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Date

August 7, 1974

A STUDY OF MATHEMATICS DROP-OUT IN THE
KLAMATH FALLS, OREGON SCHOOLS

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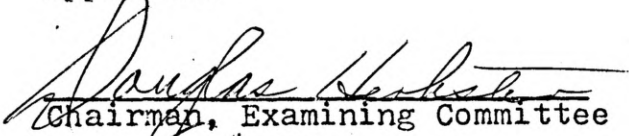
MICHAEL JAMES REYNOLDS

A professional paper submitted in partial fulfillment
of the requirements for the degree

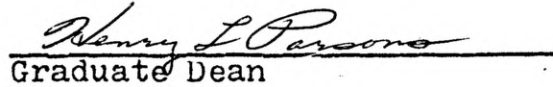
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Abstract

In order to determine those factors contributing to a decline in enrollment of the Klamath Falls, Oregon school system, a survey of recent literature was made to examine attitudes of students toward mathematics. The researcher then surveyed 61 students who had dropped from the math program and compiled the results in the form of tables. It was found that most of the students surveyed continued to have a good feeling toward math even though they were no longer in the program. It was also found that the greatest percentage of students dropping the program were doing so because they felt they had received enough math to enable them to pursue their chosen profession.

Chapter 1

INTRODUCTION

It is certainly not news to persons directly involved in education that the entire educational process is in a state of change. Advocates of all sorts of new programs, including such things as individualized instruction, programmed materials, team teaching, as well as those proponents for a return to the "good old days" are making their voices heard.

Since the launching of "Sputnik" in 1957, it is this researcher's opinion that mathematics has been subject to the greatest amount of change and controversy. Those people working in education recognize the desirability of offering the most effective program that can be devised. However, even though the proponents of some of the recent trends would attempt to impress the public to the contrary, it is questionable whether some of them are actually effective in the classroom situation.

How students feel toward mathematics is important. An unhealthy attitude toward mathematics may be reflected in the student achievement. However, modern mathematics programs, in spite of the hopes of most mathematics teachers, may have little effect and may be even a negative effect on

attitudes. It is the hope of this researcher to improve student attitudes by first identifying those things which seem unpleasant to the learner of mathematics.

Statement of the Problem

The problem of this study will be to determine those factors which influence the decline in enrollment of the Klamath Falls, Oregon public high school mathematics program. The researcher will be particularly interested in the top track math program which includes Elementary Algebra, Geometry, Trigonometry, and introduction to College Math.

Need or Purpose of the Study

The Klamath Falls public schools have an enrollment of approximately seventy students in elementary algebra at the eighth grade level. A student beginning in the so-called "top track" program as an eighth-grader has the opportunity to take elementary algebra, geometry, advanced algebra, trigonometry and analytic geometry, and finally as a senior, introduction to college mathematics. Of the seventy students beginning in the upper-track program as eighth graders, no more than twelve to fifteen have been taking the final course of the sequence.

This researcher, as well as other mathematics instructors in the Klamath Falls schools have been concerned with

the high drop-out rate. This researcher feels that if the factors contributing to the decline in enrollment can be identified, the over-all mathematics program of the Klamath Falls system can be improved.

General Questions to be Answered:

1. Why do students in the top track program fail to take the introduction to college math?
2. What are students' attitudes toward mathematics in general?
3. Does homework create a negative attitude toward mathematics?
4. Why do students who have taken elementary algebra in the ninth grade fail to take trigonometry and analytic geometry?
5. How do students feel about the mathematics faculty in the Klamath Falls schools?
6. Do student attitudes toward mathematics reflect the attitudes of their parents?

General Procedures

The researcher will be interested in determining not only why seniors do not take the terminal mathematics course, but also why students drop out of the program at any

specific point in their highschool years. With this in mind, the researcher will be questioning students selected at random from the population of students who have dropped mathematics at some point in their high school careers. The researcher will also question those students who have taken the complete sequence of mathematics offered in the Klamath Falls schools; the "top track" as well as the "regular track" program. A questionnaire will be used which will measure student attitudes toward mathematics as well as attitudes toward teachers and actual course material. The instrument which will be used to measure these factors will be made up partially from a scale devised by Thurston and Likert (Aiken 1964) and partially by this researcher. The data received from the questionnaire will be the primary resource for this research.

Limitations

1. This study will be limited to the Klamath Falls Public Schools. No attempt will be made to examine other schools in the Klamath Falls area.
2. The study will be limited to one year of time.
3. Only the students in grades eight through twelve will be examined.

Definition of Terms

Top Track Program - The words, "top track" program, used in this research will mean that sequence of courses beginning with elementary algebra in eighth grade and progressing through geometry in the ninth grade, advanced algebra in the tenth grade, trigonometry and analytic geometry in the eleventh grade, and introduction to college mathematics in the twelfth grade.

Regular Track Program - To mean that sequence of courses beginning with general math in the eighth grade, elementary algebra in the ninth grade, geometry in the tenth grade, advanced algebra in the eleventh grade and trigonometry and analytic geometry in the twelfth grade.

