. 69). The relatively small total number of studies on team teaching and its virtual disappearance as an area of research interest since 1970 may have resulted from the wide coverage the innovation received during the late 1950's and early 1960's. This "may have planted the idea that the widely heralded innovation sprang forth from a solid base

of research evidence" (Armstrong, p. 79). Empirical evidence to either affirm or deny the theoretical claims of team teaching with respect to student achievement and attitude toward the subject matter is unavailable. Team teaching represents one of those educational practices which have not been subjected to intensive investigation. "Support for team teaching has been more of a validation through affirmation than a validation based on empirical evidence" (Armstrong, p. 83). Further studies which may broaden the base of evidence in this area seem to be necessary.

Statement of the Problem and Significance of the Study

During the past decade a great amount of time and money has been allocated to establishing and implementing team teaching efforts. "In many school systems the new buildings and additions to old buildings were constructed to make team teaching not only desirable but a necessity" (McTeer and Jackson, 1977, p. 2). Part of the popularity of such architectural designs with both the architects and school boards has been lower costs of large open spaces suited to team teaching rather than the design of traditional classrooms. Amidst all of this fervor, only inadequate and conflicting evidence exists to demonstrate that team teaching has a positive effect on student achievement or attitude toward subject. According to Richard G. Schlaadt (1967), "relatively few scientific studies have attempted to evaluate the effectiveness of the team teaching in increasing student achievement" (p. 365). "Research in this area is not very

comprehensive nor are the results definitive" (Martin and Palvin, 1976, p. 314). The development of a positive attitude toward subject matter and learning is one of the major goals of American schools. "If team teaching seems to accomplish this goal to a greater degree than the traditional classroom, then this is a major reason for implementing and continuing the team teaching approach" (McTeer and Jackson, p. 5). However, the studies examined do not validate the existence of a relationship between a more positive attitude toward subject and the team teaching approach. When considering the outlay of money, time and effort involved in realizing a functioning team teaching environment, the development and continuation of this approach should be based on evidence which substantiates its benefits to students.

Purpose of the Study

The implementation of an innovation should be based on empirical evidence attesting its likelihood to contribute to positive student outcomes. Also, inherent in this implementation should be an evaluation procedure which will assess the effectiveness of the innovation within the district setting. The continued development and use of the team teaching approach demands evaluation on a large scale as well as within individual programs established in isolated schools.

In the fall of 1976, the Linden School District opened a new secondary structure which was architecturally

designed with three large open areas conducive to team teaching. With the opening of this school plant, both the mathematics and English departments, each of which inherited an open area the size equivalent of eight classrooms, developed a team teaching approach to be used with the basic freshman classes (those designed for the average freshman student). Due to the limited number of sections needed during any one semester, it is common for at least one of the basic math classes, entitled computation skills, and one of the basic English courses, entitled basic competency, to be taught in the traditional manner while other sections of the courses are taught by a team.

The teams in both subject disciplines consist of two teachers who are assigned the responsibility for instructing a group of students ranging in size from a minimum of fifty (50) to a maximum of seven (70), five days a week for a fifty-five (55) minute period over a twenty (20) week semester. Each team is housed in a large open space equal to eight traditional classrooms. The team most often uses the center of this area while other departmental classes, instructed in a traditional manner, are being conducted in the surrounding area. Both teams utilize junior and/or senior students who have evidenced proficiency in the subject area as teaching and clerical aides in these classes. The ratio between these student assistants and freshman students is kept between 1-5 and 1-8. The student assistants are allocated responsibility for working with a

small, relatively stable group of students. These assistants are responsible for the following jobs:

- 1) account for student progress and make available the appropriate materials (although the students in a group are usually covering the same unit, they may be at various points)
- 2) work individually or with total group providing explanation and immediate feedback as students move through the materials (Stoeri, 1979, p. 9)
- 3) correct or help students correct daily, objective assignments
- 4) alert team instructors to any apparent problems of students in their group

The team may identify one student assistant who helps with clerical tasks such as recording attendance, typing, running-off materials, filing, running errands and similar activities.

The student assistants free the team members to organize and supervise individual and group activities, to "diagnose", through an evaluation of student progress, and "prescribe" needed learning experiences for the students assigned to them. The team members spend a majority of their in-class time working with or testing individual students or roaming among the small groups of students giving help and directions. The teams in both the mathematics and English areas rarely work with the total number of students at any one given time except during the initial testing and orientation period.

The application, review and enrichment materials in both the subject disciplines are predominantly teacher made, but a variety of commercially available texts and supplementary soft wares such as skill sheets and tests are

provided in the teaching environments (Stoeri, p. 9). The course work is divided into units with minimal assignments indicated, and the use of any additional materials is determined on an individual student basis.

Although the English and mathematics teams both consist of two teachers, the mathematics team is more experienced and more committed to the team concept. The current mathematics team has worked together in this team situation since the opening of the school in 1976. The English team has one member who has hesitantly worked in this environment for two academic years and a newly hired department member who has had no experience in team teaching.

Since the implementation of the team approach, no evaluation of its effectiveness versus the traditional approach in computation skills and basic competency has been initiated. This study is a preliminary effort to determine the effect of the team approach on student achievement and attitude toward the subject in mathematics and English. The results may help administration and teachers determine whether the effort necessitated by the team approach is justifiable.

Areas to Be Investigated

The following research questions and the hypotheses generated by them were tested by this study.

Research Question 1: Is team teaching more effective than traditional teaching in increasing the English achievement of students as measured by the reading, vocabulary, spelling and language arts sections of the SRA Red Level Achievement

Series?

Research Question 2: Is team teaching more effective than traditional teaching in increasing the mathematics achievement of students as measured by the math concepts and math competency sections of the SRA Red Level Achievement Series?

In seeking to answer these questions about student achievement, in addition to the measurement of general achievement for each treatment group, the effects of prior achievement and past academic performance trend characteristics were explored, as well as differences in treatment effect on boys and girls.

Specifically, the following hypotheses were tested:

H1: There is no difference in reading achievement between team taught and traditionally taught students.

H2: There is no difference in reading achievement between team taught and traditionally taught students when controlled for prior achievement.

H3: There is no difference in reading achievement between team taught and traditionally taught students when controlled for past academic performance.

H4: There is no difference in reading achievement between team taught and traditionally taught students when controlled for gender.

H5: There is no difference in vocabulary achievement between team taught and traditionally taught students.

H6: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for prior achievement.

H7: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for past academic performance.

H8: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for gender.

H9: There is no difference in language arts achievement between team taught and traditionally taught students.

H10: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for prior achievement.

H11: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for past academic performance.

H12: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for gender.

H13: There is no difference in spelling achievement between the team taught and traditionally taught students.

H14: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for prior achievement.

H15: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for past academic performance.

H16: There is no difference in spelling achievement between team taught and traditionally taught students when

controlled for gender.

H17: There is no difference in math concepts achievement between team taught and traditionally taught students.

H18: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for prior achievement.

H19: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for past academic performance.

H20: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for gender.

H21: There is no difference in math computation achievement between team taught and traditionally taught students.

H22: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for prior achievement.

H23: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for past academic performance.

H24: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for gender.

One additional question was explored:

Research Question 3: Is team teaching more effective than traditional teaching in increasing student's feeling of competency in English and mathematics as measured by the

performance, importance of grades and ability scales of the Youth Questionnaire.

The following hypotheses were tested:

H25: There is no difference in attitude toward performance in English between team taught and traditionally taught students.

H26: There is no difference in attitude toward performance in English between team taught and traditionally taught girls.

H27: There is no difference in attitude toward performance in English between the team taught and traditionally taught boys.

H28: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught students.

H29: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught girls.

H30: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught boys.

H31: There is no difference in attitude toward ability in English between team taught and traditionally taught students.

H32: There is no difference in attitude toward ability in English between team taught and traditionally taught girls.

H33: There is no difference in attitude toward ability in English between team taught and traditionally taught boys.

H34: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught students.

H35: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught girls.

H36: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught boys.

H37: There is no difference in attitude toward the importance of high grades in mathematics between team taught and traditionally taught students.

H38: There is no difference in attitude toward the importance of high grades in mathematics between the team taught and traditionally taught girls.

H39: There is no difference in attitude toward the importance of high grades in mathematics between the team taught and traditionally taught boys.

H40: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught students.

H41: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught girls.

H42: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught boys.

Limitations on the Study

This study is limited because it concerns only one suburban secondary school in Linden, Michigan, which inhibits the generalizability of the findings. The specific configuration of the teams also limits the generalizability of the study. Since the curriculum is organized on a semester basis, the duration of the study was limited to one twenty-week semester which may be inadequate to evidence significant changes in achievement and/or attitude. Also, due to changes in personnel in the English team since 1976, the English team has had less experience than the mathematics team which has been together since the onset of this approach in Linden. This difference in experience may influence the effectiveness of the teams. Finally, the outcome of this study may be influenced by variables which were not considered and on which data were not gathered.

Definition of Terms

Team Teaching

An instructional organization that involves multiple teaching personnel (two in this instance) sharing equal responsibility for the total instruction in the specific subject areas of the group of students assigned to them. Team teaching is purported to be better than traditional teaching because it takes advantage of individual teacher strengths, it spurs creativity in teaching because of teacher visibility, it facilitates individualized instruction and provides for better sequencing and pacing of instructional increments.

The team teaching instructional model provides for a close relationship between colleagues and between teachers and students and is accredited with producing better academic achievement and more positive attitudes in students.

Traditional Teaching

An approach which looks upon the class as an entity. One teacher, working individually, holds the responsibility for the total instruction in the specialized subject area.

Achievement

Measurable increases in subject-matter knowledge on the part of the students in mathematics and English.

Competency

The student's perception of his ability to function successfully in a specific subject area.

Team Environment

That area of the mathematics and English classrooms which is designated for the team taught sections of the basic freshman courses.

Traditional Environment

That area of the mathematics and English classrooms which is designated for the traditionally taught sections of the basic freshman courses.

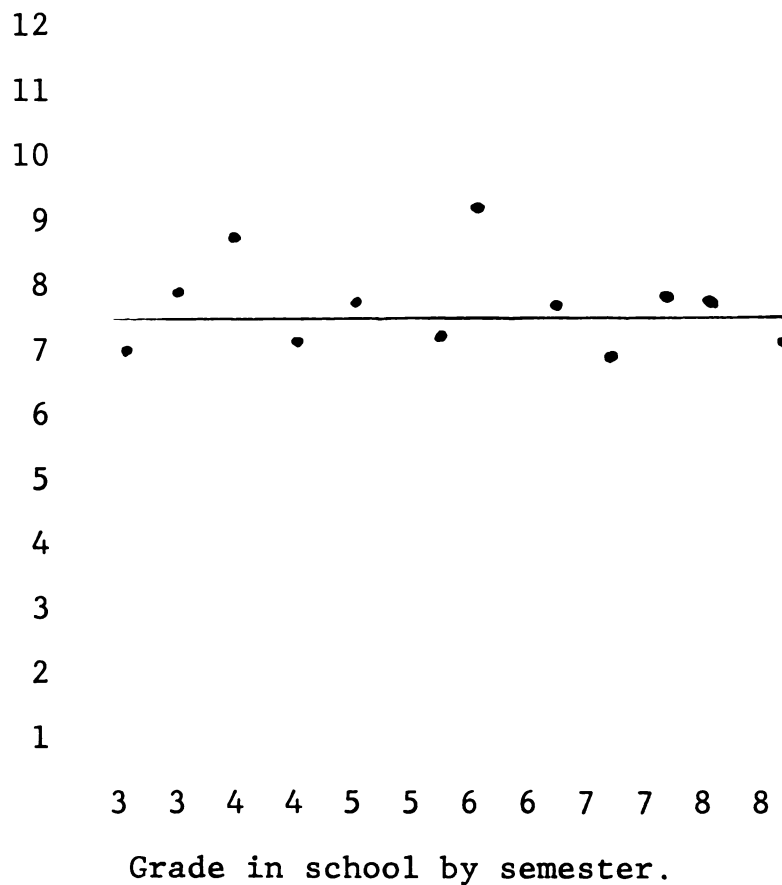
Prior Achievement

Mathematics or English achievement as indicated by scores received on standardized tests administered by the school district during the student's middle school experience.

