

**A STUDY OF SELF CONCEPT, MATHEMATICS
ATTITUDE, AND MATHEMATICS ACHIEVEMENT
OF TENTH GRADE STUDENTS AT
HENDERSONVILLE SENIOR HIGH SCHOOL**

ILA MARY GREENWELL

A STUDY OF SELF CONCEPT, MATHEMATICS ATTITUDE, AND
MATHEMATICS ACHIEVEMENT OF TENTH GRADE STUDENTS
AT HENDERSONVILLE SENIOR HIGH SCHOOL

An Abstract
Presented to
the Graduate Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in Education

by
Ila Mary Greenwell

July, 1972

ABSTRACT

Educators place emphasis on the need of each individual to feel himself a person of worth, secure in his knowledge of who he is, what he is now doing, and what he may become. His self concept is generally believed to be a factor in achievement of social, moral, and intellectual goals in life. Attitude toward a subject is also believed to play an important role in achievement, and the development of favorable attitudes is usually one of the objectives of mathematics instruction.

The purpose of this study was to investigate the relationship between mathematics attitude and mathematics achievement and between self concept and mathematics achievement. If self concept and mathematics attitude are truly important in achievement, then both should receive attention from the teacher who is dedicated to helping students realize their full potential.

This study was limited to fifty-eight students in two general mathematics classes taught by the author at Hendersonville Senior High School during the school year 1970-71. It was significant in that it adds some knowledge to the work that has already been done in relating mathematics attitude and self concept to achievement in mathematics.

The Tennessee Self Concept Scale was used to measure self concept, and the Rabinowitz Mathematics Attitude Scale was used to measure attitude toward mathematics. I.Q. scores and course grades were taken from the students' permanent school records. The students were divided into three groups on the basis of good, average, and poor attitude scores. The difference in achievement among the three groups was tested using analysis of covariance, holding I.Q. constant. Similarly, the students were divided into three groups on the basis of high, medium, and low self concept scores. Difference in achievement was tested by analysis of covariance between groups, holding I.Q. constant.

The investigation showed a relationship between mathematics attitude of tenth grade students and achievement in mathematics, but not between self concept of tenth grade students and achievement in mathematics.

A STUDY OF SELF CONCEPT, MATHEMATICS ATTITUDE, AND
MATHEMATICS ACHIEVEMENT OF TENTH GRADE STUDENTS
AT HENDERSONVILLE SENIOR HIGH SCHOOL

A Thesis

Presented to
the Graduate Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in Education

by
Ila Mary Greenwell

July, 1972

To the Graduate Council:

I am submitting herewith a Thesis written by Ila Mary Greenwell entitled "A Study of Self Concept, Mathematics Attitude, and Mathematics Achievement of Tenth Grade Students at Hendersonville Senior High School. " I recommend that it be accepted in partial fulfillment of the requirement for the degree of Master of Arts in Education, with a major in Mathematics.

William G. Stokes
Major Professor

We have read this thesis and
recommend its acceptance:

Blair F. Williams
Minor Professor

Ernest Woodward
Third Committee Member

Accepted for the Council:
Wayne E. Stamps
Dean of the Graduate School

ACKNOWLEDGEMENT

The author wishes to express appreciation to Dr. William G. Stokes, Major Professor in Mathematics, who has patiently and kindly guided each step of this study, and to Mr. George Brotherton, for his gracious assistance in analyzing the data.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	1
The Problem	1
Statement of the Problem	4
Limitations	4
Significance of the Study	5
The Hypotheses	5
II. REVIEW OF RELATED LITERATURE	6
III. METHODS OF RESEARCH	13
IV. STATISTICAL ANALYSIS	18
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS.	21
BIBLIOGRAPHY	23
APPENDIX A. Rabinowitz Mathematics Attitude Scale	26
APPENDIX B. Tabulation of the Data	32
APPENDIX C. Tennessee Self Concept Scale	38

LIST OF TABLES

Table	Page
I. Analysis of Achievement of Students with Good, Average, and Poor Attitude	19
II. Analysis of Achievement of Students with High, Medium, and Low Self Concept	20
III. Test Data on Students	32
IV. I.Q. and Achievement Scores, as They Were Used to Measure the Relationship Between Mathematics Attitude and Achievement	34
V. I.Q. and Achievement Scores, as They Were Used to Measure the Relationship Between Self Concept and Achievement . . .	36

CHAPTER I

INTRODUCTION

The Problem

Mathematics, since the dawn of civilization, has been considered as a rational discipline of excellence and as one of the master components of the intellectual equipment of mankind. As technological advances have been made, it has become more and more indispensable to make mathematics known to more students, to give them better instruction, and to present to them new and useful concepts. In all countries, those responsible for mathematical education must face the same problems of programs of study, methods, procedures, and objectives of instruction. The investigation and solution of these problems are urgent.¹

The fear and dislike some students have for mathematics has long been a problem for mathematics teachers. Many students go through four years of high school avoiding mathematics as much as possible only to find they are denied entry into vocations of interest to them because they lack the necessary background in mathematics.

¹Wily Servais, "Present Day Problems of Mathematical Instruction," The Mathematics Teacher, LXI (December, 1968), p. 791.

What causes this fear and dislike for mathematics? What can a teacher do to combat it? Is it related to an over-all feeling of insecurity or unworthiness? Is it an attitude that has been formed through years of unsuccessful attempts to learn mathematics? Studies are being made to determine what factors are of greatest importance in creating the proper mental climate for effective learning.

Educators have long believed that a good attitude toward a subject is necessary for achievement. As early as 1937, Allen postulated that favorable emotional attitude toward both the teacher and the topic is probably the greatest contributing factor to student success and the mental annoyance of unfavorable attitude contributes most to failure.²

Kinney and Purdy say that consideration of feelings toward a subject is particularly important in establishing a desirable learning situation. Favorable attitudes are a necessary but not a sufficient condition for learning.³ Johnson and Rising state that one of the goals of mathematics education is that a student develop attitudes and

²J. Eli Allen, "Some Psychological Phases of Student Success in High School Mathematics," The Mathematics Teacher, XXX (November, 1937), p. 323.