Modern Mathematics Programs - To mean those programs instituted after 1957, with an emphasis on the theory of mathematics rather than the rote memorization of earlier programs.

Summary

This research paper will be an examination of attitudes of students toward mathematics. It is the hope of this researcher that information obtained from this paper will enable the mathematics teachers in the Klamath Falls, Oregon public schools to improve the over-all mathematics program of the system.

Chapter 2

REVIEW OF RELATED LITERATURE

The review of literature in this chapter will be organized into two parts. The first, a brief history of mathematics, focused primarily on the eighth through the twelfth grade level. Second, the researcher will review studies dealing with attitudes that affect achievement in mathematics.

A Brief History of Mathematics

As early as 1892 it was felt that algebra, geometry and arithmetic should be unified into one course (Betz, 1967). Elementary algebra was taught more as a bag of tricks than as mathematics with a structure. Rules were memorized; why they worked or where they came from was not important. Grade nine students were separated into two groups, one taking general mathematics and the other taking elementary algebra (Ferguson, 1970).

Algebra was introduced into the curriculum about 1830 as primarily a ninth-grade course. However, beginning in the early 1960's more and more schools were offering elementary algebra as an eighth-grade course (Alsbaugh, 1970).

Directly following World War II the mathematicians were uneasy with the teaching of public school mathematics

in that it failed to fully reflect new developments and applications. For example, trigonometry, a mainstay in twelfth-grade mathematics of great use in older methods of surveying and navigation, was now practically obsolete. Navigation by radar and loran, and surveying with new type equipment, made little use of the laws of trigonometry (Brown 1971).

What about the future mathematics program? Ferguson states:

"The mathematics program must be flexible. Lock-step tracks must be avoided and as many good mathematics students as possible must be encouraged to complete the higher level high school mathematics courses." (Ferguson 1970)

Mathematical Attitudes

It is sometimes forgotten that in addition to learning principles, facts, and methods in school, children learn attitudes, values, and it is hoped, develop a desire for further learning. In his research on attitudes towards mathematics, Lewis Aiken uses an attitude scale constructed by William Dutton (Dutton, 1962). Results show that the reliability and validity of this scale vary somewhat with grade level, being generally more reliable and valid in high school and college. Aiken found that there is a positive correlation between attitudes and achievement at all

levels of school. With a lower correlation in the earlier grades. This is not surprising since attitudes are less stable in the elementary grades than they are in high school and college. A variety of techniques for improving attitudes toward mathematics have been tried: counseling, enrichment, provision for success experiences, special courses and teaching methods, mathematical games, and so on. However, modern mathematics programs, in spite of the hopes of mathematics educators, have had little effect and sometimes even a negative effect on attitudes (Aiken, 1972).

A study made at the Rich Township High Schools located in Park Forest, Illinois, showed that attitudes towards mathematics are a function of the teaching approach used. Two groups were tested, one using linearly-programmed materials and the other, materials presented in the usual classroom manner. It was proposed that an experiment be run for one academic year involving 140 ninth-grade students enrolled in Algebra I. In each of the two high schools, two classes were involved, one being an experimental section and the other a control section. The students involved in the experimental group worked with modern algebra solely from programmed materials. The students included in the control group worked with modern algebra in a conventional classroom situation. The hypothesis being tested was: Attitudes

toward mathematics are not a function of the teaching approach used. This hypothesis was tested by using scores obtained from the "Attitude Towards Mathematics" scale. The results of the study showed that the group using the programmed materials showed a significant decline in attitude toward mathematics. The author points out, however, that in one of the groups the experienced teacher was replaced by one with little or no experience. He admits that the inexperienced teacher may have had an effect on the decline of the scores (Devine, 1968).

A somewhat conflicting view was presented by Edward G. Begle in his study, when he found that no significant correlation was found between teacher knowledge and student understanding and attitude (Begle, 1972).

A positive attitude towards mathematics is thought to play an important role in causing students to learn mathematics. Attitude toward learning mathematics becomes increasingly less favorable as children progress in school. Students whose attitudes had been measured in either the fifth or sixth grade were re-tested six years later when they were in the eleventh or twelfth grade. The instrument was a carefully developed 94-item inventory. Some of the items used are as follows:

- a) I detest arithmetic and avoid using it at all times.

- b) Arithmetic is as important as any other subject.
- c) When I hear the word "math", I have a strong feeling of dislike.
- d) Mathematics is fascinating and fun.

Responses to items were summed to obtain a single score representing attitude toward learning mathematics. It was found that the mean scores had declined a full standard deviation over the six-year period. This decline did not differ greatly either as a function of sex or as a function of how many advanced mathematics courses were taken. Only in the case of those taking the full four years of mathematics was the decline somewhat less than a standard deviation (Neal, 1969).

Attitudes of teachers can effect student achievement as well. A total of 323 students and 112 teachers in three high schools were surveyed in order to study their attitude towards mathematics. The group included seniors and their teachers, and eighth and ninth graders and their teachers. College-bound seniors scored higher on the scale which measures attitude toward mathematics as a process. However, among the eighth and ninth graders, the opposite trend was observed. Attitudes toward mathematics shown by students and by teachers, were on the whole, similar. The attitude scores of both students and teachers suggest that attitudes

towards mathematics, once adopted, may be relatively stable over the years (Roberts, 1970).