Consistent Trend

A pattern of learning which is evidenced by an individual student receiving relatively consistent grades in mathematics or English between third grade and eighth grade which is indicated by a horizontal regression line. (Figure 1)

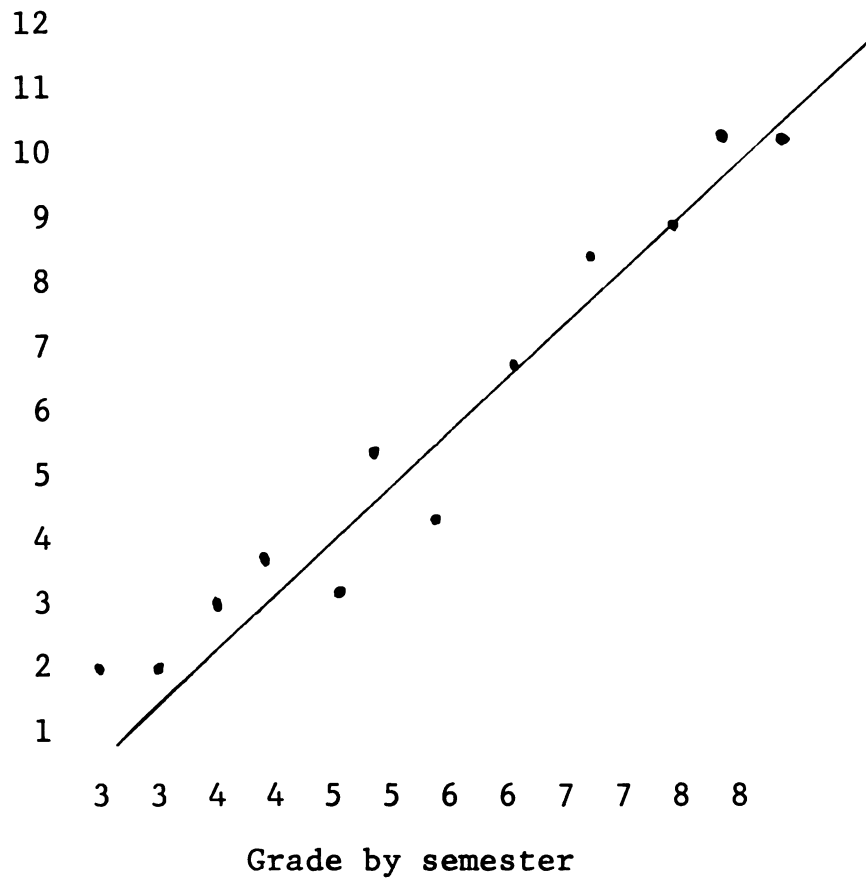
Figure 1



Inclining Trend

A pattern of learning which is evidenced by an individual student's grades reflecting gradual improvement over the years between third and eighth grades as indicated by an inclining regression line. (Figure 2)

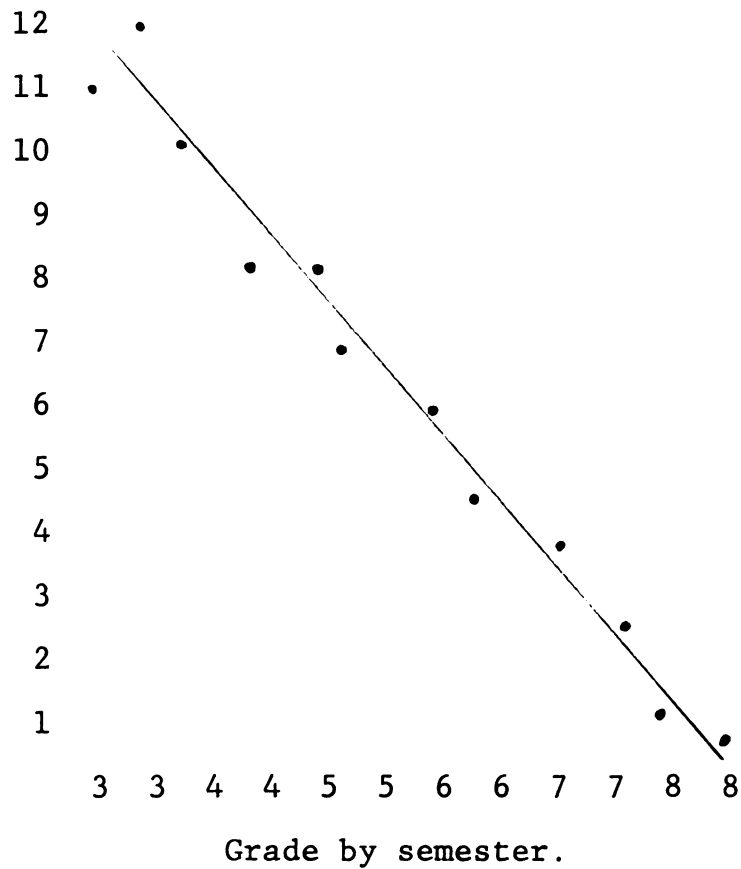
Figure 2



Declining Trend

A pattern of learning which is evidenced by a student's grades reflecting a gradual decline over the years between third grade and eighth grade as indicated by a declining regression line. (Figure 3)

Figure 3



Summary

The research to be presented in the succeeding chapters involves the comparison of student achievement and feelings of competency in a team environment and in a traditional environment. A brief overview of precedent research will be presented in Chapter II, the method of data collection and research procedures will be reviewed in Chapter III and the data analysis and findings in Chapters IV and V, respectively.

CHAPTER II

PRECEDENT RESEARCH

Introduction

Although a comprehensive overview of pertinent research will not be attempted, the study necessitates a reasonable awareness of the pattern of findings with respect to student achievement and attitude toward subject as related to team teaching. Also, a general description of the characteristics of team teaching is presented.

Description of Team Teaching

In its most generic sense, a teaching team is a group of two or more persons assigned to the same student at the same time for instructional purposes in a particular subject or combination of subjects. At present, the concept of team teaching does not infer any universally recognized model for designing a team (Bishop, 1971, p. 16). The quality and the formal organization of the working relationship among teachers varies enormously from team to team. "At one extreme two or more teachers appear to work together rather loosely as associates, meeting occasionally and dividing up the responsibility for instruction and the students..." (Shaplin and Olds, Jr., 1964, p. 9). In other instances, coordinators are assigned to make sure good

working relationships among team members are established, meetings are held, assignments are made and that all team members are fully acquainted with what is happening. "At the other extreme, there are highly organized teams with several levels...all organized in a hierarchy of formal responsibilities with prescribed status and roles" (Shaplin and Olds, P. 10). Cunningham, as summarized by David G. Armstrong (1977. p. 65), suggests four general organizational patterns in team teaching.

1. team leader type: In this arrangement one team member has a higher status than the other(s). He may well have a special title such as 'team leader.'
2. associate type: In this arrangement there is no designated leader. Leadership may be expected to emerge as a result of interactions among individuals and given situations.
3. master teaching-beginning teacher: In this arrangement team teaching is used to foster acculturation of new staff members to the school.
4. coordinated team: In this arrangement there is no joint responsibility for a common group of youngsters. What is involved is joint planning by two or more teachers who are teaching the same curriculum to two different groups of youngsters.

These organizational patterns may be classified as possessing either vertical-bureaucratic authority or an horizontal-collegial relationship. Under the vertical

pattern "the structure of the school could feature a lengthened line of authority stretching from the top administration, through principals and team leaders to classroom teachers..." (Lortie, 1975, p. 231). The horizontal pattern results in a form of authority identified as the collegium, "where equals rule their affairs by internal democratic procedures" (Lortie, 1975, p. 233). These groups tend to resist formal and permanent differences in status. "The members will have an interest in granting leadership according to the needs of the immediate group" (Lortie, 1975, p. 233).

Commentary

One of the problems created by the diversity in team teaching designs is the lack of generalizability across different studies. This would be eliminated if researchers would provide more detailed information on the specific team design being studied.

Student Achievement

Regardless of the design of the team, those committed to teaming purport the following strengths.

- Strength 1: Team teaching permits team members to take advantage of individual teacher strengths in planning for instruction and working with learners.
- Strength 2: Team teaching spurs creativity because teachers know they must teach for their colleagues as well as for their learners.
- Strength 3: Team teaching facilitates individualized instruction because it is possible to provide learning environments involving close personal

contact between teacher and learner.

Strength 4: Team teaching provides for better sequencing and pacing of increments of instruction because perceptions of an individual teacher must be verified by at least one other team member.

Strength 5: Team teaching builds program continuity over time. Team teaching programs abide. Specific teachers within a team do not. (Armstrong, 1977, p. 66).

Underlying all of these strengths, there is a fundamental assumption that team teaching results in improved learner achievement, but the evidence is inconclusive.

Bishop (1971) reports that evidence is lacking concerning the question of whether team teaching is demonstrably more effective in producing learning than the traditional classroom. "Most studies indicate no significant differences in achievement between the experimental groups and the more conventional groups (Bishop, 1971, p. 17). This conclusion is supported by M. Bair and R. G. Woodward who reviewed the research on team teaching and concluded that there were "no significant differences in the academic achievement of team-taught children and children taught by individual teachers" (Martin and Pavan, 1976, p. 313).

J. A. Burchyette (1972) found no significant difference in academic achievement of students in a team taught school and the achievement of similar children in a self-contained classroom. David G. Armstrong (1977) reviewed studies involving secondary school students with respect to team teaching and academic achievement and reported a scanty

number of research projects showing significant differences favoring team-taught students.

Commentary

Research in this area is not comprehensive nor are the results definitive; but since a prime aim is to enhance student achievement, the results to date do not seem to favor the team concept nor justify the extra time and effort inherent in this approach.

Attitude

While specific advantages in achievement, as related to team teaching, have not been demonstrated, students and teachers alike have expressed positive attitudes toward team teaching (Martin and Pavan, 1976, p. 315-316). Research suggests that teachers view team teaching as having primary benefits other than learner achievement (Armstrong, 1977, p. 79).