³Lucien B. Kinney and C. Richard Purdy, Teaching Mathematics in the Secondary School, (New York: Rinehart and Company, 1952), p. 285.

appreciations which lead to curiosity, confidence, and interest.⁴

Research indicates there is some relationship between attitude and achievement, but there is some question of which comes first. Does achievement produce positive attitude, or does a good attitude bring about achievement? Neale suggests that a student learns not so much because he enjoys discovering the orderliness of mathematical relationships, but rather that he wants to be an obedient person and do his duty.⁵

The self and self concept have been topics of concern to behavioral scientists since the days of William James. The trend in education today is toward teaching the "whole" child because the way one sees himself as a person is reflected in everything he does.

Hughes' investigation with sixth grade boys and girls demonstrated that those with more positive self concepts showed less anxiety and greater coping strength in handling a stress inducing situation. There is considerable evidence that the kind of self concept which a person takes into any situation affects the way he deals with that situation.⁶

⁴Donovan A. Johnson and Gerald R. Rising, Guidelines for Teaching Mathematics, (Belmont, California: Wadsworth Publishing Company, Inc., 1967), p. 14.

⁵Daniel C. Neale, "The Role of Attitudes in Learning Mathematics," The Arithmetic Teacher, XVI (December, 1969), p. 638.

⁶Thomas M. Hughes, "A Study of the Relationship of Coping Strength to Self Concept, School Achievement, and General Anxiety Level in Sixth Grade Pupils," Dissertation Abstracts, 28:4001-A, April, 1968.

Brookover and Gottlieb state if a person perceives he is unable to learn mathematics, this self concept of his ability becomes a limiting factor of his achievement.⁷

Statement of the Problem

The purposes of this study were: (1) to investigate the relationship between attitude toward mathematics and achievement in mathematics; (2) to investigate the relationship between self concept and achievement in mathematics.

Limitations

This study was limited to fifty-eight tenth grade students enrolled in two classes of a terminal course of general mathematics taught by the author at Hendersonville Senior High School, Hendersonville, Tennessee, during the school year 1970-71.

The conclusions of this study are based on the assumption that attitude and self concept can be accurately measured. There is the question of truthfulness of answers as well as reliability of measuring instruments to consider. The validity of the conclusions of this study is also limited to the extent that course grades are a measure of achievement.

⁷Wilbur B. Brookover and David Gottlieb, A Sociology of Education, (New York: American Book Company, 1964), p. 469.

Significance of the Study

It has long been suspected by many educators that there is a significant relationship between a positive attitude toward mathematics and high achievement in mathematics. Behavioral scientists have postulated a direct relationship between self concept and achievement but there is the charge that these relationships have not been established. This research is significant in that it is a continuation of research attempting to establish the existence, or non-existence, of a significant relationship among mathematics attitude, self concept, and achievement in mathematics.

The Hypotheses

The following null hypotheses were made:

1. There is no difference in achievement in mathematics between students with a poor attitude toward mathematics and students with a good attitude toward mathematics.

2. There is no difference in achievement in mathematics between students with a low self concept and students with a high self concept.

The five percent level of significance will be required for rejection of the hypotheses.

CHAPTER II

REVIEW OF RELATED LITERATURE

There are many definitions of attitude, but they all seem to agree on the idea of a readiness to respond, positively or negatively, to a stimulus--an act or message. Attitudes are thought to be relatively stable, having been formed during a lifetime of perception and appraisal.

Sherif and Cantril define attitude as a theoretical concept that denotes a functional state of readiness which causes the organism to react in a characteristic way to certain stimuli or stimulus situations.⁸

The social psychologist, Daniel Katz, conceives attitudes as "the predisposition of the individual to evaluate some symbol or object or aspect of his world in a favorable or unfavorable manner. . . . Attitudes include both the affective, or feeling core of liking or disliking, and the cognitive, or belief elements which describe the

⁸Muzafer Sherif and Hadley Cantril, "The Psychology of Attitudes," Part 1, Psychological Review, LII (1945), p. 295.

object of the attitude, its characteristics, and its relation to other objects."⁹

Fedon found attitudes for and against arithmetic being expressed as early as the third grade.¹⁰ Callahan reported that lasting attitudes are developed at each grade level, but the late elementary grades and the seventh grade are important in developing attitudes.¹¹

Kinney and Purdy observe that a pupil who is learning algebra is also learning to like algebra or dislike algebra; to like school or dislike school; to work as a cooperating member of the group or to work competitively for himself. The attitudes and interests that develop out of classroom activity are often more important than the skills and knowledges that are commonly thought of as primary outcomes.¹²

Aiken reports that in addition to learning principles, facts, and methods in school, children learn attitudes, values, and appreciations

⁹Daniel Katz, "The Functional Approach to the Study of Attitudes," in E. P. Hollander and Raymond G. Hunt (editors), Current Perspectives in Social Psychology, (New York: Oxford University Press, 1963), p. 343.

¹⁰J. Peter Fedon, "The Role of Attitude in Learning Arithmetic," The Arithmetic Teacher, V (December, 1958), p. 310.

¹¹Walter J. Callahan, "Adolescent Attitudes Toward Mathematics," The Mathematics Teacher, LXIV (December, 1971), p. 751.

