DOCUMENT RESUME

ED 089 824 JC 740 133

AUTHOR Grunes, Leslie S.
TITLE A Critical Study of the Attrition in the Mathematics Couses at Mercer County Community College.
PUB DATE 74
NOTE 53p.

EDRS PRICE MF-$0.75 HC-$3.15 PLUS POSTAGE
DESCRIPTORS *Community Colleges; *Failure Factors; *Mathematics Instruction; *Performance Factors; *Student Placement
IDENTIFIERS Course Withdrawal

ABSTRACT

In last year's report (1971-1972), when the attrition problem in Math 103 and 109 was first examined, one of the majcr findings was that placement was very poor. It is shown in this report that in the courses with improved placement, the attrition went down significantly. Attrition is defined as withdrawal from a mathematics course and registering the following semester. The main purpose of this report is to examine the underlying causes of the department's attrition problem and to formulate policies and solutions. A detailed comparison is made between the students enrolled in Math 107 in Fall 1971 and in Fall 1972. Data sources are the students' history tape and a questionnaire administered at the final examination. Tables showing the results of the questionnaire and a sample of the questionnaire are included in the report. (Author/SW)

A CRITICAL STUDY OF THE ATTRITION IN THE MATHEMATICS COURSES AT MERCER COUNTY COMMUNITY COLLEGE

By: Leslie S. Grunes
Assistant Professor
Department of Mathematics
and Physics

TABLE OF CONTENTS

ACKNOWLEDGMENTS

This report would not have been possible had I not received full cooperation from certain faculty members and staff.

I did not receive any remuneration nor did I obtain any release time to do this project.

The most helpful person was Dr. Melvin J. Zucker, my Department Chairman. He provided the mature and competent leadership necessary for me to pursue this project successfully.

The close working relationship I had with my colleagues was most helpful. I work with a highly dedicated group of people who are very much aware of the problems. Thanks to their insight I was able to conduct this research with a clearer perspective of the problems.

Robert Zimring, former Director of Institutional Research, helped me tremendously to develop the methodologies used in this report.

Howard Dunn and his computer staff got my programs rapidly executed at Rutgers through our terminal. I want to thank Howard for giving me an account with Educational Information Services, Inc., so I could use the statistical packages at Rutgers.

Dr. Edward H. House was very helpful in proofreading this document and made valuable suggestions on the style of this report.

Mary Ann Howard did an excellent job in typing this manuscript.

CHAPTER I

INTRODUCTION

In last year's report (1971-1972), when the attrition problem in MA 103 and MA 109 was first examined, one of the major findings was that placement was very poor. It will be shown that in the courses with improved placement, the attrition went down significantly.

Since this report is being done for the Department of Mathematics and Physics, attrition, to me, is the students who withdrew from their mathematics course and registered the following semester. The department is very much concerned about students withdrawing specifically from our courses. However, solutions and policies cannot be constructed without having a knowledge of the underlying causes of the problem. The main purpose of this report is to examine the underlying causes of the department's attrition problem, so that, policies and solutions can be formulated by using accurate information.

This report will examine the algebra sequence and the Foundations of Mathematics courses (MA 107 and MA 108). The investigation of the algebra sequence will show that in the higher level courses (MA 103 and MA 115), students were properly placed. In Technical Mathematics I (MA 109) students were poorly placed.

A detailed comparison will be made between the students enrolled in MA 107 in Fall 1971 and in Fall 1972. From this comparison it will be shown that even though the course went to a large lecture mode (Fall 1972), only a few students withdrew from the course and registered the following semester. In fact, it will be demonstrated statistically that the proportion of students who withdrew in Fall 1971 and registered the following semester is significantly higher than the Fall 1972 withdrawing students who also registered the following semester.

The sources of data were the students' history tape and a questionnaire administered at the final examination. The following data came from the student history tape: (1) C.G.P. mathematics score, (2) C.G.P. reading score, (3) high school rank and class size, and (4) grade in

mathematics course. The student questionnaire's main objective was to find the student's reaction towards the learning design used. In addition, the members of the department also wanted to know how many hours the students worked in paid employment and the number of hours spent studying their mathematics course.

This study will indicate possible causes for the attrition problem in the aforementioned courses.

CHAPTER II

THE ALGEBRA SEQUENCE

2.1 Introduction

The Department of Mathematics and Physics has three algebra sequence courses, which are Technical Mathematics (MA 109-MA 110), College Mathematics (MA 103 - MA 104) and Algebra and Trigonometry (MA 115 - MA 116). Originally, the MA 109-MA 110 course was designed for students in technical areas such as Architectural Technology, Electric Power Technology, and Machine Shop Technology. Now the course also serves the needs of any student with a poor high school mathematical background.

The College Mathematics sequence (MA 103-MA 104) is a pre-calculus course designed for the better-prepared liberal arts student who will be taking, or will need statistics, computer programming, quantitative methods, or calculus as applied to the social sciences or business.

The Algebra and Trigonometry (MA 115-MA 116) sequence is designed specifically for the technical student with an excellent algebra background; this course is taught in a traditional manner, and includes applications in the physical sciences such as mechanics and electricity.

2.2 Technical Mathematics I (MA 109)

For the poorly prepared student, Technical Mathematics is the best course. A typical student in this course would have had at most one year of high school algebra, a score of under fifty in the C.G.P. Mathematics Test A and have been in the lower half of his high school class. It will be demonstrated that many students in the course had a much better academic background than this, and thus creating a severe pedagogical problem of teaching a class with variegated students.

C.G.P. data are available for 305 students: 12 students took Mathematics Test B and of the remaining 293 students, 44 withdrew from school. Hence, the sample for the analysis is 249, which are all the students who took C.G.P. Mathematics Test A and either received a grade or withdrew from the course and registered for the spring semester.

The descriptive statistical characteristics are the following:

C.G.P. Mathematics Test A		C.G.P. Reading Test	
Average	49.36	Average	48.18
Standard deviation	7.69	Standard deviation	9.49
Maximum	67.00	Maximum	73.00
Minimum	31.00	Minimum	26.00
Range	36.00	Range	47.00

Cross-referencing C.G.P. Test A with the grade earned gives the following contingency table:

Table 2.2.1
C.G.P. Mathematics A

GRADE	Under 40	40-44	45-49	50-54	55-59	Over 60	Totals
A	0	3	4	7	12	17	43
B	2	8	11	11	15	6	53
C	4	20	21	13	9	1	68
D	5	11	3	6	2	0	27
F	4	10	3	3	2	2	24
W or WP	3	15	5	6	4	1	34
Totals	18	67	47	46	44	27	249

Using a chi-square test in testing the null hypothesis that the course grade is independent of the C.G.P. score against the alternative hypothesis that there is a dependency between course grade and C.G.P. test scores, the null hypothesis is highly significant at the 1% level. Hence, there is a dependency between the student's grade and his C.G.P. mathematics score.

From Table 2.2.1 one notices that at least 83 percent of the students with a grade of A scored at least a 50 in C.G.P.; at least 50 percent of the withdrawing students had a C.G.P. score in the forties; and approximately 25 percent of the students had a C.G.P. score over 50; 34 students from a total of 78 withdrawals registered for the spring semester.

The above statistical characteristics indicate that there are many students in the course who are already familiar with the course material. Without giving a student a questionnaire, however, the members of the department don't know how the student feels toward his mathematics course. The results of the questionnaire are the following:

QUESTION 1: Based on my ability and background, my course in math was the right one for me.

Table 2.2.2

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	30	15.5
Agree	75	38.7
Not Sure	39	20.0
Disagree	30	15.5
Strongly disagree	15	7.7
Not applicable	5	2.6
	194	100.0%

QUESTION 2: My math course simply repeats things I have already learned in high school or on my own.