Some of the studies dealing with team teaching have been concerned with the attitudes of students. Most of these studies favor the team teaching approach over the traditional approach. Zueibelson, Bahmuller and Lyman (1965), Gleason (1969), Gamsky (1970) and Hunt (1970) and Pierson (1971) all found that the students in team teaching classes developed more favorable attitudes toward the subject matter than did students taught in the traditional manner. (McTeer and Jackson, 1977, p. 2)

However, Enlow (1971) found no significant difference in attitude. In a 1974-75 study on the effect of team teaching upon achievement in and attitude toward

Summary of Investigations Comparing Performances of Team-Taught
and Solitary-Teacher-Taught Secondary Students (Armstrong, 1977, p. 77)

Investigator	Significant Differences Favoring Team- Taught Students	Significant Differences Favoring Solitary-Teacher Taught Students	No Significant Difference Between Team-Taught and Solitary- Taught Students
Patterson (1959-1960)			English, plane geometry, American history (1960) social studies, geometry, science, business education
Taffel (1962)			physics
Georgiades & Bjelke			English
Oakland Public Schools (1964)			mathematics, reading, writing
Klausmeier & Wiersma	(low-ability students, homogeneously-grouped classes) English social studies		(low-ability students, heterogeneously-grouped classes) English, social studies (average-ability students, heterogeneously- grouped classes) English, social studies
Georgiades & Bjelke (1966)	reading comprehension		reading vocabulary

Investigator	Significant Differences Favoring Team-Taught Students	Significant Differences Favoring Solitary-Teacher Taught Students	No Significant Difference Between Team-Taught and Solitary-Taught Students
Frankel (1967)	(using criterion instrument ing higher level thinking skills) U.S. history		(using criterion instrument demanding recall and memory skills) U.S. history
Robinson, (1967)			biology
Schlaadt (1969)			health
Lutenbacher (1970)			social studies, English
Gamsky (1970)	after one semester English		after one semester, social studies after two semesters, social studies, English

U.S. history by McTeer and Jackson, the results agreed with the findings of previous studies. This study concluded that there was no difference in subject matter gain between students taught in the team teaching approach and those in a traditional approach. This study also concluded, as did previous studies, "that students in team taught classes develop a more favorable attitude toward the subject matter than students taught in traditional classrooms" (McTeer and Jackson, 1977, p. 2).

Commentary

Although the reported findings indicate an increase in positive attitude in the team taught classes, the studies are too limited to establish that team teaching consistently results in more positive attitudes. The most which can be safely concluded is that team teaching does not result in detrimental effects on cognitive or affective outcomes (Martin and Pavan, 1976, p. 315).

Summary

Clear and consistent data supporting or refuting team teaching as being superior to a traditional approach are not yet available. Further studies are needed to determine whether the place team teaching has had in American education over the last few decades is justified and should endure. The data collection procedures will be presented in Chapter III, the data analysis in Chapter IV and conclusions in Chapter V.

CHAPTER III

RESEARCH PROCEDURES

Introduction

The data for this study were collected from the traditional and team taught sections of the basic freshman courses in mathematics and English offered at Linden High School. A description of the population, procedures for collection and instrumentation is presented.

Approach

This study, conducted during the fall of 1979, utilized traditional groups in both the mathematics and English subject areas composed of freshmen students being taught the subject matter in a traditional setting. The team taught groups consisted of freshmen students being taught the subject matter in a team teaching environment.

Each of the groups were given an achievement test in the fall and again at the close of the semester to assess academic gain.

An attitude questionnaire was also administered to all groups at the opening and closing of the first semester to determine any changes in this area.

Variables

The independent variable in this study was the team teaching approach being used in the designated mathematics and English groups which is presumed to influence both achievement in and attitude toward subject.

The dependent variables were achievement in and attitude toward the subject matter being presented in each of the team environments.

Research Questions

The following research questions were formulated for this study. Is team teaching more effective than traditional teaching in increasing the English achievement of

- 1) freshmen students assigned to basic competency
- 2) students with high prior achievement in English as determined by standardized test scores
- 3) students whose English grades reflect an identifiable trend
- 4) girls assigned to basic competency
- 5) boys assigned to basic competency

Is team teaching more effective than traditional teaching in improving feelings of competency in English in

- 1) freshmen students assigned to basic competency
- 2) girls assigned to basic competency
- 3) boys assigned to basic competency

Is team teaching more effective than traditional teaching in increasing the mathematics achievement of

- 1) freshmen students assigned to Computation Skills
- 2) students with high prior mathematics achievement as determined by standardized test scores

- 3) students whose mathematics grades reflect an identifiable trend
- 4) girls assigned to Computation Skills
- 5) boys assigned to Computation Skills

Is team teaching more effective than traditional teaching in improving feelings of competency in mathematics in

- 1) freshman students assigned to Computation Skills
- 2) girls assigned to Computation Skills
- 3) boys assigned to Computation Skills

Population

The subjects used in this study were the 53 students assigned to the Computations Skills classes in mathematics and the 58 students assigned to the Basic Competency classes in English. These students were scheduled by computer into the various sections of these classes. There was one traditionally taught section of each of the mathematics and the English courses and these sections met daily during the first period. The traditional group in mathematics, which consisted of 22 students, met for 20 weeks of the semester course, five times a week for a 55 minute period. The English traditional group, consisting of 25 students, also met during the first period, five times a week for 55 minutes for 20 weeks. The team taught group in mathematics consisted of one team taught section which met daily for 20 weeks during second hour for a 55 minute period. This group was composed of 31 students. The team taught group in English consisted of one team taught section. This section, which consisted of 33 students, was scheduled to meet daily for 55 minutes for 20 weeks during the fourth period. In

order to minimize the teacher variable, the most experienced of the two team members from both the second hour mathematics team and the fourth hour English team instructed the first hour traditionally taught class in their subject area. As a basis of statistical comparison of achievement in both the traditional and team taught groups, the students are classified according to treatment, gender, prior academic achievement as indicated by standardized test scores and pre-established learning trends as determined by previous grades received in mathematics or English over a six year period. The data on attitude were differentiated by gender and treatment.

Process and Instruments

The students assigned to the Computation Skills mathematics classes were given the mathematics sections of the SRA Achievement Series, form E/Red Level, as a pre-test during the early fall of 1979. This consists of a test on Math Concepts, 40 minutes and Math Computation, 30 minutes, and did, therefore cover two consecutive class days. Those students assigned to Basic Competency classes in English were given the English sections of the SRA Achievement Series, form E/Red Level, as a pre-test during the early fall of 1979. This test is composed of Reading, 50 minutes; Vocabulary, 10 minutes; Language Arts, 38 minutes; and Spelling, 12 minutes. This testing procedure covered three class periods. This test ascertained the

academic achievement of the students in the appropriate subject area. The SRA Achievement test was selected by the mathematics and English teachers who were instructing the Mathematics Computation and Basic Competency classes because they felt it closely correlated with the subject matter covered in these classes. These same students were given the Youth Questionnaire, a copy of which is included in the appendix, to determine the initial feelings of competency toward subject. The Youth Questionnaire was selected from numerous instruments developed to assess attitudes because it ascertains the student's feelings toward specific subject areas while most other instruments cannot discriminate attitude by discipline. This questionnaire was developed by the Research Institute of the University of Michigan for the Flint Youth Study conducted over a decade ago. The original data are not available. The questionnaire utilizes a Likert-type scale with most responses being scored on a 1-5 scale from "I am the Poorest" to "I am the Best". For the purpose of analysis, the Youth Questionnaire is divided into three subsections designated as Scales 1, 2, and 3. Scale 1 questions consist of items which ascertain the student attitude toward their academic ability; Scale 2, questions 9-15, is concerned with student assessment of the importance of high grades, and Scale 3, questions 16-23, deals with student evaluation of their ability in the subject (mathematics or English). The reliability test on the Youth Questionnaire reveals an acceptable Alpha level on all scales

both in English and mathematics groups. The English pre-survey Alphas were .68 on Scale 1, with item 5 deleted; .73 on Scale 2 with item 15 deleted and .84 on Scale 3 with no items deleted. The English post-survey Alphas were even higher with no items deleted on any scale. Scale 1 Alpha was .86, Scale 2, .82 and Scale 3, .85. In mathematics surveys, no items were deleted on either the pre or post analyses. The Alphas on the mathematics pre-survey were .66 on Scale 1, .70 on Scale 2 and .85 on Scale 3. The post-survey's reliabilities were .80 on Scale 1, .82 on Scale 2 and .80 on Scale 3. These same instruments, SRA Form F/Red Level and the Youth Questionnaire, were administered at the close of the semester, 1980, to ascertain changes in achievement and feelings of competency in subject.

During the span between the pre and post testing, the researcher acquired the standardized achievement scores and past grades in mathematics and English from school records in order to identify prior achievement and learning trends.

Summary

From the data collected, any significant differences between student attitude and achievement as it relates to the team teaching environment are determinable. The statistical analysis is presented in Chapter IV and the conclusions in Chapter V.

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CHAPTER IV

STATISTICAL RESULTS AND INTERPRETATION

Introduction

The statistical analysis of the results of the Youth Questionnaire and the SRA Achievement Series, Form E and F, Red Level, is organized according to the hypotheses presented in Chapter I. This study looks at the effects of the team teaching treatment versus the traditional treatment on males and females randomly assigned to each group as well as on the total treatment groups. The data were subjected to the Multivariate Analysis of Covariance (MANCOVA) which determines whether post test means are significantly different between groups. The initial statistical tests were based on actual scores. Then, the post scores were adjusted by the expected growth from pre to post test and the tests were repeated.

The test scores acquired from records of the standardized testing program in the Linden School District were also analyzed through a Multivariate Analysis of Covariance using standardized achievement as the covariate. This analysis reveals whether there is a relationship between prior achievement and cognitive outcomes over the period of the study.

To determine the effect of past academic performance on achievement, students in each treatment group whose school records revealed six or more semester marks in the subject

area out of a possible twelve between third and eighth grades were divided into three sections according to the pattern their grades evidenced. Those students whose grades revealed no relationship because of their inconsistency were not considered in this data analysis. The pattern was determined by observing the regression line each student's grades disclosed. According to the direction of this regression line, three distinct grade trends are identifiable; inclining, declining and horizontal. The inclining trend indicates an improvement in assessed performance over the years between third and eighth grades. A declining regression line intimates a lessening of the quality of achievement over the same period, and a horizontal line evidences a consistent grade pattern. Following identification of each trend group in English and mathematics, the achievement data were analyzed to determine the means and standard deviations on each subtest area for the trend groups within the team taught and traditionally taught treatments. The data were subsequently subjected to univariate tests to obtain F scores and the level of significance of F to determine if a relationship between trends and achievement exists.

Tables of the statistical results will be presented when appropriate to reinforce the descriptive and evaluative discussions.

Achievement

In each case of achievement analysis, the F levels were computed using the MANCOVA which corrects for initial

attitude and aptitude differences in the two groups. The means presented on each table are the actual, uncorrected mean scores for each group except in the analysis of the data when controlled for gender when actual post means and adjusted post means are presented.

English Achievement

Hypothesis 1: There is no difference in reading achievement between team taught and traditionally taught students.