¹²Kinney and Purdy, op. cit., p. 51.

there and, it is hoped, develop a desire for further learning. He also stated that the degree of teacher understanding, effectiveness, and appreciation of mathematics are significantly related to student attitude, and that improving teacher attitudes toward mathematics can result in more positive attitudes on the part of students.¹³

Devine made a study comparing programmed instruction with conventional classroom approach and found student attitudes toward mathematics appear to be more dependent upon the teacher than on teaching procedures.¹⁴ Husen reported achievement was positively correlated with interest in mathematics at all levels in all twelve countries in which he conducted the studies.¹⁵

The relationship between attitudes and achievement may vary with ability level. Cristaniello reported when students were divided into high, middle, and low groups on the basis of their attitudes toward mathematics, the correlation between mathematics ability test scores and mathematics achievement was higher for the middle

¹³Lewis R. Aiken, Jr., "Research on Attitudes Toward Mathematics," The Arithmetic Teacher, XIX (March, 1972), pp. 229-234.

¹⁴Donald F. Devine, "Student Attitudes and Achievement," The Mathematics Teacher, LXI (March, 1968), p. 301.

¹⁵Torstein Husen, International Study of Achievement in Mathematics (New York: John Wiley and Sons, 1967), pp. 153-154.

attitude group than for either the low- or high-attitude groups.¹⁶

From infancy, a person has been building a self-image, a concept of himself as a human being, of his place in the world, of his successes and failures in dealing with his environment. The self-image, or self concept, is influenced by his needs, his abilities, his reaction to what others tell him about himself, his physical characteristics and status, his value system, and the effects of past experience. One sees himself as athletic or not athletic, smart or dumb, popular or unpopular with his peers, good or bad. A good self concept is one in which one's self-image is as close to reality as possible.

Self concept can come from both inner and outer sources, but to a child, the image derived from a significant other person (outside source) is a more important appraisal of himself. Therefore, if a parent constantly tells the child he is short of the mark (awkward, selfish, inadequate, inferior, etc.), the child will soon see himself as unalterably thus. A child consistently praised will see himself as good. A child asked to do more than he actually can do will see himself as a failure.¹⁷

¹⁶Phillip D. Cristaniello, "Attitudes Toward Mathematics and the Predictive Validity of a Measure of Quantitative Attitude," Journal of Educational Research, 55 (1962), pp. 184-186.

¹⁷Opinion expressed by Sister Paulino Mary in an address "Helping the Child Achieve a Positive Self-Image" at a California Good Teaching Practices Conference, October 21, 1967.

Professional literature is now replete with thousands of theoretical articles and research studies about the self concept as sociologists, psychiatrists, theologians, and psychologists have increasingly come to view the self concept as a kind of construct for the understanding of people and their behavior.

Self theory is strongly phenomenological in nature and based on the general principle that man reacts to his phenomenal world in terms of the way he perceives this world. Probably the most salient feature in each person's phenomenal world is his own self--the self as seen, perceived, and experienced by him. The term "self concept" is much more commonly used than the simpler term "self" because man is not always aware of his absolute, true, or actual self but only of his own concepts and perceptions of himself.¹⁸

Purkey suggests self theory is neither an established fact nor an all-inclusive theory of human existence. Some students who esteem themselves highly do not show commensurate achievement in school. However, the overwhelming body of contemporary research points insistently to the relationship between self-esteem and academic achievement and suggests strongly the self concept can no longer be ignored by parents and teachers. The best evidence now available

¹⁸William H. Fitts, et al., The Self Concept and Self-Actualization, (Nashville, Tennessee: The Dede Wallace Center, 1971), p. 3.

suggests there is a continuous interaction between the self and academic achievement, and each directly influences the other.¹⁹

Lynch demonstrated a relationship between perceptions of self and the way one reacts to life's happenings. Persons with positive self concept gave evidence of being able to use both positive and negative experiences to enhance their psychological growth, while persons with negative self concepts became more defensive and wary of life as a result of negative experiences. He assumed a significant interaction between experiencing and development or modification of self concept.²⁰

Kinch theorized the individual's conception of himself emerges from social interaction and, in turn, guides or influences the behavior of the individual.²¹ Gordon states that only when all aspects of the child's development are seen as interrelated and mutually dependent can schools accomplish the valid purpose of self-development, uniting cognitive with affective development.²² Williams and Cole found that the self concepts of a group of sixth grade students showed significant

¹⁹William W. Purkey, Self Concept and School Achievement, (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970), p. v.

²⁰Stanley Lynch, "Intense Human Experience: Its Relationship to Openness and Self Concept," Dissertation Abstracts, 29:3832-A, May, 1969.

²¹John Kinch, "A Formalized Theory of Self Concept," American Journal of Sociology, 68: (1963), p. 481.

²²Ira J. Gordon, "Social and Emotional Development," Encyclopedia of Educational Research, ed. Robert L. Ebel (Fourth Edition, American Educational Research Association, 1969), p. 1228.

positive correlations with attitudes toward school and academic achievement.²³

Moore conducted a study of 551 boys and 559 girls in elementary schools to determine the interrelationship of self concept and attitude toward mathematics to academic achievement in the areas of arithmetical computation, concepts, and application. From the findings of the study it was concluded that self concept and attitudes toward mathematics do influence achievement in mathematics. "However, the reasonable position is to infer a reciprocal cause-effect relationship between these variables. Although not considered the main determinants of academic success, this study reveals that self concept and attitude toward mathematics have a significant influence on arithmetic achievement."²⁴

²³Robert L. Williams and Spurgeon S. Cole, "Self Concept and School Adjustment," Personnel and Guidance Journal, (January, 1968), p. 478.

²⁴Bobby Dean Moore, "The Relationship of Fifth-Grade Students' Self-Concepts and Attitudes Toward Mathematics to Academic Achievement in Arithmetical Computation, Concepts, and Application." Dissertation Abstracts, 32:4426-A, February, 1972.