Table 2.2.3.

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	25	12.9
Agree	70	36.1
Not Sure	17	8.8
Disagree	56	28.9
Strongly Disagree	13	6.7
Not Applicable	12	6.2
	193	99.5%

One student did not respond.

QUESTION 3: Most of the work in my math course is too difficult for me to handle.

Table 2.2.4

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	2	1.0
Agree	10	5.2
Not Sure	35	18.0
Disagree	81	41.8
Strongly disagree	59	30.4
Not applicable	6	3.1
	193	99.5%

One student did not respond.

QUESTION 4: The instructor seemed to know when students didn't understand the material.

Table 2.2.5

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	34	17.5
Agree	93	47.9
Not Sure	30	15.5
Disagree	20	10.3
Strongly disagree	13	6.7
Not applicable	3	1.5
	193	99.5%

One student did not respond.

QUESTION 5: My interest in the subject area has been stimulated by this course.

Table 2.2.6

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	12	6.2
Agree	49	25.3
Not Sure	44	22.7
Disagree	56	28.9
Strongly disagree	24	12.4
Not applicable	9	4.6
	194	100.0%

QUESTION 6: The instructor told students how they would be evaluated for the course.

Table 2.2.7

Responses	Absolute Frequency	Relative Frequency (percent)
Strongly agree	24	12.4
Agree	105	54.1
Not Sure	41	21.1
Disagree	16	8.2
Strongly disagree	3	1.5
Not applicable	4	2.1
	193	99.5%

One student did not respond.

QUESTION 7: The work load for this course in relation to other courses of equal credit was:

Table 2.2.8

Responses	Absolute Frequency	Relative Frequency (percent)
Much lighter	12	6.2
Lighter	25	12.9
About the same	130	67.0
Heavier	21	10.8
Much heavier	3	1.5
	191	98.5%

Three students did not respond.

QUESTION 8: For me, the pace at which the instructor covered the material for the term was:

Table 2.2.9

Responses	Absolute Frequency	Relative Frequency (percent)
Very slow	6	3.1
Somewhat slow	15	7.7
Just about right	108	55.7
Somewhat fast	44	22.7
Very fast	11	5.7
	184	94.8%

Ten students did not respond.

QUESTION 9: Was class size satisfactory for method of conducting the class?

Table 2.2.10

Responses	Absolute Frequency	Relative Frequency (percent)
Yes	151	77.8
No, class was too large	7	3.6
No, class was too small	4	2.1
It didn't make any difference	29	14.9
	191	98.5%

Three students did not respond.

QUESTION 10: On the average, how many hours per week do you spend studying and doing homework for this course?

Table 2.2.11

Responses	Absolute Frequency	Relative Frequency (percent)
3 hours or less	86	44.3
3.01 - 6 hours	62	32.0
6.01 - 9 hours	17	8.8
9.01 - 12 hours	6	3.1
12.01 - 15 hours	2	1.0
	173	89.2%

Twenty-one students did not respond.

QUESTION 11: On the average, how many hours per week do you spend in paid employment?

Table 2.2.12

Responses	Absolute Frequency	Relative Frequency (percent)
0-8.00 hours	58	29.9
8.01-16 hours	36	18.6
16.01 - 24 hours	29	14.9
24.01 - 32 hours	27	13.9
32.01 - 40 hours	23	11.9
Over 40.00 hours	3	1.5
	176	90.7%

Eighteen students did not respond.

QUESTION 12: The highest level math course I completed in high school is:

Table 2.2.13

Responses	Absolute Frequency	Relative Frequency (percent)
No algebra	21	10.8
Algebra I	41	21.1
Geometry	53	27.3
Algebra II	50	25.8
Post Algebra II	25	12.9
	190	97.9%

Four students did not respond.

Using the social security number as the identification on the student history tape data and the questionnaire data, I merged the two sets of data to construct the following tables, in which the total numbers are not the same since I did not include the not applicable response.

Contingency tables 2.2.14 to 2.2.18 cross reference the C.G.P. Mathematics Test A with questions 1,2,3,8 and 12 respectively. In each table the null hypothesis is that the score on the C.G.P. Mathematics Test A is independent of the question under consideration against the alternative hypothesis that there is a dependency between the C.G.P. score and the question under consideration, using a Chi-square Test.

Table 2.2.14

Question 1

C.G.P. Math A	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	1	2	3	0	0	6
40-44	5	14	6	3	1	29
45-49	7	7	6	6	0	26
50-54	2	10	1	4	2	19
55-59	1	12	3	5	1	22
60-64	2	4	2	5	3	16
Totals	18	49	21	23	7	118

There is insufficient evidence to reject the null hypothesis at the 10 percent level, so the C.G.P. math score has no bearing on the student's attitude toward placement.

Table 2.2.15

Question 2

C.G.P. Math A	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	1	0	1	1	2	5
40-44	1	13	1	8	4	27
45-49	5	9	3	9	0	26
50-54	2	7	3	6	0	18
55-59	3	12	3	4	0	22
60 & over	5	8	2	1	0	16
Totals	17	49	13	29	6	114

The null hypothesis is highly significant at the 1 percent level, so there is a strong dependency between the C.G.P. mathematics score and material covered in high school.

Table 2.2.16

Question 3

C.G.P. Math A	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	0	3	3	0	6
40-44	2	7	14	6	29
45-49	2	5	11	7	25
50-54	0	4	9	6	19
55-59	1	2	10	7	20
60 & over	0	0	4	11	15
Totals	5	21	51	37	114

In this question none of the students strongly agreed. There is insufficient evidence to reject the null hypothesis at the 5 percent level, so most of the students thought that the course was not too difficult to handle.

Table 2.2.17

Question 8

C.G.P. Math A	Very Slow	Somewhat Slow	Just About Right	Somewhat Fast	Very Fast	Totals
Under 40	0	0	3	2	0	5
40-44	0	0	15	9	3	27
45-49	0	3	14	8	0	25
50-54	1	2	11	3	0	17
55-59	0	4	11	5	2	22
& over	2	3	7	2	1	15
tals	3	12	61	29	6	111

There is insufficient evidence to reject the null hypothesis at the 1[illegible] percent level.

From the table, approximately half the students felt that the pace of the course was just right; approximately one-third felt that the pace of the course was fast.

Table 2.2.18

Question 12

C.G.P. Math A	No Algebra	Algebra 1	Geometry	Algebra 2	Post Algebra 2	Totals
Under 40	3	1	1	1	0	6
40-44	6	6	12	4	0	28
45-49	1	8	8	6	3	26
50-54	0	4	10	3	2	19
55-59	0	2	5	11	4	22
60 & over	0	0	3	8	4	15
Totals	10	21	39	33	13	116

The null hypothesis is rejected with high significance at the 1% level, so there is a very strong dependency between the C.G.P. Mathematics Test A score and high school preparation. In fact, the Kendall rank correlation coefficient, τ, (τ-tau), a nonparametric test used for rank data, is 0.43, which is high.

In contingency tables 2.19 to 2.23 the null hypothesis is that the C.G.P. Reading score is independent of the response to the question under consideration, against the alternative hypothesis that there is a dependency between the C.G.P. Reading score and the student's response to the question under consideration. Using a Chi-Square test in each table, there is insufficient evidence to reject any of the null hypotheses at the 10 percent level. The student's response in each case is independent of his C.G.P. Reading score.