In the light of the foregoing discussion, the question arises: Should the college-bound sequences of mathematics courses be introduced in the junior high school, or should algebra be taught as a traditional ninth-grade subject? Max Rothenberger (December, 1967) was dissatisfied with a suggestion by his school's guidance department that students who score less than 60 on the Mathematics Concepts section of the SRA Achievement Test enroll in general mathematics, while those above this cutoff be allowed to take freshman algebra. Therefore he undertook a study to determine the correlation between success in algebra and certain predictive factors. The correlation between algebra grades and each of the following variables was determined:

- 1) Performance in eighth-grade mathematics
- 2) Performance in all eighth-grade solid subjects-- mathematics, English, science, and social studies.
- 3) I.Q. - Otis Beta, Form CM, given in the second semester of the seventh grade
- 4) Mathematics Reasoning score on the SRA Achievement test, given in the eighth grade
- 5) Mathematics Concepts score on the SRA
- 6) Mathematics Computation score on the SRA
- 7) Composite score on the SRA

The Pearson product-moment formula was used to compute the coefficients of correlation between algebra grades and each of the other variables selected as possible predictions of success in algebra. The results are:

Mathematics grades	.687
Solid subjects	.624
Otis I.Q.	.240
SRA Reasoning	.393
SRA Concepts	.362
SRA Computation	.630
SRA Composite	.444

A higher correlation between success in algebra and I.Q. was anticipated. However, the data did not reveal even a consistent cutoff point. As Rothenberger (December, 1967) observes:

"It is evident that no single variable will effectively predict the success of every student in algebra. However, if only one variable is to be used, performance in eighth-grade mathematics would be the best single predictor."

(Rothenberger, 1967).

Summary

Trends in teaching mathematics have changed greatly in the years since algebra was first introduced as a high school subject. The past may be characterized as a time in mathematics when everybody knew precisely what was taught in each grade level. The present is a time of turmoil, change, and wide experimentation. Students at the junior high level usually are intellectually curious, and willing to spend some

time exploring mathematical ideas and concepts. Educators must strive to cultivate these attitudes and to meet the needs of the students regardless of their abilities.

Chapter 3

PROCEDURES

Introduction

This researcher along with other mathematics teachers in the Klamath Falls, Oregon public schools, has been concerned with the small enrollment in the final course of the system's top track mathematics program.

This study has grown out of that concern. It is the hope of this researcher that the study will provide the mathematics teachers in Klamath Falls with some insight into the problem and an improvement in the mathematics curriculum will result.

In this chapter, this researcher will discuss the procedures being used, the population description and the analysis of data.

Population Description

The population for this study will be those students who have taken eighth grade elementary algebra at Ponderosa Junior High School during the school years 1969-70, 1970-71, 1971-72, 1972-73, and have dropped from the top track math program at some time after taking elementary algebra. The population will also include those students taking elementary algebra at Mazama Middle School in the above-mentioned

years and who have since dropped from the regular track mathematics program.

Specific Procedures

The names of all students who have taken elementary algebra in both the eighth grade and ninth grade will be obtained by examining the permanent records in the Klamath Falls system. The number of students involved will be approximately 95 who have taken elementary algebra in the eighth grade, 190 who have taken elementary algebra in the ninth grade. The researcher will then identify those students from the approximately 285 students who are no longer enrolled in either the top track program or the regular program.

The permanent records will supply the researcher with information regarding the grades received by those students in math classes before dropping from the program. Also the researcher will be able to determine at what point in the sequence of courses the greatest number of drop-outs occurred.

Each student who has been identified by the above method will be tested, using a Linert-type attitude measuring device (see Appendix A). The first twenty questions measuring a general attitude toward mathematics has a reported test-retest related reliability coefficient of .94. It

is also reported that attitudes specific to mathematics were being measured (Aiken, 1972). The remaining questions are designed to determine the reasons for student failure to take the next higher course in the particular track the student is in.

The general attitude portion of the measuring instrument will also be given to those students who are enrolled in the final course of either the regular or top track programs.

Analysis of the Data

The information obtained from the attitude scale will be summarized in tables according to the number of responses to each statement and the percentage of the total group responding to each statement.

After examining the data, conclusions will be drawn relative to the over-all attitude toward mathematics and to the reasons for not continuing in the mathematics program.

Summary

This study will involve the use of permanent records and an attitude scale in order to determine general feelings and reasons for not continuing in a specific mathematics program in the Klamath Falls, Oregon Public Schools.

It is hoped that the results of this study will enable the teachers and curriculum coordinator for the Klamath Falls schools to improve the mathematics program.

Chapter 4

RESULTS OF THE SURVEY

In order to facilitate the understanding of the results of this study, each question from the survey instrument was handled separately. Responses are presented in tabular form. Tables 1 through 23 deal with a general attitude toward mathematics. Tables 24 through 34 deal with specific reasons for not continuing in a mathematics program.

Table 1. The Number and Percent of Responses in each Category to the Question: I am always under a terrible strain in a mathematics class.