Table 1

Effect of Team Teaching Versus Traditional Teaching on General Reading Achievement						
	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	29.48	20.54	22.69	17.30	4.05099	.05
Traditional	29.28	21.08	31.12	25.16		

The actual pre and post test means in reading reveal that the team taught environment was not as effective as the traditional environment in promoting positive growth in reading over the duration of the study. The team taught group declined over the semester from a mean of 29.48 on the pre test to a mean of 22.69 on the post test, a drop of 6.79 percentage points. In the same subtest area, the traditionally taught group evidenced an improvement of 1.84 percentage points, growing from a pre test mean of 29.28 to a post test mean of 31.12. The univariate test of the effect of the team teaching environment on reading achievement indicates a .05 level of significance with the team taught

students evidencing a definite decline. Hypothesis 1 is rejected with the data indicating that team teaching had a negative influence on reading achievement at a generalizably significant level.

Hypothesis 2: There is no difference in reading achievement between team taught and traditionally taught students when controlled for prior achievement.

Table 2

Effect of Team Teaching Versus Traditional Teaching On Reading Achievement After Controlled for Each Student's Prior Achievement Record						
	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	29.48	20.54	22.69	17.30	25.69	.01
Traditional	29.28	21.08	31.12	25.16		

Randon assignment of freshman students by computer to the team taught section and the traditionally taught section of Basic Competency provided samples having prior achievement in English of 43.49 percent in the traditional group and 51.77 percent in the team taught group on standardized achievement measures administered by the Linden School District. Upon assessing the post mean score in reading, the traditionally taught group had a higher mean. The univariate test to determine the relationship between prior achievement and outcome indicated an F level of .01 for reading which is easily significant. Hypothesis 2 is rejected with the team taught group evidencing a regression in reading after controlling for each student's prior achievement.

Hypothesis 3: There is no difference in reading achievement between team taught and traditionally taught students when controlled for past academic performance.

Table 3

Effect of Team Teaching Versus Traditional Teaching on Students' Achievement in Reading when Treatment Groups are Controlled for Students' Prior Learning Trends						
Trend	Post Test Scores				F.	Sig.
	Team Mean	S.D.	Traditional Mean	S.D.		
Inclining	29.50	28.99	39.50	2.12	.60890	N.S.
Consistent	26.81	16.28	26.50	20.47		
Declining	21.20	22.40	23.70	25.28		

The inclining groups in both the traditional and the team taught environment achieved higher post reading means with the traditional group revealing a post mean of 39.50 and the team taught group having a post mean of 29.50. The consistent groups' means are in the middle of the other trend groups, achieving scores of 26.81 in the team taught group and 26.50 in the traditional group. The declining groups from both environments received the lowest mean scores. The pattern does not seem to be disrupted by either treatment and the univariate test of significance reveals an F level of .55; therefore, hypothesis 3 cannot be rejected.

Hypothesis 4: There is no difference in reading achievement between team taught and traditionally taught students when controlled for gender.

Table 4

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Reading when Controlled for Gender						
Post Mean Scores						
Sex	Mean	S.D.	Team Adj.M.	S.D.	F.	Sig.
Girls	31.47	17.39	-.48	15.48	.44069	N.S.
Boys	16.12	13.84	-6.17	5.66		
Traditional						
Girls	29.77	24.40	3.88	16.56		
Boys	32.58	26.96	5.95	22.02		

The post test reading means of 31.47 and 29.77 for girls in the team taught and traditionally taught groups respectively indicate minimal difference in reading achievement over a semester, but the post test reading means of 16.12 and 32.58 for the boys in the team taught and traditionally taught sections respectively evidence distinctly lower achievement for the team taught boys. The adjusted means for both the males and females in the team taught groups are negative at $-.48$ for the girls and -6.17 for the boys which indicate that these groups failed to reach the projected growth levels and, in fact, regressed. The data reveal that the team teaching approach adversely affected the reading achievement of both boys and girls, but the influence it had on the boys' regression was more dramatic. The fourth hypothesis cannot be rejected, though, as the level of F was not significant.

Hypothesis 5: There is no difference in vocabulary achievement between team taught and traditionally taught students.

Table 5

Effect of Team Teaching Versus Traditional Teaching on General Vocabulary Achievement						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	48.03	19.26	36.09	21.18	3.99028	.05
Traditional	39.68	19.55	37.68	21.73		

On the vocabulary subtest, the team taught group dropped from a pretest mean of 48.03 to a post-test mean of 36.09, almost twelve percentage points. The traditional group declined only two points, dropping from 39.68 to 37.68. The hypothesis can be rejected at the .05 level which indicates that the team teaching approach adversely influenced vocabulary achievement more dramatically than did the traditional approach.

Hypothesis 6: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for prior achievement.

Table 6

Effect of Team Teaching Versus Traditional Teaching on Vocabulary Achievement After Controlled for Each Student's Prior Achievement						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	48.03	19.26	36.09	21.18	25.25828	.01
Traditional	39.68	19.55	37.68	21.73		

The post mean scores in both the traditional and team taught groups reveal a decline in the level of vocabulary achievement with the traditional group declining 2 percentage points and the team taught group declining 11.94 percentage points.

Although both groups evidence a retrogression in vocabulary, the team taught group's decline is much more severe. Hypothesis 6 can be rejected at the .01 level.

Hypothesis 7: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for past academic performance.

Table 7

Effect of Team Teaching Versus Traditional Teaching on Students' Achievement in Vocabulary when Treatment Groups are Controlled for Students' Prior Learning Trends						
Trend	Post Test Scores				F.	Sig.
	Team		Traditional			
Inclining	Mean	S.D.	Mean	S.D.	1.01419	N.S.
Consistent	55.50	61.51	43.50	6.36		
Declining	37.45	21.01	32.50	15.80		
	33.70	11.89	31.80	19.33		

The data indicate that the inclining groups from both environments achieved higher post vocabulary means than did the consistent and declining groups. The declining groups again achieved lower means across treatment groups with the consistent groups obtaining means midway between the other trend groups. The univariate level of .38 is not significant; therefore, hypothesis 7 cannot be rejected. Neither the team teaching nor the traditional treatment appears to alter established trends. Those students who had established upward achievement trends continue to achieve at a higher level than those on a consistent or declining trend.

Hypothesis 8: There is no difference in vocabulary achievement between team taught and traditionally taught

students when controlled for gender.

Table 8

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Vocabulary when Controlled for Gender						
Post Mean Scores						
Team						
Sex	Mean	S.D.	Adj.M.	S.D.	F.	Sig.
Girls	40.27	14.73	-3.16	13.42	.90473	N.S.
Boys	33.76	25.53	-2.68	18.38		
Traditional						
Girls	30.46	15.85	.48	7.67		
Boys	45.50	25.05	8.99	14.50		

The vocabulary achievement for the team taught girls, as indicated by an actual post mean score of 40.27 was again higher than that of the boys whose actual post mean vocabulary score was 33.76. There was a repeated pattern of the boys in the traditional section performing at a higher level of achievement than the girls, and the girls in the team taught section achieving a higher actual post mean score than the boys. The pattern of retrogression over the period of the study is repeated in the vocabulary scores for the team taught group. The data expose that the team teaching environment had a derogatory influence on achievement in vocabulary for both boys and girls with their adjusted post means being -2.68 and -3.16 respectively. Both the boys and the girls from the traditional environment reveal increased vocabulary achievement. The effect of team teaching on student achievement in vocabulary when the treatment groups are controlled for gender does not prove to be significant. The eighth hypothesis cannot be rejected.

Hypothesis 9: There is no difference in language arts achievement between team taught and traditionally taught students.

Table 9

Effect of Team Teaching Versus Traditional Teaching on General Language Arts Achievement						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	37.78	20.36	33.06	24.35	1.10874	N.S.
Traditional	36.08	20.97	36.52	22.36		

The team taught group evidences a drop from 37.78 percent on the language arts pre test to 33.06 on the language arts post test, a decline of 4.72 percentage points. The traditional group's scores of 36.08 on the pre test and 36.52 on the post test reveal a slight gain of .44 percent over the duration of the study. Although there is an obvious regression in the language arts achievement of the team taught group, the hypothesis cannot be rejected as the level of F is insignificant at .3.

Hypothesis 10: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for prior achievement.

Table 10

Effect of Team Teaching Versus Traditional Teaching on Language Arts Achievement After Controlled for Each Student's Prior Achievement						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	37.78	20.36	33.06	24.35	19.76249	.05
Traditional	36.08	20.97	36.52	22.36		

The data substantiate that the decrease in achievement between the pre and post language arts tests for the team taught group and the small increase in the traditional group is significant at the .05 level when controlled for prior achievement of 43.49 percent in the traditional group and 51.77 percent in the team taught group. Therefore, hypothesis 10 can be rejected.

Hypothesis 11: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for past academic performance.

Table 11

Effect of Team Teaching Versus Traditional Teaching
on Student Achievement in Language Arts when
Treatment Groups are Controlled for Students'
Prior Learning Trends

Trend	Post Test Scores				F.	Sig.
	Team Mean	Team S.D.	Traditional Mean	Traditional S.D.		
Inclining	44.50	50.20	46.00	15.55	1.80637	N.S.
Consistent	33.36	24.18	41.50	26.65		
Declining	23.00	21.35	26.50	20.26		

The pattern previously established by each trend group in reading and vocabulary subtests is reiterated in the language arts test results. The inclining trend groups from both treatments achieved at a noticeably higher level than did the other trend groups. The declining groups again evidence the least achievement with the consistent trend groups' achievement falling between that of the inclining and declining trend groups. The univariate level of .18 is not significant which indicates that neither treatment altered previously

established learning patterns and that hypothesis 11 cannot be rejected.

Hypothesis 12: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for gender.

Table 12

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Language Arts when Controlled for Gender						
Post Mean Scores						
			Team			
Sex	Mean	S.D.	Adj.M.	S.D.	F.	Sig.
Girls	39.93	19.46	-2.08	15.23	.00481	N.S.
Boys	27.00	27.09	-2.54	3.66		
			Traditional			
Girls	40.00	26.72	1.76	19.31		
Boys	32.75	16.80	3.67	12.28		

The actual post mean scores of both the girls and the boys from the team teaching treatment are lower than those of the traditionally taught boys and girls. Noticeably, the lowest language arts non-adjusted post mean score of 27 percent was acquired by the boys from the team taught group. The adjusted post means reveal that both the team taught girls at -2.08 and the team taught boys at -2.54 digressed in language arts while the adjusted post means of the traditionally taught girls at 1.76 and the boys at 3.67 indicate improvement. Since both sexes from the team taught group retrogressed and both sexes from the traditionally taught group improved, gender does not appear to be a determining factor in achievement. The effect of team teaching on achievement in language arts when treatment groups are controlled for gender is not

significant at the .94 level; therefore, hypothesis 12 cannot be rejected.

Hypothesis 13: There is no difference in spelling achievement between the team taught and traditionally taught students.

Table 13

Effect of Team Teaching Versus Traditional Teaching on General Spelling Achievement						
	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	44.06	19.45	26.81	17.22	.65772	N.S.
Traditional	33.04	17.32	25.56	15.18		

The spelling subtest revealed a decline of over seventeen percentage points for the team taught group and a loss of close to seven and a half percentage points for the traditional group. Although both groups experienced loss in this subtest area, the team taught group's decline is more severe. The hypothesis cannot be rejected since the univariate level of .42 was not significant.