CHAPTER III

METHODS OF RESEARCH

The subjects for this study were fifty-eight tenth grade students enrolled in two classes of a terminal course in general mathematics taught by the author at Hendersonville Senior High School during the school year 1970-71. The course was basically a review of arithmetic operations with some basic algebra and intuitive geometry added. The main objective of the course was to help the students learn to apply mathematical concepts to everyday living. Emphasis was placed on actual problem solving. Most of the work was done during the regular class periods when the author could watch for student difficulty and make individual explanations. The only lectures given were short explanations of concepts with examples worked on the board. The students were considered "poor" mathematics students, having either failed or barely passed ninth grade arithmetic. Many of them made good or average grades in other subjects but seemed to consider mathematics beyond their ability to learn.

The classes were administered a test designed to measure attitude toward mathematics and a test to give a measure of the self

concept of the student. Course grades at the end of the year were used as measures of achievement in mathematics.

The Rabinowitz Mathematics Attitude Scale²⁵ was used to measure students' attitude toward mathematics. The Scale is a Likert-type scale composed of twenty-five positive statements and twenty-five negative statements about mathematics. The student marks "A" if he agrees with the statement and "D" if he disagrees, and one point is given for each "correct" response. No statistical data is available regarding the reliability or validity of the scale, though it appears to have a face validity in that an "A" response to a positive statement denotes a favorable attitude toward mathematics and a "D" response to a negative statement also denotes a positive attitude. Appendix A contains a reproduction of the Rabinowitz Mathematics Attitude Scale with instructions and a list of "correct" responses.

The Tennessee Self Concept Scale²⁶ was used to measure self concept. The scale consists of 100 self-descriptive statements to which the subject responds on a 5-point response scale ranging from "Completely True" to "Completely False." Since a "Completely False" answer to a negative statement was essentially the same as a "Completely True" answer to a positive statement, the point value

²⁵Devised by Dr. William Rabinowitz, Chairman of the Department of Psychology, Pennsylvania State University, (mimeographed).

²⁶William H. Fitts, "Tennessee Self Concept Scale," Nashville, Tennessee: William H. Fitts, 1964.

for negative questions was reversed. A "Completely False" answer was then scored as 1 on the answer sheet but when the score was transformed to the score sheet it was given a value of 5. This provided a uniform value system for the scoring of the answers. Appendix C contains a copy of the Tennessee Self Concept Scale.

Dr. William H. Fitts reports a test-retest reliability coefficient of .92 for the total P score, which is the total positive score being used in this study. He also reports that validity of the scale was accomplished by four methods: (1) Content validity; (2) Discrimination between the groups; (3) Correlation with other personality measures; and (4) Personality changes under particular conditions.²⁷ The manual does not provide statistical support for the validation of the instrument.

The study was discussed in class several days before the tests were given. The students were told the purpose of the study was to help the author understand their feelings about themselves and about mathematics and their scores would not affect their course grades. They were asked to consider each statement carefully and be as honest in their responses as possible. Most of the students seemed to be interested in being a part of the study.

²⁷William H. Fitts, "Tennessee Self Concept Scale: Manual," (Nashville Tennessee: William H. Fitts, 1964, pp. 15-30.

The attitude test was given to both classes the same day during the regular class periods. The self concept test was given about a week later during regular class periods on the same day. Both tests were scored by the author. I.Q. scores, test scores, and achievement scores are recorded in Table III of Appendix B.

On the basis of scores on the attitude test, the students were divided into three groups representing good, average, and poor attitude. There were 19 students in the good group whose scores ranged from 31 to 43. The average group contained 21 students whose scores ranged from 23 to 30. The poor group contained 18 students whose scores ranged from 14 to 21. The total possible score was 50. Analysis of variance was used to test the difference between the three groups and indicated the groups were significantly different. It is probable the students in this study would all have relatively poor attitude in a study of a general population of tenth grade students, but the classifications used are based on relative scores of these particular fifty-eight students.

On the basis of scores on the self concept test, the students were divided into three groups representing high, medium and low self concept. The high group contained 19 students whose scores ranged from 324 to 373; the medium group contained 21 students whose scores ranged from 293 to 322; and the low group contained 18 students whose scores ranged from 241 to 291. This classification

is also relative to the population being studied, and not to the general population. Analysis of variance indicated these three groups were also significantly different.

To test Hypothesis I, the I. Q. and achievement scores of the three groups representing good, average, and poor attitude were tabulated (Table IV in Appendix B) and tested for significant relationship by analysis of covariance, which adjusted achievement scores on the basis of intelligence, eliminating the factor of mental ability in achievement. To test Hypothesis II, the I. Q. and achievement scores of the three groups representing high, medium, and low self concept were tabulated (Table V in Appendix B) and tested for significant relationship by analysis of covariance.

CHAPTER IV

STATISTICAL ANALYSIS

The statistical procedure employed was analysis of covariance which allows for adjustments to be made statistically for existing differences among the groups in regard to intelligence. The difference in mean achievement among the good, average, and poor mathematics attitude groups was analyzed for significance by analysis of covariance. The difference in mean achievement among the high, medium, and low self concept groups was also analyzed for significance by analysis of covariance.

Barr, Davis, and Johnson say that "Through application of the technique of analysis of covariance the necessity of matching individuals disappears and hence all individuals can be used. The process results in adjustment in the means of the contrasted groups for whatever inequalities exist in the basic characters of matching. Thus the evidence provided by the data themselves is the source of corrections for inequalities."²⁸

²⁸Arvil S. Barr, Robert A. Davis, and Palmer O. Johnson, Educational Research and Appraisal, (New York: J. B. Lippincott Company, 1953), pp. 233-234.