Category	Number	Percent
Strongly Disagree	14	22.95
Disagree	34	55.73
Undecided	3	4.91
Agree	7	11.47
Strongly Agree	3	4.91
No Response to the Question	0	0
Total	61	100.00

Nearly 80% of those responding to this question answered favorably. Only 10 respondents out of 61 felt a terrible strain in math classes. Four out of 61 may have felt some strain but could not decide what their feelings were.

Table 2. The Number and Percent of Responses in each Category to the Question: I do not like mathematics, and it scares me to have to take it.

Category	Number	Percent
Strongly Disagree	28	45.9
Disagree	22	36.06
Undecided	5	8.19
Agree	3	4.91
Strongly Agree	3	4.91
No Response to the Question	0	0
Total	61	100.00

Well over three-fourths, or 50 out of 61 respondents were not afraid of math courses, and indicated it does not scare them. Of those that were undecided, or 5 out of 61, it may have been that they agreed or disagreed with one part of the two-part question and could not decide how to answer.

Table 3. The Number and Percent of Responses in each Category to the Question: Mathematics is very interesting to me, and I enjoy arithmetic and mathematics courses.

Category	Number	Percent
Strongly Disagree	4	6.55
Disagree	11	18.03
Undecided	8	13.11
Agree	26	42.62
Strongly Agree	11	18.03
No response to the Question	1	1.63
Total	61	100.00

The greatest percentage of respondents, 42.62 percent, felt that mathematics is very interesting. Nearly 20 percent indicated that they do not enjoy doing mathematics.

Table 4. The Number and Percent of Responses in each Category to the Question: Mathematics is fascinating and fun.

Category	Number	Percent
Strongly Disagree	7	11.41
Disagree	12	19.67
Undecided	21	34.42
Agree	16	26.22
Strongly Agree	5	8.19
No Response to the Question	0	0
Total	61	100.00

There was no clear-cut consensus on this question. However, 21 out of 61 were undecided about the answer, which might indicate that they like math but would not use such a strong word as "fascinating" to describe it.

Table 5. The Number and Percent of Responses in each Category to the Question: Mathematics makes me feel secure, and at the same time it is stimulating.

Category	Number	Percent
Strongly Disagree	6	9.83
Disagree	21	34.42
Undecided	25	40.98
Agree	5	8.19
Strongly Agree	3	4.91
No Response to the Question	1	1.63
Total	61	100.00

Here again, we have a large percentage (40.98) of respondents undecided. This may be due partially to the nature of the question. Those that responded in this manner may have felt that math is stimulating, but that it does not make them feel secure, or that it makes them feel secure but is not stimulating.

Table 6. The Number and Percent of Responses in each Category to the Question: My mind goes blank and I am unable to think clearly when working mathematics.

Category	Number	Percent
Strongly Disagree	17	27.86
Disagree	26	42.62
Undecided	5	8.19
Agree	5	8.19
Strongly Agree	7	11.47
No Response	1	1.63
Total	61	100.00

Well over 50 percent of those responding answered favorably to this question. Only 20 percent felt that they could not think clearly when working mathematics.

Table 7. The Number and Percent of Responses in each Category to the Question: I feel a sense of insecurity when attempting mathematics.

Category	Number	Percent
Strongly Disagree	15	24.59
Disagree	23	37.7
Undecided	5	8.19
Agree	14	22.95
Strongly Agree	4	6.55
No Response to the Question	0	0
Total	61	100.00

We see that the large percentage of those answering, over 50 percent, do not feel insecure with mathematics.

Table 8. The Number and Percent of Responses in each Category to the Question: Mathematics makes me feel uncomfortable, restless, irritable and impatient.

Category	Number	Percent
Strongly Disagree	13	21.31
Disagree	29	47.54
Undecided	6	9.03
Agree	9	14.75
Strongly Agree	4	6.55
No Response to the Question	0	0
Total	61	100.00

Nearly half of the respondents, 47.54 percent, disagree with this statement; 21.31 percent strongly disagree. It is possible that those who were undecided, or 6 out of 61, could have agreed or disagreed with only a part of the statement.

Table 9. The Number and Percent of Responses in each Category to the Question: The feeling that I have toward mathematics is a good feeling.

Category	Number	Percent
Strongly Disagree	2	3.27
Disagree	10	16.39
Undecided	11	18.03
Agree	28	45.90
Strongly Agree	8	13.11
No Response to Question	2	3.27
Total	61	100.00

In light of the percentage of favorable responses to most of the previous questions, it is surprising that less than 50 percent of the respondents answered this question favorably. Also, two of the students did not respond at all.

Table 10. The Number and Percent of Responses in each Category to the Question: Mathematics makes me feel as though I'm lost in a jungle of numbers and can't find my way out.

Category	Number	Percent
Strongly Disagree	15	24.59
Disagree	32	52.45
Undecided	7	11.47
Agree	5	8.19
Strongly Agree	2	3.27
No Response to the Question	0	0
Total	61	100.00

Only 7 out of 61 respondents answered unfavorably to this strong statement.