Hypothesis 14: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for prior achievement.

Table 14

Effect of Team Teaching Versus Traditional Teaching on Spelling Achievement After Controlled for Each Student's Prior Achievement						
	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	44.06	19.45	26.81	17.22	6.40184	.01
Traditional	33.04	17.32	25.56	15.18		

As the scores indicate, the team taught group regressed drastically in spelling achievement over the semester. Although the traditional group also disgressed, their drop was not as severe. The hypothesis, there is no difference in spelling achievement between team taught and traditionally taught students when controlled for prior achievement, can be rejected at the .01 level.

Hypothesis 15: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for past academic performance.

Table 15

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Spelling when Treatment Groups are Controlled for Students' Prior Learning Trends						
Trend	Post Test Scores				F.	Sig.
	Team	Traditional				
	Mean	S.D.	Mean	S.D.		
Inclining	34.50	23.34	27.50	4.94	.88515	N.S.
Consistent	31.55	18.50	26.00	9.23		
Declining	22.50	16.85	24.30	10.00		

The spelling achievement of each trend group from both treatments followed the same tendencies as were evident in the other subtest areas. The inclining groups from both treatments achieved at the highest levels with the consistent groups receiving scores midway between the inclining and declining who received the lowest scores. The effect of treatment on prior learning trends is not significant at the .42 level.

Hypothesis 16: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for gender.

Table 16

<u>Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Spelling when Controlled for Gender</u>						
<u>Post Mean Scores</u>						
Sex	Mean	S.D.	Team Adj.M.	S.D.	F.	Sig.
Girls	30.67	17.79	-2.03	14.44	.14377	N.S.
Boys	24.41	16.68	- .80	13.53		
<u>Traditional</u>						
Girls	31.31	16.28	4.03	19.30		
Boys	19.33	9.69	.51	14.58		

Although the non-adjusted post mean scores for the girls from each treatment group are extremely close and for the boys show almost 5 percentage points difference with the team taught boys achieving at a higher level, the adjusted post means reveal that the team teaching environment adversely influenced student gains in spelling achievement. But because the F level was not significant, hypothesis 16 cannot be rejected.

Summary on English Achievement

The data reveal that the team teaching treatment had a negative influence at a generalizably significant level on student achievement in the reading and vocabulary subtest areas. The team teaching treatment also proved to have a derogatory influence on achievement in all subtest areas when controlled for individual student's prior achievement.

The influence of the team teaching model was not significant when controlled for learning trends or gender. Only the following hypotheses can be rejected:

H1: There is no difference in reading achievement between team taught and traditionally taught students.

H2: There is no difference in reading achievement between team taught and traditionally taught students when controlled for prior achievement.

H5: There is no difference in vocabulary achievement between team taught and traditionally taught students.

H6: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for prior achievement.

H10: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for prior achievement.

H14: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for prior achievement.

Mathematics Achievement

Hypothesis 17: There is no difference in math concepts achievement between team taught and traditionally taught students.

Table 17

Effect of Team Teaching Versus Traditional Teaching on General Math Concepts Achievement						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	10.35	7.53	10.93	8.58	2.55175	N.S.
Traditional	9.38	10.05	15.57	11.52		

Examination of the pre and post mean scores of each treatment group by subtest substantiates that the team teaching environment had a substantially less positive influence on achievement in math concepts. The team taught group's pre test mean of 10.35 is only .58 less than the post mean score of 10.93, indicating a slight improvement in achievement over the duration of the study. Conversely, the pre test mean in math concepts of 9.38 is 6.19 lower than the post test mean of 15.57, evidencing an achievement growth of over six percentage points in the traditionally taught group. The univariate test of the effect of the team teaching environment on achievement in math concepts revealed a .12 level of significance so hypothesis 17 cannot be rejected.

Hypothesis 18: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for prior achievement.

Table 18

Effect of Team Teaching Versus Traditional Teaching on Math Concepts Achievement After Controlled for Each Student's Prior Achievement Record						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	10.35	7.53	10.93	8.58	2.71236	N.S.
Traditional	9.38	10.05	15.57	11.52		

The prior achievement of students in mathematics was determined by obtaining each treatment group's mean score on standardized achievement tests given by the school district. The results indicate a mean score of 33.9 percent in the traditional group and 26.5 percent in the team taught group.

The team taught group's post mean score was dramatically lower than that of the traditionally taught group, but the univariate test revealed that the level of F was insignificant when controlled for prior achievement. Hypothesis 18 cannot be rejected.

Hypothesis 19: There is no difference in math concepts achievement between team taught and traditionally students when controlled for past academic performance.

Table 19

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Math Concepts when Treatment Groups are Controlled for Students' Prior Learning Trends						
Trend	Post Test Scores				F.	Sig.
	Team		Traditional			
	Mean	S.D.	Mean	S.D.		
Inclining	16.17	7.54	18.50	10.08	.50227	N.S.
Consistent	14.83	13.16	17.00	3.46		
Declining	6.00	6.63	11.50	10.60		

Analysis of the data infers that the inclining groups achieved higher post means than the other trend groups. The consistent trend groups' scores were between those of the inclining and declining groups with the declining receiving the lowest math concepts post mean scores. Although the post mean scores of the team taught trend groups were lower than those of the traditionally taught groups, neither environment altered established learning patterns. The univariate level of .61 means that hypothesis 19 cannot be rejected.

Hypothesis 20: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for gender.

Table 20

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Math Concepts when Controlled for Gender						
Post Mean Scores						
Sex	Mean	S.D.	Team Adj.M.	S.D.	F.	Sig.
Girls	7.00	8.32	-2.81	6.17	3.57129	N.S.
Boys	13.11	8.13	-1.63	6.91		
Traditional						
Girls	12.57	13.70	2.50	14.40		
Boys	17.07	10.49	1.72	11.76		

Comparison of the post test math concepts means of 12.57 for the traditionally taught girls and 7.00 for team taught girls with 17.07 for traditionally taught boys and 13.11 for team taught boys evidences that the males achieved at a higher level in math concepts regardless of the environment.

The means of both boys and girls from the traditional environment indicate a higher level of achievement in math concepts for the traditionally taught group. The adjusted math concepts means of both girls and boys from the team taught group are negative at -2.81 and -1.63 respectively. This reinforces the pattern for the traditional environment to produce positive growth in math concepts while the team taught environment had a negative influence. The univariate level of .07 does not indicate that hypothesis 20 can be rejected.

Hypothesis 21: There is no difference in math computation achievement between team taught and traditionally taught students.

Table 21

Effect of Team Teaching Versus Traditional Teaching on General Math Computation Achievement						
	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	16.26	11.65	11.23	10.15	4.03940	.05
Traditional	19.90	19.37	18.48	11.30		

The pre and post means in math computation indicate that both groups retroverted over the duration of the study. The team taught pre test mean in computation of 16.26 is 5.03 higher than the post test mean of 11.23, and the traditionally taught group's pre test mean of 19.90 is 1.42 higher than their post test mean of 18.48 revealing a loss of a little over one percent in achievement. Although both groups received lower post means on math computation, the team taught group's post mean was dramatically lower by over five percentage

points. This implies that the team teaching environment was much less successful in promoting achievement than was the traditional environment. Hypothesis 21, there is no difference in math computation achievement between team taught and traditionally taught students, can be rejected at the .05 level as the team environment did not positively influence student achievement in math computation.

Table 22

Effect of Team Teaching Versus Traditional Teaching on Math Computation Achievement After Controlled for Each Student's Prior Achievement Record						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	16.26	11.65	11.23	10.15	4.27620	.05
Traditional	19.90	19.37	18.48	11.30		

The univariate level of .05 substantiates that the prior achievement of 26.5 for the team taught group and 33.9 for the traditional group influenced achievement in math computation as the decline between the pre and post means for the team taught group was more severe than the decline of the traditionally taught group. Hypothesis 22 can be rejected at the .05 level of significance.

Hypothesis 23: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for past academic performance.

Table 23

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Math Computation when Treatment Groups are Controlled for Students' Prior Learning Trends						
Post Test Scores						
Trend	Team		Traditional		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Inclining	15.60	8.76	23.00	20.88	.25888	N.S.
Consistent	13.33	8.89	27.50	4.94		
Declining	9.17	11.14	17.38	11.80		

The mean scores of the declining groups from both treatments were lower in math computation than those of the inclining and consistent groups. The inclining group from the team taught section achieved a higher mean in math computation than did the consistent group. This situation is reversed in the traditional group with the consistent group receiving a higher mean than did the inclining group. The level of F was not significant at .77. Although the team taught means for all trend groups were lower than those of the traditional group, the data analysis indicates that established patterns of achievement are not altered by exposure to either the team or the traditional treatment.

Hypothesis 24: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for gender.

Table 24

Effect of Team Teaching Versus Traditional Teaching on Student Achievement in Math Computation when Controlled for Gender						
Post Mean Scores						
Sex	Mean	S.D.	Team Adj.M.	S.D.	F.	Sig.
Girls	10.30	7.87	-2.16	6.24	.07343	N.S.
Boys	11.67	11.23	-1.84	8.60		
Traditional						
Girls	20.14	9.29	2.78	11.73		
Boys	17.64	12.42	3.81	10.62		

The tendency for the traditional environment to promote higher achievement for both males and females is reinforced by the post means in math computation. The team girls' post mean of 10.30 and the team boys' post mean of 11.67 are distinctly lower than the means of 20.14 for girls and 17.64 for boys in the traditionally taught group. The data appear to indicate a tendency for higher math achievement for both sexes in the traditional environment. The negative scores of the team taught group in math computation emphasizes the lesser effectiveness of the team taught environment with team taught girls achieving an adjusted mean score of -2.16 and team taught boys evidencing a score of -1.84 compared with a score of 2.78 for traditionally taught girls and 3.81 for traditionally taught boys. According to the data, the team taught students did worse than the traditionally taught students in math computation. The MANCOVA revealed a univariate level of .79 which indicates that gender did not have a significant influence on achievement.

Comment on Math Achievement

The data intimate that the team teaching treatment did not positively influence student achievement in math concepts and math computation but univariate significance was revealed only in the general achievement in math computation at .05 and at .05 in math computation when controlled for students' prior achievement in mathematics. The only additional hypotheses which can be rejected are H21, there is no difference in math computation achievement between team taught and traditionally taught students; and H22, there is no difference in math computation achievement between team taught and traditionally taught students when controlled for prior achievement.

Feelings of Competency

The data acquired by administering the Youth Questionnaire were analyzed to determine student attitude toward Scale 1, questions 1-8, concerned with student attitude toward their performance in the subject area; Scale 2, questions 9-15, dealing with student assessment of the importance of high achievement in the subject area; and Scale 3, questions 16-23, concentrating on the student attitude toward their ability in the subject area. The data were explored according to each treatment group as well as by gender.

Feelings of Competency in English

Hypothesis 25: There is no difference in attitude toward performance in English between team taught and traditionally taught students.