Table 2.2.19

Question

C.G.P. Reading	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	4	11	5	1	0	21
40-44	2	10	4	4	0	20
45-49	7	10	6	4	3	30
50-54	0	7	3	5	2	17
55-59	5	6	3	6	1	21
60 & over	0	5	0	3	1	9
Totals	18	49	21	23	7	118

Table 2.2.20

Question 2

C.G.P. Reading	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	3	10	1	4	2	20
40-44	2	7	2	6	2	19
45-49	7	10	3	8	2	30
50-54	1	9	2	4	0	16
55-59	4	9	2	5	0	20
60 & over	0	4	3	2	0	9
Totals	17	49	13	29	6	114

Table 2.2.21

Question 3

C.G.P. Reading	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
Under 40	0	1	7	9	4	21
40-44	0	1	4	10	4	19
45-49	0	1	4	13	12	30
50-54	0	1	2	6	6	15
55-59	0	1	2	9	8	20
60 & over	0	0	2	4	3	9
Totals	0	5	21	51	37	114

Table 2.2.22

Question 8

C.G.P. Reading	Very Slow	Somewhat Slow	Just About Right	Somewhat Fast	Very Fast	Totals
Under 40	0	0	14	5	1	20
40-44	0	1	11	6	0	18
45-49	1	3	14	6	5	29
50-54	0	4	8	4	0	16
55-59	2	3	10	6	0	21
60 & over	0	1	4	2	0	7
Totals	3	12	61	29	6	111

Table 2.2.23

Question 12

C.G.P. Reading	No Algebra	Algebra I	Geometry	Algebra II	Algebra II	Totals
Under 40	2	4	10	5	0	21
40-44	2	5	6	5	2	20
45-49	2	4	10	8	6	30
50-54	2	1	5	6	2	16
55-59	2	4	6	6	2	20
60 & over	0	3	2	3	1	9
Totals	10	21	39	33	13	116

In contingency tables 2.24 to 2.28 the class rank is cross-referenced with questions 1, 2, 3, 8, and 12. In each table the null hypothesis is that the class quintile is independent of the response to the question under consideration, against the alternative hypothesis that there is a dependency between class quintile and the response to the question under consideration, using a chi-square test. No student in the sample was in the top fifth of his graduating class.

Table 2.2.24

Question 1

Quintile Rank	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
2	3	5	3	4	2	17
3	0	12	5	8	2	27
4	7	19	8	6	1	41
5	8	13	5	5	2	33
Totals	18	49	21	23	7	118

There is insufficient evidence to reject the null hypothesis at the 10% level.

Table 2.2.25

Question 2

Quintile Rank	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
2	4	7	1	4	1	17
3	5	13	2	5	2	27
4	5	14	5	10	3	37
5	3	15	5	10	0	33
Totals	17	49	13	29	6	114

There is insufficient evidence to reject the null hypothesis at the 10 percent level. The student's class rank is independent of the material he received in high school.

Table 2.2.26

Question 3

Quintile Rank	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Totals
2	0	1	3	6	7	17
3	0	1	2	9	15	27
4	0	3	9	20	7	39
5	0	0	7	16	8	31
Totals	0	5	21	51	37	114

The null hypothesis is rejected at the 10 percent level. Therefore, there is a dependency between rank and the student's attitude towards difficulty of the course.

Table 2.2.27

Question 8

Quintile Rank	Very Slow	Somewhat Slow	Just Right	Somewhat Fast	Very Fast	Totals
2	1	0	9	4	2	16
3	0	4	11	9	0	24
4	0	4	22	10	4	40
5	2	4	19	6	0	31
Totals	3	12	61	29	6	111

There is insufficient evidence to reject the null hypothesis at the 10 percent level. The pace of the course is, therefore, independent of the class rank.

Table 2.2.28

Question 12

Quintile Rank	No Algebra	Algebra I	Geometry	Algebra II	Post Algebra II	Totals
2	1	5	3	5	3	17
3	3	1	7	9	7	27
4	4	6	19	9	2	40
5	2	9	10	10	1	32
Totals	10	21	39	33	13	116

The null hypothesis is rejected at the 5 percent level.

Contingency tables 2.29 to 2.33 cross-reference the student's grade with questions 1,2,3,8, and 12. For each table the null hypothesis tested is that the grade is independent of the response to the question under consideration against the alternative hypothesis that there is a dependency between the course grade and the student's response.

Table 2.2.29

Question 1

Grade	Strongly Agree	Agree	Not Sure	Dis-agree	Strongly Disagree	Totals
A	2	10	1	6	3	22
B	7	15	4	6	1	33
C	7	17	12	5	2	43
D	2	7	2	4	0	15
F	0	0	2	2	1	5
Totals	18	49	21	23	7	118

There is insufficient evidence to reject the null hypothesis at the 10 percent level.

Table 2.2.30

Question 2

Grade	Strongly Agree	Agree	Not Sure	Dis-agree	Strongly Disagree	Totals
A	5	11	2	4	0	22
B	7	15	5	4	2	33
C	5	16	4	14	2	41
D	0	7	2	5	1	15
F	0	0	0	2	1	3
TOTALS	17	49	13	29	6	114

There is insufficient evidence to reject the null hypothesis at the 10 percent level.

Table 2.2.31

Question 3

Grade	Strongly Agree	Agree	Not Sure	Dis-agree	Strongly Disagree	Totals
A	0	0	0	6	16	22
B	0	0	1	17	11	29
C	0	2	11	23	7	43
D	0	1	7	5	2	15
F	0	2	2	0	1	5
TOTALS	0	5	21	51	37	114

The null hypothesis is highly significant at the one percent level. There is a very strong dependency between the student's grade and the perceived difficulty of the course.

Table 2.2.32

Question 8

Grade	Very Slow	Somewhat Slow	Just About Right	Somewhat Fast	Very Fast	Totals
A	1	4	12	3	1	21
B	1	6	21	4	0	32
C	1	1	20	17	3	42
D	0	1	6	3	2	12
F	0	0	2	2	0	4
TOTALS	3	12	61	29	6	111

There is insufficient evidence to reject the null hypothesis at the 10 percent level. No matter what grade a student received, his general attitude towards the pace of the course was the same.

Table 2.2.33

Question

Grade	No Algebra	Algebra I	Geometry	Algebra II	Post Algebra II	Totals
A	1	2	3	9	6	21
B	1	5	14	11	2	33
C	5	9	17	7	5	43
D	1	4	4	6	0	15
F	2	1	1	0	0	4
TOTALS	10	21	39	33	13	116

The null hypothesis is rejected at the 5 percent level. A student's grade depends on his high school preparation.

Cross-referencing Question 12 with Question 8 gives the following contingency table.

Table 2.2.34

	Very Slow	Somewhat Slow	Just Right	Somewhat Fast	Very Fast	Totals
No Algebra	0	0	3	7	0	10
Algebra I	0	0	11	6	2	19
Geometry	0	6	19	10	2	37
Algebra II	2	5	19	4	1	31
Post Algebra II	1	1	8	2	1	13
TOTALS	3	12	60	29	6	110

The null hypothesis, that the perceived pace of the course is independent of the high school preparation, against the alternative hypothesis that there is a dependency between perceived pace and high school preparation, is just barely rejected at the 10 percent level, using a chi-square test.

At the present time our mathematics course intended for the ill-prepared, poorly motivated student does not serve them properly since there are too many over-qualified students in the course. While approximately 10 percent of the students never had algebra, nearly half the students had at least a fifty in the C.G.P. Mathematics Test A.

For the most part a student's grade is determined by his high school mathematics background. Statistically, there is a dependency between course grade and C.G.P. Mathematics Test A, and between course grade and high school background.