TABLE I

ANALYSIS OF ACHIEVEMENT OF STUDENTS WITH
GOOD, AVERAGE, AND POOR ATTITUDE

Group	I. Q.		Achievement		F
	Mean		Mean		
Good	100.3	9.27	81.5	8.97	
Average	92.3	10.2	76.6	10.25	3.817
Poor	91.6	11.8	72.2	11.22	

Table I shows the comparative achievement scores of the three groups divided on the basis of good, average, and poor attitude. On the test for achievement, the good group had a mean achievement of 81.5; the average group had a mean achievement of 76.6; and the poor group had a mean achievement of 72.2. When the difference in achievement shown by the three groups was analyzed by analysis of covariance with adjustments made for the difference in mean score of the three groups on the basis of intelligence, F was computed 3.817. Since F_{95} is 2.76, the achievement shown by the three groups is significantly different. Therefore, Hypothesis I was rejected. The data indicates a significant relationship between attitude of tenth grade general mathematics students and achievement in mathematics.

TABLE II

ANALYSIS OF ACHIEVEMENT OF STUDENTS WITH
HIGH, MEDIUM, AND LOW SELF CONCEPT

Group	I. Q.		Achievement		F
	Mean		Mean		
High	97.1	9.17	80.6	11.32	
Medium	92.4	11.04	75.0	11.50	1.744
Low	94.8	12.68	76.2	8.13	

Table II shows the comparative achievement scores of the three groups divided on the basis of high, medium, and low self concept. On the test for achievement, the high group had a mean achievement of 80.6; the medium group had a mean achievement of 75.0; and the low group had a mean achievement of 76.2. When the difference in achievement shown by the three groups was analyzed by analysis of covariance with adjustments made for the difference in mean score of the three groups on the basis of intelligence, F was computed as 1.744. Since F_{95} is 2.76, the achievement shown by the three groups is not significantly different. Therefore, Hypothesis II was upheld. The data indicates no significant relationship between self concept of tenth grade general mathematics students and achievement in mathematics.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

It was the purpose of this study to investigate (1) the relationship between mathematics attitude and achievement in mathematics and (2) the relationship between self concept and achievement in mathematics. The study seems justifiable in view of the need for additional knowledge of any of the factors which contribute to learning. Related literature indicates that student self concept and mathematics attitude are two possible factors.

Students were given the Rabinowitz Mathematics Attitude Scale and the Tennessee Self Concept Scale in the spring of 1971. On the basis of analysis of the scores on the two tests, the students' achievement scores, and the I.Q. scores as found in the school permanent records, it was found that (1) there is a significant relationship between mathematics attitude and achievement in mathematics and (2) there is no significant relationship between self concept and achievement in mathematics.

The following conclusions were reached:

1. Attitude toward mathematics is a factor in achievement in tenth grade general mathematics.

2. Students who do not achieve well in mathematics may still have a high self concept.

3. Students appreciate being asked their opinions by a teacher. Interest in the class and mathematics in general was increased as a result of the study. This was evidenced by increased participation in class discussions and by requests from individuals, or groups of two or three students, for conferences to discuss problems.

In view of this study, the following recommendations are made:

1. Further research should be conducted to investigate the interrelationships of self concept, mathematics attitude, and mathematics achievement.

2. A study should be made to investigate whether good mathematics attitude causes achievement or whether achievement causes good attitude.

3. Mathematics attitude should be tested and the results used to plan experiences that will help the student eliminate as many negative ideas about mathematics as possible.

4. In-service meetings and workshops should be conducted to help teachers understand more about mathematics attitudes and how to improve them.

5. Since related literature indicates that teacher ability and attitude influence student attitude toward mathematics, great care should be taken in the selection of mathematics teachers.

BIBLIOGRAPHY

A. BOOKS

- Barr, Arvil S., Robert A. Davis, and Palmer O. Johnson. Educational Research and Appraisal. New York: J. B. Lippincott Company, 1953.
- Brookover, Wilbur B. and David Gottlieb. A Sociology of Education. New York: American Book Company, 1964.
- Fitts, William H. The Self Concept and Self-Actualization. Nashville: The Dede Wallace Center, 1971.
- Husen, Torstein. International Study of Achievement in Mathematics. New York: John Wiley and Sons, 1967.
- Johnson, Donovan A. and Gerald R. Rising. Guidelines for Teaching Mathematics. Belmont, California: Wadsworth Publishing Company, 1967.
- Katz, Daniel. "The Functional Approach to the Study of Attitudes," in Current Perspectives in Social Psychology, eds. E. P. Hollander and Raymond G. Hunt. New York: Oxford University Press, 1963.
- Kinney, Lucien B. and C. Richard Purdy. Teaching Mathematics in the Secondary School. New York: Rinehart and Company, 1952.
- Lindquist, Everet F. Statistical Analysis in Educational Research. New York: Houghton Mifflin Company, 1940.
- Purkey, William W. Self Concept and School Achievement. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1970.

B. PERIODICALS

- Aiken, Lewis R. "Research on Attitudes Toward Mathematics," The Arithmetic Teacher, XIX (March, 1972), 229-234.
- Allen, J. Eli. "Some Psychological Phases of Student Success in High School Mathematics," The Mathematics Teacher, XXX (November, 1937), 323.
- Callahan, Walter J. "Adolescent Attitudes Toward Mathematics," The Mathematics Teacher, LXIV (December, 1971), 751-754.
- Cristaniello, Phillip D. "Attitude Toward Mathematics and the Predictive Validity of Quantitative Attitude," Journal of Educational Research, 55 (1962), 184-186.
- Devine, Donald F. "Student Attitudes and Achievement," The Mathematics Teacher, LXI (March, 1968), 296-301.
- Fedon, J. Peter. "The Role of Attitude in Learning Arithmetic," The Arithmetic Teacher, V (December, 1958), 304-310.
- Gordon, Ira J. "Social and Emotional Development," Encyclopedia of Educational Research, ed. Robert L. Ebel (Fourth Edition, American Educational Research Association, 1969), 1228.
- Hughes, Thomas M. "A Study of the Relationship of Coping Strength to Self Concept, School Achievement, and General Anxiety Level in Sixth Grade Pupils," Dissertation Abstracts, 28:4001-A, April, 1968.
- Kinch, John. "A Formalized Theory of Self Concept," American Journal of Sociology, 68(1963), 481.
- Lynch, Stanley. "Intense Human Experience: Its Relationship to Openness and Self Concept," Dissertation Abstracts, 29:3832-A, May, 1969.
- Moore, Bobby Dean. "The Relationship of Fifth-Grade Students' Self-Concepts and Attitudes Toward Mathematics to Academic Achievement in Arithmetical Computation, Concepts, and Applications," Dissertation Abstracts, 32:4426-A, (February, 1972).