Table 25

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward Performance in English						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	3.44	.37	3.48	.67	1.55201	N.S.
Traditional	3.23	.47	3.17	.45		

The pre and post test means of the team taught group indicate a slight improvement of .04 in attitude toward performance in English while the traditional group declined .07 on Scale 1. Both treatment groups evidence a slight change, but the means still fall in the average range of responses. The univariate level of significance of .22 indicates that hypothesis 25 cannot be rejected.

Hypothesis 26: There is no difference in attitude toward performance in English between team taught and traditionally taught girls.

Table 26

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward Performance in English						
Post Test Scores						
Team	Mean	S.D.	Girls	S.D.	F.	Sig.
			Adj.M.			
Team	3.47	.63	.03	.69	.04250	N.S.
Traditional	3.47	.31	-.04	.29		

The mean of the girls in the team taught environment is slightly higher than the mean of the girls in the traditional group. The negative adjusted mean of the traditionally taught girls intimates a regression in their attitude toward

their performance in English while the team taught girls evidence a minor improvement. Although the team teaching environment influenced a positive change in attitude, the level of significance of F at .83 reveals that hypothesis 26 cannot be rejected. The difference is minimal and both groups' responses are in the average range.

Hypothesis 27: There is no difference in attitude toward performance in English between team taught and traditionally taught boys.

Table 27

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward Performance in English						
Post Test Scores						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	3.48	.74	.08	.70	.04250	N.S.
Traditional	3.08	.74	-.09	.68		

The data regarding boys' attitudes toward their performance in English reiterate the pattern established by the girls. Although the level of F is not significant, the team taught boys evidence a more positive post mean score than the traditionally taught boys. Also, the negative adjusted means of the traditionally taught boys reveals their retrogression in attitude toward their performance in English.

Hypothesis 27 cannot be rejected.

Hypothesis 28: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught students.

Table 28

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward the Importance of High Grades in English						
	Pre-test		Post-test			
	Mean	S.D.	Mean	S.D.	F.	Sig.
Team	3.39	.62	3.23	.72	4.84616	.03
Traditional	2.67	.51	2.70	.70		

The data reveal that the team taught group evidences a regression of .16 over the duration of the study while the traditionally taught group indicates an increase of .03. The team teaching treatment affected a negative change in student attitude toward the importance of high grades in English at the generalizably significant level of .03. Hypothesis 28 can be rejected.

Hypothesis 29: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught girls.

Table 29

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward the Importance of High Grades in English						
Post Test Scores						
	Mean	S.D.	Girls Adj.M.	S.D.	F.	Sig.
Team	3.33	.76	.02	.57	.20532	N.S.
Traditional	2.75	.71	.06	.57		

The team taught girls had actual higher means than the traditionally taught girls, but the adjusted means reveal that the traditionally taught girls expressed more positive growth over the study. Since the level of F was not significant,

hypothesis 29 cannot be rejected.

Hypothesis 30: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught boys.

Table 30

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward the Importance of High Grades in English						
Post Test Scores						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	3.19	.74	-.08	.65	.20532	N.S.
Traditional	2.83	.78	.06	.49		

The pattern established by the girls is reiterated in the boys' attitude toward the importance of high English grades. The team taught boys' actual mean was higher than that of the traditionally taught boys, but the adjusted means reveal that the team taught boys developed a negative attitude while the traditional treatment resulted in positive movement. The hypothesis cannot be rejected, though, as the level of F was insignificant.

Hypothesis 31: There is no difference in attitude toward ability in English between team taught and traditionally taught students.

Table 31

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward Ability in English						
Team	Pre-test		Post-test		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	3.14	.69	3.12	.69	.00573	N.S.
Traditional	2.90	.67	3.13	.74		

Although the team taught group evidences a slight regression in attitude toward ability in English while the traditional treatment group indicates a movement from the below average range of responses into the average range, the level of F was not significant and hypothesis 31 cannot be rejected.

Hypothesis 32: There is no difference in attitude toward ability in English between team taught and traditionally taught girls.

Table 32

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward their Ability in English						
Post Test Scores						
Team	Mean	S.D.	Girls	S.D.	F.	Sig.
			Adj.M.			
Team	3.13	.53	-.05	.40	.12501	N.S.
Traditional	3.23	.58	.10	.64		

The traditionally taught girls had a higher actual post mean and a positive adjusted post mean. Conversely, the team taught girls' post mean was .10 lower and their adjusted post mean was negative which intimates development of a less positive attitude during the study. The level of F was not significant so hypothesis 32 cannot be rejected.

Hypothesis 33: There is no difference in attitude toward ability in English between team taught and traditionally taught boys.

Table 33

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward their Ability in English						
Post Test Means						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	3.15	.83	-.04	.81	.12501	N.S.
Traditional	2.93	.83	.05	.61		

Although the team taught boys evidence a higher actual post mean score on their attitude toward ability in English, their adjusted post mean is negative indicating a retrusion in attitude where the traditionally taught boys' adjusted post mean score reveals positive change. Again, the level of F is not significant enough to reject hypothesis 33.

Summary of Feelings of Competency in English

Although the team taught environment influenced less positive attitude change than did the traditional environment, the only hypothesis which can be rejected is 28, there is no difference in the attitude toward the importance of high grades in English between the team taught and traditionally taught students, which is rejected at the .03 level.

Feelings of Competency in Mathematics

Hypothesis 34: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught students.

Table 34

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward Performance in Mathematics						
Team	Pre-test		Post-team		F.	Sig.
	Mean	S.D.	Mean	S.D.		
Team	3.16	.56	3.25	.53	.00176	N.S.
Traditional	3.21	.52	2.29	.54		

The data reveal that the team taught students had lower pre and post mean scores than the traditionally taught students, but the difference in the amount of growth over the semester is slight. The level of significance of F indicates that hypothesis 34 cannot be rejected.

Hypothesis 35: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught girls.

Table 35

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward their Performance in Mathematics						
Post Test Scores						
Team	Mean	S.D.	Girls	S.D.	F.	Sig.
			Adj.M.			
Team	3.00	.62	-.09	.61	.01243	N.S.
Traditional	3.38	.80	.17	.75		

The actual mean score of the traditionally taught girls was higher than that of the team taught girls, and the negative adjusted post mean of -.09 for the team taught girls indicates a lessening of positive attitude. Hypothesis 35 cannot be rejected.

Hypothesis 36: There is no difference in attitude toward

performance in mathematics between team taught and traditionally taught boys.

Table 36

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward their Performance in Mathematics						
Post Test Scores						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	3.34	.48	.06	.30	.01243	N.S.
Traditional	3.24	.33	.01	.25		

The team taught boys express a more positive attitude toward their performance in mathematics than do the traditionally taught boys, but both groups' responses fall in the average range. The hypothesis, there is no difference in attitude toward performance in mathematics between team taught and traditionally taught boys, cannot be rejected.

Hypothesis 37: There is no difference in attitude toward the importance of high grades in mathematics between team taught and traditionally taught students.

Table 37

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward Importance of High Grades in Mathematics						
	Pre-test		post-test			
	Mean	S.D.	Mean	S.D.	F.	Sig.
Team	2.73	.51	2.76	.50	.54700	N.S.
Traditional	2.81	.53	2.89	.58		

The pre test and post test means of each treatment group reflect a slim positive change in attitude, but both groups'

responses remained in the below average range. The F level was insignificant so hypothesis 37 cannot be rejected.

Hypothesis 38: There is no difference in attitude toward the importance of high grades in mathematics between team taught and traditionally taught girls.

Table 38

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward Importance of High Grades in Mathematics						
Post Test Scores						
	Mean	S.D.	Girls Adj.M.	S.D.	F.	Sig.
Team	2.67	.38	-.11	.37	.51189	N.S.
Traditional	2.90	.83	.05	.60		

The girls from the traditional treatment evidence a higher actual post mean score and a positive adjusted post mean compared to the girls from the team taught environment who reveal a negative adjusted post mean. This infers that, although neither group climbed out of the below average range of responses, the team taught group evidences a noticeable decline. Because the level of F was .48, hypothesis 38 cannot be rejected.

Hypothesis 39: There is no difference in attitude toward the importance of high grades in mathematics between the team taught and traditionally taught boys.

Table 39

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward Importance of High Grades in Mathematics						
Post Test Means						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	2.81	.56	3.49	15.83	.51189	N.S.
Traditional	2.88	.39	.20	.38		

The actual post mean scores for the boys from each treatment group are extremely close. The adjusted means reveal a dramatic difference between the team taught boys at 3.49 and the traditionally taught boys at .2. Although the level of F is not significant, the team taught boys' score reflects an obvious positive change in attitude toward the importance of high grades in mathematics.

Hypothesis 40: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught students.

Table 40

Effect of Team Teaching Versus Traditional Teaching on General Attitude Toward Ability in Mathematics						
	Pre-test		Post-test		F.	Sig.
Team	Mean	S.D.	Mean	S.D.		
	3.25	.44	3.10	.45	.34823	N.S.
Traditional	3.19	.53	3.22	.49		

The results reveal that the team taught group's attitude toward their ability in mathematics digressed over the semester while that of the traditionally taught group improved slightly. The hypothesis cannot be rejected as the level

of F was insignificant at .5.

Hypothesis 41: There is no difference in attitude toward ability in mathematics between team taught girls and traditionally taught girls.

Table 41

Effect of Team Teaching Versus Traditional Teaching on Girls' Attitude Toward Ability in Mathematics						
Post Test Scores						
	Mean	S.D.	Girls Adj.M.	S.D.	F.	Sig.
Team	3.15	.41	-.03	.32	1.40201	N.S.
Traditional	3.36	.66	.23	.70		

The team taught girls evidence a lower actual post mean of 3.15 as compared to 3.36 for the traditionally taught girls. The negative adjusted post taught girls' score reflect a negativism in their attitude toward their ability in mathematics. Again, the hypothesis cannot be rejected.

Hypothesis 42: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught boys.

Table 42

Effect of Team Teaching Versus Traditional Teaching on Boys' Attitude Toward Ability in Mathematics						
Post Test Scores						
	Mean	S.D.	Boys Adj.M.	S.D.	F.	Sig.
Team	3.08	.48	-.09	.36	1.40201	N.S.
Traditional	3.13	.33	-.05	.38		

The data substantiate that the attitude of the team taught

boys toward their mathematics ability, like that of the team taught girls, declined. Although the traditionally taught boys also expressed a negative adjusted mean, their drop was not as severe and the responses of both groups were in the average range. The hypothesis, there is no difference in attitude toward mathematics between team taught and traditionally taught boys, cannot be rejected.

Summary of Feelings of Competency in Mathematics

The results of the Youth Questionnaire in both the traditionally taught and the team taught groups are positive on Scales 1 and 2 when the whole treatment group is considered. The team taught group indicates a decline on Scale 3, while the traditional group maintains a positive pattern. On Scales 1 and 2, the girls from the team teaching environment reflect an increasing negativism while all other sub-groups reveal a positive change. According to the data analysis, none of the hypotheses related to feelings of competency in mathematics can be rejected.

Summary

The analysis of data acquired by administering the SRA Achievement Series and the Youth Questionnaire was presented according to the hypotheses. The achievement sections were divided by sub test areas into results by total treatment groups, relationship between prior achievement and outcome, relationship between learning trends and outcome and by gender. The feelings of competency sections were organized according to total treatment group and gender.