Most students felt that the course was not too difficult to handle. The basic problem is that the mathematics department is not properly catering to the needs of the students for whom the course was designed. Also, without the right students in the course, research cannot be performed to determine some basic student characteristics. As a result, the mathematics department cannot properly experiment with

various learning designs to facilitate better learnings of the ill-prepared and poorly-notivated students.

2.3 College Mathematics I (MA 103)

College Mathematics, a pre-calculus course, is designed for the social science or biology student; it covers advanced algebra from a modern approach. This course prepares a student for calculus, statistics, and computer programming.

This course had good placement, and, as a result, I was able to examine important underlying causes of student's behavior in the course.

C.G.P. data are available for 186 students. 21 students took C.G.P. Mathematics Test B with at least a score of 49, with the following grade distributions:

Table 2.3.1

	Number	Percentage
A	2	10%
B	8	37%
C	5	24%
D	1	5%
F	0	0%
W or WP (registered Spring semester)	3	14%
W or WP (withdrew from school)	2	10%

From Table 2.3.1, one notices that almost three-quarters of the students who took test B received a C or better.

From the 41 students who withdrew from the course, 23 of them registered the following semester. This is a slight improvement from last year where 37 from 63 withdrawing students registered the subsequent semester.

For the statistical characteristics the sample will be the 124 students who took C.G.P. Mathematics Test A and received a grade, or withdrew from the course and registered the following semester. The statistical descriptions are the following:

C.G.P. Mathematics A

1.	Average	55.40
2.	Standard Deviation	7.87
3.	Maximum	70.00
4.	Minimum	37.00
5.	Range	33.00

C.G.P. Reading

1.	Average	51.50
2.	Standard Deviation	9.31
3.	Maximum	72.00
4.	Minimum	24.00
5.	Range	48.00

Comparing the student's grade with his C.G.P. Mathematics Test A gives the following contingency table:

Table 2.3.2

C.G.P. Math A

Grade	Under 40	40-44	45-49	50-54	55-59	Over 60	Totals
A	0	0	0	0	2	5	7
B	0	1	4	3	2	8	18
C	0	1	3	7	14	12	37
D	1	1	8	4	4	8	26
F	0	1	1	4	5	2	13
W or WP	2	6	1	4	7	3	23
TOTALS	3	10	17	22	34	38	124

This course had good placement; only 10 percent of the students received below a 45 in C.G.P. Mathematics Test A; no student under a 55 received an A.

The results of the survey administered during the final examination are the following:

Question 1: Based on my ability and background, my course in math was the right one for me.

TABLE 2.3.3

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	15	13.5
Agree	48	43.2
Not Sure	19	17.1
Disagree	14	12.6
Strongly Disagree	13	11.7
Not Applicable	1	.9
	110	99.1%

One student did not respond.

Question 2: My math course simply repeats things I have already learned in high school or on my own.

TABLE 2.3.4

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	11	9.9
Agree	15	13.5
Not Sure	6	5.4
Disagree	53	47.7
Strongly Disagree	22	19.8
Not Applicable	4	3.6
	111	100.0%

Question 3: Most of the work in my math course is too difficult for me to handle.

TABLE 2.3.5

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	6	5.4
Agree	10	9.0
Not Sure	18	16.2
Disagree	54	48.6
Strongly Disagree	21	18.9
Not Applicable	1	.9
	110	99.1%

One student did not respond.

Question 4: The instructor seemed to know when students didn't understand the material.

TABLE 2.3.6

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	23	20.7
Agree	45	40.5
Not Sure	22	19.8
Disagree	9	8.1
Strongly Disagree	12	10.8
	111	100.0%

Question 5: My interest in the subject area has been stimulated by this course.

TABLE 2.3.7

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	2	1.8
Agree	18	16.2
Not Sure	25	22.5
Disagree	32	28.8
Strongly Disagree	27	24.3
Not Applicable	6	5.4
	111	99.1%

One student did not respond.

Question 6: My instructor told students how they would be evaluated for the course.

TABLE 2.3.8

	Absolute Frequency	Relative Frequency (percent)
Strongly Agree	20	18.0
Agree	50	45.0
Not Sure	20	18.0
Disagree	9	8.1
Strongly Disagree	4	3.6
Not Applicable	5	4.5
	108	97.3%

Three students did not respond.

Question 7: The work load for this course in relation to other courses of equal credit was:

TABLE 2.3.9

	Absolute Frequency	Relative Frequency (percent)
Much Lighter	3	2.7
Lighter	12	10.8
About the Same	70	63.1
Heavier	21	18.9
Much Heavier	4	3.6
	110	99.1%

One student did not respond.

Question 8: For me the pace at which the instructor covered the material for the term was:

TABLE 2.3.10

	Absolute Frequency	Relative Frequency (percent)
Somewhat Slow	2	1.8
Just About Right	54	48.6
Somewhat Fast	43	38.7
Very Fast	10	9.0
	109	98.2%

Two students did not respond.

Question 9: Was class size satisfactory for method of conducting the class?

TABLE 2.3.11

	Absolute Frequency	Relative Frequency (percent)
Yes	84	75.7
No, too large	5	4.5
Didn't make any difference	22	19.8
	111	100.0%

Question 10: On the average, how many hours per week do you spend studying and doing homework for this course?

TABLE 2.3.12

	Absolute Frequency	Relative Frequency (percent)
0-3.00 hours	57	51.4
3.01 - 6 hours	32	28.8
6.01 - 9 hours	6	5.4
9.01 - 12 hours	4	3.6
	99	89.2%

Twelve students did not respond.

Question 11: On the average, how many hours per week do you spend in paid employment?

TABLE 2.3.13

	Absolute Frequency	Relative Frequency (percent
0-8.00 hours	43	38.7
8.01 - 16 hours	17	15.3
16.01 - 24.00 hours	21	18.9
24.01 - 32.00 hours	15	13.5
32.01 - 40.00 hours	5	4.5
Over 40 hours	3	2.7
	104	93.7%

Seven students did not respond.

Question 12: The highest level math course I completed in high school is:

TABLE 2.3.14

	Absolute Frequency	Relative Frequency (percent)
No Algebra	4	3.6
Algebra I	10	9.0
Geometry	19	17.1
Algebra II	42	37.8
Post Algebra II	35	31.5
	110	99.1%

One student did not respond.

Since there was good placement in MA 103, I was able to examine other underlying causes concerning placement. From the available data, I decided to construct a linear prediction model using the method of stepwise multiple regression. This is an iterative process: the entering variable in each step has the highest correlation in absolute value with the grade controlling the effect of the previous entering variables. The variables examined were C.G.P. Mathematics Test A, C.G.P. Reading score, high school rank, high school mathematics preparation, average number of mathematics study hours, and average numbers of hours in paid employment. There were N=44 students for which these data were available.

The variables were entered into the model as follows: Step 1 - high school rank, Step 2 - C.G.P. mathematics A, Step 3 - average number of study hours, Step 4 - average number of paid employment hours, Step 5 - C.G.P reading score and Step 6 - high school preparation. The linear prediction model is:

$$\hat{Y} = -1.692 + .033X_1 + 1.358X_2 + .0133X_3 + .096X_4 - .0121X_5 + .114X_6$$

Where X_1 - C.G.P. Mathematics A Score

X_2 - High school rank calculated by the formula (class size - rank)/class size

X_3 - C.G.P. Reading Score

X_4 - Average number of hours per week a student plans to study

X_5 - Average number of hours per week a student plans to work in paid employment

X_6 - High school preparation, as follows

0 - No Algebra
1 - Algebra I
2 - Geometry
3 - Algebra II
4 - Post Algebra II

The multiple correlation, the degree of association between the actual grade and the predicted grade, is .546, which is high.