- Neale, Daniel C. "The Role of Attitudes in Learning Mathematics," The Arithmetic Teacher, XVI (December, 1969), 631-640.
- Servais, Wily. "Present Day Problems of Mathematics Instruction," The Mathematics Teacher, LXI (December, 1968), 791.
- Sherif, Muzafer and Hadley Cantril. "The Psychology of Attitudes," Psychological Review, LII (1945), 295.
- Williams, Robert L. and Spurgeon Cole. "Self Concept and School Adjustment," Personnel and Guidance Journal, (January, 1968), 478.

C. OTHER SOURCES

- Fitts, William H. "Tennessee Self Concept Scale" Nashville, Tennessee: William H. Fitts, 1964.
- Fitts, William H. "Tennessee Self Concept Scale: Manual," Nashville, Tennessee: William H. Fitts, 1964.
- Mary, Sister Paulino. "Helping the Child Achieve a Positive Self-Image." Address at a California Good Teaching Practices Conference, October 21, 1967.
- Rabinowitz, William. "Rabinowitz Mathematics Attitude Scale." University Park, Pennsylvania: Dr. William Rabinowitz, n.d. (mimeographed.)

APPENDIX A

APPENDIX A

HOW DO YOU FEEL ABOUT MATHEMATICS?

This is not a test.

It is a chance for you to show how you feel about mathematics.

On the next two pages you will find 50 statements about mathematics. You will probably agree with some of the statements. With other statements you will probably disagree. We are interested in your opinion about each of the statements.

You can tell us how you feel about each statement in the following way. First, read each statement carefully. Then, if you feel that the statement is true or if you agree with it, cross out the "A" on the separate answer sheet. If you feel that the statement is false or if you disagree with it, cross out the "D" on the separate answer sheet.

For example, suppose you were given this statement:

I GET MY LOWEST MARKS IN MATHEMATICS. If you feel that this is true, that you get your lowest marks in mathematics, you should cross out the "A" on the answer sheet. But if you feel that the statement is false, that you do not get your lowest marks in mathematics, you should cross out the "D" on the answer sheet.

Be sure to mark a response for each statement even if you are not sure how you feel. Don't leave anything out.

There are 50 statements for you to read and respond to. Don't spend too much time on any particular one.

Be sure to make your response on the separate answer sheet. Just cross out the letter that shows how you feel.

Remember: This is not a test. There are no right or wrong answers. Give your personal opinion.

1. It takes me a long time to catch on to a new topic in mathematics.
2. Very often in mathematics courses I cannot see a clear relationship between one topic and another.
3. I get a great deal of satisfaction out of solving a problem in mathematics.
4. I can't see how most of the mathematics I have learned thus far will really help me very much in later life.
5. In mathematics you have to be able to remember an awful lot of rules that don't make too much sense.
6. I find mathematics clear.
7. To do well in mathematics it's much more important to think clearly than to have a good memory.
8. Mathematics is such a hard subject that one student usually can't get very much help from another.
9. When I get an answer to a mathematical problem, I usually can't tell whether it's right or wrong until the teacher gives the correct answer.
10. Unless a mathematics teacher gives many quizzes, most students will soon fall far behind.
11. In mathematics, ideas have a logical relationship to one another.
12. Mathematics is probably the most difficult subject in school.
13. Even before I begin a new topic in mathematics, I feel confident that I will be able to understand it.
14. Mathematics should be very appealing to a student with imagination.
15. I'm looking forward to studying some of the advanced mathematical topics I've heard about.
16. The trouble with mathematics is that it's too theoretical, and not practical enough.

17. I enjoy trying to solve mathematical problems and puzzles.
18. I think I have good mathematical ability.
19. The average student can't help being bored with mathematics.
20. I feel quite capable of going on to higher mathematics.
21. Mathematics helps us to find out more about the world we live in.
22. In mathematics you either know what you're doing or you don't, there's no in-between.
23. Unless a mathematics teacher gives a clear explanation of a topic, a student has difficulty.
24. I find mathematics useful in everyday life.
25. Mathematics is very interesting.
26. Mathematics courses are for the bright students, not those who are just average.
27. The only students who should be required to take mathematics are those who need it for a career like engineering or science.
28. Mathematics is an essential part of the background of a well-educated person.
29. Most of the students who get good marks in mathematics are "bookworms."
30. You don't have to have a special kind of abstract mind or an unusual mathematical talent to enjoy mathematics.
31. Mathematics frightens me.
32. In mathematics, more than in any other subject, what a student learns depends on how good the teacher is.
33. Mathematics is probably not the easiest school subject, but it isn't the hardest either.

34. Homework in mathematics is more difficult than homework in other subjects.
35. The most important thing in mathematics is a good memory.
36. Mathematicians are no more peculiar than doctors, lawyers, or people in other fields.
37. I would take mathematics even if I didn't have to.
38. Even when I understand a mathematical topic fairly well, I find it hard to explain it to someone else.
39. Mathematics is basically a very interesting subject, and there is no reason why a student has to find it boring or dull.
40. I get more nervous before a test in mathematics than a test in any other subject.
41. I find mathematics confusing.
42. Mathematics is highly practical as well as theoretical.
43. We always start a new topic in mathematics before I feel sure of the old one.
44. You don't need a special aptitude for mathematics to do well in the subject.
45. Students who are very good in mathematics are often not interested in other students.
46. An average student can understand mathematics.
47. In mathematics I have to memorize because I can't really understand.
48. In mathematics it isn't necessary for each student to study topics in the same order.
49. If you go about studying mathematics in a sensible way, you usually find it's not too difficult.
50. I like to study interesting applications of mathematics even if they are not part of the assigned course work.