Analysis of the data on reading for the total treatment group exposes the team teaching environment as being less effective in promoting student achievement in reading than the traditional environment as the team teaching group's scores regressed while the traditional groups's scores improved slightly. When controlled for prior achievement in English, the team teaching treatment again evidenced a decline in student scores over the semester which was significant at the .01 level. There was no significant difference in reading achievement between the team taught and traditionally taught students when controlled for prior learning trends or gender.

The results on vocabulary achievement follow a pattern similar to that established in reading achievement. Although vocabulary achievement for both the team taught students and the traditionally taught students declined, the team taught group regressed almost 12 percentage points. This tendency for the team taught environment to adversely influence vocabulary achievement was significant at the .05 level. When controlled for prior achievement in English, the negative influence of team teaching was also significant at the .01 level. Again, there was no significant difference in vocabulary achievement between treatment groups when controlled for prior learning trends or gender.

The language arts data did not reveal a significant difference between treatment groups except when controlled for prior achievement which was generalizably significant at the .05 level. The team taught students did decline from the

pre to post test while the traditionally taught students improved, but the difference was only significant when controlled for prior achievement. There was no significant difference between groups when controlled for prior learning trends or gender.

The data on spelling achievement repeats the trend found in the vocabulary achievement results. The declining scores of both groups were significant at the .01 level only when controlled for prior achievement. No other significant differences between groups were revealed.

Although only Hypotheses 1, 2, 5, 6, 10 and 14 can be rejected, the team teaching environment consistently produced a decline in student achievement in all four subtest areas. The traditional treatment also reflects a slim retrogression in vocabulary and spelling but produced positive achievement in reading and language arts. The team approach was not effective in producing improvement in student achievement in English.

The math concepts results revealed no significant difference between team taught and traditionally taught students. Both groups reflect an increase in math concepts achievement, but the traditionally taught students evidence a gain of 6.19 percentage points as compared to .58 percent in the team taught group. There were no significant differences between groups when controlled for prior achievement, learning trends or gender.

The effect of team teaching versus traditional teaching

on math computation was significant at the .05 level with the team taught group digressing 5 percentage points and the traditional group digressing a little over 1 percentage point. Controlling for prior achievement also revealed a .05 level of significance with the team taught group regressing in achievement. There were no differences between groups when controlled for learning trends or gender.

Although both groups increased in math concepts achievement and decreased in math computation achievement, the more adverse influence of the team teaching environment on student achievement in mathematics is apparent.

There was no difference in attitude toward performance in English between the two treatment groups when the results were analyzed for the total groups and by gender within each treatment group. The traditional group's attitude toward performance in English was consistently lower than that of the team taught group but not at a significant level.

The hypothesis, there is no difference in the attitude toward the importance of grades in English between team taught and traditionally taught students, can be rejected at the .03 level of significance with the team taught students evidencing a more negative attitude over the duration of the study than did the traditionally taught students. When the results were analyzed by gender, both boys and girls from the traditional environment had positive adjusted post means while only the boys from the team taught environment had a positive adjusted post mean score.

Even though there were no significant differences between the team taught students' and the traditionally taught students' attitude toward their ability in English, the team taught group evidenced a decline in attitude while the traditionally taught group reflected an increase in positive attitude. This trend was consistent when the data were analyzed by gender.

The data revealed that the difference in attitude toward the importance of grades between the team taught group and the traditionally taught group was significant at the .03 level. There were no significant differences in attitude toward performance and ability in English between treatment groups.

Change in attitude toward performance in mathematics was positive when the data were analyzed for each total treatment group, but the change was not generalizably significant. The girls from the team taught environment showed a decline in attitude toward performance in mathematics while all other subgroups revealed positive growth, but these results were not significant.

The team taught students' and the traditionally taught students' attitudes toward the importance of high grades in mathematics was repeated when the data on attitude toward performance were analyzed. Only the team taught girls revealed a digression over the semester while all other subgroups reflected positive adjust post test means, but not at a significant level.

Again, there were no significant differences between groups in their attitude toward ability in mathematics although the team taught students' attitude retrogressed and the traditionally taught students' attitudes improved. All subgroups, except traditionally taught girls, reflected a decline in attitude toward ability in mathematics, but the data were not generalizably significant.

There were no significant differences in attitude toward performance, importance of grades and ability in mathematics between team taught and traditionally taught students.

The data reveal that nine of the total forty-two hypotheses are rejected at generalizably significant levels. The analysis also infers that the team teaching approach utilized at Linden is not producing sufficient achievement in either English or mathematics and that there is virtually no difference in student feelings or competency in the subject between the team taught and traditionally taught students.

CHAPTER V

SUMMARY, CONCLUSIONS AND COMMENTARY

Summary of Study

Team teaching, which grew from the teacher shortage of the 1950's and survived the shift to teacher surplus, has proved to be an enduring innovation; yet its support has been derived more from affirmation than through validation based on empirical evidence. Supporters of the team approach claim that it promotes development of a positive attitude toward subject while sustaining cognitive achievement. This study is an attempt to evaluate the effectiveness of the team teaching method versus the traditional method in advancing student achievement and evolving a positive attitude toward subject in mathematics and English so that more informed decisions regarding the continuation of the team environment in the Linden Senior High School can be made.

Although the term "team teaching" does not connote any universally recognized pattern of organization; in simplified terms, team teaching exists when two or more persons are assigned to the same students at the same time for instructional purposes. Traditional teaching is evident when the responsibility for instruction of a group of students for a designated period of time and/or subject is delegated to

a solitary teacher. Both environments existed at Linden Senior High School when this study was undertaken.

A review of the literature indicated that no clear or consistent data exist to support or refute that team teaching is superior to traditional teaching in promoting superior cognitive or affective outcomes.

The instrumentation utilized in this study consisted of the SRA Achievement Series forms E and F/Red Level, mathematics and English subtests, to ascertain cognitive growth and the Youth Questionnaire to acquire data on attitude toward subject. The Youth Questionnaire was administered on all subjects as a pre and post measure. The Achievement Series, form E/Red Level was given as a pre test and form F/Red Level was given as the post test. The English subjects received only the English Reading, Vocabulary, Language Arts and Spelling subtests and the mathematics subjects received only the Math Concepts and Math Computation subtests.

The subjects used in the study were freshmen students randomly scheduled by computer into the team or traditional sections of Computation Skills in mathematics and Basic Competency in English. Both the Computation Skills and Basic Competency Courses were designed to meet the needs of the average entering freshman student.

Out of the forty-two hypotheses tested by this study, only hypotheses 1, 2, 5, 6, 10, 14, 21, 22, and 28 were rejected at generalizably significant levels.

H1: There is no difference in reading achievement between team taught and traditionally taught students. Rejected at .05.

H2: There is no difference in reading achievement between team taught and traditionally taught students when controlled for prior achievement. Rejected at .01.

H3: There is no difference in reading achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H4: There is no difference in reading achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H5: There is no difference in vocabulary achievement between team taught and traditionally taught students. Rejected at .05.

H6: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for prior achievement. Rejected at .01.

H7: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H8: There is no difference in vocabulary achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H9: There is no difference in language arts achievement between team taught and traditionally taught students. Not significant.

H10: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for prior achievement. Significant at .05.

H11: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H12: There is no difference in language arts achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H13: There is no difference in spelling achievement between team taught and traditionally taught students. Not significant.

H14: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for prior achievement. Rejected at .01.

H15: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H16: There is no difference in spelling achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H17: There is no difference in math concepts achievement between team taught and traditionally taught students. Not significant.

H18: There is no difference in math concepts achievement between team taught and traditionally taught students

when controlled for prior achievement. Not significant.

H19: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H20: There is no difference in math concepts achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H21: There is no difference in math computation achievement between the team taught and traditionally taught students. Rejected at .05.

H22: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for prior achievement. Rejected at .05.

H23: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for past academic performance. Not significant.

H24: There is no difference in math computation achievement between team taught and traditionally taught students when controlled for gender. Not significant.

H25: There is no difference in attitude toward performance in English between team taught and traditionally taught students. Not significant.

H26: There is no difference in attitude toward

performance in English between team taught and traditionally taught girls. Not significant.

H27: There is no difference in attitude toward performance in English between team taught and traditionally taught boys. Not significant.

H28: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught students. Rejected at .03.

H29: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught girls. Not significant.

H30: There is no difference in attitude toward the importance of high grades in English between team taught and traditionally taught boys. Not significant.

H31: There is no difference in attitude toward ability in English between team taught and traditionally taught students. Not significant.

H32: There is no difference in attitude toward ability in English between team taught and traditionally taught girls. Not significant.

H33: There is no difference in attitude toward ability in English between team taught and traditionally taught boys. Not significant.

H34: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught students. Not significant.

H35: There is no difference in attitude toward

performance in mathematics between team taught and traditionally taught girls. Not significant.

H36: There is no difference in attitude toward performance in mathematics between team taught and traditionally taught boys. Not significant.

H37: There is no difference in attitude toward the importance of high grades in mathematics between team taught and traditionally taught students. Not significant.

H38: There is no difference in attitude toward the importance of high grades in mathematics between team taught and traditionally taught girls. Not significant.

H39: There is no difference in attitude toward the importance of high grades in mathematics between the team taught and traditionally taught boys. Not significant.

H40: There is no difference in attitude ability in mathematics between team taught and traditionally taught students. Not significant.

H41: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught girls. Not significant.

H42: There is no difference in attitude toward ability in mathematics between team taught and traditionally taught boys. Not significant.

Conclusions and Comment on Achievement

Achievement data when analyzed for the total treatment group indicated that the team teaching treatment adversely influenced cognitive growth of subjects in both mathematics and English. The data revealed that team taught students' achievement scores went down from pre to post test in all English subtest areas. The tendency for team taught students achievement to decline was generally significant in reading at the .05 level and in vocabulary at the .05 level. Although the traditional group also evidenced a retrogression in vocabulary and spelling, their loss was not as dramatic as that of the team taught group and they did improve in reading and language arts. The results from the mathematics achievement measures reiterated the tendency for team taught students to reflect less achievement than the traditionally taught students. It is apparent that both groups improved in achievement in mathematics concepts, but the team taught students evidenced an increase of only .58 percent in contrast to the 6.19 percent increase of the traditionally taught students. This pattern of the team taught treatment to affect less achievement is statistically significant at the .05 level in math computation where both groups declined, but the team taught group declined 5.03 percent while the traditionally taught group declined slightly. The study substantiates that Linden's team teaching environments in both English and mathematics were not as successful as the traditional

environment in promoting positive achievement.

Although the treatment did not prove to be significant in all subtest areas in either mathematics or English, the tendency for the team taught subjects to do worse than the traditional students cannot be denied on the basis of this study. The fact that in English both treatment groups did worse in vocabulary and spelling between the pre and post measures and in mathematics both did worse in computation between pre and post test measures implies that these areas are not receiving adequate attention or that the presentation and/or materials are ineffective. Staffs from both departments need to evaluate their pedagogy and assess whether the cognitive outcomes of their students are consistent with departmental goals and objectives. Possibly, these areas are not emphasized because of departmental decisions on priorities; but if not, problem areas need to be identified and alterations considered.