Table 11. The Number and Percent of Responses in each Category to the Question: Mathematics is something that I enjoy a great deal.

Category	Number	Percent
Strongly Disagree	3	4.91
Disagree	18	29.50
Undecided	14	22.95
Agree	15	24.59
Strongly Agree	10	16.39
No Response to the Question	1	1.63
Total	61	100.00

As could be expected, there was no clear-cut consensus on this question. Those that answered unfavorably or were undecided may have enjoyed math but not necessarily a great deal.

Table 12. The Number and Percent of Responses in each Category to the Question: When I hear the word "mathematics," I have a feeling of dislike.

Category	Number	Percent
Strongly Disagree	12	19.67
Disagree	28	45.90
Undecided	10	16.39
Agree	8	13.11
Strongly Agree	3	4.91
No Response to the Question	0	0
Total	61	100.00

Well over half of the respondents answered favorably to this question. Ten were undecided.

Table 13. The Number and Percent of Responses in each Category to the Question: I approach mathematics with a feeling of hesitation, resulting from a fear of not being able to do mathematics.

Category	Number	Percent
Strongly Disagree	15	24.59
Disagree	26	42.62
Undecided	7	11.47
Agree	10	16.39
Strongly Agree	3	4.91
No Response to the Question	0	0
Total	61	100.00

Forty-one out of 61 students indicated they do not fear being unable to do mathematics. Thirteen out of 61 felt they were not able to do mathematics.

Table 14. The Number and Percent of Responses in each Category to the Question: I really like mathematics.

Category	Number	Percent
Strongly Disagree	2	3.27
Disagree	12	19.67
Undecided	12	19.67
Agree	22	36.06
Strongly Agree	10	16.39
No Response to the Question	3	4.91
Total	61	100.00

The favorable responses to the question were not overwhelming. However, over 50 percent said they really like math. Three students did not respond to this question.

Table 15. The Number and Percent of Responses in each Category to the Question: Mathematics is a course in school I have always enjoyed studying.

Category	Number	Percent
Strongly Disagree	1	1.63
Disagree	19	31.14
Undecided	9	14.75
Agree	24	39.75
Strongly Agree	8	13.11
No Response to the Question	0	0
Total	61	100.00

Of the 61 respondents, 20 indicated that they have not always enjoyed studying mathematics. Nine were not sure whether they enjoyed it all the time.

Table 16. The Number and Percent of the Responses in each Category to the Question: It makes me nervous to even think about having to do a mathematics problem.

Category	Number	Percent
Strongly Disagree	22	36.06
Disagree	29	47.54
Undecided	3	4.91
Agree	4	6.55
Strongly Agree	1	1.63
No Response to the Question	2	3.27
Total	61	100.00

Only 5 out of 61 respondents said they get nervous when they think about math. Two students did not respond.

Table 17. The Number and Percent of Responses in each Category to the Question: I have never liked mathematics, and it is my most dreaded subject.

Category	Number	Percent
Strongly Disagree	34	55.73
Disagree	18	29.50
Undecided	7	11.47
Agree	2	3.27
Strongly Disagree	0	0
No Response to the Question	0	0
Total	61	100.00

Less than 4 percent of the respondents indicated that they have never liked math.

Table 18. The Number and Percent of Responses in each Category to the Question: I am happier in Mathematics class than in any other class.

Category	Number	Percent
Strongly Disagree	13	21.31
Disagree	22	36.06
Undecided	19	31.14
Agree	5	8.19
Strongly Agree	1	1.63
No Response to the Question	1	1.63
Total	61	100.00

Even though most of the responses to the previous question have been favorable, over 50 percent of the students indicated that they are not happier in math class than any other. Note, however, that 19 out of 61 or 31.14 percent were undecided, while 6 out of 61 were definitely happy in their math class.

Table 19. The Number and Percent of Responses in each Category to the Question: I feel at ease in mathematics, and I like it very much.

Category	Number	Percent
Strongly Disagree	3	4.91
Disagree	15	24.59
Undecided	13	21.31
Agree	24	39.34
Strongly Agree	6	9.83
No Response to the Question	0	0
Total	61	100.00

Nearly 50 percent of the respondents feel at ease in mathematics and like it very much.

Table 20. The Number and Percent of Responses in each Category to the Question: I feel a definite positive reaction toward mathematics; it's enjoyable.

Category	Number	Percent
Strongly Disagree	2	3.27
Disagree	17	27.86
Undecided	12	19.67
Agree	22	36.06
Strongly Agree	6	9.83
No Response to the Question	2	3.27
Total	61	100.00

Even though the majority of respondents feel a positive reaction toward mathematics and think it is enjoyable, over 30 percent do not have these feelings.

Table 21. The Number and Percent of Responses in each Category to the Question: My parents do not like mathematics and I don't like it either.

Category	Number	Percent
Strongly Disagree	24	39.34
Disagree	26	41.62
Undecided	8	13.11
Agree	2	3.27
Strongly Agree	0	0
No Response to the Question	1	1.63
Total	61	100.00

Responses show that parents and students have a favorable attitude toward mathematics.

Table 22. The Number and Percent of Responses in each Category to the Question: My parents like mathematics and so do I.