"CORRECT" RESPONSES

1. D	21. A	41. D
2. D	22. D	42. A
3. A	23. D	43. D
4. D	24. A	44. A
5. D	25. A	45. D
6. A	26. D	46. A
7. A	27. D	47. D
8. D	28. A	48. A
9. D	29. D	49. A
10. D	30. A	50. A
11. A	31. D	
12. D	32. D	
13. A	33. A	
14. A	34. D	
15. A	35. D	
16. D	36. A	
17. A	37. A	
18. A	38. D	
19. D	39. A	
20. A	40. D	

TABLE III
TEST DATA ON STUDENTS

Student	I. Q.	Attitude	Self Concept	Course Grade
1	76	15	329	75
2	91	29	324	72
3	82	17	334	65
4	94	17	341	65
5	79	15	270	65
6	81	20	286	85
7	91	25	275	65
8	91	26	290	85
9	105	27	372	85
10	95	29	271	85
11	102	36	325	85
12	90	15	322	40
13	90	15	294	75
14	100	27	333	95
15	92	25	304	75
16	114	36	301	85
17	97	40	311	75
18	79	30	275	75
19	77	26	301	65
20	91	28	300	75
21	91	19	344	65
22	97	39	305	75
23	102	43	365	95
24	79	23	311	65
25	108	26	284	82
26	81	14	252	75
27	110	38	358	75
28	97	35	287	82
29	84	36	310	72
30	82	37	319	95
31	108	37	338	85
32	100	31	290	75
33	97	35	346	95
34	103	33	344	85
35	92	23	311	82
36	88	30	283	65

TABLE III (continued)

Student	I. Q.	Attitude	Self Concept	Course Grade
37	110	30	302	82
38	92	41	300	75
39	97	38	302	82
40	89	21	277	65
41	82	25	309	65
42	90	19	318	85
43	89	20	278	82
44	77	24	304	65
45	90	23	328	85
46	97	21	333	65
47	108	41	281	85
48	103	35	340	75
49	93	18	301	72
50	122	15	241	85
51	119	34	278	65
52	110	28	328	95
53	117	16	293	85
54	97	23	291	75
55	98	20	310	75
56	93	28	276	75
57	90	14	339	75
58	93	32	353	95

TABLE IV

I. Q. AND ACHIEVEMENT SCORES, AS THEY WERE USED TO
MEASURE THE RELATIONSHIP BETWEEN MATHEMATICS
ATTITUDE AND ACHIEVEMENT

Good Attitude		Average Attitude		Poor Attitude	
A		B		C	
<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>
102	95	79	75	89	65
92	75	88	65	97	65
108	85	110	85	81	85
97	75	91	72	89	82
97	75	95	85	98	75
110	75	91	75	91	65
97	85	110	95	90	85
82	95	93	75	93	72
108	75	105	85	82	65
102	85	100	95	94	65
114	85	91	85	117	85
84	72	77	65	76	75
97	82	108	82	79	65
97	95	91	65	90	40
103	75	92	75	90	75

TABLE IV (continued)

Good Attitude		Average Attitude		Poor Attitude	
A		B		C	
<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>
119	65	82	65	122	85
103	85	77	65	81	75
93	95	79	65	90	75
100	75	92	85		
		90	85		
		97	65		

TABLE V

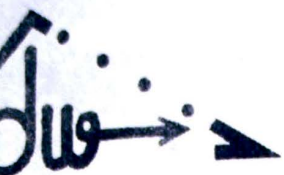
I.Q. AND ACHIEVEMENT SCORES, AS THEY WERE USED TO
MEASURE THE RELATIONSHIP BETWEEN SELF CONCEPT
AND ACHIEVEMENT

High Self Concept A		Medium Self Concept B		Low Self Concept C	
<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>
93	95	90	40	97	75
105	85	82	95	91	85
102	95	90	85	100	75
110	75	97	75	97	82
97	95	79	65	81	85
91	65	92	85	108	82
103	85	84	72	88	65
94	65	98	75	108	85
103	75	82	65	89	82
90	75	97	75	119	65
108	85	92	75	89	65
82	65	77	65	93	75
100	95	110	85	91	65
97	65	97	85	79	75
76	75	114	85	95	85
90	85	77	65	79	65

TABLE V (continued)

High Self Concept A		Medium Self Concept B		Low Self Concept C	
<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>	<u>X</u>	<u>Y</u>
110	95	93	72	81	75
102	85	91	75	122	85
91	72	92	75		
		90	75		
		117	85		

APPENDIX C



dede wallace center

nashville mental health center · 2410 white avenue · nashville, tennessee 37204 · phone 297-

July 25, 1972

Miss Ila Mary Greenwell
118 Stillhouse Road
Colonial Acres
Hendersonville, Tennessee 37075

Dear Miss Greenwell:

In reply to your letter of July 25, permission is hereby granted for you to have a copy of the Tennessee Self Concept Scale (Fitts, 1964) bound with your thesis.

Sincerely,

William H. Fitts
William H. Fitts, Ph.D. *
Director of Research

TENNESSEE SELF CONCEPT SCALE

by

William H. Fitts, PhD.

INSTRUCTIONS

On the top line of the separate answer sheet, fill in your name and the other information except for the time information in the last three boxes. You will fill these boxes in later. Write only on the answer sheet. Do not put any marks in this booklet.

The statements in this booklet are to help you describe yourself as you see yourself. Please respond to them as if you were describing yourself to yourself. Do not omit any item! Read each statement carefully; then select one of the five responses listed below. On your answer sheet, put a circle around the response you chose. If you want to change an answer after you have circled it, do not erase it but put an X mark through the response and then circle the response you want.