In other subtest areas, reading and language arts in English and concepts in mathematics, the team taught groups actually evidenced a loss in achievement over the duration of the study while the traditional groups revealed improvement. Since the senior member of each team taught the traditional section and the same materials were used, the key difference appears to be in the model for the instructional environment.

An explanation for the lower achievement of the team taught groups in both mathematics and English is inherently speculative, but is based on observation of both environments

since the onset of team teaching in Linden in 1976 and concentrated observation during the study. The mathematics team is well organized and has strong leadership in the departmental chairman; cooperation and sharing of responsibility is most evident. The possible reason for lesser achievement of the team taught group may be that these "average" freshmen students are too immature and too concerned with socializing to effectively assume the greater responsibility for learning implied by the team concept. Most appear to prefer socializing to mathematics and the distance of any team teacher from any one group at any one time certainly does encourage this tendency. Also, the aides vary in ability, and it is possible that most student aides are not as capable of presenting the material or explanations in as effective a manner as is the senior team member who taught the traditional mathematics section. Also, even though the team meets regularly and updates materials constantly, the major development of softwares was accomplished during the first two pilot years of the team environment and only minor additions and alterations have taken place since then. A lack of major alterations in materials or team organization is most probably due to the fact that the team is highly committed to this concept and believes that they are most successful. Without previous evaluation, no indication of possible areas for improvement were evident.

The English team presents a totally different situation.

The team members involved in the study were not involved in the original pilot project and, therefore, had no part in designing the approach or developing the materials. The two team members involved in the study did not advocate team teaching nor did they feel comfortable with it. Teacher morale was apparently low in the English team which may have adversely influenced the achievement of the students in all subtest areas. The English team members were hesitant to allocate responsibility for "teaching" to the student aides which resulted in an overwhelming work load on them both in and out of the classroom. Another disadvantage was that little cooperation existed between the team members with respect to planning, development of materials or student evaluation. There appears to be little hope for salvaging the team concept in English without identification of teachers who are committed and willing to work for its success.

Other variables which might have influenced the outcome of the study, but on which no data were systematically gathered, are selection of team members, the various levels of commitment of the team members, experience of team members, selection of student aides and degree of administrative support.

The selection of team members has frequently been based on convenience in scheduling. After the teachers were assigned to courses in their specialized areas, the team members would be selected from those who happened to be unassigned during the period(s) where team teaching was planned.

Neither the educator's teaching strengths nor attitude toward team teaching was a primary consideration in team design. Although teacher choice was honored when possible, it was frequently not possible. This situation may have caused teacher discontent which influenced the results and could be related to the more dramatic loss of achievement in team taught students.

Although it was apparent that different levels of commitment existed in team members and between teams, no data were gathered with respect to this variable. Ironically, the mathematics team which vocally advocated the team concept did not affect more positive growth in their students than did the English team which often voiced their discontent with the team concept. The English team was dissolved at the end of the first semester during the 1979-1980 academic year, but the mathematics team maintained the approach.

Just as the mathematics team appeared to possess a higher level of commitment to team teaching than did the English team, they also had more experience teaching in this instructional model than the English team. This may account for the more drastic decline of the students in English achievement than was observable in the mathematics achievement of students.

The selection of student aides has been haphazard, often being based on student choice or counselor placement. Students who needed a class during a particular hour frequently became teaching aides. Their teaching potential

and knowledge of course content have not been primary considerations. Their effectiveness, or lack of it, could have influenced student achievement in the team taught sections. If one possible area where improvements seem needed were to be highlighted, it seems most reasonable to direct it toward the process of selecting and training the student aides.

The degree of administrative support is another variable not investigated by this study but which could have indirectly influenced the outcome. The building administrators during the period of the study were not the administrators at the time the team teaching concept was initiated in Linden Senior High School. The administration's attitude toward the instructional model has not been overtly stated, but some indications of their level of support exist. Provisions for team teaching have often been overlooked when the master schedule was designed, necessitating a last minute juggling in order to accommodate a team approach. It has rarely been possible for team members to share common planning time and, as previously mentioned, the team design does not appear to be a priority when teaching assignments are made. No provisions have been made for orientating teachers, students, parents or Board members to the team concept. Team teaching appears to be tolerated rather than actively supported.

There were conflicting results on the relationship between prior achievement and outcome between English subjects and mathematics subjects. This data reflect upon the

standardized achievement measures and infer that these standardized tests are consistent in English assessment but are not uniform in mathematics assessment. Possibly, a review of the district's testing tools should be undertaken so there is a consistency between standardized testing and the subject areas being emphasized by the curricula.

The results of the relationship between learning trends and achievement were compatible between English and mathematics although no significance was evident. The team and traditional declining groups in both subject areas evidenced the lowest post mean scores. The inclining groups from both treatments revealed the highest post mean scores with the consistent groups' means falling between the declining and inclining scores. The results do indicate that neither treatment affects a change in learning trends; those students who were on a downward trend continue to do poorly and those who were on an upward trend continue to achieve at a higher level. The consistent groups maintained their relationships with the other means in each subtest area over the duration of the study. The reason for this pattern not to be statistically significant may be related to the small number of students who could be classified into any one trend group, but the most important conclusion is that neither treatment results in a trend change.

Conclusion and Commentary on Attitude

The analysis of the results of the Youth Questionnaire failed to reveal any significant difference between groups

when analyzed by the total group or when analyzed by gender within each group except on Scale 2, the importance of high achievement in English, significant at the .03 level when analyzed for the total group. The data reveal that the English team taught group declined in positive attitude while the traditional group's attitude improved on every scale. This may be due to the lower achievement of the team taught students which caused a defensive position of apathy to develop. In mathematics, both treatment groups showed a slightly positive change on Scales 1 and 2, but the team taught group declined on Scale 3. In all areas, the responses clustered around the below average to average range. This may be due to the fact that the students who are scheduled into Basic Competency and/or Computation Skills as freshmen are those who are identified by previous records and teachers as possessing average or below average skills in English or mathematics. Students with superior achievement are scheduled into more accelerated courses. The study does reveal that no significant differences in attitude exist and that little is caused as a result of either environment, although the attitudes of the team taught students were more negative. Possibly, the Youth Questionnaire did not adequately differentiate between attitudes, or the duration of the study was too brief to affect any significant difference.

The results from the Youth Questionnaire add little to conclusions regarding the effect of team teaching on the

development of positive attitudes.

Further Research

Although the team teaching environment failed to affect significant differences in either the cognitive or affective domains, the tendency for the traditional group's results to be more positive is interesting and contrary to other studies. This should be re-examined before any conclusions can be finalized. In conjunction with this, more sophisticated instrumentation is required to differentiate student attitudes. Although available achievement instrumentation is adequate, further and more intensive correlation between the specific areas covered by teachers and the standardized instrument used to assess growth is recommended. Admittedly, there are limitations against a longitudinal study, but this still appears to be needed before definitive conclusions can be reached regarding the effect of team teaching on either attitude or achievement.

From this study, other interesting possibilities for further research emerge. Since the team taught classes at Linden are restricted to the freshmen mathematics and English courses, which provided subjects for this research, it might be revealing to conduct a follow-up study to determine if there is any difference in the achievement of students who enter a solitary teacher taught class after being in a team taught class than those students who enter a solitary teacher taught class after having been in a solitary teacher taught

class.

Further, since all students were randomly assigned to either treatment, it might prove beneficial to ascertain a criteria which could function as a valid predictor of success in the team environment. If nothing else, student/parent choice should be given consideration over random computer placement.

Although the study did not reveal any noticable difference between achievement and attitude of the team taught students in mathematics and English, the years of teacher experience in team teaching and the commitment levels of the two teams were distinctly different. It might be worthwhile to investigate the relationship between teacher experience and student outcome as well as the relationship between teacher commitment and student outcome.

Another area which this study poses for further research is the relationship between student aides' effectiveness and student outcomes in the team environment. Again, it would be valuable to develop an instrument which would provide descriptive predictors of which students would make successful student aides.

Regardless of the unanswered questions prompted by the team teaching concept and the lack of empirical evidence to attest its effectiveness, it still should be accepted as a viable alternative which has the potential to contribute to education. In Linden's situation, re-evaluation of the components which comprise the total team approach is indicated.

If the staff genuinely believes in team teaching as a worthwhile instructional model, they must seriously assess and redesign their program. Possibly this study, which offers a condemnation of team teaching, can concomitantly provide a warning of some pitfalls for those committed to this instructional model to be aware of and avoid.

APPENDIX

APPENDIX A
YOUTH QUESTIONNAIRE

5. I am the best
 4. I am above average
 3. I am average
 2. I am below average
 1. I am the poorest
1. How do you rate yourself in school ability compared with your close friends?
 2. How do you rate yourself in school ability compared with those in your class at school?
 3. Where do you think you would rank in your class in high school?
 4. Do you think you have the ability to complete college?
 5. Where do you think you would rank in your class in college?
 6. In order to become a doctor, lawyer, or university professor, work beyond four years of college is necessary. How likely do you think it is that you could complete such advanced work?
 5. very likely
 4. somewhat likely
 3. not sure
 2. unlikely
 1. most unlikely
 7. Forget for a moment how others grade your work. In your own opinion, how good do you think your work is?
 8. What kind of grades do you think you are capable of getting?
 5. A's
 4. B's
 3. C's
 2. D's
 1. E's

highly important

important

moderately important

not particularly important

not important at all

9. How important to you are the grades you get in school?
10. How important is it to you to be high in your class in grades?
11. How important is it to you to do as well in school as you know you can?
12. How important is it to you to do better than others in school?
13. How important is it to you to get better grades than others in school?
14. How important is it to do better on your schoolwork than others?
15. How important to you are good grades compared with other aspects of school?

Put an X in the column which best answers the question. If you are in the math group, answer only the math; if you are in the English group, answer only for English.

I am
the
poorest

I am
below
average

I am
average

I am
above
average

I am
the
best

16. How do you rate your ability in math/English as compared with your close friends?
17. How do you rate your ability in math/English compared with those in your class at school?
18. Where do you think you will rank in your high school graduating class in math/English?
19. Do you think you have the ability to do college work in math/English?
20. Where do you think you would rank in your college class in math/English?

21. How likely do you think it is that you could complete advanced work beyond college in math/English?
22. Forget for a moment how others grade your work; in your opinion, how do you think your work is in math/English?
23. What kind of grades do you think you are capable of getting in math/English?

Scoring Key for "Youth Questionnaire"

<u>Item</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
1.	5	4	3	2	1
2.	5	4	3	2	1
3.	5	4	3	2	1
4.	5	4	3	2	1
5.	5	4	3	2	1
6.	5	4	3	2	1
7.	5	4	3	2	1
8.	5	4	3	2	1
9.	5	4	3	2	1
10.	5	4	3	2	1
11.	5	4	3	2	1
12.	5	4	3	2	1

<u>Item</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
13.	5	4	3	2	1
14.	5	4	3	2	1
15.	5	4	3	2	1
16.	5	4	3	2	1
17.	5	4	3	2	1
18.	5	4	3	2	1
19.	5	4	3	2	1
20.	5	4	3	2	1
21.	5	4	3	2	1
22.	5	4	3	2	1
23.	5	4	3	2	1

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