A student who had one year of high school algebra, a C.G.P. math score over sixty, and was in the upper half of his high school class can handle MA 103; meanwhile, a student who had two years of high school algebra, below fifty-five in C.G.P. math, and was in the lower half of his high school class will have considerable problems in the course. From this model it is still hard to predict an A student.

The College Mathematics I (MA 103) is still the department's most troublesome course. During this past academic year excellent progress has been made in discovering the symptoms of the problems. Now positive steps need to be taken to curtail some of the trouble spots.

2.4 Algebra and Trigonometry I (MA 115)

Algebra and Trigonometry is a course designed for the technical student pursuing a terminal program such as Civil Engineering Technology or Electrical Engineering Technology. To be placed properly in the course a student should have had at least two years of high school algebra and a score of 50 or higher in C.G.P. Mathematics Test A. The best placement occurred in this course.

From a population of 145 students, 35 took C.G.P. Mathematics Test B, and 110 took C.G.P. Mathematics Test A: the sample for the analysis is 100 which are the students who took C.G.P. Mathematics Test A and either received a grade or withdrew from school and registered the following semester. Twenty-six students withdrew from the course, 10 of whom also withdrew from school.

The statistical characteristics are the following:

C.G.P. Mathematics Test A		C.G.P. Reading	
Average	57.73	Average	52.31
Standard Deviation	7.29	Standard Deviation	8.80
Maximum	71.00	Maximum	69.00
Minimum	37.00	Minimum	27.00
Range	34.00	Range	42.00

Cross referencing C.G.P. Mathematics Test A with grade gives the following:

TABLE 2.4.1
C.G.P. Math A

Grade	Under 40	40-44	45-49	50-54	55-59	Over 60	Totals
A	0	0	1	0	2	6	9
B	0	0	0	2	7	12	21
C	0	1	4	2	10	12	29
D	0	0	2	4	6	2	14
F	1	0	0	2	4	4	11
W or WP	1	2	3	2	1	7	16
Totals	2	3	10	12	30	43	100

The null hypothesis that the course grade is independent to the C.G.P. Mathematics Test A score, against the alternative hypothesis that there is a dependency between course grade and C.G.P. Mathematics Test A is rejected at the 5 percent level, using a ChiSquare test.

This course had the best placement with only 5 percent of the students having below a 45 in C.G.P. Mathematics Test A. Of these students, one received an F; three withdrew; and one received a C.

A questionnaire and C.G.P. Mathematics Test A have been sent to students with a C.G.P. score of 55 or higher and who also received an F or withdrew from the course, to find the reason why they did not complete the course with a reasonable grade.

The correlation coefficient between course grade and C.G.P. Mathematics Test A is .235. Since the correlation coefficient is low, there are other important underlying factors in determining success in the course. I could not use the data from the history tape and the questionnaire to find other underlying causes since the sample was too small to properly infer population characteristics.

The results of the questionnaire administered during the final are the following:

Question 1:

Based on my ability and background, my course in math was the right one for me.

TABLE 2.4.2

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	12	18.5
Agree	20	30.8
Not sure	22	33.8
Disagree	7	10.8
Strongly disagree	4	6.2
Totals	65	100.0%

Question 2:

My math course simply repeats things I have already learned in high school or on my own.

TABLE 2.4.3

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	6	9.2
Agree	18	27.7
Not Sure	3	4.6
Disagree	25	38.5
Strongly disagree	11	16.9
Not Applicable	1	1.5
	64	98.5%

One student did not respond.

Question 3:

Most of the work in my math course is too difficult for me to handle.

TABLE 2.4.4

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	4	6.2
Agree	7	10.8
Not Sure	11	16.9
Disagree	25	38.5
Strongly disagree	18	27.7
	65	100.0%

Question 4:

The instructor seemed to know when students didn't understand the material.

TABLE 2.4.5

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	13	20.0
Agree	32	49.2
Not sure	10	15.4
Disagree	5	7.7
Strongly disagree	5	7.7
	65	100.0%

Question 5: My interest in the subject area has been stimulated by this course.

TABLE 2.4.6

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	2	3.1
Agree	19	29.2
Not sure	20	30.8
Disagree	14	21.5
Strongly disagree	8	12.3
Not applicable	1	1.5
	64	98.5%

One student did not respond.

Question 6: The instructor told students how they would be evaluated for the course.

TABLE 2.4.7

	Absolute Frequency	Relative Frequency (percent)
Strongly agree	9	13.8
Agree	34	52.3
Not Sure	9	13.8
Disagree	5	7.7
Strongly disagree	6	9.2
Not applicable	1	1.5
	64	98.5%

One student did not answer.

Question 7: The work load for this course in relation to other courses of equal credit was:

TABLE 2.4.8

	Absolute Frequency	Relative Frequency (percent)
Much lighter	2	3.1
Lighter	3	4.6
About the same	35	53.8
Heavier	21	32.3
Much heavier	3	4.6
	64	98.5%

student did not respond.

Question 8: For me, the pace at which the instructor covered the material for the term was:

TABLE 2.4.9

	Absolute Frequency	Relative Frequency (percent)
Somewhat slow	1	1.5
Just about right	37	56.9
Somewhat fast	14	21.5
Very fast	13	20.0
	65	100.0%

Question 9: Was class size satisfactory for method of conducting the class?

TABLE 2.4.10

	Absolute Frequency	Relative Frequency (percent)
Yes	45	69.2
No, class was too large	6	9.2
It didn't make any difference	13	20.0
	64	98.5%

One student did not respond.

Question 10: On the average, how many hours per week do you spend studying and doing homework for this course?

TABLE 2.4.11

	Absolute Frequency	Relative Frequency (percent)
0- 3.00 hours	32	49.2
3.01 - 6.00 hours	18	27.7
6.01 - 9.00 hours	7	10.8
9.01 -12.00 hours	2	3.1
12.01-15.00 hours	1	1.5
	60	92.3%

Five students did not respond.

Question 11. On the average, how many hours per week do you spend in paid employment?

TABLE 2.4.12

	Absolute Frequency	Relative Frequency (percent)
0- 8 hours	26	40.0
8.01-16 hours	8	12.3
16.01-24 hours	17	26.2
24.01-32 hours	6	9.2
32.01-40 hours	3	4.6
Over 40 hours	1	1.5
	61	93.8%

Four students did not respond.

Question 12. The highest level math course I completed in high school is:

TABLE 2.4.13

	Absolute Frequency	Relative Frequency (percent)
No algebra	1	1.5
Algebra I	3	4.6
Geometry	11	16.9
Algebra II	23	35.4
Post Algebra II	27	41.5
	65	100.0%

2.5 Concluding Remarks

The most severe problem is in the Technical Mathematics course since there are too many students registered who are already familiar with the course material. Slightly half of the students had a 50 or higher in C.G.P. Mathematics Test A; only 10 percent of the students never had algebra in high school; and at least a third of the students had at least two years of high school algebra. Statistically, there is a very strong dependency between C.G.P. Mathematics Test A scores and student's recognition of course content in high school, there is no evidence to demonstrate that the perceived pace of course material is dependent upon C.G.P. Mathematics Test A score; there is a very strong dependency between C.G.P. Mathematics Test A score and the high school preparation; there is a dependency between a student's high

school rank quintile and his perceived difficulty of the course; there is a dependency between high school rank and high school mathematics preparation; and there is a dependency between course grade and high school preparation.