Category	Number	Percent
Strongly Disagree	3	4.91
Disagree	9	14.75
Undecided	16	26.22
Agree	25	40.98
Strongly Agree	6	9.83
No Response to the Question	2	3.27
Total	61	100.00

Even though the responses to this question were favorable they are not as overwhelming by favorable as the previous related question.

Table 23. The Number and Percent of Responses in each Category to the Question: My parents were never very good at mathematics but feel that is important and that I should take all I can.

Category	Number	Percent
Strongly Disagree	6	9.83
Disagree	14	22.95
Undecided	12	19.67
Agree	17	27.86
Strongly Agree	7	11.47
No Response to the Question	5	8.19
Total	61	100.00

Nearly 30 percent, or 24 out of 61 said that their parents were not good at math but felt they should take all they could. Five out of 61 did not respond. This may have been because the student did not know whether their parents were good or bad in math.

Table 24. The Number and Percent of Responses in each Category to the Question: I am not taking a math course this year because I think there is too much homework involved.

Category	Number	Percent
Strongly Disagree	11	18.03
Disagree	21	34.42
Undecided	14	22.95
Agree	14	22.95
Strongly Agree	4	6.55
No Response to the Question	0	0
Total	61	100.00

Eighteen respondents or nearly 30 percent felt that mathematics courses involve too much homework. Fourteen were undecided.

Table 25. The Number and Percent of Responses in each Category to the Question: I am not taking a math course this year because I don't like the teachers who are teaching the next course.

Category	Number	Percent
Strongly Disagree	13	21.31
Disagree	38	62.29
Undecided	5	8.19
Agree	3	4.91
Strongly Agree	2	3.27
No Response to the Question	0	0
Total	61	100.00

Only 5 respondents indicated that they are not taking math courses because of dislike for the teachers.

Table 26. The Number and Percent of Responses in each Category to the Question: I feel that for the type of work that I will be doing in the future I have taken enough math.

Category	Number	Percent
Strongly Disagree	4	6.55
Disagree	13	21.31
Undecided	11	18.03
Agree	16	26.22
Strongly Agree	17	27.86
No Response to the Question	0	0
Total	61	100.00

Of the 61 respondents 33 felt that they have had enough mathematics to meet their future needs. Eleven were undecided and only 17 felt that they may need more math.

Table 27. The Number and Percent of Responses in each Category to the Question: The next math course higher than the last one I took is too hard, so I am not taking it.

Category	Number	Percent
Strongly Disagree	21	34.42
Disagree	20	32.78
Undecided	5	8.19
Agree	14	22.95
Strongly Agree	5	8.19
No Response to the Question	0	0
Total	61	100.00

Over 30 percent of the students felt that the next math course was too hard; while 41 out of 61 did not feel it was too hard.

Table 28. The Number and Percent of Responses in each Category to the Question: I wanted to take math this year but I couldn't get it into my schedule.

Category	Number	Percent
Strongly Disagree	32	52.45
Disagree	24	39.34
Undecided	0	0
Agree	2	3.27
Strongly Agree	3	4.91
No Response to the Question	0	0
Total	61	100.00

Only 8 percent of the respondents were unable to schedule a math course if they desired to do so.

Table 29. The Number and Percent of Responses in each Category to the Question: I am not taking math this year because I am no longer interested in it.

Category	Number	Percent
Strongly Disagree	12	19.67
Disagree	21	34.42
Undecided	8	13.11
Agree	12	19.67
Strongly Agree	7	11.47
No Response to the Question	1	1.63
Total	61	100.00

Nineteen respondents indicated they were no longer interested in math. Over 50 percent said they were interested in math, which may indicate that they will take another course at a later time.

Table 30. The Number and Percent of Responses in each Category to the Question: I am not taking a math course this year because my parents did not want me to.

Category	Number	Percent
Strongly Disagree	31	50.81
Disagree	24	39.34
Undecided	2	3.77
Agree	4	6.55
Strongly Agree	0	0
No Response to the Question	0	0
Total	61	100.00

Only 4 respondents indicated that their parents did not want them to take a math course.

Table 31. The Number and Percent of Responses in each Category to the Question: I am not taking a math course this year because none of my friends are taking the course.

Category	Number	Percent
Strongly Disagree	30	49.18
Disagree	25	40.98
Undecided	0	0
Agree	6	9.83
Strongly Agree	0	0
No Response to the Question	0	0
Total	61	100.00

Over 89 percent of the students indicated that not having friends in a course was not a reason for failure to enroll in a math course.

Table 32. The Number and Percent of Responses in each Category to the Question: My counselor said I should not take a math course this year.

Category	Number	Percent
Strongly Disagree	39	63.93
Disagree	12	19.67
Undecided	2	3.27
Agree	8	13.11
Strongly Agree	0	0
No Response to the Question	0	0
Total	61	100.00

Nearly 23 percent indicated that their counselor had recommended they not take math.

Table 33. The Number and Percent of Responses in each Category to the Question: I am not taking a math course because my last math teacher recommended that I should not.