When you are ready to start, find the box on your answer sheet marked time started and record the time. When you are finished, record the time finished in the box on your answer sheet marked time finished.

As you start, be sure that your answer sheet and this booklet are lined up evenly so that the item numbers match each other.

Remember, put a circle around the response number you have chosen for each statement.

Responses-	Completely false	Mostly false	Partly false and partly true	Mostly true	Completely true
	1	2	3	4	5

You will find these response numbers repeated at the bottom of each page to help you remember them.

1. I have a healthy body.....	1
3. I am an attractive person.....	3
5. I consider myself a sloppy person.....	5
19. I am a decent sort of person.....	19
21. I am an honest person.....	21
23. I am a bad person.....	23
37. I am a cheerful person.....	37
39. I am a calm and easy going person.....	39
41. I am a nobody.....	41
55. I have a family that would always help me in any kind of trouble.....	55
57. I am a member of a happy family.....	57
59. My friends have no confidence in me.....	59
73. I am a friendly person.....	73
75. I am popular with men.....	75
77. I am not interested in what other people do.....	77
91. I do not always tell the truth.....	91
93. I get angry sometimes.....	93

Responses-	Completely false	Mostly false	Partly false and partly true	Mostly true	Completely true
	1	2	3	4	5

- | | |
|--|----|
| 2. I like to look nice and neat all the time..... | 2 |
| 4. I am full of aches and pains..... | 4 |
| 6. I am a sick person..... | 6 |
| 20. I am a religious person..... | 20 |
| 22. I am a moral failure..... | 22 |
| 24. I am a morally weak person..... | 24 |
| 38. I have a lot of self-control..... | 38 |
| 40. I am a hateful person..... | 40 |
| 42. I am losing my mind..... | 42 |
| 56. I am an important person to my friends and family..... | 56 |
| 58. I am not loved by my family..... | 58 |
| 60. I feel that my family doesn't trust me..... | 60 |
| 74. I am popular with women..... | 74 |
| 76. I am mad at the whole world..... | 76 |
| 78. I am hard to be friendly with..... | 78 |
| 92. Once in a while I think of things too bad to talk about..... | 92 |
| 94. Sometimes, when I am not feeling well, I am cross..... | 94 |

Responses-

Completely false

Mostly
false

Partly false
and
partly true

Mostly
true

Completely
true

1

1

2

△

A

7. I am neither too fat nor too thin.....	7
9. I like my looks just the way they are.....	9
11. I would like to change some parts of my body.....	11
25. I am satisfied with my moral behavior.....	25
27. I am satisfied with my relationship to God.....	27
29. I ought to go to church more.....	29
43. I am satisfied to be just what I am.....	43
45. I am just as nice as I should be.....	45
47. I despise myself.....	47
61. I am satisfied with my family relationships.....	61
63. I understand my family as well as I should.....	63
65. I should trust my family more.....	65
79. I am as sociable as I want to be.....	79
81. I try to please others, but I don't overdo it.....	81
83. I am no good at all from a social standpoint.....	83
95. I do not like everyone I know.....	95
97. Once in a while, I laugh at a dirty joke.....	97

Responses-

Completely
falseMostly
falsePartly false
and
partly trueMostly
trueCompletely
true

1

2

3

4

5

8.	I am neither too tall nor too short.....	8
10.	I don't feel as well as I should.....	10
12.	I should have more sex appeal.....	12
26.	I am as religious as I want to be.....	26
28.	I wish I could be more trustworthy.....	28
30.	I shouldn't tell so many lies.....	30
44.	I am as smart as I want to be.....	44
46.	I am not the person I would like to be.....	46
48.	I wish I didn't give up as easily as I do.....	48
62.	I treat my parents as well as I should (Use past tense if parents are not living).	62
64.	I am too sensitive to things my family say.....	64
66.	I should love my family more.....	66
80.	I am satisfied with the way I treat other people.....	80
82.	I should be more polite to others.....	82
84.	I ought to get along better with other people.....	84
96.	I gossip a little at times.....	96
98.	At times I feel like swearing.....	98

Responses - Completely false Mostly false Partly false and partly true Mostly true Completely true

13.	I take good care of myself physically.....	13
15.	I try to be careful about my appearance.....	15
17.	I often act like I am "all thumbs".....	17
31.	I am true to my religion in my everyday life.....	31
33.	I try to change when I know I'm doing things that are wrong.....	33
35.	I sometimes do very bad things.....	35
49.	I can always take care of myself in any situation.....	49
51.	I take the blame for things without getting mad.....	51
53.	I do things without thinking about them first.....	53
67.	I try to play fair with my friends and family.....	67
69.	I take a real interest in my family.....	69
71.	I give in to my parents. (Use past tense if parents are not living).....	71
85.	I try to understand the other fellow's point of view.....	85
87.	I get along well with other people.....	87
89.	I do not forgive others easily.....	89
99.	I would rather win than lose in a game.....	99

Responses -

Completely false	Mostly false	Partly false and partly true	Mostly true	Completely true
---------------------	-----------------	------------------------------------	----------------	--------------------

	No.
14. I feel good most of the time	14
16. I do poorly in sports and games	16
18. I am a poor sleeper	18
32. I do what is right most of the time	32
34. I sometimes use unfair means to get ahead	34
36. I have trouble doing the things that are right	36
50. I solve my problems quite easily	50
52. I change my mind a lot	52
54. I try to run away from my problems	54
68. I do my share of work at home	68
70. I quarrel with my family	70
72. I do not act like my family thinks I should	72
86. I see good points in all the people I meet	86
88. I do not feel at ease with other people	88
90. I find it hard to talk with strangers	90
100. Once in a while I put off until tomorrow what I ought to do today	100

Responses-	Completely false	Mostly false	Partly false and partly true	Mostly true	Completely true
	1	2	3	4	5