In MA 109 it was demonstrated that there is a dependency between high school rank and high school mathematics preparation, that is, the higher the high school rank, the greater the probability that a student had at least two years of algebra. This fact is important to better understand the linear prediction model constructed for MA 103. It was found that the most important variable to predict a student's success in MA 103 is high school rank with the the next important variable being the C.G.P. Mathematics Test A score. The least important significant variable is the student's high school preparation. The linear prediction model is:

$$\hat{Y} = -1.69 + .033x_1 + 1.358x_2 + .013x_3 + .096x_4 - .012x_5 + .114x_6$$

Where:

x_1 - C.G.P. Mathematics Test A score

x_2 - High School Rank calculated by the formula (class size-rank)/class size

x_3 - C.G.P. Reading score

x_4 - Average number of hours per week a student plans to study

x_5 - Average number of hours per week a student plans to work in paid employment

x_6 - High school preparation, as follows:

0 - No Algebra
1 - Algebra I
2 - Geometry
3 - Algebra II
4 - Post Algebra II

The multiple correlation, the degree of association between the predicted grade and actual grade, is .546, which is high.

In all of the courses in the algebra sequence approximately 40 percent of the students work on the average at least 16 hours in paid employment. In the C.G.P. biographical inventory in which the student responds to before he registers at the college, approximately 50 percent of the students have told the college officials before registering that they were planning to work at least fifteen hours while pursuing a full-time course of study.

In all of the algebra courses, approximately half of the students study on the average of at most three hours per week. At least three-quarters of the students study on the average, at most, six hours per week. Since a large percentage of the students work at least fifteen hours a week in paid employment, study at most three hours per week, and pursue a full-time load; the mathematics department has an extremely difficult time in gaining enthusiastic interest from these students.

Students who have had trigonometry in high school took C.G.P. Mathematics Test B. None of the MA 109 students who took Test B received below a C. Of the 35 students who took Test B in MA 115, only three withdrew, two earned a D and one earned an F. If a student in MA 109 took Test B, C.G.P. Mathematics in MA 109, there is a high probability that he would have also earned a respectable grade in MA 115.

Placement into our algebra courses should be so good that there should be no excuse for a student to earn below a C except through his own lack of initiative.

CHAPTER III

THE FOUNDATIONS OF MATHEMATICS COURSE - MA 107

This past academic year (1972-1973) the Foundations of Mathematics course changed its learning design from a thirty student lecture-recitation combination to a two-period large lecture-one period seminar. When this course was developed, there was no pilot study with a control group and an experimental group to determine whether the new learning design would facilitate learning and gain more student enthusiasm. In this report, an evaluation will be made of the new MA 107-MA 108 math course. The main purposes of this chapter are:

1. to compare the attrition rate between the two approaches of instruction, and

2. to analyze the student's reaction towards the large lecture-recitation mode of course presentation.

The population for the Fall 1971 semester for which C.G.P. data are available is 124, and for the Fall 1972 semester is 217. For the Fall 1971 semester three students took test B and 23 withdrew or received an N.G. of whom 12 registered for the following semester. There was an experimental section of a self-paced, programmed learning approach; any students who did not complete the course during the Fall semester received an N.G. I am considering the three N.G.'s in the population as withdrawals since they never earned a course grade. The sample for the statistical analysis is 108, which are the students who received a grade (A-F) or withdrew and registered the following semester.

The population for the fall semester 1972 is 217 for whom C.G.P. data are available. Eight students took C.G.P. Mathematics Test B, and 68 percent of the withdrawing students also withdrew from school while only 48 percent of the 1971 withdrawals left school. The sample for the analysis is 179 which are the students who received a grade (A-F) or withdrew from school and registered the following semester.

Comparing the C.G.P. Mathematics Test A between the two classes gives the table on the next page.

TABLE 2.3.1

C.G.P. Math Test A	1971	1972
Under 35	5	2
35 - 39	20	9
40 - 44	21	36
45 - 49	21	34
50 - 54	15	29
55 - 59	20	39
60 - 64	2	22
Over 65	4	8
	108	179

Those students who received below a 40 do not belong in this course. From Table 2.3.1 one notices that slightly less than 25 percent of the students had C.G.P. scores under 40 in 1971, as compared to 6 percent in 1972. Also, only 3 percent of the students in 1971 had C.G.P. Mathematics Test A scores of 60 or higher as compared to 17 percent in 1972. It is very evident that placement was much better in 1972.

Testing the null hypothesis that the proportion of students who enrolled in the Fall 1971 semester is the same as that for the students who enrolled in the Fall 1972 semester, for any C.G.P. Mathematics Test A subdivision against the alternative hypothesis that the proportion of students who enrolled in the Fall 1971 semester is different from the proportion of students who enrolled in the Fall 1972 course for at least one C.G.P. Mathematics Test A subdivision, we find, using a Chi-Square test, that the null hypothesis is rejected with high significance at the 1 percent level. In fact, statistically, the Z-Test for the difference of proportions shows at the 1 percent significance level, that there is a higher proportion of students with C.G.P. Mathematics Test A scores in the 60's or higher in 1972 than in 1971.

The basic statistical characteristics are the following:

C. G. P. Mathematics Test A

	1971	1972
Average	46.92	51.19
Standard Deviation	8.63	8.36
Maximum	69.00	72.00
Minimum	32.00	30.00
Range	37.00	42.00

C. G. P. Reading Test

	1971	1972
Average	47.04	49.65
Standard Deviation	9.31	8.75
Maximum	69.00	75.0
Minimum	27.00	26.00
Range	42.00	49.00

In contingency tables 3.2.2 and 3.3.3 the null hypothesis is that the C.G.P. Mathematics Test A is independent of the course grade in the year under consideration, against the alternative hypothesis that there is a dependency between C.G.P. Mathematics Test A and course grade.

TABLE 3.3.2 (Fall 1971)

C.G.P. Math Test A

Grade	Under 40	40-44	45-49	50-54	55-59	Over 60	Totals
A	1	6	7	6	7	3	30
B	6	2	7	5	5	0	25
C	7	6	5	1	3	1	23
D	1	4	1	0	2	0	8
F	5	0	1	2	1	1	10
W or WP	5	3	0	1	2	1	12
Totals	25	21	21	15	20	6	118

There is insufficient evidence to reject the null hypothesis at the 10 percent level.

TABLE 3.3.3 (Fall 1972)

C.G.P. Math Test A

Grade	Under 40	40-44	45-49	50-54	55-59	Over 60	Totals
A	0	0	0	3	2	3	8
B	1	3	5	7	17	18	51
C	4	17	15	17	18	8	79
D	4	6	5	2	1	0	18
F	0	3	5	0	1	0	9
W or WP	2	7	4	0	0	1	14
Totals	11	36	34	29	39	30	179

The null hypothesis is highly significant at the 1 percent level, so there is a strong dependency between C.G.P. Mathematics Test A and course grade.

From the previous two tables, one notices that the proportion of withdrawals for the Fall 1971 semester was .11, and .08 for the Fall semester of 1972.

Testing the hypothesis that the proportion of withdrawals was the same for both years against the alternative hypothesis that the proportion of withdrawals was higher in 1971 than in 1972, the null hypothesis is rejected at that 1 percent level, so there was a higher percentage of students who withdrew in 1971 than in 1972.

For the 1971 class the correlation coefficient between C.G.P. Mathematics Test A and course grade is .224 and between C.G.P. reading and course grade it is .304; for the 1972 class the correlation coefficient between C.G.P. Mathematics Test A and course grade is .494 and between C.G.P. reading and course grade it is .400. In standardizing the course in 1972, C.G.P. Mathematics Test A and C. G.P. reading had a larger correlation with course grade than under the traditional method used in 1971.

A questionnaire was administered during the final examinations in MA 107 and MA 108 in the Spring semester, 1973. The main objectives of the questionnaire were to determine the student's attitudes towards the course materials, and toward different programs under consideration for course improvement. The results of the questionnaire are the following:

QUESTION 1: I used the textbook only for exercises and reference.