Category	Number	Percent
Strongly Disagree	19	31.14
Disagree	36	59.01
Undecided	1	1.63
Agree	7	11.47
Strongly Agree	0	0
No Response to the Question	0	0
Total	61	100.00

The mathematics teacher recommended that 7 of the 61 respondents not take a math course. One student was not sure what the math teacher recommended.

Table 34. The Number and Percent of Responses in each Category to the Question: I am not taking a math course this year because I am afraid it might lower my grade point average.

Category	Number	Percent
Strongly Disagree	19	31.14
Disagree	27	44.26
Undecided	6	9.83
Agree	9	14.75
Strongly Agree	6	9.83
No Response to the Question	0	0
Total	61	100.00

As might be expected, nearly one-fourth of the respondents were worried about their grade point average when deciding whether or not to take a math course.

Chapter 5

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

The problem of this study was to determine the attitudes towards mathematics of those students who dropped from the Klamath Falls, Oregon top track math program, and to determine what factors influenced the student to drop.

A survey of recent literature was made to examine studies dealing with attitudes that affect achievement in mathematics. Specific techniques suggested by authors were incorporated into a survey instrument which was given to 71 students in the Klamath Falls schools who were identified as having taken Elementary Algebra but who had since dropped from the program.

The investigator received 61 completed survey instruments out of 65 for a 94 percent return. Summary information from returned survey instruments was tabulated and is presented in 34 tables.

Tables one through 23 deal with general attitudes toward mathematics. The responses to the 23 questions summarized in the table can be classified as having a favorable attitude toward mathematics or an unfavorable attitude. The responses also indicate indecision concerning an attitude. The mean for favorable responses was 57.14 percent, while the mean for the unfavorable responses was 23.59.

The mean for those responding undecided was 17.03. As might be expected from the population surveyed, the responses reflect a positive attitude toward mathematics.

Of the 23 questions in the attitude survey, 11 were written in a negative manner and 12 were written in a positive fashion.

It was found that those questions written negatively received a higher percent of favorable attitude responses than those written in a positive manner. For example, 51 out of 61 respondents either disagreed or strongly disagreed with the statement, "It makes me nervous to even think about having to do a mathematics problem." And 52 or nearly 85 percent responded favorably to the statement, "I have never liked mathematics, and it is my most dreaded subject." Of those written in a positive fashion 36 or 58 percent responded favorably to the statement, "The feeling that I have toward mathematics is a good feeling." The two positive statements, "I really like mathematics," and "Mathematics is a course in school that I have always enjoyed studying," received favorable responses 52 percent of the time. The statement receiving the lowest favorable response was "I am happier in mathematics class than in any other class." Only 6 out of 61 answered this question favorably. "Mathematics

makes me feel secure, and at the same time it is stimulating," ranked second lowest with 8 out of 61 answering favorably.

Tables 24 through 34 pertain to specific reasons why students fail to continue in a math program. The statement "I feel that for the type of work that I will be doing in the future I have taken enough math" ranked first with 33 out of 61 or 54.08 percent of the respondents either agreeing or strongly agreeing with the statement. A feeling that the next math course was too hard ranked second in reasons for not taking the next math course, and too much homework and fear of having their grade point average lowered were reasons given by over one fourth of the respondents.

Conclusions

As a result of this study, the researcher concluded that the majority of those students who began in the top track program in the junior high school maintain a positive or favorable attitude toward mathematics, even though they have dropped from the program. Admittedly those students who were surveyed were above average in mathematical ability or they would not have been in the top track program to begin

with. Consequently it would be expected that their attitudes toward mathematics would be higher than those students who were not in the top track program.

This study revealed that the greatest percentage of students dropping the program were doing so because they felt they had received enough math to enable them to pursue their chosen profession. This may or may not be a plus for the math program. However, the second most-mentioned reason was that the next course was too hard. The researcher might tend to believe that the modern curriculum has become too rigorous for today's students, since 29.50 percent of the respondents said that mathematics involved too much homework. Are we to conclude then that we should lessen the homework assignment in our top track program, thereby reducing the quality of the program? The researcher also found that 24.58 percent of the respondents indicated that worry about grade point average was the reason for not taking a math course. From this it might be concluded that much too much emphasis is placed on receiving A and B grades.

The researcher also concluded that this study has been useful. Not only does it give the mathematics staff insight into the attitudes of some students who have dropped the program but it reveals some ways in which the program can be improved.

Recommendations

Based on the findings of this study, the following recommendations seem to be justified:

1. An educational program begun in the eighth grade in which students can find out the amount of mathematics needed in various jobs and professions.
2. Further research on the attitudes of students continuing mathematics, as opposed to those dropping mathematics.
3. Change in the requirements for determining grade point averages.
4. Further research into the requirement of homework.
5. Research into the type of motivational techniques necessary to interest students in continuing in the mathematics program.