TABLE 3.3.4

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	17	20.2 %
Agree	47	56.0
Not Sure	1	1.2
Disagree	14	16.7
Strongly Disagree	4	4.8
	83	98.8%

One student did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	18	22.2 %
Agree	45	55.6
Not Sure	2	2.5
Disagree	12	14.8
Strongly Disagree	4	4.9
	81	100.0%

QUESTION 2: The Study Guides were indispensable.

TABLE 3.3.5

MA 107	Absolute Frequency	Relative Frequency
Strongly agree	30	35.7%
Agree	35	41.7
Not Sure	9	10.7
Disagree	6	7.1
Strongly Disagree	3	3.6
	83	98.8%

One student did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	38	46.9%
Agree	25	30.9
Not Sure	5	6.2
Disagree	10	12.3
Strongly Disagree	2	2.5
	80	98.8%

One student did not respond.

QUESTION 3: The textbook and study guides were closely related to the lecture.

TABLE 3.3.6

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	33	39.3%
Agree	41	48.8
Not Sure	7	8.3
Disagree	3	3.6
	84	100.0%

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	28	34.6%
Agree	41	50.6
Not Sure	6	7.4
Disagree	4	4.9
Strongly Disagree	2	2.5
	81	100.0%

QUESTION 4: I feel that the exercises done in lecture clarified the basic concepts presented.

TABLE 3.3.7

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	26	31.0%
Agree	42	50.0
Not Sure	10	11.9
Disagree	3	3.6
Strongly Disagree	3	3.6
	84	100.0%

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	22	27.2%
Agree	47	58.0
Not Sure	6	7.4
Disagree	5	6.2
	80	98.8%

One student did not respond.

QUESTION 5: The prepared transparencies used in the course helped me to understand the concepts presented in the lecture.

TABLE 3.3.8

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	23	27.4%
Agree	48	57.1
Not Sure	8	9.5
Disagree	3	3.6
Strongly Disagree	1	1.2
	83	98.8%

One student did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	24	29.6%
Agree	36	44.4
Not Sure	11	13.6
Disagree	8	9.9
Strongly Disagree	2	2.5
	81	100.0%

QUESTION 6: The class size was suitable for good learning.

TABLE 3.3.9

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	18	21.4%
Agree	34	40.5
Not Sure	11	13.1
Disagree	11	13.1
Strongly Disagree	9	10.7
	83	98.8%

One student did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	21	25.9%
Agree	33	40.7
Not Sure	5	6.2
Disagree	13	16.0
Strongly Disagree	8	9.9
	80	98.8%

One student did not respond.

QUESTION 7: The scheduled time of the lecture was conducive to comprehension of the material presented.

TABLE 3.3.10

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	11	13.1%
Agree	49	58.3
Not Sure	14	16.7
Disagree	6	7.1
Strongly Disagree	3	3.6
	83	98.8%

One student did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	7	8.6%
Agree	29	35.8
Not Sure	8	9.9
Disagree	21	25.9
Strongly Disagree	14	17.3
	79	97.5%

Two students did not respond.

QUESTION 8: I feel that the tests given covered the lecture material.

TABLE 3.3.11

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	18	21.4%
Agree	53	63.1
Not Sure	8	9.5
Disagree	2	2.4
Strongly Disagree	3	3.6
	84	100.0%

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	22	27.2%
Agree	44	54.3
Not Sure	9	11.1
Disagree	5	6.2
Strongly Disagree	1	1.2
	81	100.0%

QUESTION 9: Along with the unit tests I would like to have had weekly quizzes given in the recitation.

TABLE 3.3.12

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	9	10.7%
Agree	22	26.2
Not Sure	14	16.7
Disagree	25	29.8
Strongly Disagree	12	14.3
	82	97.6%

Two students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	13	16.0%
Agree	23	28.4
Not Sure	9	11.1
Disagree	25	30.9
Strongly Disagree	9	11.1
	79	97.5%

Two students did not respond.

QUESTION 10: I feel that the recitation was a valuable part of the course.

TABLE 3.3.13

MA 107	Absolute Frequency	Relative Frequency
Strongly Agree	16	19.0%
Agree	40	47.6
Not Sure	12	14.3
Disagree	9	10.7
Strongly Disagree	5	6.0
	82	97.6%

Two students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Strongly Agree	18	22.2%
Agree	32	39.5
Not Sure	11	13.6
Disagree	11	13.6
Strongly Disagree	7	8.6
	79	97.5%

Two students did not respond.

QUESTION 11: Overall, I would rate the text:

TABLE 3.3.14

MA 107	Absolute Frequency	Relative Frequency
Excellent	5	6.0%
Good	39	46.4
Satisfactory	27	32.1
Fair	6	7.1
Poor	4	4.8
	81	96.4%

Three students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Excellent	5	6.2%
Good	25	30.9
Satisfactory	35	43.2
Fair	10	12.3
Poor	4	4.9
	79	97.5%

Two students did not respond.

QUESTION 12: In my opinion the best method for learning in this course is:

TABLE 3.3.15

MA 107	Absolute Frequency	Relative Frequency
Present Method	35	41.7%
Independent	7	8.3
3 times per week	31	36.9
Other	1	1.2
Not Sure	6	7.1
	80	95.2%

Four students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Present Method	26	32.1%
Independent	6	7.4
3 times per week	32	39.5
Other	10	12.3
Not Sure	5	6.2
	79	97.6%

Two students did not respond.

QUESTION 13: This semester I usually attended lecture as follows:

TABLE 3.3.16

MA 107	Absolute Frequency	Relative Frequency
M/W 11:00-12:00	47	56.0%
M/W 3:00- 4:00	29	34.5
T/Th 3:30- 4:30	3	3.6
W/F 8:00- 9:00	1	1.2
	80	95.2%

Four students did not respond.

MA 108	Absolute Frequency	Relative Frequency
M/W 11:00-12:00	3	3.7%
M/W 3:00-4:00	5	6.2
T/Th 3:30- 4:30	34	42.0
W/F 8:00- 9:00	36	44.4
	78	97.5%

Three students did not respond.

QUESTION 14: I would rate the general quality of the lectures as follows:

TABLE 3.3.17

MA 107	Absolute Frequency	Relative Frequency
Excellent	15	17.9%
Good	42	50.0
Satisfactory	17	20.2
Fair	4	4.8
Poor	4	4.8
	82	97.6%

Two students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Excellent	10	12.3%
Good	39	48.1
Satisfactory	22	27.2
Fair	6	7.4
Poor	1	1.2
	78	96.3%

Three students did not respond.

QUESTION 15: I would rate this course as being:

TABLE 3.3.18

MA 107	Absolute Frequency	Relative Frequency
Impossible for me	5	6.0%
Difficult for me	32	38.1
Just right for me	24	28.6
Easy for me	8	9.5
Not sure	13	15.5
	82	97.6%

Two students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Impossible for me	2	2.5%
Difficult for me	31	38.3
Just right for me	24	29.6
Easy for me	6	7.4
Not sure	15	18.5
	78	96.3%

Three students did not respond.

QUESTION 16: For me, the pace at which the course material was covered was:

TABLE 3.3.19

MA 107	Absolute Frequency	Relative Frequency
Somewhat slow	5	6.0%
Just about right	37	44.0
Somewhat fast	33	39.3
Very slow	7	8.3
	82	97.6%

Two students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Somewhat slow	7	8.6%
Just about right	36	44.4
Somewhat fast	30	37.0
Very slow	6	7.4
	79	97.5%

Two students did not respond.