REFERENCES CITED

- Aiken, Lewis R. "Research on Attitudes Toward Mathematics," The Arithmetic Teacher, 19:631-643, March, 1972.
- Alspaugh, John W. "Curriculum Change in Secondary School Mathematics," School Science and Mathematics, 7:9-12, February, 1970.
- Begle, Edward G. "Teacher Knowledge and Student Understanding in Algebra," Eric Reports, January, 1972.
- Betz, William. "Five Decades of Mathematical Reform," Mathematics Teacher, 16:221-229, October, 1967.
- Brown, Gerald W. "What Happened to Elementary School Arithmetic?" The Arithmetic Teacher, 18:172-178, March, 1971.
- Devine, Donald F. "Student Attitudes and Achievement," Mathematics Teacher, 17:176-182, March, 1968.
- Dutton, Willbur H. "Attitude Change of Prospective Elementary Teachers Toward Arithmetic," Arithmetic Teacher, 9:445-452, December, 1962.
- Ferguson, Eugene W. "The Junior High School Mathematics Program--Past, Present, and Future," Mathematics Teacher, 19:216-221, May, 1970.
- Neale, Daniel C. "The Role of Attitudes in Learning Mathematics," The Arithmetic Teacher, 16:631-640, December, 1969.
- Roberts, Fannie M. "Attitudes Toward Mathematics of Faculty and Students in Three High Schools," School Science and Mathematics, 18:272-281, December, 1970.
- Rothenberger, Max L. "Who Should Take Algebra?" Clearing House, 8:102-110, December, 1967.

APPENDIX

QUESTIONNAIRE

Directions: Do not write your name on this questionnaire.
Place a check mark () in front of the proper response.

1. Year in school
 - ☐ Freshman
 - ☐ Sophomore
 - ☐ Junior
 - ☐ Senior
2. Last Math course you have taken
 - ☐ Elementary Algebra
 - ☐ Geometry
 - ☐ Advanced Algebra
 - ☐ Math Analysis
 - ☐ Algebra 2A
 - ☐ Consumer Math
 - ☐ Computer Science
3. Male or Female: ☐ Male ☐ Female

Mathematics Attitude Scale

Directions: Each of the statements which follow expresses a feeling or attitude toward mathematics. You are to indicate, on a five-point scale, the extent of agreement between the attitude expressed in each statement and your own personal feeling. The five points are: Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A), Strongly Agree (SA). Draw a circle around the letter or letters giving the best indication of how closely you agree or disagree with the attitude expressed in each statement.

1. I am always under a terrible strain in a mathematics class. SD D U A SA
2. I do not like mathematics, and it scares me to have to take it. SD D U A SA
3. Mathematics is very interesting to me, and I enjoy arithmetic and mathematics courses. SD D U A SA
4. Mathematics is fascinating and fun. SD D U A SA

- | | |
|---|-------------|
| 5. Mathematics makes me feel secure, and at the same time it is stimulating. | SD D U A SA |
| 6. My mind goes blank and I am unable to think clearly when working mathematics. | SD D U A SA |
| 7. I feel a sense of insecurity when attempting mathematics. | SD D U A SA |
| 8. Mathematics makes me feel uncomfortable, restless, irritable, and impatient. | SD D U A SA |
| 9. The feeling that I have toward mathematics is a good feeling. | SD D U A SA |
| 10. Mathematics makes me feel as though I'm lost in a jungle of numbers and can't find my way out. | SD D U A SA |
| 11. Mathematics is something that I enjoy a great deal. | SD D U A SA |
| 12. When I hear the word "mathematics," I have a feeling of dislike. | SD D U A SA |
| 13. I approach mathematics with a feeling of hesitation, resulting from a fear of not being able to do mathematics. | SD D U A SA |
| 14. I really like mathematics. | SD D U A SA |
| 15. Mathematics is a course in school that I have always enjoyed studying. | SD D U A SA |
| 16. It makes me nervous to even think about having to do a mathematics problem. | SD D U A SA |
| 17. I have never liked mathematics, and it is my most dreaded subject. | SD D U A SA |
| 18. I am happier in a mathematics class than in any other class. | SD D U A SA |
| 19. I feel at ease in mathematics, and I like it very much. | SD D U A SA |
| 20. I feel a definite positive reaction toward mathematics; it's enjoyable. | SD D U A SA |

21. My parents do not like mathematics and I don't like it either. SD D U A SA
22. My parents like mathematics and so do I. SD D U A SA
23. My parents were never very good at math but feel that it is important and that I should take all I can. SD D U A SA
24. I am not taking a math course this year because I think there is too much home-work involved. SD D U A SA
25. I am not taking a math course this year because I don't like the teachers who are teaching the next course. SD D U A SA
26. I feel that for the type of work that I will be doing in the future I have taken enough math. SD D U A SA
27. The next math course higher than the last one I took is too hard so I am not taking it. SD D U A SA
28. I wanted to take math this year but I couldn't fit it into my schedule. SD D U A SA
29. I am not taking math this year because I am no longer interested in it. SD D U A SA
30. I am not taking a math course this year because my parents did not want me to. SD D U A SA
31. I am not taking a math course this year because none of my friends are taking the course. SD D U A SA
32. My counselor said I should not take a math course this year. SD D U A SA
33. I am not taking a math course because my last math teacher recommended that I should not. SD D U A SA
34. I am not taking a math course this year because I am afraid it might lower my grade point average. SD D U A SA