QUESTION 17: The amount of interaction I had with the instructors in this course was:

TABLE 3.3.20

MA 107	Absolute Frequency	Relative Frequency
Too much	2	2.4%
Just right	22	26.2
Too little	25	29.8
Not important	11	13.1
Not sure	21	25.0
	81	96.4%

Three students did not respond.

MA 108	Absolute Frequency	Relative Frequency
Too much	1	1.2%
Just right	29	35.8
Too little	19	23.5
Not important	12	14.8
Not sure	18	22.2
	79	97.5%

Two students did not respond.

QUESTION 18: In high school the highest level math course I took was:

TABLE 3.3.21

MA 107	Absolute Frequency	Relative Frequency
No math	1	1.2%
General or Business	16	19.0
Algebra I or Geometry	35	41.7
Algebra II	22	26.2
Post Algebra II	5	6.0
	79	94.1%

Five students did not respond.

MA 108	Absolute Frequency	Relative Frequency
General or Business	9	11.1%
Algebra I or Geometry	27	33.3
Algebra II	33	40.7
Post Algebra II	9	11.1
	78	96.3%

Three students did not respond.

QUESTION 19: On the average I spend ___ hours per week studying and doing homework for this course.

TABLE 3.3.22

MA 107	Absolute Frequency	Relative Frequency
0 - 3 hours	48	57.1%
3.01 - 6 hours	18	21.4
6.01 - 9 hours	6	7.1
	72	85. 7%

Twelve students did not respond.

MA 108	Absolute Frequency	Relative Frequency
0 - 3 hours	59	72.8%
3.01 - 6 hours	17	21.0
6.01 - 9 hours	4	4.9
	80	98. 8%

One student did not respond.

QUESTION 20: On the average I spend ___ hours per week in paid employment:

TABLE 3.3.23

MA 107	Absolute Frequency	Relative Frequency
0 - 8 hours	10	11.9%
8.01 - 16 hours	16	19.0
16.01 - 24 hours	7	8.3
24.01 - 32 hours	7	8.3
32.01 - 40 hours	2	2.4
Over 40 hours	2	2.4
	44	52.4%

Forty students did not respond.

MA 108	Absolute Frequency	Relative Frequency
0 - 8 hours	1	1.2%
8.01 - 16 hours	18	22.2
16.01 - 24 hours	15	18.5
24.01 - 32 hours	11	13.6
32.01 - 40 hours	7	8.6
Over 40 hours	1	1.2
	53	65.4%

Twenty-eight students did not respond.

The new approach to MA 107-MA 108, in my opinion, is a success. Statistically, a smaller proportion of students are withdrawing and registering the following semester. The majority of the students by their responses on the questionnaire found: that the study guides were a great help; that the study guides and textbooks closely followed the lecture; that the class exercises clarified the basic concepts presented in class; that the prepared transparencies helped in the understanding of course material; that the class size was suitable for good learning; that the examinations covered the material presented in class; and that the course as a whole was good or excellent. As judged by the lower attrition rate and the positive response in the questionnaire, the newly developed course is a success.

:mah

APPENDIX

The algebra sequence questionnaire was administered at the final examination during the Fall semester - 1972 and the Foundations of Mathematics course questionnaire was administered at the final examination during the Spring semester - 1973. The purpose of distributing the questionnaire at that time was to get the largest number of responses after the course was completed.

MA 103, MA 109, MA 115

(College Math I, Tech. MAth I and Algebra & Trig I)

FALL & SUMMER, 1972

Soc. Sec. Number _____ Course _____

The Math Department would like to know your feelings in your math course. Your answers will in no way affect your grade. Please answer every question so that the math department can better serve the students' needs in future math courses.

	Strongly Agree	Agree	Not Sure	Dis-Agree	Strongly Dis-Agree	Not Appli-Cable
1. Based on my ability and background, my course in math was the right one for me.	1	2	3	4	5	6
2. My math course simply repeats things I have already learned in high school or on my own.	1	2	3	4	5	6
3. Most of the work in my math course is too difficult for me to handle.	1	2	3	4	5	6
4. The instructor seemed to know when students didn't understand the material.	1	2	3	4	5	6
5. My interest in the subject area has been stimulated by this course.	1	2	3	4	5	6
6. The instructor told students how they would be evaluated for the course.	1	2	3	4	5	6

7. The work load for this course in relation to other courses of equal credit was:

a. much lighter
b. lighter
c. about the same
d. heavier
e. much heavier

8. For me, the pace at which the instructor covered the material for the term was:

a. very slow
b. somewhat slow
c. just about right
d. somewhat fast
e. very fast

9. Was class size satisfactory for method of conducting the class?

a. Yes
b. No, class was too large
c. No, class size was too small
d. It didn't make any difference

10. On the average, how many hours per week do you spend studying and doing homework for this course?

11. On the average, how many hours per week do you spend in paid employment?

12. The highest level math course I completed in high school is:

a. no algebra
b. Algebra I
c. Geometry
d. Algebra II
e. Past Algebra II

COMMENT:

MA 107 AND MA 108 QUESTIONNAIRE

Course Number _____ Social Security Number _____

The Mathematics Department is very much concerned about the students' reactions towards the Foundations of Mathematics course. Please answer the following questionnaire so the department can get the proper feedback from the students who took the course before making further improvements or modifications in the course.

CHECK THE APPROPRIATE RESPONSE IN QUESTIONS NOS. 1 - 18

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1. I used the textbook only for exercises and reference.					
2. The Study Guides were indispensable.					
3. The textbook and study guides were closely related to the lecture.					
4. I feel that the exercises done in lecture clarified the basic concepts presented.					
5. The prepared transparencies used in the course helped me to understand the concepts presented in the lecture.					
6. The class size was suitable for good learning.					
7. The scheduled time of the lecture was conducive to comprehension of the material presented.					
8. I feel that the tests given covered the lecture material.					

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
9. Along with the unit tests I would like to have had weekly quizzes given in the recitation.					
0. I feel that the recitation was a valuable part of the course.					

. Overall, I would rate the text

a. ___ excellent b. ___ good c. ___ satisfactory d. ___ fair e. ___ poor

. In my opinion the best method for learning is this course is

a. ___ the present method
b. ___ independent study
c. ___ 3 times a week with the same instructor teaching 30 students or less
d. ___ other - explain
e. ___ not sure

. This semester I usually attended lecture as follows:

a. ___ M-W, 11-12 c. ___ T-Th, 3:30-4:30
b. ___ M-W, 3-4 d. ___ W-F, 8-9

. I would rate the general quality of the lectures as follows:

a. ___ excellent b. ___ good c. ___ satisfactory d. ___ fair e. ___ poor

I would rate this course as being:

a. ___ impossible for me to comprehend
b. ___ difficult for me
c. ___ just right for me
d. ___ easy for me
e. ___ not sure

For me, the pace at which the course material was covered was

a. ___ very slow b. ___ somewhat slow
c. ___ just about right d. ___ somewhat fast e. ___ very fast

The amount of interaction I had with the instructors in this course was

a. ___ too much b. ___ just right c. ___ too little
d. ___ not important e. ___ not sure

8. In high school the highest level math course I took was

a. ___ no math
b. ___ general or business math
c. ___ algebra I or geometry
d. ___ algebra II
e. ___ post algebra II

LL IN THE BLANK IN QUESTIONS 19 and 20.

. On the average I spend _____ hours per week studying and doing homework for this course.

. On the average I spend _____ hours per week in paid employment.

lease use the following space to comment on MA 107 or MA 108. The following opics may bring to your mind some comments you wish to make: (study guides, ransparencies, general conditions in lecture rooms, recitation, scheduling, extbook, tests, grading.)

OMMENTS: